July 16, 2019

Jerry L. Demings
Orange County Mayor
201 South Rosalind Avenue
P.O. Box 1393
Orlando, FL 32802-1393

Dear Mayor Demings:

The Florida Department of Health takes health concerns brought forward by the community very seriously and strives to ensure the health and safety of our residents each day through public health action in preventing health threats and promoting healthy lifestyles.

In response to your request that the state conduct additional data review and testing for a local area in Orange County, please find enclosed the following materials:

- **Attachment A** – The number of brain and central nervous system cancers for persons age 19 or younger for the current time period 2005 to 2014 and for historical reference the time period from 1981 to 2005 for the following zip codes: 32803, 32806, 32822, 32825, and 32828 and for Orange County, Seminole County, and the entire state of Florida.
- **Attachment B** – Radiologic test findings within proximity of a local utility facility in East Orlando.
- **Attachment C** – A consumer-friendly Frequently Asked Questions document (FAQ) about polonium, polycyclic aromatic hydrocarbons (PAHs), and the occurrence of cancer and what constitutes a cancer cluster.

In an effort to reduce the morbidity and mortality due to cancer, the Florida Legislature under Section 385.202 *Florida Statutes* established the state cancer registry, the Florida Cancer Data System (FCDS), to collect annually the number of new cancers diagnosed among Florida residents to track trends. However, there are limitations to using FCDS data. Although FCDS data can be provided by select geographical area, these data represent a retrospective account of the burden of cancer for an area. The FCDS collects outcome data. The case information submitted by medical reporters to the FCDS describes "who", "what", "when", and "where" of the cancer case. The FCDS does not collect data as to "why" nor can analyses of FCDS data alone determine why the occurrence of cancer in a specific area or population is happening.

Cancer can occur randomly among populations. For the requested zip codes, Attachment A tables shows that the number of cancers fluctuated each year from no cases to a few cases. The number of cancer cases may vary from year to year even if there is no change in the population or environment[1]. Among children age 0 to14 or 0 to19, cancers of the brain and blood are the top cancer types occurring in Florida as a whole and nationally[2]. Please note that a true comparison between two or more geographical areas is done by comparing the rate of occurrence, the number of cancers per a specified population, which takes into account the demographics and size of the population of interest.

In regards to radiologic testing, approximately 7,700 gamma exposure rate measurements were taken. The data was processed and a map of the survey was completed (Attachment B). As indicated on the map, all readings were within the normal expected radiation background for Florida. No unusual levels were noted.

In summary, the radiologic test findings and the review of cancer data in addition to current scientific knowledge on the potential health risks associated with polonium and PAHs does not provide evidence to substantiate a suspected cancer cluster of pediatric brain cancers.

As you stated earlier, we too are appreciative of the partnership between Orange County Government and the Florida Department of Health in Orange County as this partnership has consistently worked to address public health priorities locally. Should you have further questions on the information provided, please feel free to contact Dr. Kendra Goff, State Toxicologist and Chief of the Bureau of Environmental Health, at Kendra.Goff@flhealth.gov.

Warm regards,

Carina Blackmore

Carina Blackmore, DVM, PhD, Dipl ACVPM
State Epidemiologist & Director
Division of Disease Control and Health Protection
Florida Department of Health

CB/th
Enclosures

Reference
1. Centers for Disease Control and Prevention. Investigating Suspected Cancer Clusters and Responding to Community Concerns, Guidelines from CDC and the Council of State and Territorial Epidemiologists. MMWR 2013;62(No. 8).
2. Florida Department of Health. Florida Annual Cancer Report: Incidence and Mortality Annual Epidemiological Series.

**Attachment A. Florida Cancer Data System (FCDS) Data**

**Table 1. Brain and Central Nervous System Cancer Counts**
**Age 19 or Younger by Diagnosis Year and by Geography, 2005-2014**

| | Geographic Region at Time of Diagnosis | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | Zip Code 32803 | Zip Code 32806 | Zip Code 32822 | Zip Code 32825 | Zip Code 32828 | Orange County | Seminole County | State of Florida |
| 2005 | 1 | 0 | 2 | 1 | 1 | 10 | 2 | 162 |
| 2006 | 0 | 0 | 1 | 2 | 0 | 10 | 0 | 157 |
| 2007 | 0 | 0 | 0 | 0 | 1 | 8 | 4 | 147 |
| 2008 | 0 | 0 | 0 | 0 | 0 | 11 | 4 | 179 |
| 2009 | 0 | 0 | 1 | 0 | 1 | 8 | 2 | 156 |
| 2010 | 0 | 0 | 1 | 0 | 4 | 11 | 4 | 167 |
| 2011 | 1 | 0 | 0 | 0 | 3 | 6 | 5 | 147 |
| 2012 | 0 | 1 | 0 | 0 | 1 | 9 | 3 | 139 |
| 2013 | 0 | 1 | 2 | 0 | 1 | 20 | 1 | 155 |
| 2014 | 0 | 0 | 0 | 0 | 0 | 6 | 4 | 162 |
| **Total** | **2** | **2** | **7** | **3** | **12** | **99** | **29** | **1571** |

Source: Florida Department of Health, Florida Cancer Data System (FCDS) as of 3/5/19
*Primary Site C71.0-C71.9 Histology excluding 9050-9055, 9140, 9530-9539, 9590-9992
Primary Site C71.0-C71.9 Histology 9530-9539
Primary Site C70.0-C70.9, C72.0-C72.9 Histology excluding 9050-9055, 9140, 9590-9992

**Table 2. Diffuse Intrinsic Pontine Glioma (DIPG) Cancer Counts**
**Age 19 or Younger by Diagnosis Year and by Geography, 2005-2014**

| | Geographic Region at Time of Diagnosis | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | Zip Code 32803 | Zip Code 32806 | Zip Code 32822 | Zip Code 32825 | Zip Code 32828 | Orange County | Seminole County | State of Florida |
| 2005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 28 |
| 2006 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 |
| 2007 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 22 |
| 2008 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 21 |
| 2009 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 26 |
| 2010 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 23 |
| 2011 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 28 |
| 2012 | 0 | 1 | 0 | 0 | 0 | 4 | 1 | 26 |
| 2013 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 27 |
| 2014 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 22 |
| **Total** | **1** | **1** | **0** | **0** | **0** | **13** | **7** | **245** |

Source: Florida Department of Health, Florida Cancer Data System (FCDS) as of 3/5/19
Primary Site C71.7, Histology 9380-9480 & Behavior =3 (Malignant)

**Table 3. Brain and Central Nervous System Cancer Counts**
**Age 19 or Younger by Diagnosis Year and by Geography, 2005-2014**

| | Geographic Region at Time of Diagnosis | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | Zip Code 32803 | Zip Code 32806 | Zip Code 32822 | Zip Code 32825 | Zip Code 32828 | Orange County | Seminole County | State of Florida |
| 1981 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 65 |
| 1982 | 0 | 0 | 0 | 0 | 0 | 6 | 2 | 80 |
| 1983 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 67 |
| 1984 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 85 |
| 1985 | 0 | 0 | 1 | 0 | 0 | 3 | 2 | 86 |
| 1986 | 2 | 1 | 0 | 0 | 0 | 6 | 0 | 89 |
| 1987 | 0 | 1 | 1 | 0 | 0 | 9 | 0 | 95 |
| 1988 | 0 | 1 | 0 | 0 | 0 | 9 | 1 | 81 |
| 1989 | 1 | 0 | 1 | 0 | 0 | 11 | 1 | 103 |
| 1990 | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 113 |
| 1991 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 93 |
| 1992 | 0 | 0 | 1 | 0 | 0 | 3 | 3 | 108 |
| 1993 | 0 | 0 | 0 | 1 | 0 | 6 | 3 | 121 |
| 1994 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 119 |
| 1995 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 119 |
| 1996 | 0 | 0 | 0 | 2 | 0 | 6 | 2 | 115 |
| 1997 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 128 |
| 1998 | 0 | 0 | 1 | 1 | 0 | 7 | 3 | 132 |
| 1999 | 0 | 0 | 1 | 1 | 0 | 12 | 2 | 139 |
| 2000 | 0 | 0 | 0 | 0 | 0 | 4 | 5 | 158 |
| 2001 | 0 | 1 | 1 | 1 | 0 | 7 | 4 | 127 |
| 2002 | 2 | 0 | 1 | 2 | 0 | 18 | 3 | 155 |
| 2003 | 0 | 0 | 0 | 0 | 0 | 8 | 4 | 156 |
| 2004 | 0 | 0 | 0 | 1 | 1 | 16 | 5 | 158 |
| 2005 | 1 | 0 | 2 | 1 | 1 | 10 | 2 | 162 |
| **Total** | **6** | **4** | **10** | **10** | **2** | **167** | **63** | **2854** |

Source: Florida Department of Health, Florida Cancer Data System (FCDS) as of 3/5/19

*Primary Site C71.0-C71.9 Histology excluding 9050-9055, 9140, 9530-9539, 9590-9992

Primary Site C71.0-C71.9 Histology 9530-9539

Primary Site C70.0-C70.9, C72.0-C72.9 Histology excluding 9050-9055, 9140, 9590-9992

**Table 4. Diffuse Intrinsic Pontine Glioma (DIPG) Cancer Counts**
**Age 19 or Younger by Diagnosis Year and by Geography, 2005-2014**

| | Geographic Region at Time of Diagnosis | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | Zip Code 32803 | Zip Code 32806 | Zip Code 32822 | Zip Code 32825 | Zip Code 32828 | Orange County | Seminole County | State of Florida |
| 1981 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 1982 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 8 |
| 1983 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 1984 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 9 |
| 1985 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 1986 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 1987 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| 1988 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 13 |
| 1989 | 0 | 0 | 1 | 0 | 0 | 4 | 0 | 13 |
| 1990 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 23 |
| 1991 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 |
| 1992 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 18 |
| 1993 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 22 |
| 1994 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 |
| 1995 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 20 |
| 1996 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 20 |
| 1997 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 19 |
| 1998 | 0 | 0 | 0 | 1 | 0 | 4 | 2 | 29 |
| 1999 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 23 |
| 2000 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 17 |
| 2001 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 25 |
| 2002 | 0 | 0 | 1 | 0 | 0 | 4 | 2 | 22 |
| 2003 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 21 |
| 2004 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 25 |
| 2005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 28 |
| **Total** | **0** | **0** | **2** | **1** | **0** | **34** | **8** | **420** |

Source: Florida Department of Health, Florida Cancer Data System (FCDS) as of 3/5/19
Primary Site C71.7, Histology 9380-9480 & Behavior =3 (Malignant)

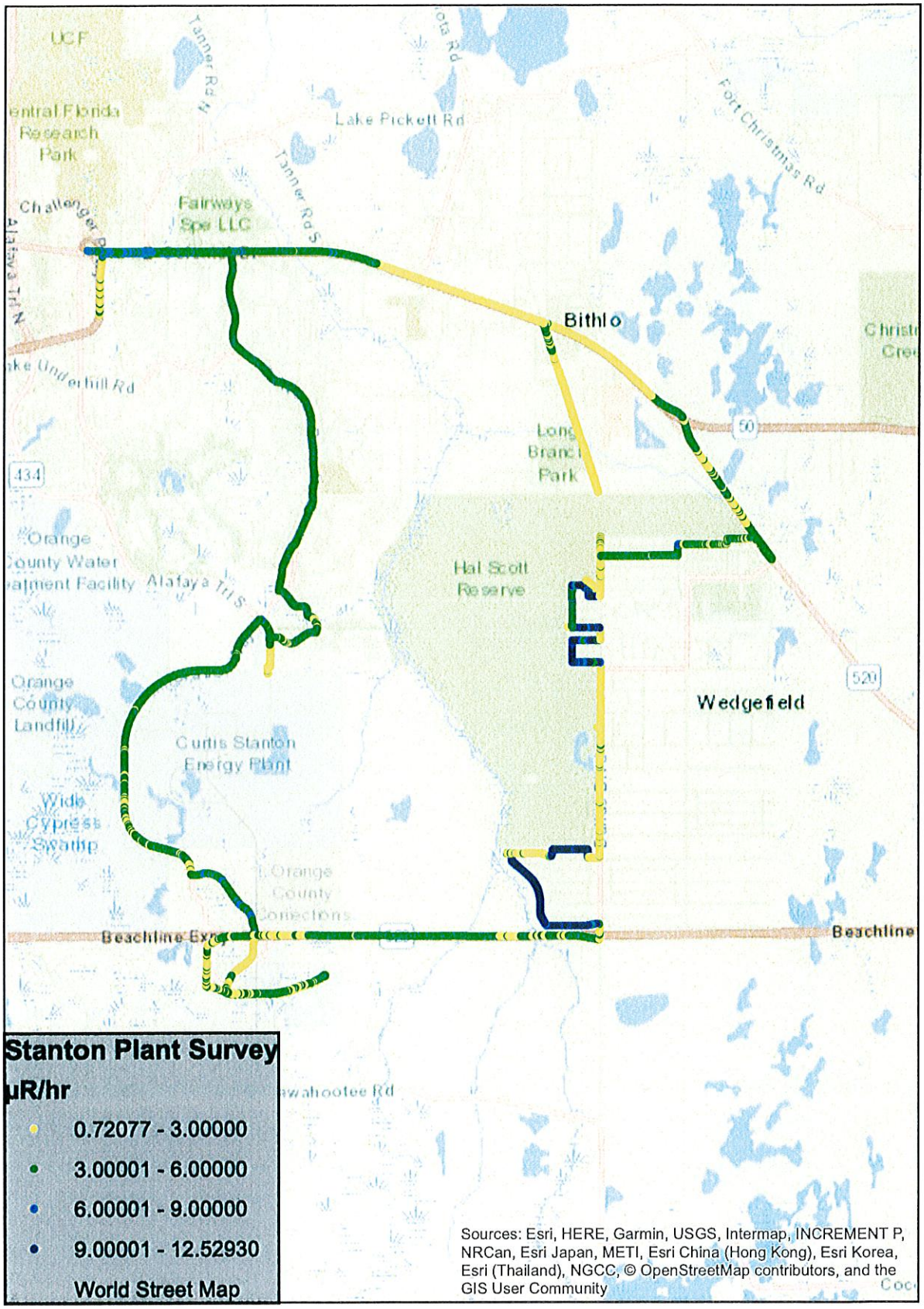
**Attachment B. Radiologic Testing**

On March 6, 2019, the Florida Department of Health's Bureau of Radiation Control conducted gamma radiation surveys of the vicinity of the Stanton Energy Complex using Radiation Solutions Inc. (RSI) mobile radiation survey detection systems. The RSI equipment is identical to the equipment used by the Department of Energy Radiological Assistance (RAP) teams and the U.S. Environmental Protection Agency for conducting large area gamma radiation surveys including Aerial Measurement Surveys used for surveying after the Fukushima nuclear power plant accident. Bureau personnel were trained in the use of the systems by the Department of Energy.

Approximately 7,700 gamma exposure rate measurements were taken. The data was processed and a map of the survey was completed (see attached). As indicated on the map, all readings were within the normal expected radiation background for Florida. No unusual levels were noted. The Bureau uses guidance provided by the National Council on Radiation Protection (NCRP) #116 to determine if gamma radiation levels are within safe levels.

The levels in NCRP #116 are set at 100 millirem and 500 millirem a year above normal background. Typical occupancy rates are 16 hours per day indoors and 2 hours outdoors for a residential setting (50 weeks per year). Based upon that, a reading of 22 micro rem per hour would yield an exposure of 100 millirem in one year. No actions would be recommended at that exposure level. At 85 micro per hour, yearly dose would be 500 millirem above background and remediation would be recommended. Between the 22 and 85 values, the Department would look at each situation on an individual basis to determine the recommended course of action.

## Attachment B - Radiologic Testing Map




Florida Department of Health, Bureau of Radiation Control - Map Created March 2019

## - FREQUENTLY ASKED QUESTIONS -

### Coal Combustion Wastes



**What happens during the coal burning process?**
Coal is generally used as a fuel to produce steam that drives turbine and/or power generators. During the steam production process, coal is burned to heat water boilers. The steam is produced in the boilers at very high temperatures and pressure. Coal is a combustible black or brownish-black sedimentary rock that consists mostly of carbon and other elements such as hydrogen, sulfur, oxygen, and nitrogen. Radioactive materials, such as uranium and thorium, are naturally occurring in coal. When coal is burned, these elements concentrate at up to 10 times higher than their original levels, and that could pose a threat to the environment and to human health.

**What are the byproducts of coal burning power plants?**
Coal combustion products (CCPs) are byproducts generated from burning coal in coal-fired power plants. The byproducts include fly ash, bottom ash, and boiler slag among other substances.

**Are there any risks associated with coal burning?**
Coal burning waste can contain several hazardous chemicals, thus having the potential to cause air pollution. It also has the potential to pollute other environmental media.

**What is coal ash?**
Coal ash is the byproduct of the coal burning process at power plants managed by electric utilities and independent power companies. Its components include both fly ash and bottom ash.

**What is the difference between fly ash and bottom ash?**
**Fly Ash** are small particles which can be carried up boiler stacks with the gases exiting to the atmosphere through a pipe used for exhaust flow, like from a fireplace or oven. Most of the coal burning ash is fly ash.

**Bottom Ash** is ash that is too heavy to be carried through an exhaust pipe, and thus settles to the bottom. The amount of bottom ash created during coal burning will depend on the contents of the coal and the equipment being used.

**Can coal ash be used for anything?**
The U.S. Environmental Protection Agency (EPA) supports the responsible use of coal ash for recycling or reuse instead of disposal. Coal ash has been used to manufacture concrete as well as wallboard.

## Attachment C. Frequently Asked Questions

### Benefits of Coal Combustion Products?

The benefits of coal combustion products include improvements in issues related to environmental, economic, and product performance. Environmental benefits include the reduction of greenhouse gas releases and a decrease in the need for disposal in landfills. Economic benefits include reduced costs for coal ash disposal, an increase in revenue from the sale of coal ash, and potential savings by using coal ash instead of other more expensive materials. The use of coal combustion products has shown that with their use, there is an increase in the strength and durability of building materials which helps with the sustainability of construction materials.

### Can you put coal ash in your garden?

So far as benefits in the garden, coal ash can help break up compacted clay, improve drainage, and probably add at least small amounts of nutrients (although not as much as wood ash). The coal was mined from the earth and burned, so it is akin to lime, greensand, and other similar minerals used in gardening.

### How is coal ash disposal regulated?

The U.S. EPA signed the Disposal of Coal Combustion Residuals from Electric Utilities final rule on December 19, 2014. This rule finalized guidelines for the safe disposal of coal ash from coal-fired power plants. The rules address risks from coal ash disposal leaking into groundwater and blowing into the air as dust.

## Attachment C. Frequently Asked Questions

### Polonium (Po-210)



### General Information

#### What is polonium?

Polonium-210 is a radioactive element that occurs naturally and is normally present in the environment at very low concentrations. It is a byproduct of the radioactive decay of uranium-238, which decays to radon-222, and then to polonium.

#### Where do you find polonium?

Polonium can be found in small amounts in the human body, due to low levels in the normal environment and the food chain, especially in seafood. Natural polonium is rare. Smokers (tobacco) have more polonium in their body because smoking causes it to accumulate in the lungs.

In the industry, polonium is used in static eliminators (e.g., making tapes, rolling paper). It is also used to keep sensitive environments, such as computer chips, dust free.

#### Can polonium travel in the air?

Normally, alpha particles are not able to pass through other materials, thus, the particles can be blocked by a sheet of paper, skin, or even a few inches of air. However, alpha particles have the potential to be dangerous if inhaled or swallowed. External exposures generally do not pose a risk.

#### Why is polonium a concern?

Though polonium occurs naturally in the environment at very low concentrations, if ingested or inhaled it has the potential to have toxic effects on the body.

#### What are the main sources of polonium exposure?

Ingestion and inhalation are the main sources of exposure. You can be exposed to polonium by:

- Breathing air contaminated with polonium
- Eating or drinking contaminated food
- Contact through an open cut on the skin

#### What are the other sources of polonium exposure?

Polonium is a very rare natural element; however, other sources include its production in the decay of radon-222 gas and in uranium decay.

#### How can polonium potentially affect health?

Polonium emits alpha particles and is very radioactive. Alpha particles do not have enough energy to penetrate the outer layer of skin, thus exposure to the outside of the body is not a major concern. However, inside the body, they can be very harmful. It is important to also note that exposure to polonium and other types of radiation can occur through normal daily activities as well. Once it enters the body and the central nervous system is attacked, death could occur. According to the U.S. Nuclear Regulatory Commission (NRC), most people are exposed to radiation through both food ingestion and medical procedures.

The health effects from exposure to polonium depend on how a person is exposed (chemical concentration, exposure times, duration, and frequencies). If the chemical is inhaled, swallowed, or gets into the body through a cut, the alpha particles could potentially damage sensitive living tissues and cells inside the body. Exposure to low levels of radiation encountered in the environment does not cause immediate health effects, but could potentially increase overall cancer risk.

## Attachment C. Frequently Asked Questions

### What are the symptoms of a polonium contamination?

Because polonium occurrence is rare, diagnosing a polonium poisoning is difficult. Symptoms depend on the strength of the polonium exposure - the higher the dose the faster the effect will be. Acute symptoms could include the following: nausea, vomiting, anorexia, hair loss, lowered white blood cell count (lymphopenia), diarrhea, and/or damages to bone marrow. After the acute symptoms appear, chronic damages affecting various body organs, the gastrointestinal system, and the cardiovascular and central nervous system are often seen. If exposure occurs in high doses, and the central nervous system is attacked, symptoms will appear such as confusion, convulsion, and ultimately a coma.

### What happens to polonium after it enters the body?

Between 50% and 90% of ingested polonium goes through the gastrointestinal (GI) tract and leaves the body through feces. The amount that remains in the body goes to the bloodstream. It then goes to various tissues. The tissues that can potentially be affected include those of the spleen, kidneys, liver, and bone marrow.

### How long does polonium remain in the body?

On average, polonium has a half-life of 50 days, which is a measure of the time to eliminate one-half of the polonium retained by the body.

### Does polonium cause cancer?

Because polonium is a radioactive compound, once in the body it has the potential to alter tissue and cells, and thus could potentially lead to an increased risk of cancer. Polonium is not a hazard to the outside of the body; however, when inhaled, it can increase the risk of lung cancer and when ingested, it can cause genetic damage and increase the risk of certain types of cancer (e.g., bladder, leukemia, and liver).

### Am I at risk if I come in close contact with a polonium contaminated person?

You are not exposed to radiation just by being near a person who is internally contaminated with polonium. You are at risk if you inhale or ingest polonium contaminated bodily fluids.

### How can I protect myself from and/or reduce exposure to polonium contamination?

Normal hygiene practices will protect you from polonium contamination. Showering and changing clothes regularly reduces your exposure to environmental chemicals. Make sure you wash your hands and your children's hands with soap and warm water, especially before eating and after being outside. Also, wash things that children put in their mouths, such as pacifiers, bottles, and sippy-cups, especially if they come in contact with soil or household dust. Taking o□ shoes before going into your house will help reduce the amount of dust or dirt brought into the household that might contain slight amounts of polonium.

If the private drinking water well is suspected to be contaminated with polonium, the use of other water sources is suggested for both drinking and irrigation.

### Is there a treatment for polonium poisoning?

Polonium poisoning can be treated via supportive care with monitoring and treatment of symptoms, preventing and treating infections, and having blood transfusions as needed. There is also the potential for chelating therapy where a medication is given to attach to the polonium in the body and prevent it from being absorbed.

## Attachment C. Frequently Asked Questions

### Regulation and Advisories

**What is considered a safe concentration of polonium in water?**
The EPA has yet to establish drinking water standards for polonium. Generally, polonium concentrations in groundwater are not greater than 1 pCi/L (picocurie per liter). The maximum concentration for alpha radioactivity in drinking water is 15 pCi/L. Maximum concentrations are determined by the EPA. The determination considers the effects from a person drinking 2 liters of water per day for 70 years and it is protective of public health.

**What is the current Health Advisory Level (HAL) for polonium in drinking water?**
The EPA has not established a Health Advisory Level (HAL) for polonium in drinking water.

**What is the current Health Advisory Level (HAL) for polonium in soil?**
The EPA has not established a Health Advisory Level (HAL) for polonium in soil.

**If the drinking water level is above the HAL, what should I do?**
If the drinking water contains polonium above the maximum concentration of alpha radioactivity, alternative water sources for drinking, food preparation, cooking, brushing teeth, and other activities may be preferable.

**Should I use irrigation water contaminated with polonium to water my lawn?**
Polonium contaminated irrigation water used for activities like watering a lawn with non-edible plants and grass, and washing a car or pressure washing a home may pose a low health risk. With the main polonium exposure routes being ingestion and inhalation, activities that could use irrigation water such as filling a pool or other recreational uses could pose a potential health risk.

**Is it safe to use water with polonium for irrigation of my home produce?**
It is not recommended to use water with polonium for irrigation of home produce as polonium could potentially enter the body.

### Biomonitoring and Testing

**Is there a test to determine whether a person has been exposed to polonium [*polonium poisoning*]?**
To determine polonium poisoning the rate of reduction in lymphocyte counts is assessed using serial blood counts. Also, the analysis of chromosomes (e.g. dicentric count) helps to establish radiation effects and provides an estimation of exposure dose. Furthermore, polonium can be detected in urine and feces. In general, if exposure is not known, polonium poisoning is difficult to diagnose as the symptoms show a variety of similarities to other health related conditions.

## Attachment C. Frequently Asked Questions

### Polycyclic aromatic hydrocarbons (PAHs)



## General Information

### What are PAHs?

PAHs are a group of more than 100 chemicals which can occur naturally in the environment from the burning of coal, oil, gas, wood, garbage, or other organic substances, such as tobacco and charbroiled meat.

### Where do you find PAHs?

PAHs are found in the production or use of coal tar or asphalt. They can also be found in coal gasification plants, municipal waste incinerators, smokehouses, and aluminum production facilities.

### Can PAHs travel in the air?

PAHs can be found in air and they tend to bind to surfaces of small solid particles. PAHs can travel long distances via air/wind transportation when bound to dust particles.

### Why are PAHs a concern?

They are a global group of several hundred chemically related compounds, which are persistent in the environment. PAHs have toxic effects in the body and its effects occur through various actions. PAHs enter the environment through many routes and are usually found as a mixture of two or more compounds. PAHs are commonly detected in air, soil, and water.

### How have PAHs been used?

Some of the PAHs are used in medicines and to make dyes, plastics, and pesticides. PAHs can also be found in asphalt, e.g. for road construction. PAHs can also be found in substances like crude oil, coal, coal tar pitch, creosote, and roofing tar.

### What are the main sources of PAH exposure?

Ingestion, inhalation, and contact with the skin are the routes of exposure. You can be exposed to PAHs by:

- Breathing contaminated air
- Eating or drinking contaminated food
- Contact with any PAH contaminated media (air, water, soil, sediment) through the skin

### What are other sources of PAHs?

Another source of PAH exposure is from the consumption of grilled or charred meats.

### What are the potential health effects of exposure to PAHs?

These compounds can potentially cause asthma, bronchitis, or other respiratory problems. Exposure to PAHs can affect the developing fetus, reduce fertility, and impact hormones in the body. PAHs are known to increase cancer risk.

### Are health effects caused by PAHs in animals the same as in humans?

The carcinogenicity of certain PAHs is well established in laboratory animals. There have been reported increases in the rates of skin, lung, bladder, liver, and stomach cancers among animals exposed to PAHs. Animal studies also show that certain PAHs can impact the blood and immune systems and cause reproductive, neurological, and developmental effects.

## Attachment C. Frequently Asked Questions

### How long do PAHs remain in the body?

Results from animal studies show that PAHs do not tend to be stored in your body for a long time. Most PAHs that enter the body leave within a few days, primarily in feces and urine.

### Do PAHs cause cancer?

The U.S. Environmental Protection Agency (EPA) has determined that PAHs are cancer causing (Table 1). Some people who have inhaled or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer, such as lung, stomach, and skin cancer in laboratory animals when they inhaled PAH contaminated air, ingested PAH contaminated food, or had skin contact with PAH contaminated media, respectively (Table 1).

Table 1: Carcinogenic classification by agency.

| Agency | PAH | Compound(s) Carcinogenic Classification |
|---|---|---|
| U.S. Department of Health and Human Services (HHS) | • benz(a)anthracene<br>• benzo(b)fluoranthene<br>• benzo(a)pyrene<br>• dibenz(a,h)anthracene<br>• indeno(1,2,3-c,d)pyrene | known animal carcinogens |
| International Agency for Research on Cancer (IARC) | • benz(a)anthracene<br>• benzo(a)pyrene | probably carcinogenic to humans |
| | • benzo(a)fluoranthene<br>• benzo(k)fluoranthene<br>• ideno(1,2,3-c,d)pyrene | possibly carcinogenic to humans |
| | • anthracene<br>• benzo(g,h,i)perylene<br>• benzo(e)pyrene<br>• chrysene<br>• fluoranthene<br>• fluorene<br>• phenanthrene<br>• pyrene | not classifiable as to their carcinogenicity to humans |
| U.S. Environmental Protection Agency (EPA) | • benz(a)anthracene<br>• benzo(a)pyrene<br>• benzo(b)fluoranthene<br>• benzo(k)fluoranthene<br>• chrysene<br>• dibenz(a,h)anthracene<br>• indeno(1,2,3-c,d)pyrene | probable human carcinogens |
| | • acenaphthylene<br>• anthracene<br>• benzo(g,h,i)perylene<br>• fluoranthene<br>• fluorene<br>• phenanthrene<br>• pyrene | not classifiable as to human carcinogenicity |

*** source https://www.atsdr.cdc.gov/csem/csem.asp?csem=13&po=11 ***

## Attachment C. Frequently Asked Questions

### How can I protect myself from and/or reduce exposure to PAH contamination?

Normal hygiene practices will protect you from PAH contamination. Showering and changing clothes regularly reduce your exposure to environmental chemicals. Make sure you wash your hands and your children's hands with soap and warm water, especially before eating and after being outside. Wash items that children put in their mouths, such as pacifiers, bottles, and sippy-cups, especially if they contact soil or household dust. Taking o□ shoes before going into your house will help reduce the amount of dust or dirt brought into the household that might contain slight amounts of PAHs.

If a private drinking water well is suspected to be contaminated with PAHs, the use of other water sources is suggested, for both drinking and irrigation.

## Regulations and Advisories

### How are PAHs regulated?

PAHs are regulated under The Emergency Planning and Community Right-to-Know (EPCRA) standards of 40 CFR Subpart J. EPCRA requires owners and operators of certain facilities that manufacture, import, process, or otherwise use these chemicals to report annually their release of those chemicals to any environmental media. Out of all PAHs, 16 are considered to be priority pollutants by the U.S. EPA. The harmful effects of each of these PAHs to human health can vary. DEP in Florida assess soil considering a combined effect of seven of those PAHs and their various ways of causing harm to human health.

The Agency for Toxic Substance and Disease Registry (ATSDR) developed health and environmental guidelines based on toxicology to use when conducting the analysis and evaluation of exposures to substances found at various sites. For PAHs, the most protective value to use for comparison of concentrations is the Cancer Risk Evaluation Guide (CREG). CREGs are comparison values that are used to identify concentrations of cancer-causing substances which are unlikely to cause an increase of cancer in those exposed.

The United States Occupational Safety and Health Administration (OSHA) assures safe and healthful working conditions for men and women by setting and enforcing standards and by providing training, outreach, education, and assistance. OSHA has not established a substance-specific standard for occupational exposure to PAHs. Exposures are regulated under OSHA's Air Contaminants Standard for substances termed coal tar pitch volatiles (CTPVs) and coke oven emissions. Employees exposed to CTPVs in the coke oven industry are covered by the coke oven emissions standard.

The Florida Department of Environmental Protection (FDEP) has promulgated cleanup target levels (CTLs). The CTLs for the specific members of the PAH family in groundwater and soil (Chapter 62-780, Florida Administrative Code) are shown in Tables 2 and 3, respectively. Other chemical specific CTLs can be found in the "*Technical Report: Development of Cleanup Target Levels for Chapter 62-777*" https://floridadep.gov/waste/district-business-support/content/waste-management-rules.

The Department of Health has developed Health Advisory Levels (HAL) for chemicals found in drinking water (Table 2). HALs ensure that no adverse human health effects are caused when consumed over a lifetime. It is a guidance level and is not enforceable.

### What is the current health standard/advisory level for PAHs in drinking water?

The U.S. EPA has set an enforceable drinking water quality standard (maximum contaminant level - MCL) for some PAHs (Table 2). An MCL is a standard set by the U.S. EPA for drinking water quality. It presents a legal threshold limit on the amount of a substance that is allowed in public water systems under the Safe Drinking Water Act (SDWA). Drinking water at or below this standard for a lifetime is not expected to cause any harm to your health.

Table 2: Maximum contaminant level and Health Advisory Levels for specific PAHs in drinking water by agency.

| Compound (milligrams per liter) | US EPA MCL | ATSDR CREG | DEP CTL | DOH HAL |
|---|---|---|---|---|
| benz(a)anthracene | 0.0001 | NA | 0.00005** | 0.0002 |
| benzo(a)pyrene,<br>benzo(b)fluoranthene,<br>benzo(k)fluoranthene,<br>chrysene | 0.0002* | 0.012 | 0.0002***<br>0.0005**<br>0.0005**<br>0.0048** | 0.0002<br>0.0002<br>0.0005<br>0.0048 |
| dibenz(a,h)anthracene | 0.0003 | NA | 0.000005** | 0.0002 |
| indenol(1,2,3-c,d)pyrene | 0.0004 | NA | 0.00005** | 0.0002 |

* *A concentration of 0.0002 mg/L (milligrams per liter) is the equivalent of 7 tablespoons of sand in an Olympic size pool*
** *Minimum criteria, no drinking water standard available, calculation based on health consideration and aesthetic factor*
*** *Primary drinking water standard*

ATSDR - Agency for Toxic Substances and Disease Registry
CTL - Cleanup Target Level
CREG - ATSDR Cancer Risk Evaluation Guide
DEP - Florida Department of Environmental Protection
DOH - Florida Department of Health
EPA - Environmental Protection Agency
HAL - Health Advisory Level
MCL - Minimal contaminant level
NA - Not Available

### What is the current health standard/advisory level for PAHs in soil?

When evaluating soil, PAH data are usually presented as carcinogenic equivalents (BaP-TEQ) for the sum of 8 specific PAHs by calculating the sum of the 8 PAHs weighted to their toxic equivalency. In other words, each of the 8 PAHs have a different "capability" in their toxic effects which needs to be accounted for prior summing. The U.S. EPA has set enforceable soil regional screening levels (RSL) for the 8 PAHs used to determine the BaP-TEQ (Table 3). The EPA's regional screening level for other PAHs can be found here: https://semspub.epa.gov/work/HQ/197418.pdf.

Table 3: Screening/cleanup target level and Health Advisory Levels for specific PAHs in soil by agency.

| Compound (milligrams per kilogram | US EPA RSL ($10^{-6}$ level) | ATSDR CREG | DEP CTL | DOH HAL |
|---|---|---|---|---|
| benzo(a)pyrene, BaP-TEQ | 0.11 | 0.11 | 0.1 (residential)<br>0.7 (industrial) | NA |
| benz(a)anthracene | 1.1 | NA | NA | |
| benzo(b)fluoranthene | 1.1 | | | |
| benzo(k)fluoranthene | 11 | | | |
| chrysene | 110 | | | |
| dibenz(a,h)anthracene | 0.11 | | | |
| indenol(1,2,3-c,d)pyrene | 1.1 | | | |

ATSDR - Agency for Toxic Substances and Disease Registry
BaP - Benzo(a)pyrene
CTL - Cleanup Target Level
CREG - ATSDR Cancer Risk Evaluation Guide
DEP - Florida Department of Environmental Protection
DOH - Florida Department of Health
EPA - Environmental Protection Agency
HAL - Health Advisory Level
NA - Not Available
RSL - Regional Screening Level (based on $1x10^{-6}$ and Hazard Quotient= 1)
TEQ - Toxic Equivalency

## Attachment C. Frequently Asked Questions

### What is the current health standard/advisory level for PAHs in air?

The U.S. EPA has set regional screening levels (RSL) for PAHs in air (Table 4). For more information regarding screening levels of PAHs other than the one shown in Table 4, visit the following link: https://semspub.epa.gov/work/HQ/197426.pdf.

The OSHA permissible exposure limit (PEL) for PAHs in the workplace is 200 µg/m$^3$. The limit is based on an 8-hour time-weighted average. The OSHA standard for coke oven emissions is 0.15 mg/m$^3$. The National Institute for Occupational Safety and Health (NIOSH) has recommended that the workplace exposure limit for PAHs be set at the lowest detectable concentration, which was 100 µg/m$^3$ for coal tar pitch volatile agents at the time of the recommendation.

Table 4: Screening levels and Health Advisory Levels for specific PAHs in air by agency.

| Compound (microgram per cubic meter - µg/m$^3$) | US EPA RSL ($10^{-6}$ level) | ATSDR CREG | DEP CTL | DOH HAL | OSHA PEL |
|---|---|---|---|---|---|
| benzo(a)pyrene | 0.0017 | 0.0010 | NA | NA | 200 |
| benz(a)anthracene | 0.017 | NA | | | NA |
| benzo(b)fluoranthene | 0.026 | | | | |
| benzo(k)fluoranthene | 0.17 | | | | |
| Chrysene | 1.7 | | | | |
| dibenz(a,h)anthracene | 0.0017 | | | | |
| indenol(1,2,3-c,d)pyrene | 0.017 | | | | |

ATSDR - Agency for Toxic Substances and Disease Registry
CTL - Cleanup Target Level
CREG: - ATSDR Cancer Risk Evaluation Guide
DEP - Florida Department of Environmental Protection
DOH - Florida Department of Health
EPA - Environmental Protection Agency
HAL - Health Advisory Level
NA - Not Available
OSHA - Occupational Safety and Health Administration
RSL - Regional Screening Level (based on $1x10^{-6}$ and Hazard Quotient= 1)
PEL - Permissible Exposure Limit

### If the drinking water is above the standard/advisory level, what should I do?

If the drinking water contains PAHs above the drinking water quality standard concentration, alternative water sources for drinking, food preparation, cooking, brushing teeth, and other activities may be preferable.

### Should I use irrigation water with PAHs for watering the lawn?

Irrigation of a lawn with non-edible plants and grass poses potential risk if the water is contaminated with PAHs. Also, as previously stated, irrigation water is not potable water and should not be used for drinking. For this chemical, drinking is a potential route of exposure.

### Is it safe to use water with PAHs for irrigation of my home produce?

It is not recommended to use water with PAHs for irrigation of home produce as PAHs could potentially enter the body.

## Biomonitoring and Testing

### Is there a test to determine whether a person has been exposed to PAHs?

There is a test that can measure the presence of PAHs in the urine, the body's tissue, and/or blood. This test can only tell if you have been exposed; but it can't determine the exposure source, how much a person is exposed, nor how harmful the effects of the exposure will be.

## Attachment C. Frequently Asked Questions

### What can the test results tell me?

While the tests may be able to detect PAHs in the body, it does not:

- Provide information to pinpoint whether PAHs caused a health problem, nor will it provide information for treatment
- Predict or rule-out the development of future health problems related to a PAH exposure
- Identify how or where the PAH exposure occurred

## Document Disclaimers

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## Attachment C. Frequently Asked Questions

**Cancer Clusters**
**Florida Cancer Data System (FCDS)**

### What is a cancer cluster?

A cancer cluster is defined as a greater-than-expected number of cancer cases that occurs within a group of people in a defined geographica area over a specified period of time. When people learn that several friends, family members, or neighbors have found out they have cancer, cancer clusters are often suspected. Cancer clusters are also sometimes suspected when people who work at the same place or have other factors in common get cancer.

### What are the criteria for a group of cancer cases to be considered a cluster?

To be a cancer cluster, a group of cancer cases must meet the following criteria:

- Include a large number of cases of one type of cancer or types of cancer scientifically proven to have the same cause or etiology, rather than several different cancer types.
- The observed number of cases is higher than one would typically observe in a similar setting (e.g., in a group with a similar population, age, race, or gender).

Other important factors in evaluating reports of cancer clusters are:

- A rare type of cancer, rather than common types.
- An increased number of cases of a certain type of cancer in an age group that is not usually affected by that type of cancer.
- The type of cancer involved is a primary (original) cancer not a metastasized (spread from another organ) cancer.

### How are suspected cancer clusters investigated?

Not all community concerns of excess cancer require investigation; oftentimes, community concerns can be resolved by providing general cancer educational information, facts and resources.

When needed, a local or state health department gathers information about the suspected cancer cluster. This commonly includes the types of cancer, number of cases, age, sex, race, address, and age at diagnosis of the individuals with cancer. The department reviews this available information and determines if analysis of cancer rates and other investigative steps are needed to better understand the situation.

If the department determines that analysis is needed, this involves confirming the number and types of cancers in the community and comparing this to what might be expected based on state or county rates of cancer. Specific analysis (such as investigating just childhood rates, or just among women in the case of breast cancer) may also be needed depending upon the type of concern. The department communicates and discusses the results of the analysis with the community.

## Attachment C. Frequently Asked Questions

### Where do I go for additional information?

Centers for Disease Control and Prevention (CDC) Cancer Clusters

Agency for Toxic Substances and Disease Registry

National Cancer Institute (NCI) Cancer Clusters

### What is FCDS (Florida Cancer Data System)?

The Florida Department of Health (DOH), Public Health Research has contracted with the University of Miami's Miller School of Medicine since 1979 for the day-to-day operations of the statewide cancer registry, the Florida Cancer Data System (FCDS). The FCDS is legislatively mandated to collect incidence data on all cancers diagnosed among residents in Florida per Section 385.202 *Florida Statute.* Since 1981, the FCDS has been collecting the number of new cancers diagnosed each year statewide (e.g., the annual incidence). The FCDS is used to observe cancer trends and provide a research base for studies into the possible causes of cancer.

The FCDS has been certified by the Centers for Disease Control and Prevention's National Program of Cancer Registries (CDC-NPCR) as a 'Registry of Excellence' for meeting all program standards. Furthermore, the North American Association of Central Cancer Registries (NAACCR) has certified the FCDS at its highest level, "Gold Certification" since 2002. Gold Certification is conferred on central registries that exceed standards for completeness, timeliness, and data quality.

### What kind of cancer cases must be reported to FCDS?

Florida statute requires all malignant cancers reportable with the following *exceptions* - In situ carcinoma of the cervix (CIS), intraepithelial neoplasia grade III of the cervix (CIN III) and intraepithelial neoplasia of the prostate (PIN III) are *not reportable.* Basal and squamous cell carcinoma of non-genital skin sites are *not reportable* regardless of extent of disease at the time of diagnosis or the date of first contact with the reporting facility. *Reportable* on or after diagnosis date of 01/01/2001 are Intraepithelial neoplasia Grade III of vulva (VIN III), vagina (VAIN III) and anus (AIN III) and Myelodysplastic Syndrome (MDS). All patients with an active, benign or borderline brain or central nervous system (CNS) tumor, diagnosed on or after 01/01/2004, whether being treated or not *are reportable.* All cancer cases diagnosed and/or treated in Florida since 1981 must be reported to the FCDS.

### What kind of data is collected by FCDS?

The FCDS requires that the data collected include information which indicates diagnosis, stage of disease, patient demographics, laboratory data, tissue diagnosis and methods of diagnosis or treatment for each cancer diagnosed or treated in Florida.

### Who is required to report cancer cases to FCDS?

All facilities licensed under Chapter 395 and each freestanding radiation therapy center under Section 408.07; All ambulatory surgical centers as specified by Rule 64D-3.034; Any licensed practitioner in the state of Florida that practices medicine, osteopathic, chiropractic medicine, naturopathy or veterinary medicine are required to report under Chapter 381 or any laboratory licensed under Chapter 483 that diagnoses or suspects the existence of a cancer.

## Attachment C. Frequently Asked Questions

### Are there limitations to using FCDS data for analyses?

Yes, there are limitations to using Florida Cancer Data System (FCDS) data. Although FCDS data can be provided by select geographical area, these data represent a retrospective account of the burden of cancer for an area. The FCDS collects outcome data. The case information submitted by medical reporters to the FCDS describes "who", "what", "when", and "where" of the cancer case. However, the FCDS does not collect data as to "why" nor can analyses of FCDS data alone determine why the occurrence of cancer in a specific area or population is happening. Moreover, there is an inherent delay in collecting cancer incidence data as a reporting entity has up to six (6) months after the initial date of diagnosis to report the cancer case information to the Florida Department of Health. This six-month period permits the cancer case information to include the completed initial course of treatment. In addition, the FCDS must conduct external linkages with Department's Bureau of Vital Statistics and the Florida Agency for Health Care Administration to ensure the completeness and accuracy for the diagnosis year. Therefore, cancer surveillance data from the FCDS is not available for official release until two years after the close of the diagnosis year.

### Has information been released before from the Florida Department of Health in regards to zip code 32828?

Yes, the total number of pediatric brain cancers and a more specific brain cancer sub-type, diffuse intrinsic pontine glioma (DIPG) over the ten-year period from 2005 to 2014 was released for the zip code tabulation area (ZCTA) 32828, Orange County, and Seminole County under an approved data request. The number of pediatric brain cancers for ZCTA 32828 fluctuated each year from no cases to a few cases. This is a very typical pattern as cancer can occur randomly among populations. The number of cancer cases may vary from year to year even if there is no change in the population or environment. Among children 0-14 or 0-19, cancers of the brain and blood are the top cancer types occurring in Florida as a whole and nationally.

ORANGE COUNTY MAYOR
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February 22, 2019

Dr. Kendra Goff, PhD, State Toxicologist & Chief of Bureau of Environmental Health
Dr. Carina Blackmore, PhD, State Epidemiologist, Director of Disease Control and Health Protection
Florida Department of Health
Division of Disease Control & Health Protection
Bureau of Environmental Health
4052 Bald Cypress Way, Bin A-08
Tallahassee, Fl 32399-1710

Dear Doctors Goff and Blackmore:

This letter is to follow up on recent conversations that have taken place between your state and local Department of Health staff regarding the concerns of residents within close proximity of the Stanton Energy Plant in east Orange County, Florida.

It is my understanding that our local Department of Health officials just requested that the state conduct additional data review and testing within this community. As Mayor of Orange County, I echo this request and urge you to make this a priority item. The lack of sufficient information and explanation has caused a great deal of stress and concern for our residents. The active engagement of the Department of Health's unique resources is critical in addressing their fears.

In an effort to better understand the issues, my staff and I met with Mr. David Overfield from the local office. Mr. Overfield gave some historical perspective and explained the existing data. We also discussed the local Department of Health's request from your office. Specifically, that request included the following:

- **Brain & CNS Tumor data for those under 19 years of age, during the time period 2005-2014, in each of the following zip codes – 32825, 32822, 32806 and 32803.** This would be the same data that has been extracted for the 32828 zip code and will be useful as comparators. Two of these zip codes are adjacent to the 32828 area, and two of these zip codes contain county hospitals.
- **Brain & CNS Tumor data for those under 19 years of age, during the time period 1981 – 2005, in the 32828 zip code.** This data will provide additional historical information by which the more recent data can be measured.
- **Personnel and equipment from Florida Department of Health's radiologic team to conduct concentric sampling with a 5-1/2 mile radius of the Stanton Energy Plant**, specifically looking for polonium or, alternatively, background radiological levels.
- **A consumer-friendly "Frequently Asked Questions" that can be provided to citizens and an explanation of the Department of Health's opinion regarding cancer rate data from 32828.**

Additionally, I would like to provide a community forum in the next few weeks in which the Department of Health could meet with the residents and explain the existing data, as well as address questions and concerns. If possible, I would appreciate having individuals from the state toxicology department and cancer registry in attendance at this community meeting to make sure any and all issues can be addressed.

As you may know, Orange County Government and Orange County Department of Health have an exceptional working relationship and we consistently partner on public health matters. If resources are a barrier to ensuring this request can be fulfilled, please let my staff know and we will be happy to assist.

Thank you for your commitment to the health and safety of our citizens. I look forward to working with you.

Warm Regards,

Jerry L. Demings
Orange County Mayor

C: Maribel Gomez Cordero, Commissioner, District 4, Orange County Government
Dr. Kevin Sherin, Director, Florida Department of Health in Orange County
Nasseam McPherson James, Assistant Director, Florida Department of Health in Orange County
David Overfield, Environmental Administrator, Florida Department of Health in Orange County
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