

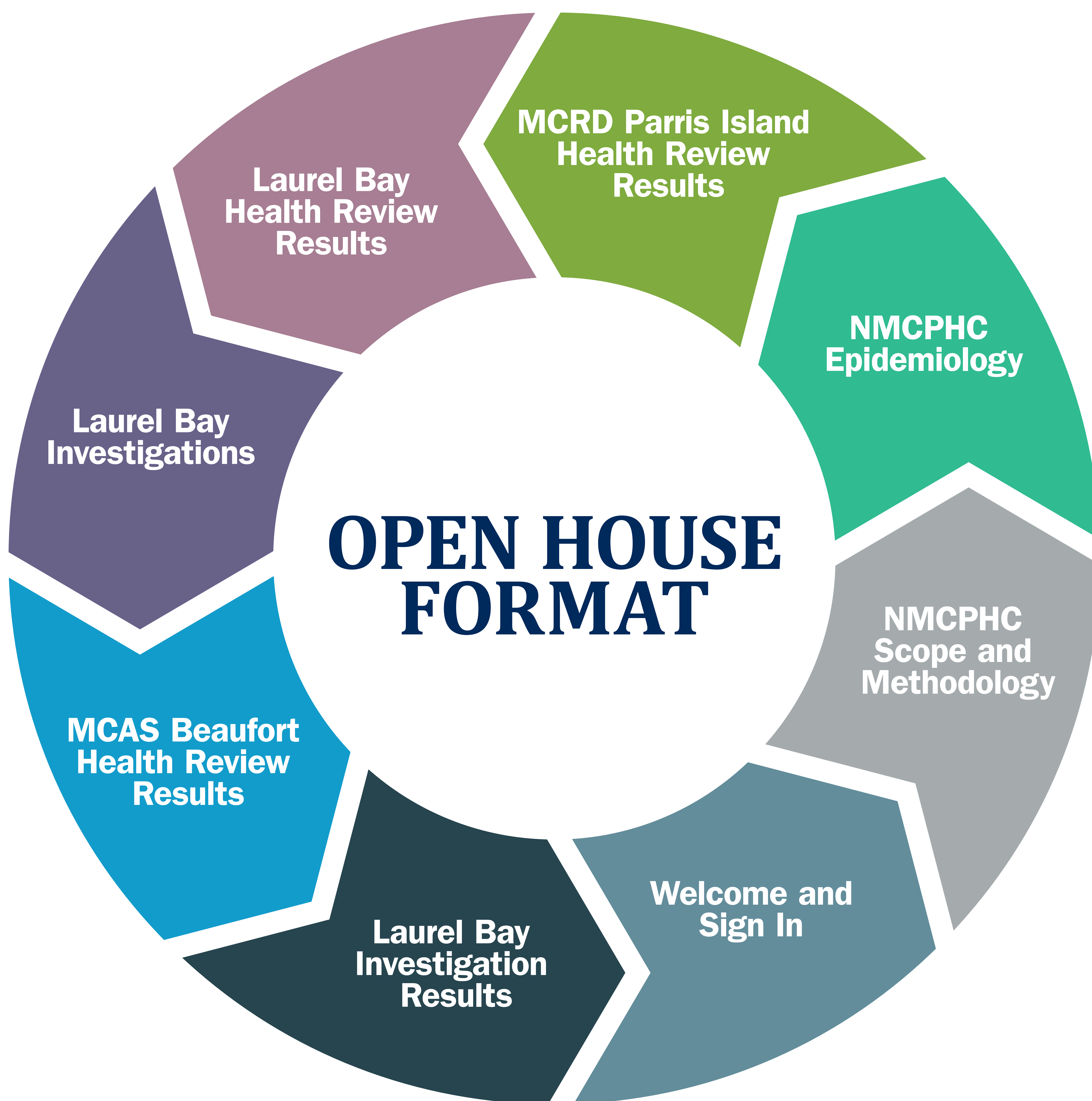
Welcome



Navy and Marine Corps Public Health Center's Public Health Review

Open House

October 11-12, 2017 • 5:00 p.m. – 8:00 p.m.



Pediatric Cancer Investigation, MCAS Beaufort, 2002-2016

BACKGROUND

The Navy & Marine Corps Public Health Center (NMCPHC) investigated a number of pediatric cancers among current and former residents of Laurel Bay Military Housing (LBMH)

Some residents believe the pediatric cancers may be associated with suspected or unknown environmental exposures.

The NMCPHC EpiData Center (EDC) was requested to identify and validate all pediatric cancers among beneficiary children, living or conceived, January 2002 to December 2016

METHODOLOGY

A study area was established, 30-mile radius around LBMH and MCRD Parris Island.

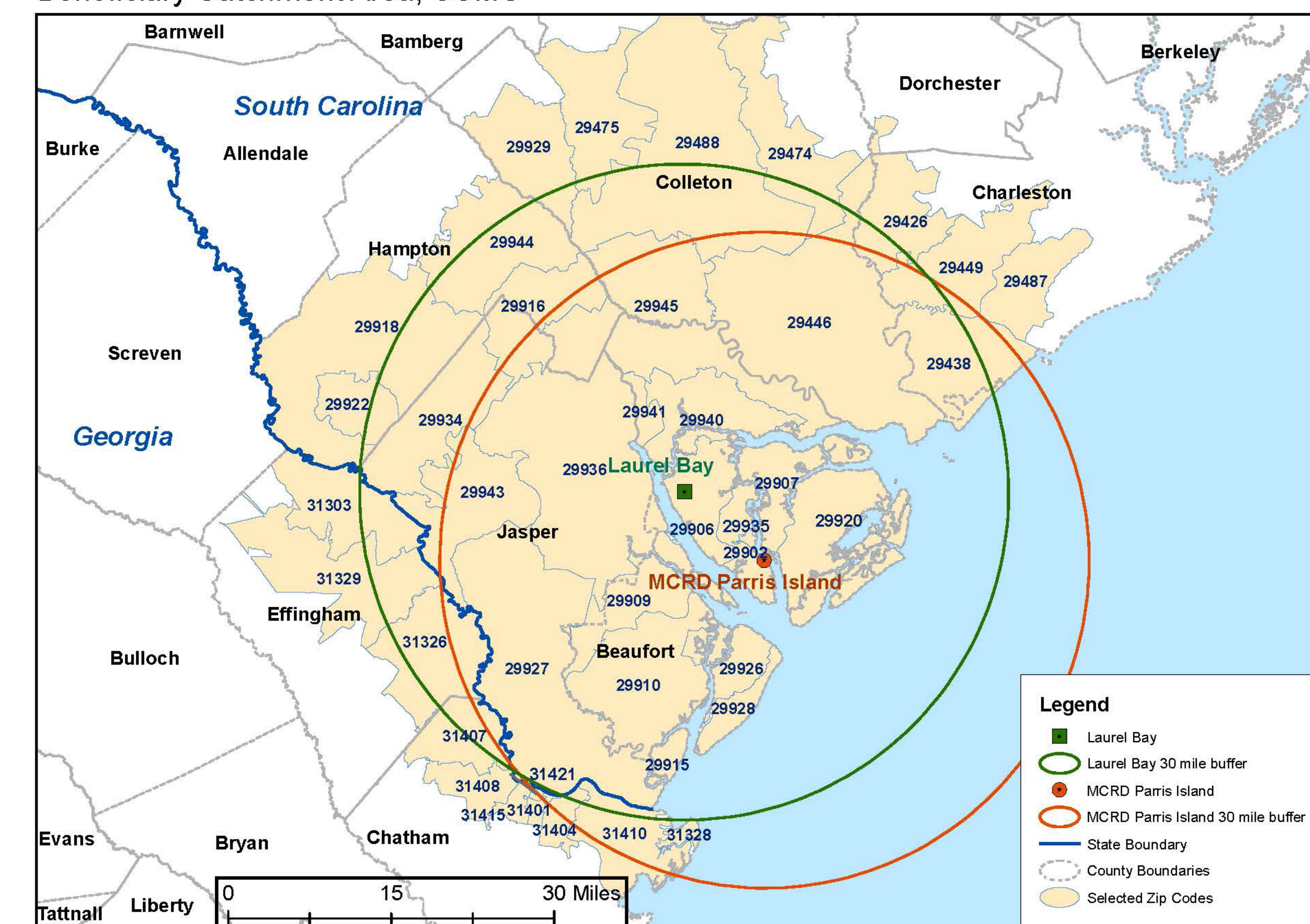
Available electronic records were searched to determine all active duty military sponsors stationed in the study area.

Using the sponsor list, all children born after 01 January 2002 and treated for cancer were identified, including children conceived in the study area.

Cases were included in the study if they met specific criteria:

- The sponsor was assigned to the study area between 01 January 2002 and 31 December 2016 except for duty as a recruit
- The child lived or was conceived in the study area prior to diagnosis
- The child's cancer diagnosis date was during or after the date the sponsor reported to the study area
- The sponsor was on active duty at the time of the diagnosis

Beneficiary Catchment Area, USMC



The following zip codes are postal offices included within the selected zip code boundaries: 29452, 29901, 29903, 29904, 29905, 29912, 29914, 29921, 29925, 29931, 29938.

Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 14 January 2016.



Pediatric Cancer Investigation, MCAS Beaufort, 2002-2016

RESULTS

313 TRICARE children were treated at a military treatment facility or a civilian facility, and met the Armed Forces Health Surveillance Branch surveillance cancer case definition

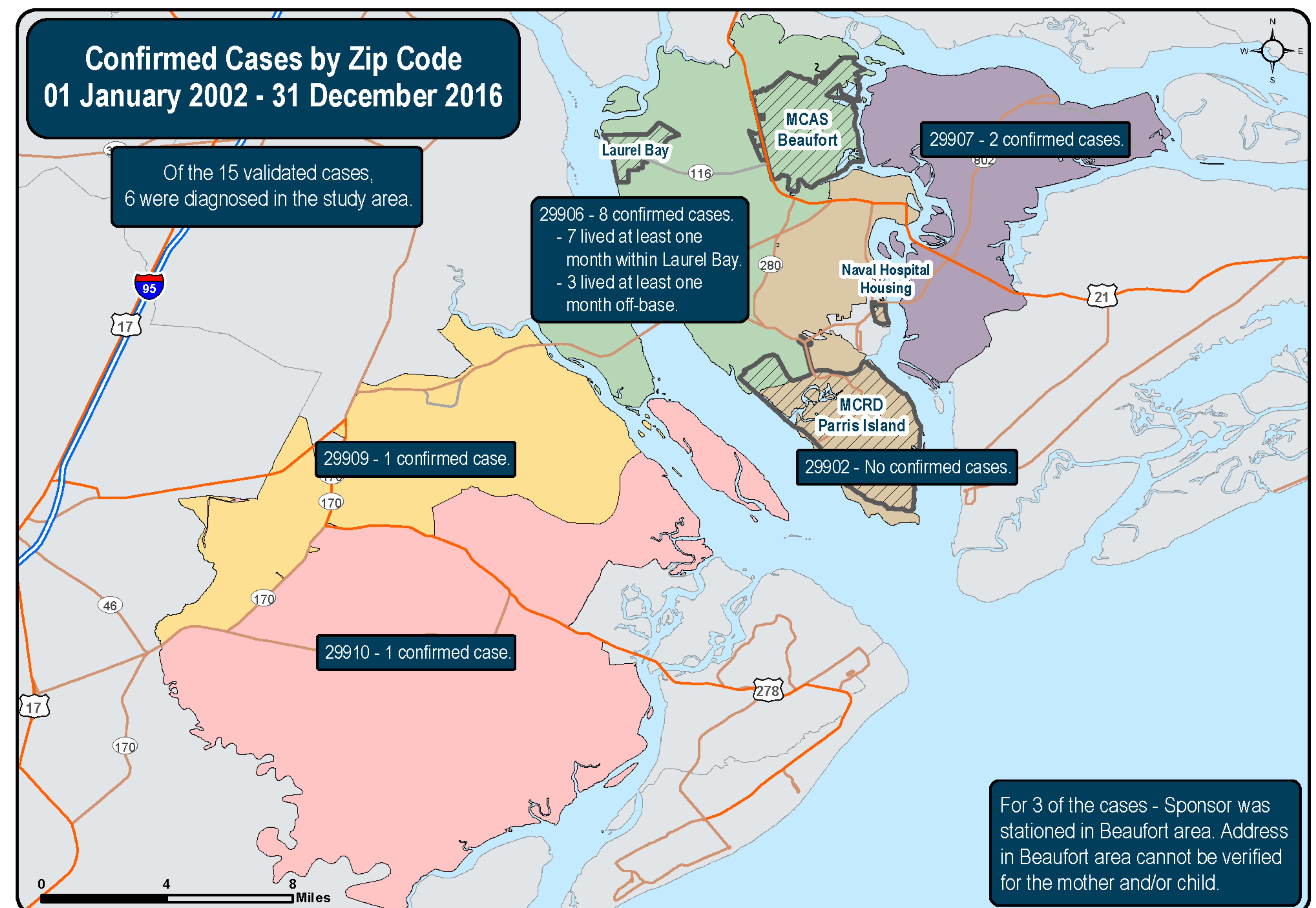
95 children were excluded because their sponsor was a recruit while stationed in study area

20 children were excluded because their first cancer encounter occurred before sponsor's first date in study area

87 children were excluded because they were born more than 10 months after sponsor was transferred from the study area

96 children were excluded because their cancer diagnosis was confirmed as benign or did not meet case definition, based on treatment record reviews

15 pediatric cancer cases were validated



Pediatric Cancer Investigation, MCAS Beaufort, 2002-2016

DISCUSSION

The study identified 5 different types of cancer among 15 cases in the study population

- acute lymphocytic leukemia (ALL)
- acute myeloid leukemia (AML)
- neuroblastoma
- soft tissue sarcoma (e.g., infantile rhabdomyosarcoma)
- Wilms tumor

While cancer is rare in a pediatric population, the types of cancer observed in this study are the most commonly seen in a pediatric population.

Cancer incidence rates could not be calculated due to the low number of cancers validated by the study.

Because the development of cancer is multifactorial, it is not scientifically valid to group all cancers together as a single health outcome.

If a parent or guardian has any questions or concerns, he or she should discuss them with an oncologist or their healthcare provider.



What is Cancer?

Cancer is a group of “diseases in which abnormal cells divide without control and can invade nearby tissues.”

There are about 200 different types of cancer that are divided into 5 main types: carcinomas, lymphomas, leukemias, brain tumors, and sarcomas.

UNDERSTANDING CANCER RISK

Many factors affect the likelihood of a person developing cancer, including age, genetic factors, and lifestyle behaviors such as diet, alcohol and smoking.

- Age at diagnosis
- Genetics
- Exposure to external agents
- Lifestyle behavior

A recent study published in the journal *Science* (2017), reported that:

- About 66% of all cancers were due to random errors in cell division
- 5% were related to genetic factors
- 29% were attributed to environmental exposures including lifestyle, occupational, and environmental sources



The Cancer Process

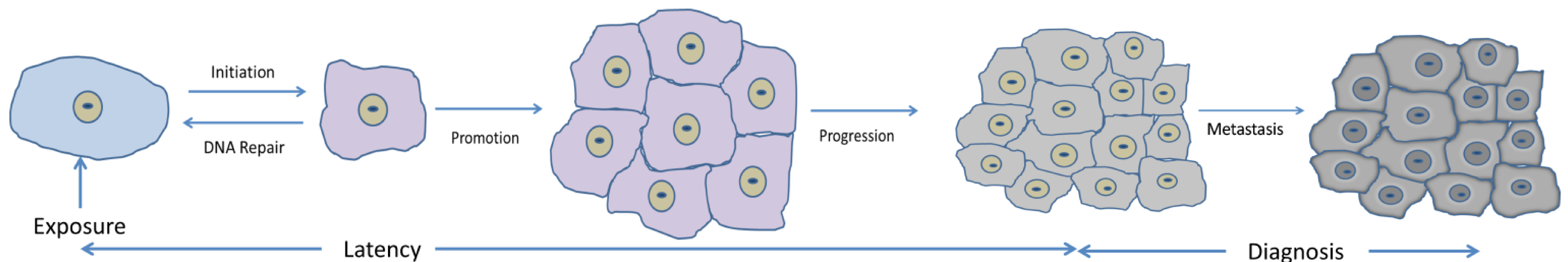
Initiation – Normal cell division is disrupted by changes in the cell DNA, occurring either naturally or is induced by exposure to a carcinogenic agent. If the body recognizes the altered cell, it will attempt to repair or kill the cell. If the altered cell is not recognized, it can reproduce.

Promotion – A process in which existing tumors are stimulated to grow, but do not cause cancer.

Latency period – The time between cancer initiation and clinical diagnosis. It is typically decades for solid tumors, but can be much shorter for blood-related cancers.

Diagnosis – A specific type of cancer is diagnosed based on the target organ cells, the size of the tumor, and if it has spread outside the original tumor.

The graphic also indicates points in the cancer process that interventions and treatments can be taken.



Background on Pediatric Cancers

Pediatric cancer, although less common than adult cancer, is the second leading cause of death in children ages 5 – 14.

The 2013 incidence rate of pediatric cancer, which is the most recent year of available data from the Centers for Disease Control and Prevention (CDC), was 16.8 cases per 100,000 children over a calendar year.

The probability that a child will develop a malignant cancer before age 15 is about 1 in 408 children.

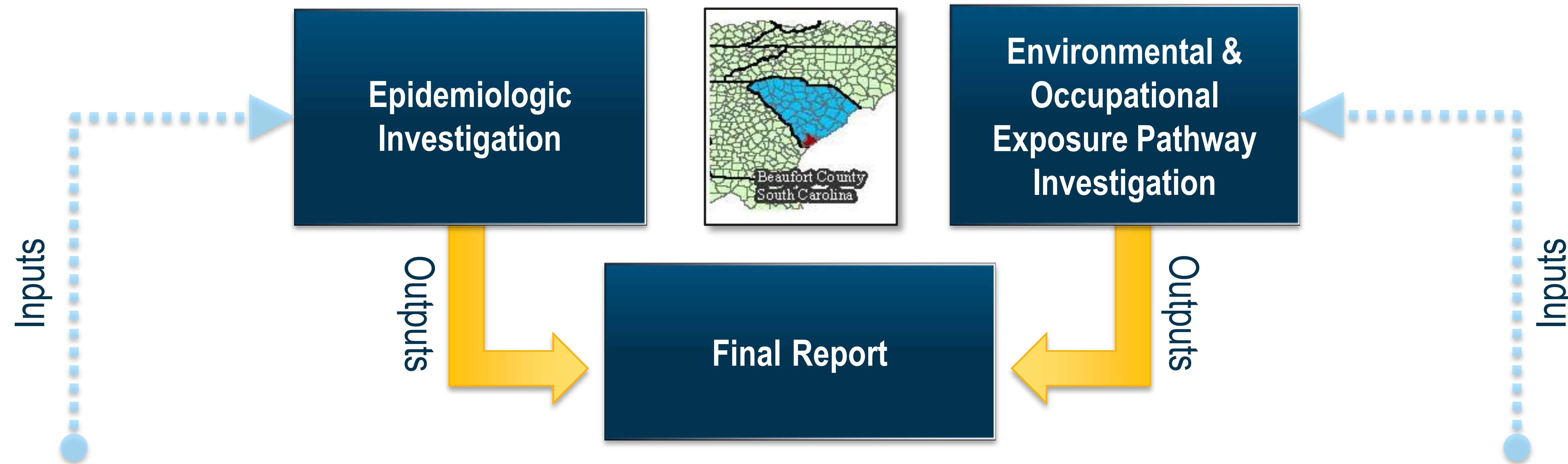
The types of cancer and proportion of cases that develop in children ages 0 – 14 years are:

- **Acute lymphocytic leukemia (26%)**
- **Brain and central nervous system (21%)**
- **Neuroblastoma (7%)**
- **Non-Hodgkin lymphoma (6%)**
- **Wilms tumor (5%)**
- **Acute myeloid leukemia (5%)**
- **Bone tumors (4%)**
- **Hodgkin lymphoma (4%)**
- **Rhabdomyosarcoma (3%)**
- **Retinoblastoma (3%)**
- **Other types (16%)**



Cancer Cluster Investigations

We Follow CDC's Process



- Performed a focused review of medical databases to identify and confirm the diagnosis of pediatric cancer, as well as the type of cancer within a 30-mile radius of (Laurel Bay Military Housing LBMH) and Marine Corps Recruiting Depot (MCRD)
- Reviewed medical literature to determine known environmental risk factors for each confirmed cancer type

- Evaluated completed exposure pathways for both occupationally exposure and/or environmentally exposed at LBMH
- Gathered and reviewed available historical occupational and environmental records for LBMH, MCAS and MCRD
- Conducted on-site investigation at LBMH, MCAS, MCRD and Naval Hospital Beaufort Housing
- Assessed the need for collecting additional environmental or occupational data to fill data gaps



Public Health Review (PHR) Results & Findings

RESULTS

- Initiated June 2015
- Documents reviewed to determine potential health risks related to environmental releases from past disposal/handling practices at housing, solid waste management units, underground storage tanks, etc.

FINDINGS

- 15 pediatric cancer cases were validated (January 2002 through December 2016)
- Types of cancers validated to date include,
 - acute lymphocytic leukemia (ALL)
 - acute myeloid leukemia (AML)
 - neuroblastoma
 - soft tissue sarcoma (e.g., infantile rhabdomyosarcoma)
 - Wilms tumor
- 3 of 5 validated cancer types have known environmental risk factors (ionizing radiation from x-rays and benzene)
- The distribution of the same cancers in this population is within normal pediatric cancer population

The CDC defines a cancer cluster as a greater-than-expected number of cancer cases that occurs within a group of people in a geographic area over a defined period of time.

One of every four deaths in the United States is attributable to some form of cancer.

Multiple factors affect the likelihood of developing cancer, including age, genetic factors, and lifestyle behaviors.



Installation Restoration Program

WHO

Who is involved with the Installation Restoration Program?

- MCRD Parris Island works closely with the U.S. Environmental Protection Agency, South Carolina Department of Health and Environmental Control, and Naval Facilities Engineering Command to clean up hazardous substances in soil, groundwater, and sediment at Parris Island.
- MCRD Parris Island must meet or exceed all Federal and State regulations regarding human health and the environment.

WHAT

What is the Installation Restoration Program?

- Focuses on hazardous substances in the environment due to past waste disposal operations and spills.
- Identifies, investigates, and cleans up or controls hazardous substances in soil, groundwater, and sediment.
- Monitors concentrations of hazardous substances in soil and groundwater to determine if there may be impacts to air quality (vapor intrusion) in buildings located on or near contaminated soil and/or groundwater.

WHERE

Where is the Installation Restoration Program?

- Installation Restoration Program sites are spread throughout Parris Island.
- Please see the map of Installation Restoration Program sites.

WHY

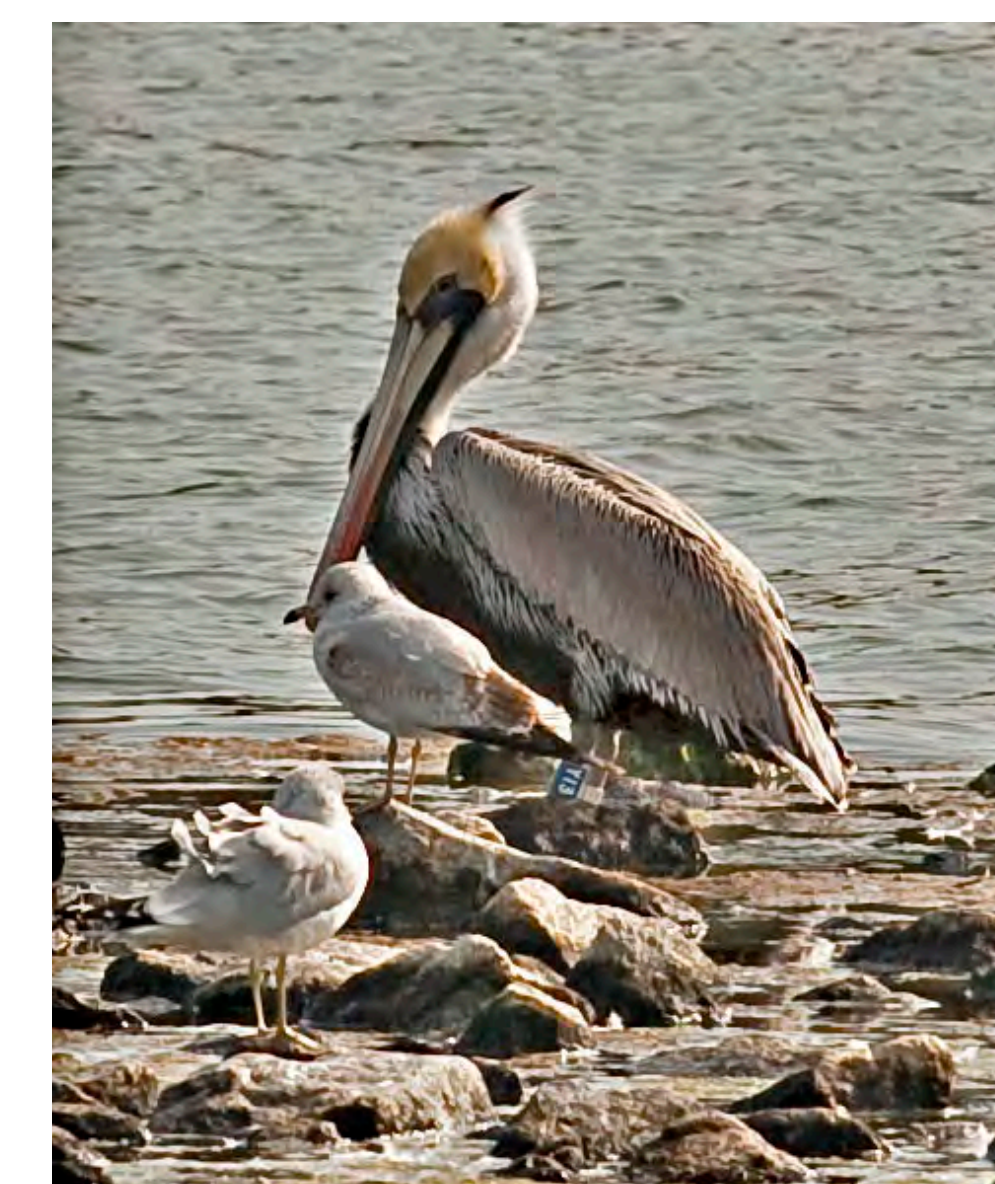
Why is there an Installation Restoration Program?

- The Installation Restoration Program is designed to protect human health and the environment.

WHEN

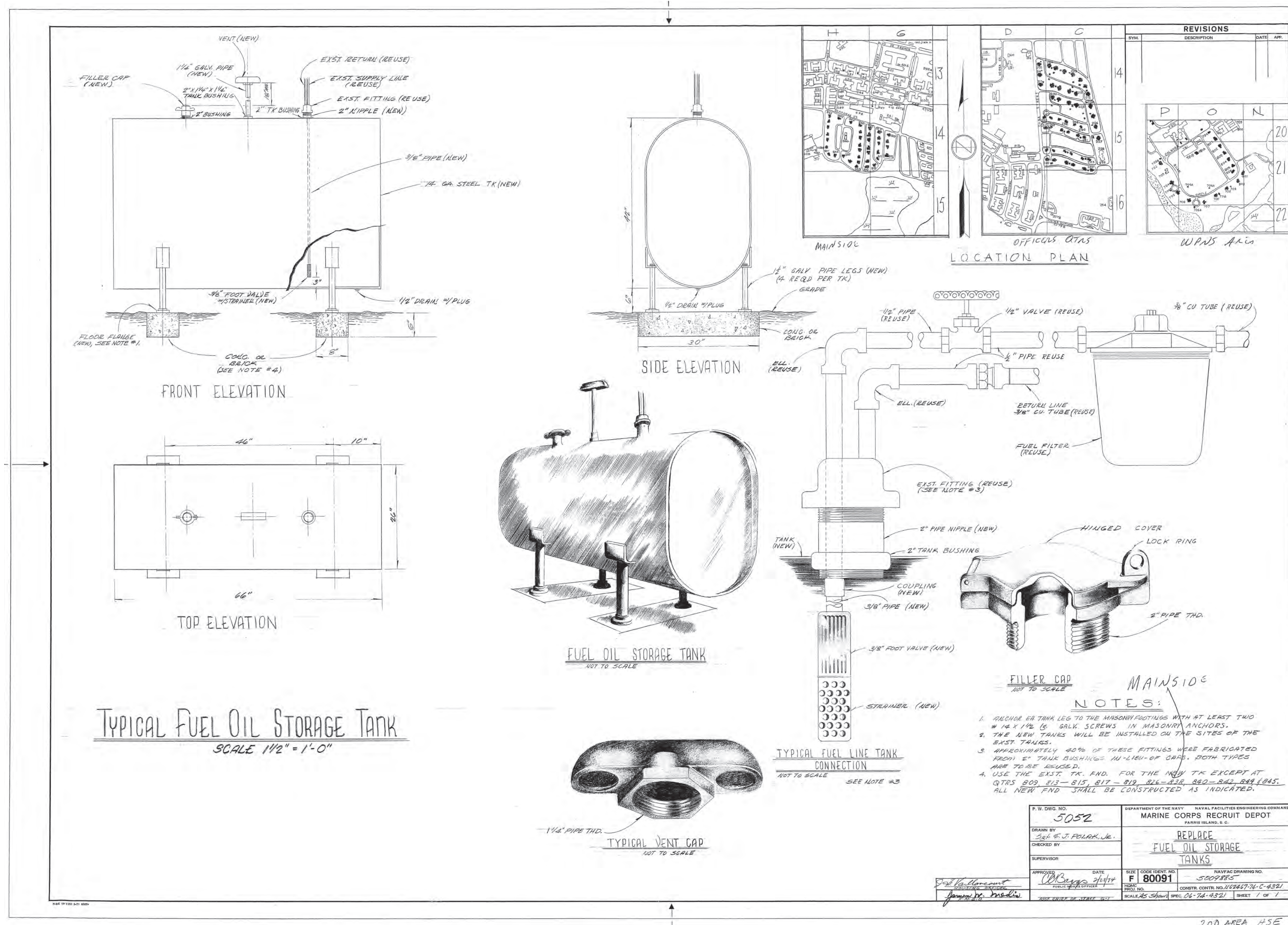
When did Parris Island begin cleaning up sites?

- The Installation Restoration Program began in approximately 1986.



Status of Underground Home Heating Oil Tanks at MCRD Parris Island

- A review of historical documentation indicates 27 underground home heating oil tanks may have existed at Parris Island.
- Based on historical documentation, underground home heating oil tanks that may have existed were replaced with aboveground tanks prior to 1974.
- The historical documentation indicates that underground home heating oil tanks were only installed at Type A houses.
 - 23 Type A houses were located in the Officer's Quarters community (now Marsh Landing).
 - 4 Type A houses were located in the Weapons Area community (now Weapons Sound).



Typical replacement fuel oil storage tank used at Parris Island after 1974.



Status of Underground Home Heating Oil Tanks at MCRD Parris Island

- Family housing was privatized in 2005. As a result, all houses in existence in 2005 have been demolished with the exception of four historic homes.
- To confirm the historical documentation, in 2002 MCRD Parris Island completed an investigation to look for any remaining underground heating oil tanks in the housing areas.
 - The investigation used two different types of metal detectors, probe rods, and digging.
 - **No underground heating oil tanks were found.**
- Currently, family housing is heated by electrical units.



Metal detectors being used at Parris Island. Following identification of a buried object by the EM-61, a Schonstedt was used to confirm and identify the outline of the buried object.



What is an Exposure Pathway?

An exposure pathway is the course along which a material in the environment moves from its source and into your body.

5 ELEMENTS OF AN EXPOSURE PATHWAY

1. Source – How the material gets in the environment.
2. Media – How a material moves from its source (e.g., soil, water or air).
3. Exposure Point – Where people contact the media.
4. Exposure Route – How the material enters the body (e.g., eating, drinking, breathing).
5. Receptor Population – People who are exposed or potentially exposed.

A pathway of exposure is considered complete when all 5 elements are present. A complete pathway connects the source of the material to people. If one element is missing, the pathway is incomplete and there is no exposure and no health effects.



What is an Exposure Pathway?

Routes of Exposure

Routes of exposure are breathing (inhalation), eating or drinking (ingestion), or contact with the skin (dermal contact).

SOIL

Access to impacted soils is limited until cleanup is completed to below risk-based levels.

GROUNDWATER

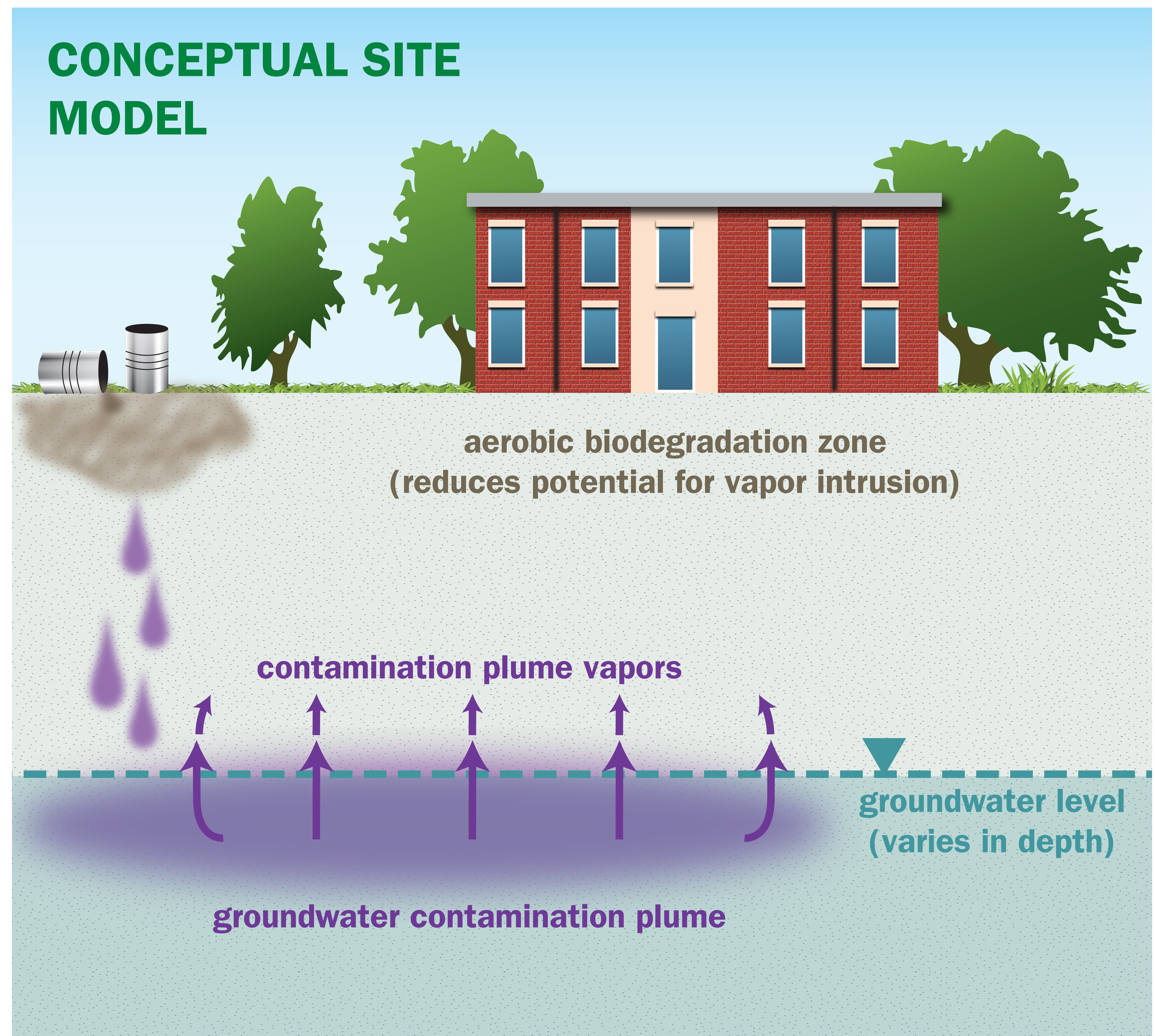
Groundwater is not used for drinking at MCRD Parris Island. Water is supplied by Beaufort Jasper Waster and Sewer Authority (BJWSA).

VAPOR

Soil vapor is evaluated, as necessary, based on site conditions.

Mitigation is conducted, if required, to reduce vapor levels to acceptable concentrations.

MCRD Parris Island works closely with State and Federal Regulatory Agencies to clean up hazardous substances and protect human health and the environment at Parris Island.



Public Health Review Conclusions

MCAS Beaufort

Based on the documents reviewed, the NMCPHC concludes that there are no apparent public health hazards as a result of contamination from past disposal and handling practices at 130 sites that were determined to have local impacts limited to direct contact to accessible contaminants.

Based on the results of the Radiation Safety Program and NAVRAMP evaluations, and radiation surveys and measurements, it is not likely that an individual would receive any additional radiation dose above normal background radiation from the occupied areas at LBMH, MCAS Beaufort, or MCRD Parris Island.

PURPOSE

To determine if a potential public health hazard exists as a result of environmental releases of hazardous substances from past use, handling, and disposal practices at MCAS Beaufort.

METHODOLOGY

The U.S. Navy Environmental Restoration Program (ER Program) provided many of the documents.

Other sources of information included:

- U.S. Navy Occupational Safety and Health Program
- MCAS' Radiation Safety Program
- Navy Radon Assessment and Mitigation Program (NAVRAMP)
- South Carolina Department of Health and Environmental Control (SCDHEC)

RESULTS

- NMCPHC identified 141 environmental sites at MCAS, of these, 130 sites were determined to have no apparent health hazards as a result of contamination from past disposal and handling practices.
- The remaining 11 were determined to have data gaps, which are typically sites that are currently in use or undergoing investigation in coordination with SCDHEC.
- This review found the Radiation Safety Program was in compliance with all federal, state and local requirements.
- Review of monitoring data indicates that no health effects are expected in workers due to ionizing radiation exposure.

MCAS continues to work with SCDHEC towards assessing environmental sites to ensure they do not present a health hazard to Marines, their families, and civilians aboard the Air Station.



Ongoing Environmental Investigation

No apparent public health hazard has been identified for LBMH residents from former heating oil tanks based on the extensive monitoring history within LBMH (including schools), the evaluation of potential exposures to residents from different media, former remediation efforts at individual residences, and technical plans which were coordinated with SCDHEC. The VI investigation is ongoing and SCDHEC continues to be involved with each step in the investigation.

- Each of the ~ 1,100 Capehart-style homes used heating oil and had one or more underground storage tanks (USTs).
- USTs were removed from each home site using procedures developed in coordination with SCDHEC.
- All home sites have undergone investigation in coordination with SCDHEC.
 - 990 sites require no further action based on SCDHEC determination.
 - 110 sites have ongoing investigation in coordination with SCDHEC.

NEXT STEPS INCLUDE:

- Temporary ground water monitoring well installation at 37 homes in September - October 2017.
- Permanent ground water monitoring well installation at 29 home demolition sites.
- Additional steps are dependent on results of current investigations.



Installation of a Source Area or Near-Slab Soil Vapor Well



Sampling of a Source Area or Near-Slab Soil Vapor Well



Installation of a Sub-Slab Soil Vapor Pin



Sub-Slab Soil Vapor Pin



Indoor Air Sampling



Public Health Review Conclusions

Laurel Bay Family Housing Area

Based on the types and number of cancers and the evaluation of their recognized risk factors, it is unlikely an environmental or occupational exposure is associated with the pediatric cancers at LBMH.

PURPOSE

Determine if there is a complete exposure pathway for chemicals in the air, water, soil, or soil gas by ingestion, inhalation, or dermal contact which could have contributed to the incidence of cancer.

- Determine the exposure routes (ingestion, dermal, inhalation).
- Determine the specific chemicals that may be present in air, water, soil, or soil gas.



RESULTS:

Two risk factors were identified.

- **Ionizing radiation.** Ionizing radiation is a risk factor for 3 of the 5 types of confirmed pediatric cancers.
- **Benzene.** Benzene is a risk factor for 1 of the 5 types of confirmed pediatric cancers.

CONCLUSIONS:

Ionizing radiation

- It is not likely any individual would receive any additional radiation exposure above normal background radiation from occupied areas of MCAS, MCRD, or Laurel Bay.

Benzene

- Ground water is not used as a source of drinking water for Laurel Bay; therefore, exposure via drinking water is not a pathway.
- While vapor intrusion investigation is ongoing, the results of UST investigations to date indicate that exposure to indoor air concentrations of the constituents of home heating oil is not a pathway for residents in Laurel Bay.

