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# **PENNSYLVANIA BUREAU OF RADIATION PROTECTION**

## **ENVIRONMENTAL RADIATION IN PENNSYLVANIA**

### **2013 ANNUAL REPORT**



**pennsylvania**

**DEPARTMENT OF ENVIRONMENTAL  
PROTECTION**

*Commonwealth of Pennsylvania  
Department of Environmental Protection  
Bureau of Radiation Protection*

[www.dep.state.pa.us](http://www.dep.state.pa.us)

## Table of Contents

Bureau of Radiation Protection	
Introduction .....	1
Summary .....	1
Animal Monitoring After Radionuclide Release .....	1
Radium-Contaminated Property .....	1
TENORM Study .....	2
Radiation Control	
Introduction .....	3
Mammography .....	5
Diquad Analyzer™ .....	5
Radon	
Introduction .....	6
Radon Outreach .....	6
New Home with High Radon Levels .....	6
Radon Hero Award .....	6
Nuclear Safety	
Introduction .....	7
Limerick Generating Station .....	7
Reactor Oversight Process .....	7
Bell Bend Nuclear Power Plant .....	7
Post-Fukushima Monitoring .....	7
Nuclear Power Plant Drills and Exercises .....	7
Radioactive Waste & Emergency Response	
Introduction .....	9
Low-Level Radioactive Waste Program .....	9
Three Mile Island Hostile Action-Based Exercise .....	10
Limerick Generating Station Hostile Action-Based Exercise .....	11
Decommissioning	
Introduction .....	12
Keystone Metals Reduction .....	12
Whittaker .....	13
Remacor .....	14
Strube, Inc. ....	14
Safety Light Corporation .....	15
Karnish Instruments .....	16
Westinghouse Waltz Mill .....	17
Environmental Surveillance	
Introduction .....	18
Radioactivity Measurements .....	19
Background Radiation Monitoring .....	20
Pennsylvania Water Quality Network .....	21
Precipitation Monitoring .....	22

---

Source-Oriented Monitoring .....	23
Beaver Valley Power Station.....	25
Limerick Generating Station .....	31
Peach Bottom Atomic Power Station .....	36
Susquehanna Steam Electric Station .....	42
Three Mile Island Nuclear Station .....	47

## Appendix

### Background Radiation Monitoring

Pennsylvania Water Quality Network Data .....	57
Precipitation Monitoring Data .....	59

### Source-Oriented Monitoring

Beaver Valley Power Station	
Quarterly Thermoluminescence Dosimetry (TLD) Inter-comparison .....	60
TLD Data .....	61
Air Sampling Data .....	62
Air Particulate Composites .....	66
Surface Water Data .....	67
Milk Sampling Data .....	69
Fish, Produce & Sediment Data .....	70
Limerick Generating Station	
Quarterly TLD Inter-comparison .....	71
TLD Data .....	72
Air Sampling Data .....	73
Air Particulate Composites .....	77
Surface Water Data .....	78
Milk Sampling Data .....	80
Fish, Produce & Sediment Data .....	81
Peach Bottom Atomic Power Station	
Quarterly TLD Inter-comparison .....	82
TLD Data .....	83
Air Sampling Data .....	84
Air Particulate Composites .....	88
Surface Water Data .....	89
Milk Sampling Data .....	90
Fish, Produce & Sediment Data .....	91
Susquehanna Steam Electric Station	
Quarterly TLD Inter-comparison .....	92
TLD Data .....	93
Air Sampling Data .....	94
Air Particulate Composites .....	98
Surface Water Data .....	99
Milk Sampling Data .....	101
Fish, Produce & Sediment Data .....	102
Three Mile Island Nuclear Station	
Quarterly TLD Inter-comparison .....	103
TLD Data .....	104
Air Sampling Data .....	105
Air Particulate Composites .....	110

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Surface Water Data .....	111
Milk Sampling Data .....	112
Fish, Produce & Sediment Data .....	113

# **BUREAU OF RADIATION PROTECTION**

***“Building on the past to shape the future.”***

## **MISSION**

**“Our mission is to safeguard the public health and safety and the environment from harmful and unwanted, unnecessary or inappropriate exposure from controllable radiation sources.”**

**We “LEAD BY EXAMPLE” and value:**

- **Public Service**
- **Teamwork**
- **Professional Development**

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## **BUREAU OF RADIATION PROTECTION**

### **INTRODUCTION**

The Department of Environmental Protection (DEP), Bureau of Radiation Protection's (BRP) mission is to ensure that public, occupational and environmental exposure to radiation from man-made and controllable natural sources is As Low As Reasonably Achievable (ALARA).

The BRP manages the regulation and inspection of users of radiation sources throughout the state. It performs a nuclear safety review while evaluating nuclear power plants and conducts an emergency radiation response program. It administers a statewide radon program by increasing public and professional awareness of radon and its health risks. The BRP licenses and inspects users of radioactive materials as part of an agreement with the U.S. Nuclear Regulatory Commission (NRC). It also licenses and/or registers all radiation-producing machines in the state. The BRP performs technical reviews of decontamination and decommissioning activities for radioactive materials licensees and oversees a comprehensive environmental radiation monitoring program.

The report is submitted to the President Pro Tempore of the Senate and the Speaker of the House of Representatives and made available to the general public.

### **SUMMARY**

As directed by the Radiation Protection Act of 1984 (Act 147) and DEP's mission statement, BRP plays a vital role in protecting public health and safety. BRP is staffed by professionals committed to protecting the public, workers and environment from any potential negative effects resulting from radiation exposure.

### **ANIMAL MONITORING AFTER RADIONUCLIDE RELEASE**

In February 2013, BRP staff attended a meeting held by the U.S. Department of Agriculture regarding the monitoring and decontamination of animals in the aftermath of a release of radionuclides to the environment. Topics covered in the meeting included current emergency plans in effect with the Commonwealth of Pennsylvania, proposed monitoring and decontamination methodology and specific areas of responsibility for transporting, monitoring and determining final disposition strategies for pets and farm animals. The meeting served as a basis for development of more specific guidance in the future.

### **RADIUM-CONTAMINATED PROPERTY**

In March 2013, a concerned citizen contacted BRP regarding a relative who worked for a former company (Bendix Corporation) that used radium during the 1940s. The federal government performed tests on the relative in the 1970s. The citizen attempted several times to obtain the records from these tests to no avail. BRP contacted the laboratory and the repository that houses these records. The records were found and copies were made for the family.

Another concern was that the former company site in Philadelphia may still be contaminated. The property currently houses a charter school. The former company had a south plant and a north plant. It was not known if the radium work had been done in the south plant, which houses the school, or the now demolished and removed north plant. A preliminary gamma radiation survey of the building exterior and adjacent roadways showed no gross radium contamination. Radiological surveys inside the building also did not show any measurable radium contamination.

## **TENORM STUDY**

In 2013, DEP initiated a study to collect data relating to technologically enhanced naturally occurring radioactive material (TENORM) associated with oil and gas operations in Pennsylvania. This study includes the assessment of potential worker and public radiation exposure, TENORM disposal, and other possible environmental impacts. The study encompasses radiological surveys at well sites, wastewater treatment plants, landfills, gas distribution and end use, and oil and gas brine-treated roads. The media being sampled includes solids, liquids, natural gas, ambient air, and surface radioactivity.

This study, which is expected to be completed in late 2014, is aimed at ensuring that public health and the environment continue to be protected.

The report will be peer-reviewed prior to being finalized and published.

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## **RADIATION CONTROL**

### **INTRODUCTION**

BRP's Radiation Control Division works to keep the public exposure to radiation-producing machines and radioactive materials to ALARA and to help prevent radiation injury from the use of licensed or registered sources.

The division is responsible for the registration of over 10,000 facilities possessing over 37,000 X-ray units.

DEP has a goal to inspect all facilities at least once every four years to ensure that patients, personnel, and the environment are protected, that operators are properly trained and radiation equipment and facilities meet current protection standards. Major facilities may be inspected every two to three years.

Users of radiation-producing machines are required to register with the division, to designate an individual to be responsible for radiation protection, and to indicate the number and type of units possessed. Registration allows the division to maintain an inventory of X-ray equipment in Pennsylvania so that all users can be inspected for compliance with the applicable radiological health regulations. Users pay registration fees based on the type of facility and the number of tubes possessed. The division oversees the production and issuance of associated registration certificates, renewal letters, invoices, and the collection of initial and annual fees.

The division has participated in the U.S. Food and Drug Administration's (FDA) National Evaluation of X-ray Trends program since its inception in the mid-1970s. The program tracks exposure to patients from selected diagnostic X-ray procedures over the years. FDA randomly selects the facilities to be surveyed and provides a list to BRP along with the necessary patient equivalent phantoms, survey equipment and protocols needed to conduct the surveys.

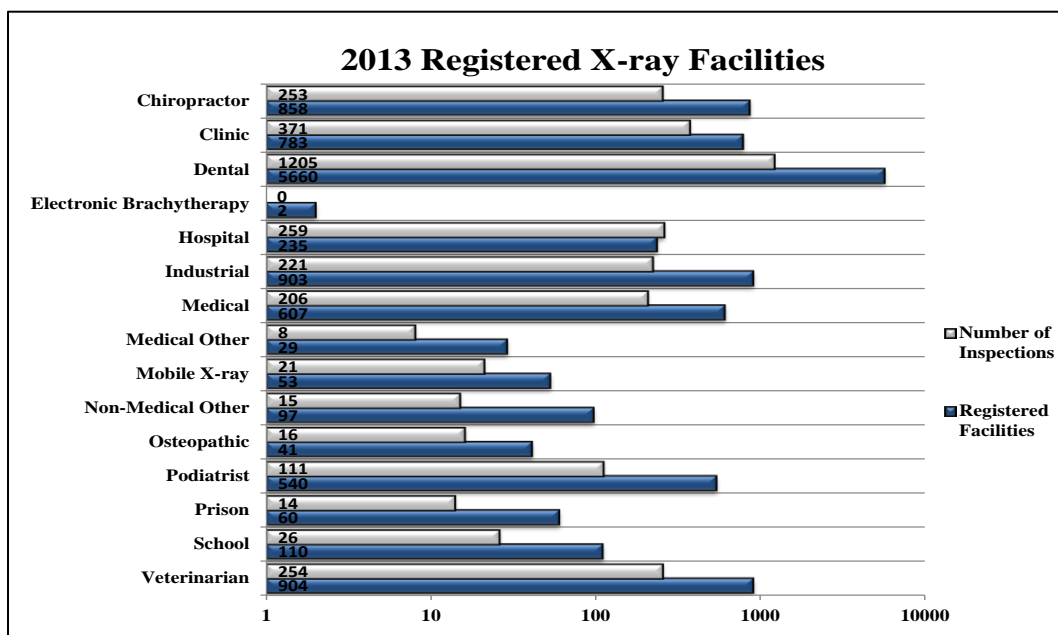
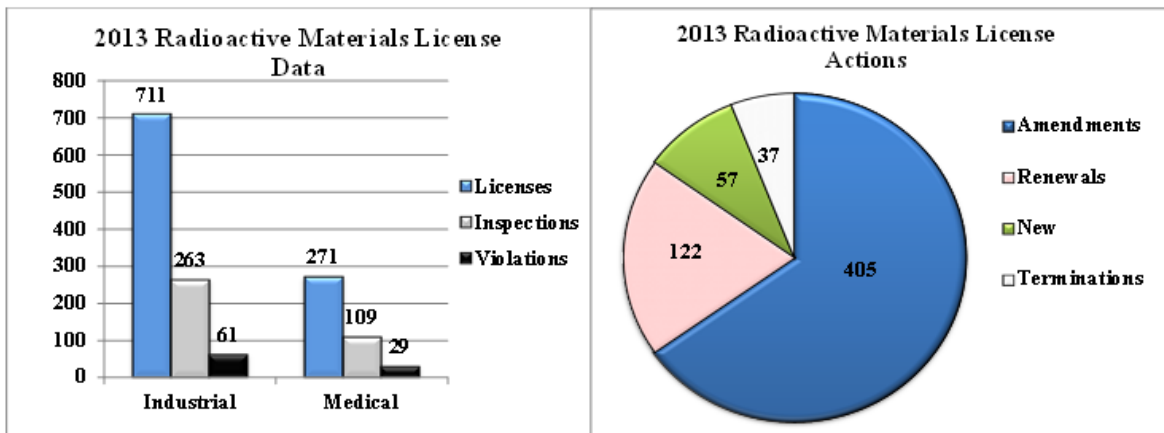
The division issues specific licenses to medical and non-medical accelerator facilities. In 1998, the regulations were amended to replace the previous registration program. By the end of 2013, there were 153 accelerator facilities in the state. Unlike registration, licensing requires prior approval for licensed activities. Accelerator operations are complex and information must be provided up-front so DEP can determine on a case-by-case basis what requirements are necessary for the accelerator to be used safely. The division oversees the production and issuance of associated accelerator license certificates, license renewal letters, invoices and the collection of the license fees. Pre-licensing inspections are conducted by the regional staff in coordination with the central office license reviewer.

Users of all byproduct materials are required to obtain a license from the division prior to obtaining those radioactive materials. This material is used in hospitals, colleges, and industries for medical, research, and industrial purposes. DEP issues specific and general licenses for the use of radioactive material. The objective of the licensing program is to ensure radioactive material is used safely, disposed of properly and facilities are free from contamination when licensed operations are terminated. Licensees pay fees based on the type of radioactive material being used; thus, the licensing and inspection programs are self-supporting.

The division is responsible for the registration of over 300 service providers/vendors throughout the state. Those who provide services for radiation-producing machines (X-ray machines and accelerators) are required to register with the division. They are also required to provide to the division information on what equipment or service was provided, by whom, and when and where it was provided to the X-ray registrants and accelerator licensees in the state. The division oversees the production and issuance of associated registration certificates, renewal letters, invoices, and the collection of initial and annual fees.

In addition to the aforementioned routine activities, staff perform a number of special projects. These projects are related to: special investigations of medical events (misadministration of radiation-producing machines and materials); development of educational materials; training; support of radioactive material site decommissioning; review of complex proposals for healing arts screening using X-rays (e.g., whole body Computed Tomography screening); participation in emergency response activities involving nuclear power or radioactive materials; maintaining a radiation protection advisory committee drawn from the public, regulated and scientific communities; performing outreach to the community on the subject of mammography cancer screening; and answering questions regarding non-ionizing hazards from such things as microwaves, power lines and tanning booths.

In 2013, the division was responsible for 10,882 registered X-ray facilities, 153 licensees of accelerators and 982 licensees of radioactive material. Of the 982 licensees, 670 were specific licenses of which 67 were issued increased controls, 115 were reciprocity licenses and 197 were general licenses. There were 490 new registrations, four new accelerator licenses and 57 new radioactive material licenses issued in 2013.



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## MAMMOGRAPHY

The Mammography Quality Standards Act of 1992 (MQSA) is a federal law that makes sure every mammography facility meets rigorous quality standards. The regulations regarding MQSA can be found in Title 21 Code of Federal Regulations (CFR) Part 900. The FDA continued its MQSA contractual agreement with the DEP for the 2012/2013 fiscal year. The contract requires the DEP to conduct annual inspections of all mammography facilities in Pennsylvania. The inspections must meet rigorous federal quality standards in order to assure each mammography facility is operating at a high level of proficiency. All BRP MQSA inspectors have received extensive training and attend refresher courses annually. In 2013, 358 MQSA inspections were completed.

In March 2013, a representative from BRP attended the 2013 Women's Veteran's Symposium in Gettysburg to provide guidance and information pertaining to mammography and the importance of breast cancer awareness. Information of the role of the BRP in administering the FDA's MQSA contract was also provided. The symposium was hosted by the Pennsylvania Department of Veterans Affairs and the Pennsylvania Veteran's Foundation.

## DIQUAD ANALYZER™

In March 2013, BRP staff met with representatives from the Pennsylvania Dental Association (PDA) and their representative to the DEP Radiation Protection Advisory Committee to discuss growing concerns with patient radiation exposure identified in a number of medical and dental journals. Staff explained BRP's dental X-ray equipment testing initiative and solicited the PDA's support in communicating the value of this project to their members. The ongoing project implements the use of a new X-ray test device called the DIQUAD *Analyzer*™ for enhancing the evaluation of intraoral dental radiographic equipment. The data gathered from the continuing evaluation will assist in facilitating a patient radiation dose trend analysis and improving image quality. The DIQUAD is a relatively new device which provides the BRP additional metrics to the normal equipment and facility inspection process. This new initiative includes optimization of patient radiation dose and image quality, thus improving the services provided by the BRP to the dental community and, more importantly, the patient.

## **RADON**

### **INTRODUCTION**

The Radon Division ensures public health and safety by increasing public and professional awareness of radon and its health risks by administration of a certification program for radon testing, mitigation, and laboratory analysis for firms and individuals.

In 2013, the division performed 49 inspections. Eight inspections were done for mitigation businesses; eight inspections were done at private residences where a mitigation system was installed; 30 inspections were done for certified radon testers; and three inspections were done in the first six months of certified radon testers' employment to ensure a positive start-up.

After some uncertainty, the division received full funding under the State Indoor Radon Grant from the U.S. Environmental Protection Agency (EPA) for its continued efforts at radon outreach, training, testing, mitigation, research and other activities. This will allow the division to continue these efforts from October 1, 2013 through September 30, 2014.

### **RADON OUTREACH**

In January 2013, representatives of the BRP participated in a live radon call-in program on WBRE/WYOU-TV Eyewitness News in Wilkes-Barre. WBRE TV has a viewing audience consisting of 19 counties with approximately 1.5 million viewers. In addition to BRP staff, phones in the WBRE studio were manned by a retired physics professor, an American Lung Association representative and other experts in the field. The panel answered questions from the WBRE viewing audience on many different aspects of radon.

The division hosted a booth at the Pennsylvania Home Show in March 2013. This was an ideal venue since radon is a significant issue for both new home buyers as well as homeowners in general.

In September 2013, division staff attended the Pennsylvania Association of School Business Officials Conference held in Camp Hill. BRP was an exhibitor for promoting radon testing in schools. Approximately 60 school districts were represented at this conference.

### **NEW HOME WITH HIGH RADON LEVELS**

In March 2013, staff from the division traveled to a newly constructed home in Chester County to sample, survey and investigate a home with a reported radon reading of 800 picocuries per liter (pCi/L). This result was 200 times higher than the EPA Action Level of 4 pCi/L. The homeowners had completed a radon test and found these results. The results were confirmed with grab sampling by the BRP staff. Follow-up testing of two neighboring properties took place and showed elevated levels as well. One home measured 446 pCi/L, and the other home measured 309 pCi/L. BRP reported these results to the builder of these new homes as well as the local officials.

### **RADON HERO AWARD**

At the National Radon Conference in September 2013, BRP's Radon Division Chief, Robert Lewis, was awarded the Conference of Radiation Control Program Directors (CRCPD) "Radon Hero Award" for outstanding radon work in service to the public.

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## **NUCLEAR SAFETY**

### **INTRODUCTION**

The Nuclear Safety Section (NSS) in BRP conducts a comprehensive nuclear power plant oversight review program at the five nuclear power plant sites in Pennsylvania. Oversight responsibilities include routine site visits, safety reviews, off-hour surveillance, license amendment reviews, generic and specific nuclear safety issue evaluations, nuclear power plant emergency exercise participation and radioactive waste shipment inspections.

During calendar year 2013, the NSS conducted over 500 site visits and safety review activities at the five nuclear power plant sites in Pennsylvania. This included “walk-down” surveillance of various plant areas, interactions with the NRC resident and regional inspectors, review of proposed license amendments and attendance at various meetings. Although the NRC has the authority for regulating and inspecting nuclear power facilities, the NSS staff provide an independent assessment of plant operations and input to the NRC review and approval process.

### **LIMERICK GENERATING STATION**

The NSS continued to monitor the NRC’s activities related to the license renewal application for the Limerick Generating Station. The staff also review related correspondence and attend the NRC public meetings as appropriate.

The NRC conducted two meetings to seek public comment and input to the draft supplemental environmental impact study prepared pursuant to a petition to extend the license for Limerick Generating Station Unit One and Unit Two for a period of 20 years. NSS staff attended both meetings.

### **REACTOR OVERSIGHT PROCESS**

The NSS continued to monitor the NRC’s implementation of the new Reactor Oversight Process at the Pennsylvania nuclear power plants. The NSS also monitored the NRC regulatory activities by attending the NRC Regulatory Information Conference and the annual assessment public meetings for each of the nuclear power plant sites in Pennsylvania.

### **BELL BEND NUCLEAR POWER PLANT**

The NSS monitored the NRC review of PPL Electric’s application for a new nuclear power plant site (Bell Bend Nuclear Power Plant) in Berwick, including review of related correspondence and interface with the NRC and DEP staff on environmental aspects of the application.

### **POST-FUKUSHIMA MONITORING**

The NSS staff scrutinized post-Fukushima industry actions and the regulatory initiatives for the nuclear power plants.

### **NUCLEAR POWER PLANT DRILLS AND EXERCISES**

The NSS staff routinely participate in emergency preparedness drills and exercises at the Pennsylvania nuclear power plants. Participation in these drills and exercises are important in maintaining the capability to assess plant conditions during a real event. It also provides the state with the opportunity to evaluate and assess the licensee’s ability to provide adequate information and to take appropriate actions to mitigate the consequences of an event. In addition to routine exercises of radiological scenarios in nature, the NSS staff also participated in the tabletop, rehearsal and federally evaluated Hostile Action-Based

(HAB) exercises for Three Mile Island and Limerick Generating Station during 2013. The HAB exercise involves a security-based scenario or event at a nuclear power plant that may or may not result in a release of radioactive materials. The HAB exercise at Three Mile Island was the first federally evaluated exercise of this nature in the United States. Approximately 33 staff from the BRP central office and regional offices participated in each HAB exercise.

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## **RADIOACTIVE WASTE & EMERGENCY RESPONSE**

### **INTRODUCTION**

The Radioactive Waste & Emergency Response Section oversees the activities associated with the management and disposal of low-level radioactive waste (LLRW) in Pennsylvania. This section also monitors activities related to the development of a high-level radioactive waste (HLRW) repository and transportation of HLRW and spent nuclear fuel.

As of January 1, 1999, the Radioactive Waste Section assumed the administrative duties of the Appalachian States LLRW Compact Commission (Commission). The Commission represents the four compact party states of Delaware, Maryland, Pennsylvania, and West Virginia.

The Radioactive Waste & Emergency Response Section also provides planning and support for the state's response to nuclear power plant accidents and other incidents involving radioactive material in Pennsylvania. The section also coordinates with the Pennsylvania Emergency Management Agency (PEMA) and the Federal Emergency Management Agency (FEMA) for training of bureau staff in radiological emergency response.

Over a half-million individuals live within the Emergency Planning Zone (within a 10-mile radius) of the five nuclear power plant sites in Pennsylvania. Timely, effective and protective action decisions on their behalf are necessary in the event of a nuclear power plant accident. These decisions depend on the continued viability of a comprehensive radiation emergency plan; up-to-date techniques; radiation detection equipment; ongoing staff training; and coordination with nuclear utilities, federal agencies and other state agencies. The BRP has a major responsibility to provide technical support and assistance to PEMA during a nuclear event or emergency.

BRP participated in 25 emergency preparedness drills and exercises at Pennsylvania's nuclear power plants in 2013. Two of these were FEMA-evaluated nuclear power plant biennial exercises. In 2013, the FEMA exercises were held at Three Mile Island Nuclear Station and Limerick Generating Station. Participation in these drills and exercises is important to maintain the ability to assess plant conditions in actual events. It also provides the Commonwealth of Pennsylvania with an opportunity to evaluate and assess the licensee's ability to provide adequate information and to take appropriate actions to mitigate the consequences of an event.

### **LOW-LEVEL RADIOACTIVE WASTE PROGRAM**

DEP continued to perform the administrative responsibilities and duties of the Commission. The Commission's powers and duties are specified in the Appalachian States LLRW Compact Act of 1985 (Act 1985-120).

In January 2013, the Commission provided a bulletin to all LLRW generators in the Appalachian Compact and informed them of the availability of the Waste Control Specialists (WCS) disposal facility and, specifically, disposal options for Class B and C wastes. The Commission also responded to several inquiries by the generators regarding access to the WCS disposal facility in Texas.

In March 2013, a representative from the LLRW program represented the department at the Low-Level Waste Forum (Forum) meeting in Charleston, South Carolina, as one of the Forum directors. The Forum was established to facilitate state and compact implementation of the LLRW Policy Act and to promote the objectives of LLRW regional compacts. A representative from the Commission also attended this meeting.

In September 2013, DEP published the combined DEP and Commission annual LLRW report for 2011. The report provides a summary of the current activities of the Appalachian Compact, a list of all LLRW generators in the Compact and the amounts of LLRW disposed of by volume and radioactivity. It also contains a discussion of LLRW generation trends, including waste minimization and financial statistics, pertaining to all aspects of the Compact.

In October 2013, the DEP held the annual meeting of the LLRW Advisory Committee. The primary purpose of the meeting was to discuss regional and national issues and recent developments pertaining to disposal of LLRW. DEP also provided an overview of its recent activities and initiatives at the national level as follows:

- Provided input and worked closely with the NRC staff on a risk-informed, performance-based blending concept for LLRW;
- Represent the Organization of Agreement States on the NRC Storage Working Group and the development of the Regulatory Issue Summary on Extended Storage;
- Served on the Forum Working Group and provided extensive comments to the NRC regarding 10 CFR Part 61 proposed revisions;
- Provided information and assistance to the state of Texas in support of a characterization study for LLRW to be disposed of at the WCS disposal facility;
- Provided two separate Information Notices to the radioactive materials licensees and LLRW generators in Pennsylvania on collection and disposal of sealed sources at the EnergySolutions facility in Utah and the WCS facility in Texas.

A representative from the LLRW program represented DEP at the Forum meeting in Utah as a Forum director in October 2013. At this meeting, the representative provided an update on recent activities of the Appalachian Compact.

The LLRW program staff coordinated and attended the 2013 annual meeting of the Commission in Harrisburg.

A representative from the LLRW program staff continued to serve on the Forum Working Group on 10 CFR Part 61 Rulemaking. The Working Group provided extensive comments to the NRC regarding its proposed approach to revising LLRW regulations in Part 61.

DEP continued to monitor the generation of LLRW in Pennsylvania. DEP significantly reduced the regulated community's administrative LLRW reporting requirements by obtaining the appropriate disposal information directly from the national Manifest Information Management System database.

### **THREE MILE ISLAND HOSTILE ACTION-BASED EXERCISE**

In February 2013, BRP staff attended the Three Mile Island (TMI) HAB tabletop exercise at the Exelon emergency operations facility (EOF) in Coatesville. BRP was represented at the utility EOF and the technical support center (TSC), the state emergency operations center (SEOC) and at the incident command post (ICP) stations. The scenario involved a simulated airborne attack on TMI in conjunction with a ground-based assault. In addition to BRP staff and utility personnel, representatives from FEMA, NRC, Pennsylvania State Police, Federal Bureau of Investigations and the TMI risk and support counties (York, Lancaster, Dauphin, and Schuylkill) participated in this exercise. Also in attendance were invited observers from Ohio and Maryland as well as utility personnel from Beaver Valley Power Station. The exercise was a prelude to the April 2013 federally evaluated TMI HAB exercise, which was the first in the nation.

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After the tabletop exercise in February 2013, BRP staff participated in the TMI HAB exercise rehearsal. BRP staffed the SEOC, the utility EOF in Coatesville, the ICP, alternate reporting location and field monitoring teams. BRP received information from the utility and provided technical analysis to the senior state official at the SEOC. Field teams completed equipment and instrument operational checks at the Bureau of Laboratories. After receiving a briefing from the field team coordinator, the field teams were dispatched to the vicinity of TMI to obtain radiological surveys in support of the exercise. The rehearsal was conducted in preparation for the federally evaluated HAB exercise in April 2013.

In April 2013, BRP staff participated in the TMI HAB exercise. BRP staffed the SEOC, utility EOF in Coatesville, ICP, alternate reporting location and two field monitoring teams. BRP received information from the utility and provided technical analysis and protective action recommendations to the senior state official at the SEOC. Field teams completed equipment and instrument operational checks at the Bureau of Laboratories. After receiving a briefing from the field team coordinator, the field teams were dispatched to the vicinity of TMI to perform radiological surveys in support of the exercise. The FEMA evaluators complimented BRP on its performance in the exercise.

### **LIMERICK GENERATING STATION HOSTILE ACTION-BASED EXERCISE**

In October 2013, BRP staff participated in the Limerick Generating Station HAB rehearsal exercise. BRP staffed the SEOC, the utility EOF and the Tactical Operations Center (TAC). BRP also provided two field teams and a field team command vehicle to support the exercise. A full complement of Emergency Plan Liaison Officers were at PEMA. The exercise scenario involved hostile forces attacking the site and disabling offsite electrical power and the onsite diesel generators that supply power to the Unit 1 reactor. Security forces eventually neutralized the hostile forces, and the utility developed plans to supply an alternate Alternating Current (AC) power source to provide power to the Unit 1 cooling systems. The exercise was in preparation for the HAB exercise at Limerick Generating Station in November.

In November 2013, BRP staff participated in the Limerick Generating Station HAB exercise. BRP staffed the SEOC, utility EOF and TSC, law enforcement's TAC and nuclear atmospheric plume monitoring field teams. The drill was organized by PEMA, the utility and BRP. BRP staff provided critical support by technically assessing the severity of the HAB scenario and its radiological consequence on affected commonwealth citizens and the environment. BRP was not evaluated by FEMA in this exercise; however, FEMA observed and commented on BRP's success.

## **DECOMMISSIONING**

### **INTRODUCTION**

The Decommissioning Section performs technical reviews of decontamination and decommissioning activities for radioactive materials licensees in accordance with appropriate state and federal criteria. Typical reviews include the evaluation of financial assurance mechanisms required for decommissioning, site characterization plans and reports, health and safety plans for decommissioning activities, decommissioning plans and final status survey (FSS) reports. The section performs confirmatory inspections during and after decommissioning activities to ensure the licensee has met the required levels for decontamination. In addition, the section provides technical support for radiologically contaminated sites that are remediated under the DEP's Hazardous Sites Cleanup Act (HSCA) program and the EPA Superfund program.

Extensive technical reviews of licensee submittals and confirmatory inspections in 2013 involved Whittaker and Westinghouse Waltz Mill.

Extensive technical support for the DEP HSCA and EPA Superfund programs in 2013 involved Keystone Metals Reduction, Remacor, Strube, Inc., Safety Light Corporation and Karnish Instruments.

### **KEYSTONE METALS REDUCTION**

During the early 1900s, Keystone Metals Reduction (KMR) operated a small-scale facility producing radium at a location in Cheswick. Records are scarce on the operation but indicate the standard chemical extraction process on previously 'milled' uranium ore was performed at the site. The initial scoping survey was performed to determine if waste products remaining at the site were in quantities that could impact the environment and public health and safety. The discovery of the site and location of the property occurred in 2010. As a result, staff from BRP performed a radiological scoping survey of areas around two businesses (Pro-Mechanical and North American Fencing) currently operating on the former KMR site.

The radiological scoping survey of the Pro-Mechanical property showed no elevated radiation levels on the surface. However, there were two notable areas identified on the North American Fencing property. Soil samples were collected at these locations, and the laboratory results confirmed radium-226 contamination that would exceed normal unrestricted release criteria. A radon study was then performed in the surrounding buildings to ensure there was no excessive radon exposure to the employees. The study showed all values less than the 4 pCi/L standard set by the EPA.

The scoping survey and radon tests performed indicated there was no imminent threat to the public health and safety under the current conditions. However, BRP began to work with the HSCA program to perform a further investigation. Most of 2011 was spent developing a characterization plan for the properties. The initial characterization was performed in late 2011.

The characterization results received in 2012 showed extensive subsurface contamination of the North American Fencing Property. Additional characterization was performed later in 2012 to help bound the extent of contamination. A groundwater investigation was also initiated in 2012 that showed potential elevated contamination levels in groundwater at the site.

Quarterly groundwater monitoring continued at the site and indicated that the contamination did not migrate off-site thus far. Much of 2013 was spent in the development of a Remedial Alternatives Analysis (RAA). The contractor was working with staff from BRP and HSCA on the RAA, but it was not finalized

as of the end of 2013. The current property owners have been provided the characterization results and are aware of future development issues with these properties.

## **WHITTAKER**

Whittaker (formerly Mercer Alloys Corporation) is located within an industrial park, approximately 3.7 miles south of Greenville. The site comprises a 5.9-acre strip of land, divided into five sections, located between the Greenville Metals, Inc. (GMI) plant and the Shenango River.

In 2004, the site initiated decommissioning activities, starting in the section where the highest activity slag was believed to be located. The slag piles in three sections were excavated and screened to remove the radioactive material, which was shipped for disposal in 2007.

During excavation of Section 2, additional subsurface contamination was identified that extends beyond the fence separating the property from the GMI site. The material was below ground level and could not be accessed from the uncontrolled side of the fence. There were no adverse safety consequences to the public or to workers at the GMI site due to this material in its current configuration. However, its discovery required Whittaker to further characterize how far onto the property the material extends. Whittaker prepared a summary of the characterization and a dose assessment for release of the GMI property in 2007 for the NRC. The actual submission was made after Pennsylvania became an Agreement State in 2008. BRP also performed confirmatory surveys at the Whittaker site in 2008.

The contamination on the Whittaker property was identified at depths that are greater than had been expected based on characterization data. The slag pile reached between 15 to 20 feet below grade. In one location, contamination reached approximately 25 feet. The material was excavated and shipped for disposal.

In 2011, BRP consultants performed confirmatory radiation measurements and took soil samples of Sections 1 and 2. The laboratory results from those samples indicated those sections met the free-release criteria. Backfilling of the remediated area commenced, including 17 lifts to grade and several lifts to the final exposed surface. Section 1 was released from the license for unrestricted use. Section 5 was also completed and suitable for unrestricted use. However, work in the adjacent contaminated section prevented the release until that section was finalized as well. Whittaker continued the groundwater monitoring program throughout the year and submitted multiple addendums. A certified letter was sent to Whittaker requesting submittal of a final version of the Decommissioning Funding Plan. In December 2011, BRP had an FSS Plan for Section 3 and an FSS Data Package Final Exposed Surface for Section 2.

In 2012, GMI replaced a water line with Whittaker's radiological contractor's oversight on GMI's adjacent property. Whittaker's radiological contractor submitted the FSS plan for Section 3, Survey Unit 5 (a wetland area adjacent to the Shenango River). BRP released Section 2 for unrestricted use. Whittaker's radiological contractor also submitted a characterization plan for GMI as their property was part of the original radiological process work. BRP also approved the Section 3 FSS plan. However, initial surveys indicated contamination beyond what was expected, and excavation of Section 3 began. In September 2012, Whittaker's radiological contractor proposed an Unimportant Quantities of Source Material (UQSM) exemption for the excavated Section 3 material with the intent to dispose of the material in a hazardous waste disposal landfill in Michigan.

In 2013, confirmatory work was performed in Survey Units 1, 4 and 5 of Section 3 for excavated surfaces. The remaining material from the old fill pile used in Section 2 was applied, surveyed, and verified in seven lifts. Section 3 has Survey Units 2 and 3 remaining and scheduled for 2014. The UQSM was approved in June 2013. Just prior to shipping the waste, a fire and explosion was reported from inside the operating area of the site. The local fire department responded and secured the scene from outside the

perimeter, and there were no injuries due to the incident. The incident was studied and considered to be the result of an exothermic reaction of something in the waste pile. The exact cause was unable to be determined by a laboratory because the reactive material had completed its reaction. The material was monitored and contained onsite, and a 30-day report was provided by the contractor summarizing the incident. This delayed shipment of the UQSM until November, when over 12,000 tons of waste was successfully shipped. DEP also reviewed and commented on a characterization plan for the adjacent properties. The finalized plan was not provided by the end of 2013.

## **REMACOR**

The REMACOR Site is located in Taylor Township, Lawrence County, on the west side of Pennsylvania Route 168. The site is a 45-acre facility of which roughly half is developed and the other half is a field with two ponds located on it. The site is bordered to the north by an overhead door company and the First Energy power plant, to the west by the Beaver River, to the south by a former quarry and residential area, and to the east by railroad tracks and Route 168.

The site was an active facility since the 1970s involving a couple of different processes. More recent activities involved the processing of secondary magnesium scrap into magnesium powders and granules for use in the steel industry as a desulfurization agent. Magnesium was stored onsite improperly in buildings as well as outside on the concrete pads that were former building foundations. Magnesium fires started to occur requiring major efforts from local emergency responders, which led to the discovery of major site problems.

Former activities at the site also involved the production of mischmetal. Mischmetal is used in the steel industry as a desulfurization agent and in the film-making industry for special effects. Production of this material results in the formation of TENORM as a waste product. Based on test pitting in various areas onsite and radiation surveys conducted by BRP and EPA, TENORM material was buried across the site. The exact amount of material buried at the site is currently unknown.

In early 2012, a contractor with the HSCA program submitted a Draft Characterization Work Plan for the REMACOR site. Over the course of 2012 and into 2013, DEP submitted comments and had correspondence with the contractor on several drafts of a Characterization Work Plan. The contractor ended up being unable to produce a useable plan until late 2013, but the weather prevented all of the work from being accomplished. A separate gamma walkover survey was performed in May 2013 to get some initial surface contamination maps. Due to the surface contamination in proximity of the Taylor Township Municipal building, it was decided to test for radon in the township building due to staff occupancy. The analysis revealed the radon levels were well below the EPA Action Level of 4 pCi/L for all of the canisters.

## **STRUBE, INC.**

Strube, Inc. (Strube) began in 1957 to purchase surplus military aircraft parts at government auctions for eventual resale. The parts included an undetermined number of gauges, instruments and parts containing radium luminous paint. The parts were stored in eight warehouses at seven different locations scattered about western Lancaster County.

In 2007, DEP issued Strube a decommissioning license. DEP performed an initial inspection in October 2007 and determined that these warehouses posed an imminent threat to the health and safety of the surrounding communities and requested the assistance of the EPA's Emergency Removal Group.

The licensee, under EPA order, employed a contractor to remove contaminated parts and soil from the Marietta site that consisted of two warehouses. The contractor completed the removal and performed an FSS. DEP confirmed the FSS, removed the site from the license and released it for unrestricted use.

In 2009, DEP approved a decommissioning cost estimate of over \$800,000 for the remaining buildings. DEP received a request to remove one location from the license following removal of all materials and an FSS. DEP performed confirmatory survey work, and the location was removed from the license.

In 2010, decommissioning work began at one of the remaining five warehouses. The work on this warehouse and an additional one was completed in 2011. DEP performed the confirmatory survey work, and the locations were removed from the license.

In 2011, decommissioning work began at two of the three remaining warehouses and was ongoing at the end of the year. Strube had to stop work for a period of time while waiting for funding of their escrow account.

Work resumed after the first quarter of 2012. The smaller warehouse that was nearly completed in 2011 was completed in early 2012. However, due to the need for soil remediation behind the warehouse, the release of the property from the license was not completed until November 2012. Work also occurred in one of the two remaining large warehouses in 2012. Four of the five floors were complete with only the basement and the exterior soil surveys remaining.

In early 2013, work was completed on one of the two remaining Strube warehouses. DEP performed confirmatory surveys and approved release of the building for unrestricted use. DEP amended the Strube license to remove that warehouse. Strube then made three waste shipments from the remaining warehouse and suspended further decommissioning work awaiting the buildup of needed funds.

## **SAFETY LIGHT CORPORATION**

Safety Light Corporation (SLC) (formerly U.S. Radium) previously manufactured tritium gaseous light sources, self-luminous watch and instrument dials and other items involving radium-226, tritium, cesium-137, strontium-90, cobalt-60 and americium-241. Radioactive waste was disposed of onsite in three primary locations: underground silos, lagoons and a waste dump.

Radioactive waste was exhumed from underground silos in 1999 and 2000 and containerized for disposal. Offsite shipment of the waste was delayed until 2007.

SLC was added to the EPA National Priority List (also known as Superfund) in 2005, and remedial investigation studies of groundwater, buildings and soil were completed by the end of 2007. The EPA obtained the assistance of the U.S. Army Corps of Engineers (USACE) to ship the ex-silo waste to WCS in Texas for temporary storage.

All manufacturing activities ceased by the end of 2007 when the renewed licenses expired. SLC personnel remained onsite solely to assist and monitor the EPA cleanup.

In 2008–2009, USACE removed seven of the most dilapidated buildings from the site. The building demolition debris was shipped to a U.S. Ecology RCRA (Resource Conservation and Recovery Act) “C” landfill in Idaho. The debris was exempted from regulation as radioactive waste by the Commonwealth of Pennsylvania. During this time, BRP provided technical support to the EPA and was compensated through a cooperative agreement with the EPA.

In 2010, additional waste shipments were made to a licensed disposal facility. As of July 2010, one drum containing radium remained on the site in a shielded area awaiting disposition.

In 2011, a BRP representative assisted USACE personnel with efforts to gather information and documents at the SLC site. The information was used by USACE to perform a project review to evaluate the impact of the federally funded demolition and cleanup project as required by the National Historic

Preservation Act (Section 106) and the Pennsylvania History Code (the Pennsylvania Historic Preservation Act, Chapter 5).

Parts of the SLC site were affected by the 2011 flood including the site perimeter fence. Some of the water also flowed onto an adjacent residential property. BRP performed radiological surveys and took samples that were analyzed by the Bureau of Laboratories. One sample from the residential property showed elevated levels of radium-226. The SLC structures were not directly affected by the flood; however, leaks into the building through damaged roofs and broken windows were resulting in degradation and were causing structural concerns. This information was shared with the EPA in an effort to prioritize the cleanup process.

In 2012, BRP assisted the EPA in an effort to identify site documents that may be useful to EPA in cost recovery efforts. SLC repaired damage to the site perimeter fence. Additionally, SLC demolished a vacant residence and garage on an adjoining property owned by SLC. BRP performed radiological measurements during and after the demolition to ensure all contaminated material was not sent to the landfill. Late in 2012, the EPA mobilized a contractor to the site to begin the process of reinforcing the main building to prevent its collapse and to consolidate radioactive waste items for disposal. BRP provided technical assistance to the EPA for this purpose.

In 2013, EPA reinforced and weatherized the main building to prevent collapse. EPA removed more than 60,000 pounds of the main building contents for clearance and disposal as non-radioactive material. EPA removed a large amount of the remaining radioactive material from the site for proper disposal. EPA performed partial remediation of an onsite dump area and stabilized and capped the dump to prevent future erosion. DEP continued to provide technical support to EPA and its contractors throughout this project.

## **KARNISH INSTRUMENTS**

Karnish Instruments was a manufacturer and repair facility for aircraft instruments. The removal of radium paints from the dials appears to have been a common activity. The use of solvents and other techniques were common for the paint removal. The operation started at a small building adjacent to the Piper Airport in Lock Haven. The building no longer exists, but a relatively small amount of soil contamination remained around the building footprint.

During discussions with an operating contaminated instrument repair facility located at the Piper Airport, DEP was made aware of another former Karnish Instruments operation. The business moved from the Piper Airport across town to a larger facility and continued operations until 1979. The building sat vacant until the early 1980s when an equipment rental and repair shop (Ron's Rentals) moved in completely unaware of the former use of radioactive materials. The owner remodeled the second floor into four apartments. This building had significant soil and structural radium contamination. Both Karnish sites were investigated and determined to have contamination issues. Ron's Rentals was the most affected property. The owners of these properties were considered innocent parties. There remains no legacy business or even ownership from the Karnish Instruments days. Due to the lack of a responsible party, the DEP's HSCA program was brought in to facilitate the site characterization and cleanup.

Following initial characterization, an evaluation was performed by the HSCA program staff to determine the best approach for handling the affected properties, primarily the Ron's Rental property. Options studied included no action, a partial cleanup that would leave the Ron's Rental building standing or a total dismantlement of the building and removal of all impacted soils. Additional characterization of the Ron's Rental building and surrounding soils showed widespread contamination, including under the foundation of the building. This led to the decision to demolish the Ron's Rental building and remove all impacted

soils. As of the end of 2010, the cost of cleanup was over \$5 million and additional contamination on five adjacent residential and commercial properties had been identified.

In April 2011, URS Corp. (HSCA contractor) mobilized to begin work to remediate the five impacted properties adjacent to the former Karnish Instruments site. During remediation activities, radium contamination underneath a building utilized as low-income housing for female senior citizens (Lock Haven Court) was discovered to be more extensive and at higher concentrations than previous characterization efforts indicated. An evaluation of radiological conditions was performed to determine if there was any risk to occupants or workers, and it was determined that there was no risk under the current conditions; however, certain restrictions in the use of the building were required. Long-term plans for addressing the remaining contamination were in development.

By the end of 2011, all impacted properties with the exception of the building housing the senior citizens had been remediated and deemed suitable for unrestricted use.

Only minor site activities occurred in 2012. The HSCA program chose to revisit the feasibility study for the contamination under the Lock Haven Court building. Their contractor spent most of the year performing that evaluation. No resolution to the evaluation was completed by the end of the year.

In 2013, DEP met with the owners and managers of the Lock Haven Court apartments to discuss the site status and the feasibility study being conducted by the DEP's contractor. DEP also continued to measure radiation exposure rates in the common areas of the Lock Haven Court building. DEP issued a feasibility report with remedial options for the Lock Haven Court building. Options considered included installation of floor-mounted shielding, excavation underneath the existing building and demolition of the building followed by complete cleanup of contaminated soil.

## **WESTINGHOUSE WALTZ MILL**

The Westinghouse Waltz Mill (WWM) site is located in Westmoreland County, approximately 30 miles southeast of Pittsburgh. The site is 850 acres in size. About 85 acres of the site were developed and utilized.

WWM has legacy contamination issues, and remediation of the site has been gradual. Most of the radiological contamination can be attributed to the fuel failure that occurred in the test reactor in 1960. The greatest radiological contamination levels at Waltz Mill from historical operations were located in the northwest (test reactor area) and southeast (solid and liquid waste processing area) portions of the site and a liquid process line that connects the two areas. Contaminated water from the reactor containment was directed from the reactor facility to three retention basins/lagoons via the liquid process line. Radioactive contamination exists in various active and inactive site buildings and in buried liners from the three retention basins. Since the late 1990s, WWM has performed significant cleanup, including remediation of the lagoons and surrounding soils and the removal of the reactor containment structure down to ground level.

In early 2013, WWM completed remediation and FSS reports of the G-Building. The G-Building was originally constructed as part of the Westinghouse Test Reactor (WTR), and legacy residual contamination remained in place from the WTR. The G-Building also housed two former laboratories to perform analytical radiochemistry. BRP performed a confirmatory survey of the G-Building. The conclusion of this survey confirmed that WWM's results did not exceed release criteria and were suitable for unrestricted release.

## ENVIRONMENTAL SURVEILLANCE SECTION

### INTRODUCTION

BRP maintains a comprehensive environmental radiation monitoring program in Pennsylvania, as required by Act 147. The purpose of the program is to evaluate long-term trends in environmental radiation levels; to assess the environmental impact of particular sites, such as nuclear power plants; and to provide this information to the public. The Environmental Surveillance Section within the BRP is responsible for ensuring these goals are accomplished. The Environmental Surveillance Section's monitoring activity is focused on radiation levels in the outdoor environment affected by human activities such as industrial (including power production), weapons testing and wastes from medical facilities.

Following are the results of this section's environmental monitoring activities for calendar year 2013, including both background radiation monitoring and source-oriented monitoring around nuclear facilities.

The results of BRP's 2013 environmental sampling program indicate that Pennsylvanians have not been exposed to levels of radiation that would affect their health. This has been determined by comparing samples collected around nuclear facilities with those from locations that would not be influenced by such facilities.

Included in this annual report are the results of the routine sampling done to measure radiation levels in Pennsylvania during 2013. Air sampling and environmental dosimeter results from around facilities that could be contributing radiation contamination to the environment are compared to samples that were collected from the control station at 2575 Interstate Drive, Susquehanna Township, Dauphin County, in the greater Harrisburg area, where the section's operations are based. Water, fish and sediment samples taken downstream of a facility are compared with those collected upstream (control samples). Downwind milk and vegetation samples at each facility are compared to samples collected from the upwind direction. If these comparisons ever point out elevated levels from controllable sources of radiation, action would be taken to investigate and correct the problems.

Samples collected as part of the BRP environmental monitoring program are analyzed by the DEP Bureau of Laboratories, Radiation Measurements Section. Data tables containing analysis results of samples are contained in the attached appendices.

The direct gamma radiation measurements reported in the appendices are readings from thermoluminescent dosimeters (TLDs). Dosimeters are provided by Mirion Technologies (MT) and exchanged quarterly by BRP staff and submitted to MT for reading. Results are reported to BRP.

For quality control purposes, a limited number of collocated radiation measurements are made using dosimeters supplied by another contractor, Radiation Detection Company (RDC). The contractor analyzes these dosimeters with the results reported to BRP as a check on the data from the main contractor, MT. The quality control contractor dosimeters are exchanged quarterly with the main contractor's TLDs. The quality control contractor is not advised of the locations during the field exposure period.

The federal government has established guidelines for levels of exposure to radiation thought to be safe. Levels detected in samples collected during 2013 did not exceed these guidelines.

Variations of radiation levels observed are well within normal ranges. Though certain isotopes were detected in both control samples and source-oriented samples that are not normally seen, the levels were not considered a health risk. Background levels, mostly due to natural sources, vary somewhat from place to place and season to season. Background levels are affected by type of terrain (some rock and soil formations contribute more radiation exposure than others); fallout from nuclear weapons testing; and

variations in cosmic radiation, which increase with altitude and vary with sunspot activity. Exposure to radon and its decay products is affected by weather conditions. Lastly, there is still detectable man-made radioactivity in the environment from past nuclear weapons testing and past accidents in Chernobyl and Japan.

Tritium levels normally observed in the environment have varied greatly through the years. These levels were significantly affected by fallout from nuclear weapons testing. In 1963, mean concentrations of tritium in surface streams in the United States were on the order of 4000 pCi/L, about 400 times the contribution from naturally occurring tritium (NCRP 1979) and an order of magnitude greater than the concentration typically found in environmental waters in 1983 (Kathren, 1984). Cosmogenic radiation is responsible for producing concentrations in groundwater on the order of 19 pCi/l (Kathren, 1984).

## **RADIOACTIVITY MEASUREMENTS**

Samples collected as part of the BRP environmental monitoring program are analyzed by the DEP Bureau of Laboratories, Radiation Measurements Section. Radioactivity measurements for these samples are reported in terms of sample concentration. The unit of radioactivity used most frequently in this report is the picocurie (pCi). One picocurie is equal to 2.22 nuclear disintegrations per minute. A picocurie is one one-trillionth of a curie.

Air borne radioactivity is reported in terms of picocuries per cubic meter. Since the concentrations found are less than one picocurie per cubic meter, the gross activity and iodine-131 measurements listed must be multiplied by 0.01 to obtain the measured value. For example,  $1.4 \times 0.01 \text{ pCi/m}^3 = 0.014 \text{ pCi/m}^3$ . Air particulate gamma measurements are reported in femtocuries per cubic meter. A femtocurie (fCi) is one one-thousandth of a picocurie.

Radioactivity concentrations in liquids, such as water and milk, are expressed in pCi/L. In precipitation, the gross activity concentration in pCi/L is used to determine deposition in nanocuries per square meter (nCi/m<sup>2</sup>). A nanocurie is one one-billionth of a curie.

Radioactivity concentrations in solids (i.e., fish, sediment and produce) are expressed in picocuries per kilogram (pCi/kg).

The sample concentration is the observed reading of radioactivity in a sample on a given date and time divided by volume or mass of the sample, as appropriate. Because the radioactive decay process is random, it requires using a method of reporting the uncertainty inherent in this single measurement. This method uses basic counting statistics. It considers background and sample counting rates. The resulting count rate uncertainties are corrected for instrument counting efficiency, sample size, decay since collection and other modifiers to allow reporting in the same units as the sample concentration data.

All measurements for samples found to contain radioactivity are reported as the mean  $\pm 2\sigma$  ( $\sigma$  = standard deviation of the mean) or the 95 percent Confidence Limit (CL). This means that BRP is 95 percent confident that the real concentration in the sample lies somewhere between the measured concentration minus the counting error and the measured concentration plus the counting error. For example, if a value of  $8 \pm 2 \text{ pCi/L}$  is reported, this means we are 95 percent confident that the real concentration is somewhere between 6 and 10 pCi/L.

Counting statistics are also used in reporting the confidence that the radioactivity in the sample is less than some concentration. This minimum concentration is termed the Lower Limit of Detection (LLD) and is represented by  $<$ .

Real world limitations of sample size, counting time and the statistical nature of radioactive decay preclude the ability to analyze and report a true zero concentration. The method used to describe the LLD

for all sample analyses in this report uses  $4.66\sigma$  applied to the instrument background, corrected for volume, counting efficiency, radioactive decay since collection, branching ratio and chemical recovery. This LLD at  $4.66\sigma$  is also called the 95 percent CL since it statistically yields a five percent risk of reporting a false positive and a five percent risk of reporting a false negative result. For example, if a datum is reported as less than 10 pCi/L ( $<10$  pCi/L), we are 95 percent confident that the sample concentration, if any, is less than 10 pCi/L. Conversely, if a similar sample was counted so as to produce an LLD at  $4.66\sigma$  of 10 pCi/L and the result was greater than 10 pCi/L, we are 95 percent confident that this datum truly is greater than 10 pCi/L.

The direct gamma radiation measurements reported are readings from TLDs, currently supplied and read by the contractor, MT. The TLDs used for environmental monitoring consist of three replicate elements of the gamma sensitive phosphor calcium sulfate, which is doped with thulium ( $\text{CaSO}_4\text{:Tm}$ ). Each element is shielded with lead to compensate for the tendency of the phosphor to overreact to low-energy gamma rays. The data in this document are reported in terms of milliroentgen per standard month (mR/std. mo.), a standard month being 30.4 days. Regardless of the duration of TLD exposure in the field, the data have been normalized to a standard month to allow convenient inter-comparisons in the net value.

Each of the three elements in a dosimeter observes the radiation environment differently. The reported data then must include an error term to express this variation. This error term is reported at  $2\sigma$  or the 95 percent CL. Individual correction factors are also used for each element to lower the error term and improve the overall accuracy in these measurements.

The current contracted dosimetry service is fully accredited by the following:

**-National Voluntary Laboratory Accreditation Program (NVLAP)** accredits public and private laboratories based on evaluation of their technical qualifications and competence to carry out specific calibrations or tests. MT is accredited by NVLAP under code number 100555-0.

**-DOE Laboratory Accreditation Program (DOELAP)** evaluates the performance of testing laboratories for equipment and standards adherence and conformance with operating procedures. MT is approved by DOELAP.

**-Health and Safety Executive (HSE)** is responsible for the regulation of safety issues arising from work in Britain and protecting the public's health by ensuring risks in the changing workplace are properly controlled. MT is an HSE-approved dosimetry service.

**-Canadian Nuclear Safety Commission (CNSC)** grants operating licenses to Canadian nuclear facilities and promotes health and safety by regulating the use of nuclear energy and materials.

RDC is accredited to provide dosimetry services with NVLAP.

## BACKGROUND RADIATION MONITORING

The purpose of a background radiation monitoring program is to evaluate the normal levels of radionuclides in the environment from natural sources and atmospheric fallout, and to monitor trends over time. Background monitoring stations are not intended to monitor specific nuclear facilities, but rather to gauge widespread impacts. The types of media routinely sampled in this program include milk, surface water, drinking water and precipitation.

## Pennsylvania Water Quality Network

The Pennsylvania Water Quality Network (WQN) originally was established to measure a number of conventional water quality parameters in surface water. In 1963, analyses for gross alpha and gross beta activity were added to measure the impact of atmospheric testing of nuclear weapons. The early program sampled about 180 surface water stations on a quarterly basis.

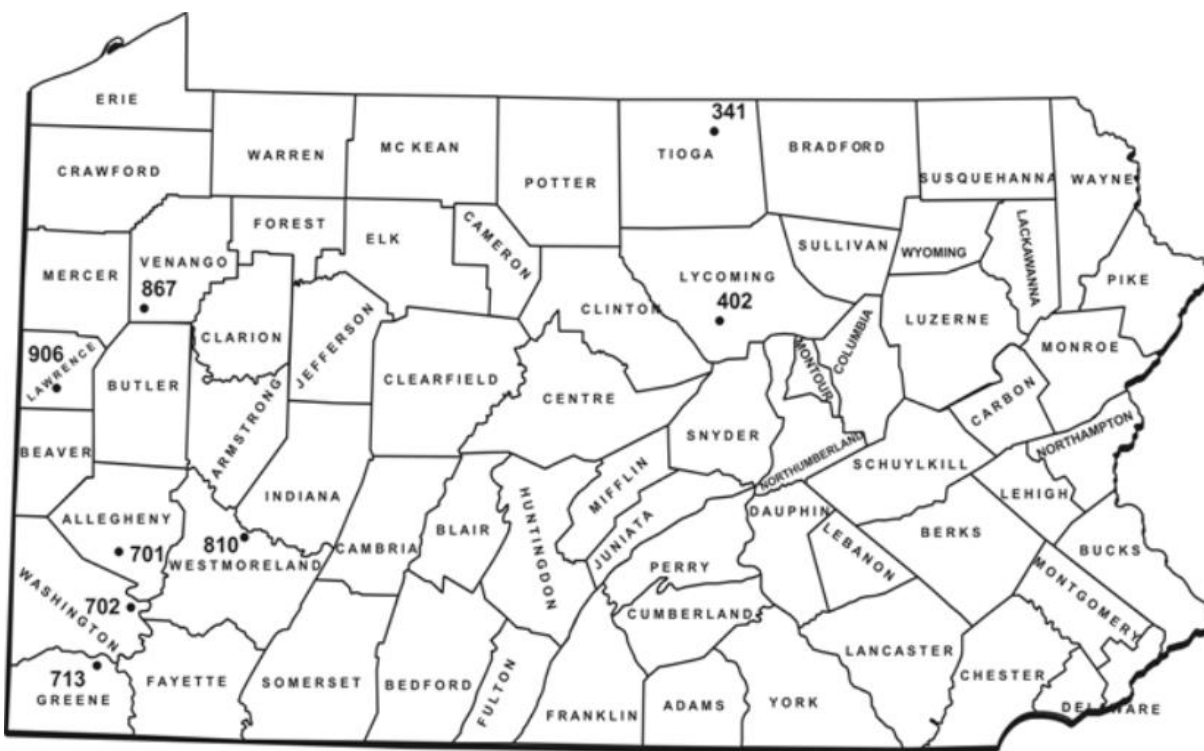
Through the years, stations and frequency of sampling have been revised. Eight stations were sampled for radiological analysis in 2013. Sampling frequency has continued at varying intervals at the stations due to staffing restraints and stream conditions.

The purpose of this program has gradually evolved from one of assessing the impact of atmospheric weapons testing to one of developing a database against which the long-term impact of nuclear facilities might be gauged.

All 2013 WQN samples are grab samples collected by DEP's Bureau of Water Quality Management.

During 2013, gross alpha and gross beta results were indicative of normal background levels. (See Appendix 1.A.)

## Pennsylvania Water Quality Network Stations



## Precipitation Monitoring

Precipitation such as rain, snow, mist, sleet or fog condensation is routinely gathered from a collector located on the roof of the building for base operations at 2575 Interstate Drive in Harrisburg. Sampling is tied to precipitation episodes.

Precipitation is analyzed for gross alpha and gross beta activity, tritium and gamma emitters. Only gross alpha, gross beta and tritium are routinely reported. Gross activity concentration data are used to express deposition data. In times of environmental radiation crises, such as the Chernobyl accident in 1986, or the Fukushima Dai-ichi nuclear accident in 2011, deposition data are used to evaluate the potential for contamination of the milk supply. Data for tritium in precipitation are used for comparison with similar data for surface water.

The gross activity and tritium data collected at 2575 Interstate Drive during 2013 are indicative of normal background levels. (See Appendix 1.B.)



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## SOURCE-ORIENTED MONITORING

The purpose of a source-oriented monitoring program is to assess the environmental impact of a particular facility. BRP currently maintains off-site environmental radiation monitoring programs around five nuclear power plants in Pennsylvania: Beaver Valley Power Station, Limerick Generating Station, Peach Bottom Atomic Power Station, Susquehanna Steam Electric Station and Three Mile Island Nuclear Station. At each facility, the monitoring program is designed to measure human population exposure. Monitoring stations are placed at locations that serve as indicators of any effects from plant operation and at control locations, which are beyond the measurable influence of the facility. These stations also provide verification of utility effluent monitoring programs during routine operations and serve as an in-place-sampling network in the event of an accidental release.

Exposure to the population can occur through direct pathways (i.e., immersion or inhalation) or indirectly through the food chain. These exposure pathways are monitored using TLDs and by collection of air, milk, produce, water, fish and sediment samples around nuclear power facilities.

Direct exposure by immersion or inhalation is measured by TLDs and collection of representative air samples, respectively. TLDs continuously observe the radiation environment and provide a direct measurement of ambient gamma radiation levels. Approximately 30 TLD stations are located within a 15-mile radius around each nuclear power plant. At three facilities, a TLD station is located at a distance greater than 15 miles as a control. A statewide control station is located in Harrisburg.

At the five nuclear power plants, air samples are collected by drawing air through a particulate filter and an activated charcoal canister in tandem using continuously running vacuum pumps. The particulate filters are analyzed individually for gross alpha and gross beta activity and composited for gamma spectrum analysis. The charcoal canisters are analyzed for iodine-131. Four air samplers are located within a 5-mile radius of each nuclear power plant, with a statewide control station located in Harrisburg. The locations of both the TLDs and air sampling sites are chosen with respect to the meteorology and population distribution around each plant.

Radionuclides can enter the food chain through atmospheric and liquid discharges from the nuclear power plant. Radionuclides released to the atmosphere (e.g., iodine-131 or cesium-137) may be deposited on agricultural land and then ingested by dairy animals, becoming concentrated in milk. An indicator sample of milk is collected for each plant from the closest dairy farm in the prevailing wind direction. A control sample is also collected from a farm in the least prevalent wind direction. These isotopes can also become incorporated in food products such as green leafy vegetables. A green leafy vegetable (e.g., cabbage) is collected from the closest indicator garden around each plant when available. For the Susquehanna Steam Electric Station, where irrigation uses water downstream of the discharge, produce with high water content is sampled.

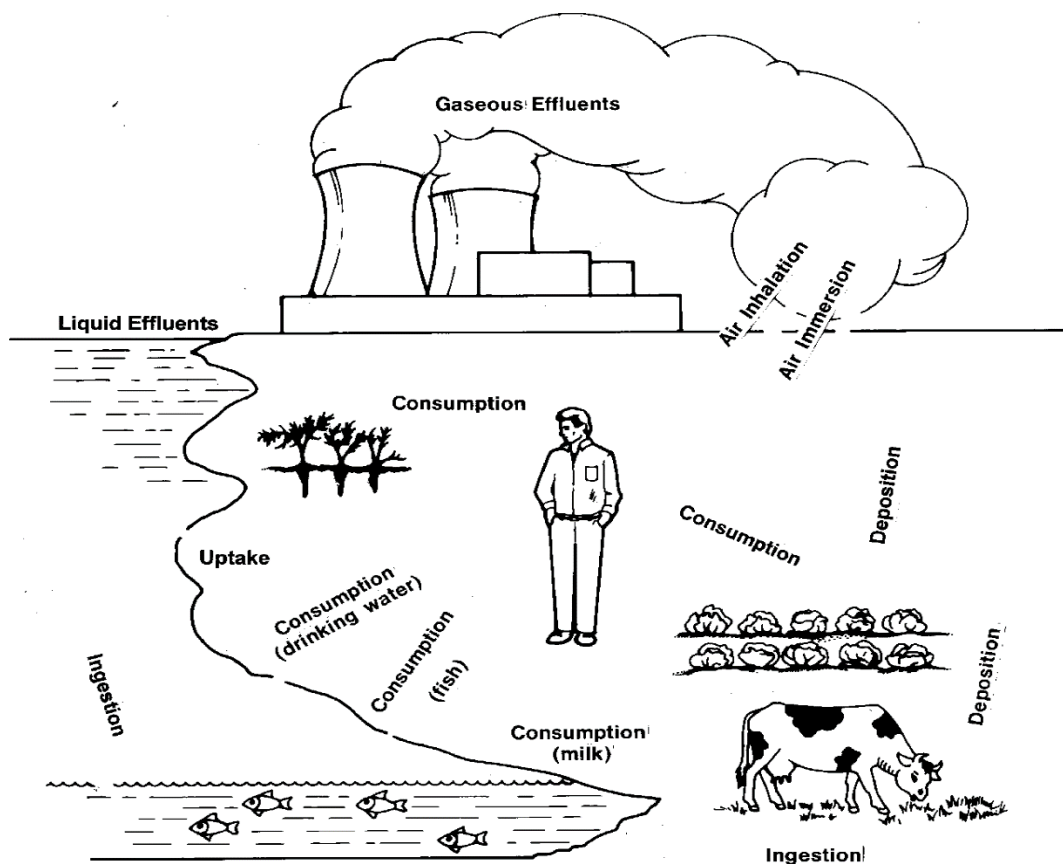
Monitoring for radionuclides in liquid discharges at nuclear power facilities includes collection of surface and finished water, fish and sediment samples and produce samples. Raw water samples are collected upstream of the plant discharge as a control and downstream of the discharge at the closest drinking water user. A sample in the vicinity of the discharge is also collected at four facilities. The samples are analyzed for gross beta, tritium and gamma-emitting radionuclides. All water samples are composites to provide a more accurate indication of the quantities of radionuclides present in water available for public use.

Vegetation samples were collected from gardens within as close a proximity to the facility as possible to measure any uptake of radionuclides deposited onto the soil either by immersion in the atmosphere or by rainfall.

Fish are sampled annually or semiannually in the vicinity of the discharge. The collected species correspond to those consumed by the public, when possible. Fish are good indicators because they concentrate radionuclides to some extent and provide an effective mechanism for integrating the variable concentrations of radionuclides in the water over extended periods.

Annual or semiannual bottom sediment samples are collected in the vicinity of the discharge. Sediment represents the major site for accumulation of radionuclides in an aquatic environment and, with long-lived radionuclides, a gradual increase in concentration may be expected over time. Sediment, therefore, may provide a long-term indication of change that may also appear in other media.

### Exposure Pathways Monitored by BRP



### ACKNOWLEDGMENTS

Special thanks are extended to the individuals who allow us to maintain sampling sites on their properties and provide the BRP with samples from their farms and gardens.

## BEAVER VALLEY POWER STATION

Beaver Valley Power Station Units 1 and 2 are pressurized water reactors, producing 911 and 904 megawatts electrical (Mwe), respectively. The facility is situated on the south bank of the Ohio River in Shippingport Borough, Beaver County, Pennsylvania.

The facility is operated by FENOC (First Energy Nuclear Operating Company).



## BEAVER VALLEY THERMOLUMINESCENCE DOSIMETRY

The BRP TLD program in the environs of Beaver Valley Power Station includes 30 dosimeter stations exchanged quarterly. Dosimeters and quarterly readout services were provided by MT during 2013. The locations range in distance from 0.4 to 29.2 miles from the site.

Contractor cross-check dosimeters were collocated with four MT dosimeters to provide a check on the MT data. RDC provided cross-check dosimeter services in 2013.

All dosimeters are changed by BRP staff.

The annual average exposure for the 30 MT TLD locations was 41.0 milliroentgen (mR) in 2013 (see Appendix 2.B), compared to 36.6 in 2012. The annual average for the four RDC cross-check TLDs collocated with MT contractor TLDs was 51.9 mR (corrected for transit exposure). The corresponding MT contractor values averaged 42.6 mR (corrected for transit exposure). (See Appendices 2.A and 2.B.)

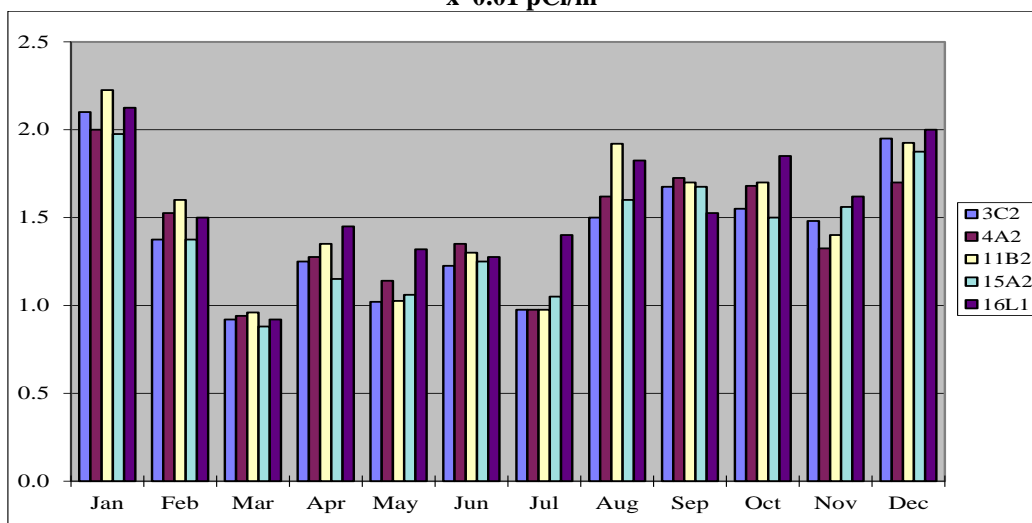


## BEAVER VALLEY AIR SAMPLING

In 2013, air sampling in the environs of Beaver Valley continued at four stations. A control sampler is located at Harrisburg. (See Appendix 6.C.5.) The samplers continuously collect air particulates and radioiodines. The particulate filters were individually analyzed for gross activity and composited quarterly for gamma spectrum analysis. Activated charcoal canisters impregnated with TEDA, a chelating agent, were individually analyzed by gamma spectroscopy for iodine-131. The filters and canisters were changed by BRP on a weekly basis.

The airborne gross activity in the environs of Beaver Valley was relatively uniform throughout the year. Air monitoring data from Beaver Valley are similar to analogous data from other nuclear power plants in Pennsylvania and the 2013 control station (16L1) at Harrisburg. (See Appendices 2.C and 2.D.)

**2013**  
**Average Gross Beta Concentrations in Airborne**  
**Particulates At Beaver Valley Power Station**  
**x 0.01 pCi/m<sup>3</sup>**



## BEAVER VALLEY WATER SAMPLING

Beaver Valley Power Station uses the Ohio River for station water and for the discharge of liquid effluents.

Raw river water is sampled monthly at three locations. Continuous composites are collected upstream at Arco Polymer, downstream 1.3 miles at Midland, and five miles at East Liverpool, Ohio.

The samples were analyzed for gross beta activity, tritium and gamma emitters.

During 2013, no reactor-related isotopes were detected in water samples. (See Appendix 2.E.)

## **BEAVER VALLEY MILK SAMPLING**

Milk sampling near Beaver Valley Power Station continued monthly at local farms in 2013. These grab samples, one of raw milk (11C1) and one of processed milk (07G2), were analyzed by gamma spectroscopy.

No reactor-related isotopes were detected in any of these samples. Natural potassium-40 concentrations are equivalent to potassium content of 1.2 to 1.7 grams per liter in 2013. (See Appendix 2.F.)

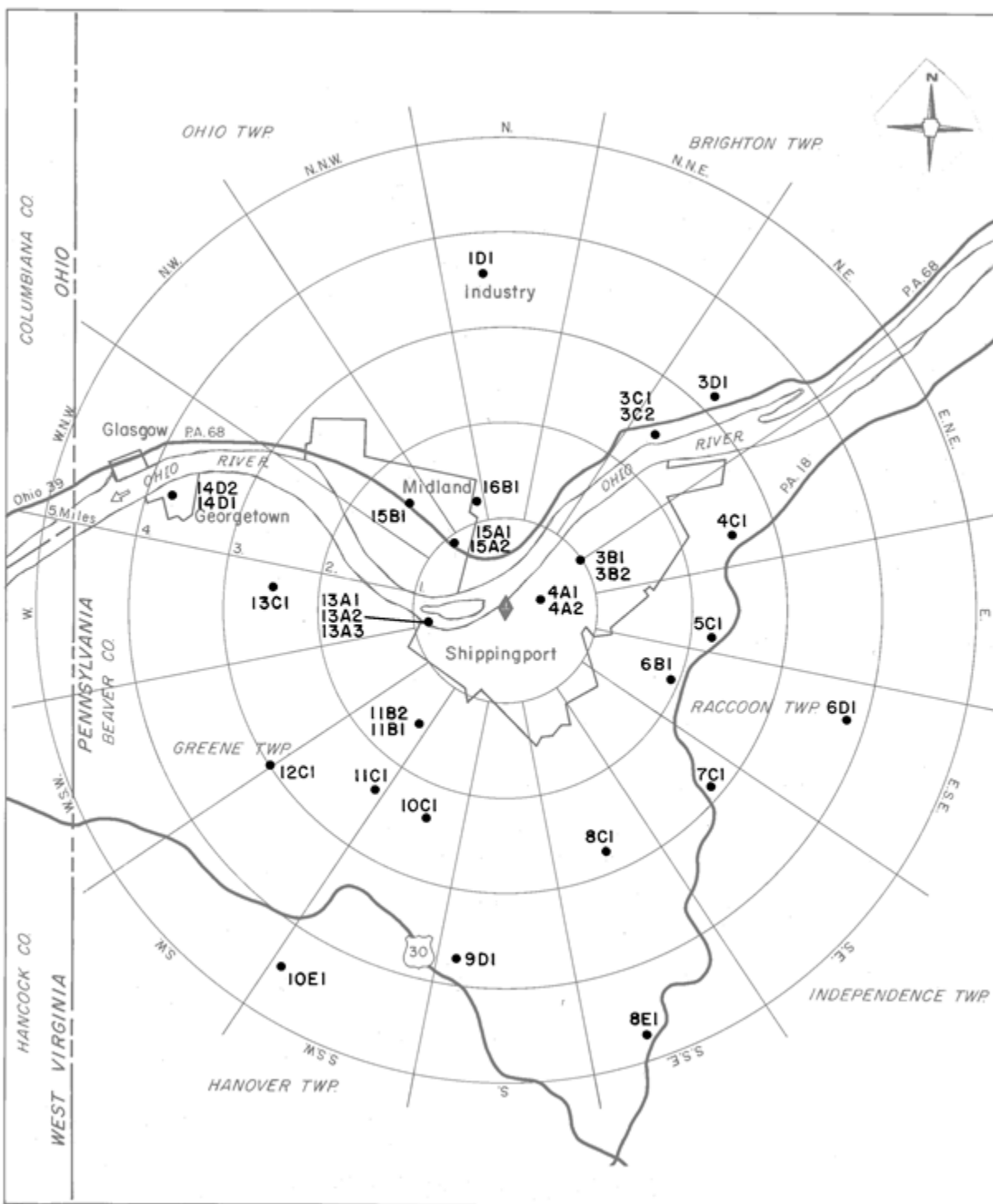
## **BEAVER VALLEY FISH, PRODUCE AND SEDIMENT**

During 2013, fish and sediment from the Ohio River and locally grown cabbage were collected by a utility contractor and split with BRP.

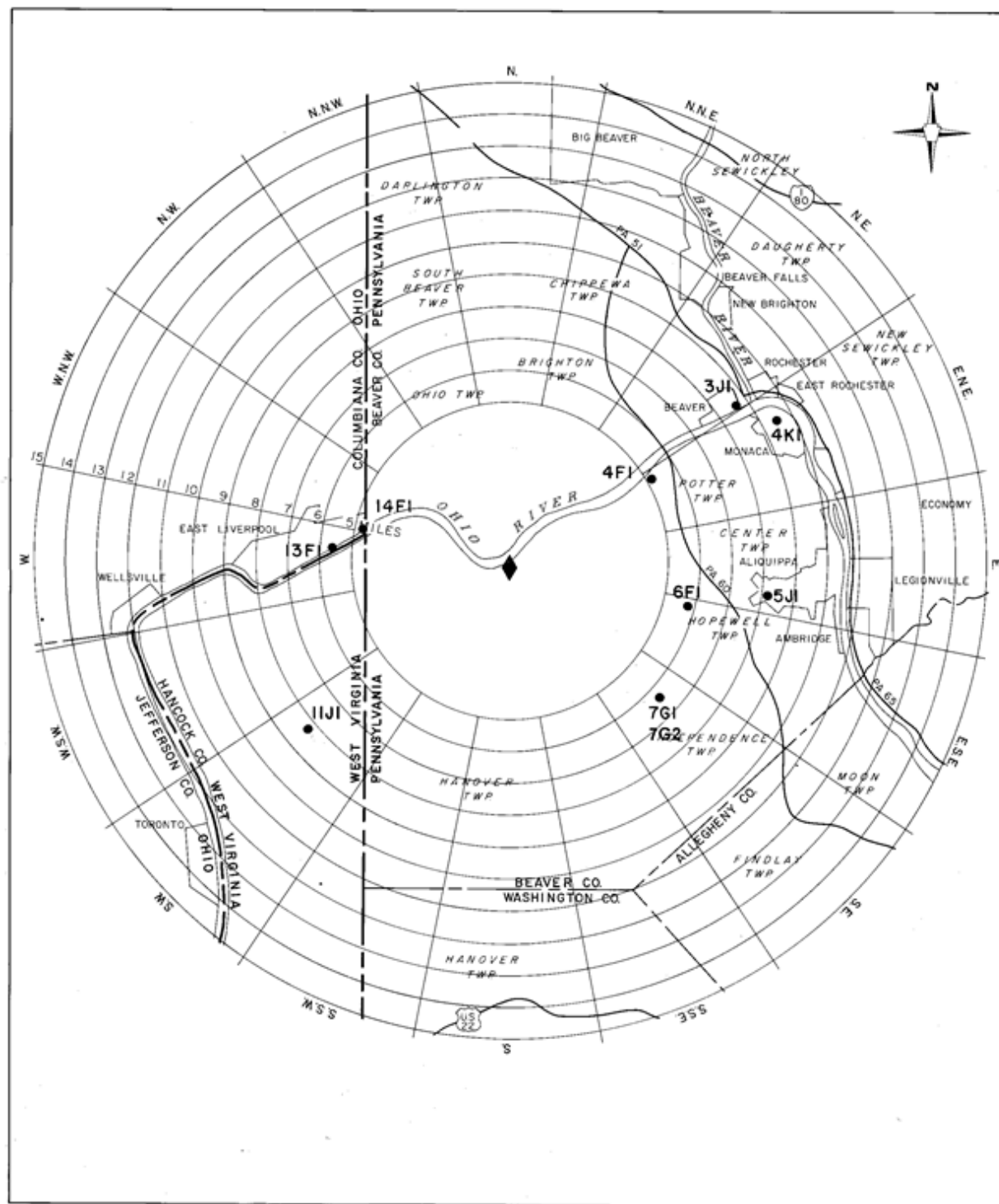
The semi-annual fish samples collected in the vicinity of the discharge were predators. Cabbage was sampled from gardens at two locations, one mile northeast and 3.8 miles west-northwest of the site. The sediment sample was collected downstream from the discharge point. Analysis was by gamma spectroscopy.

No reactor-related radionuclides were detected in the samples. (See Appendix 2.G.)

**Beaver Valley Power Station  
Locations of Environmental Monitoring Stations  
Within 5 Miles of the Site**



### Greater Than 5 Miles from the Site



## LIMERICK GENERATING STATION

Limerick Generating Station Units 1 and 2 are boiling water reactors, each rated at 1090 megawatts electrical (Mwe). The facility is located on the east bank of the Schuylkill River in Limerick Township, Montgomery County, Pennsylvania.

The facility is operated by Exelon Nuclear.



## LIMERICK THERMOLUMINESCENCE DOSIMETRY

The BRP TLD program in the environs of Limerick Generating Station includes 30 dosimeter stations exchanged quarterly. Dosimeters and quarterly readout services were provided by MT during 2013. The locations range in distance from 0.4 to 11.8 miles from the site.

Contractor cross-check dosimeters were collocated with four MT dosimeters to provide a check on the MT data. RDC provided cross-check dosimeter services in 2013.

All dosimeters are changed by BRP staff.

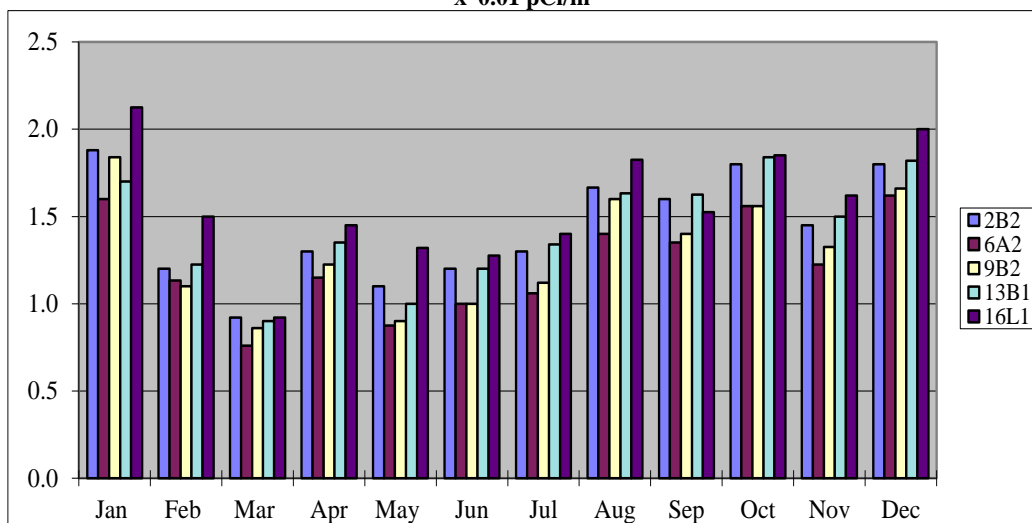
The annual average exposure for the 30 MT TLD locations was 43.5 mR in 2013 (see Appendix 3.B), compared to 46.5 in 2012. The annual average for the four RDC cross-check TLDs collocated with MT contractor TLDs was 60.2 mR (corrected for transit exposure). The corresponding MT contractor values averaged 46.5 mR (corrected for transit exposure). (See Appendices 3.A and 3.B.)

## LIMERICK AIR SAMPLING

In 2013, air sampling in the environs of the Limerick Generating Station continued at four stations. A control sampler is located at Harrisburg. (See Appendix 6.C.5.) The samplers continuously collect air particulates and radioiodines. The particulate filters were individually analyzed for gross activity and composited quarterly for gamma spectrum analysis. Activated charcoal canisters impregnated with TEDA, a chelating agent, were individually analyzed by gamma spectroscopy for iodine-131. The filters and canisters were changed by BRP on a weekly basis.

The airborne gross activity in the environs of Limerick Generating Station was relatively uniform throughout the year. Air monitoring data from the Limerick station are similar to analogous data from other nuclear power plants in Pennsylvania and the 2013 control station (16L1) at Harrisburg. (See Appendices 3.C and 3.D.)

**2013**  
**Average Gross Beta Concentrations in Airborne**  
**Particulates At Limerick Generating Station**  
**x 0.01 pCi/m<sup>3</sup>**



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## **LIMERICK WATER SAMPLING**

The Limerick Generating Station uses the Schuylkill River for station water and for the discharge of effluents.

Raw river water is sampled at two locations. The upstream sample is collected at the Limerick intake and the downstream sample is collected at Vincent Dam, 1.7 miles downstream. Finished drinking water is sampled at the Aqua Pennsylvania's Pickering plant, seven miles downstream. These monthly samples represent essentially continuous composites.

The samples were analyzed for gross beta activity, tritium and gamma emitters. No reactor-related isotopes were detected in samples collected during 2013. (See Appendix 3.E.)

All data compare favorably with the EPA National Interim Primary Drinking Water regulations. Those criteria were 15 pCi/L gross alpha, 50 picocuries gross beta and 20,000 pCi/L tritium before the December 2000 revisions went into effect. Drinking water criteria, at present, maintain the 15 pCi/L gross alpha limit, but make gross beta and tritium criteria contingent on activity levels for isotopes that are not analyzed in this program.

## **LIMERICK MILK SAMPLING**

Milk sampling near the Limerick Generating Station continued monthly at local farms in 2013. These grab samples of raw milk were analyzed by gamma spectroscopy.

No reactor-related isotopes were detected in any of the samples collected during 2013. Natural potassium-40 concentrations are equivalent to potassium content of 1.4 to 1.7 grams per liter in 2013. (See Appendix 3.F.)

## **LIMERICK FISH, PRODUCE AND SEDIMENT**

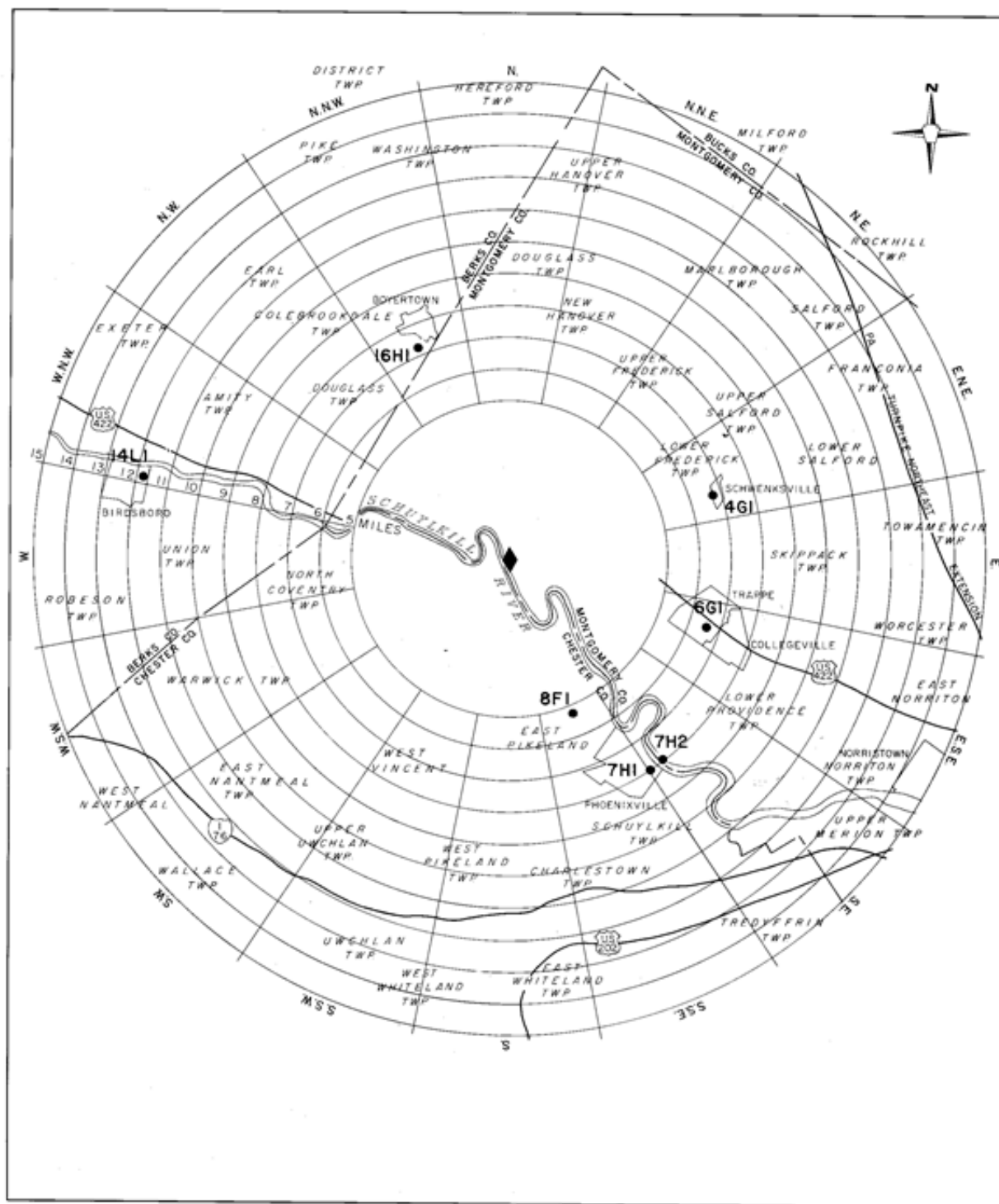
During the reporting period, vegetation from the garden at the former information center and fish and sediment from the Schuylkill River were collected by a utility contractor and split with BRP.

The semi-annual samples of bottom-feeding and predator fish were collected in the vicinity of the discharge. The vegetation sample was collected from a garden maintained by the contractor at the utility's former information center located east southeast, less than one half mile from the site. The sediment samples were collected approximately 1.5 miles downstream from the Limerick discharge.

Cesium-137 was present in the June sediment sample. Presence of the cesium isotope may be attributable to station discharges or fallout from weapons testing and the accidents at Chernobyl in April 1986 and Fukushima Dai-ichi in the spring of 2011. (See Appendix 3.G.)



**Limerick Generating Station  
Locations of Environmental Monitoring Stations  
Greater Than 5 Miles from the Site**



## PEACH BOTTOM ATOMIC POWER STATION

Peach Bottom Atomic Power Station Units 2 and 3 are boiling water reactors, each rated at 1065 megawatts electrical (Mwe). The facility is located on the west bank of the Conowingo Pond of the Susquehanna River in Peach Bottom Township, York County, Pennsylvania.

The facility is operated by Exelon Nuclear.



## PEACH BOTTOM THERMOLUMINESCENCE DOSIMETRY

The BRP TLD program in the environs of Peach Bottom Atomic Power Station includes 36 dosimeter stations exchanged quarterly. Six of the dosimeters were placed for the purpose of monitoring dry cask storage. The TLD locations range in distance from 0.1 to 11.0 miles from the site.

Dosimeters provided by MT were placed at all 36 stations during 2013. Contractor cross-check dosimeters were collocated with four MT dosimeters to provide a check on the MT data. RDC provided cross-check dosimeter services in 2013.

All dosimeters are changed by BRP staff.

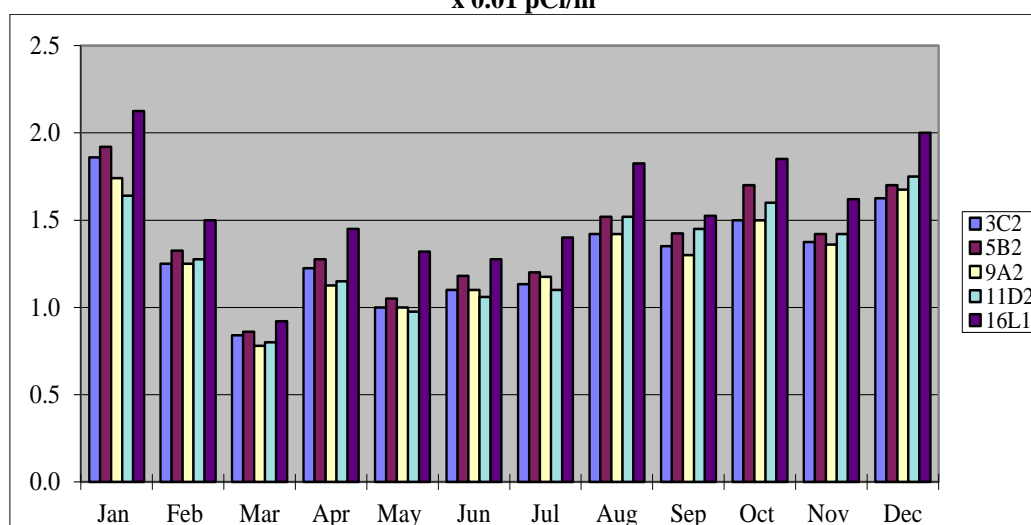
The annual average exposure for the 30 MT TLD locations was 41.8 mR in 2013 (see Appendix 4.B), compared to 41.8 in 2012. The annual average for the four RDC cross-check TLDs collocated with MT contractor TLDs was 52.2 mR (corrected for transit exposure). The corresponding MT contractor values averaged 41.9 mR (corrected for transit exposure). (See Appendices 4.A and 4.B.)

## PEACH BOTTOM AIR SAMPLING

Air sampling in the environs of Peach Bottom continued at four stations in 2013. A control sampler is located at Harrisburg. (See Appendix 6.C.5.) The samplers continuously collect air particulates and radioiodines under normal conditions. The particulate filters were analyzed individually for gross activity and composited quarterly for gamma spectrum analysis. Activated charcoal canisters impregnated with TEDA, a chelating agent, were analyzed individually by gamma spectroscopy for iodine-131. The filter and canisters were changed by BRP on a weekly basis.

The airborne gross activity in the environs of the Peach Bottom Atomic Power Station was relatively uniform throughout the year. Air monitoring data from the Peach Bottom station are similar to analogous data from other nuclear power plants in Pennsylvania and the 2013 control station (16L1) at Harrisburg. (See Appendices 4.C and 4.D.)

**2013**  
**Average Gross Beta Concentrations in Airborne**  
**Particulates At Peach Bottom Atomic Power Station**  
**x 0.01 pCi/m<sup>3</sup>**



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## PEACH BOTTOM WATER SAMPLING

The Peach Bottom Atomic Power Station uses the Susquehanna River (Conowingo Pond) for station water and discharge of effluents.

Raw river water is sampled at two locations, upstream at Holtwood Power Station and downstream at Conowingo Dam. The monthly samples essentially represent continuous composites.

The samples were analyzed for gross beta activity, tritium and gamma emitters. A low level of tritium was present in the June and July downstream Conowingo Dam samples. Presence of this isotope may be attributable to fallout from weapons testing and the accident at Chernobyl in April 1986. (See Appendix 4.E.)



## **PEACH BOTTOM MILK SAMPLING**

In 2013, milk sampling near Peach Bottom Atomic Power Station continued monthly at local farms. The grab samples of raw milk were analyzed by gamma spectroscopy.

No reactor-related isotopes were detected in any samples during 2013. Natural potassium-40 concentrations are equivalent to a potassium content of 1.5 to 1.7 grams per liter. (See Appendix 4.F.)

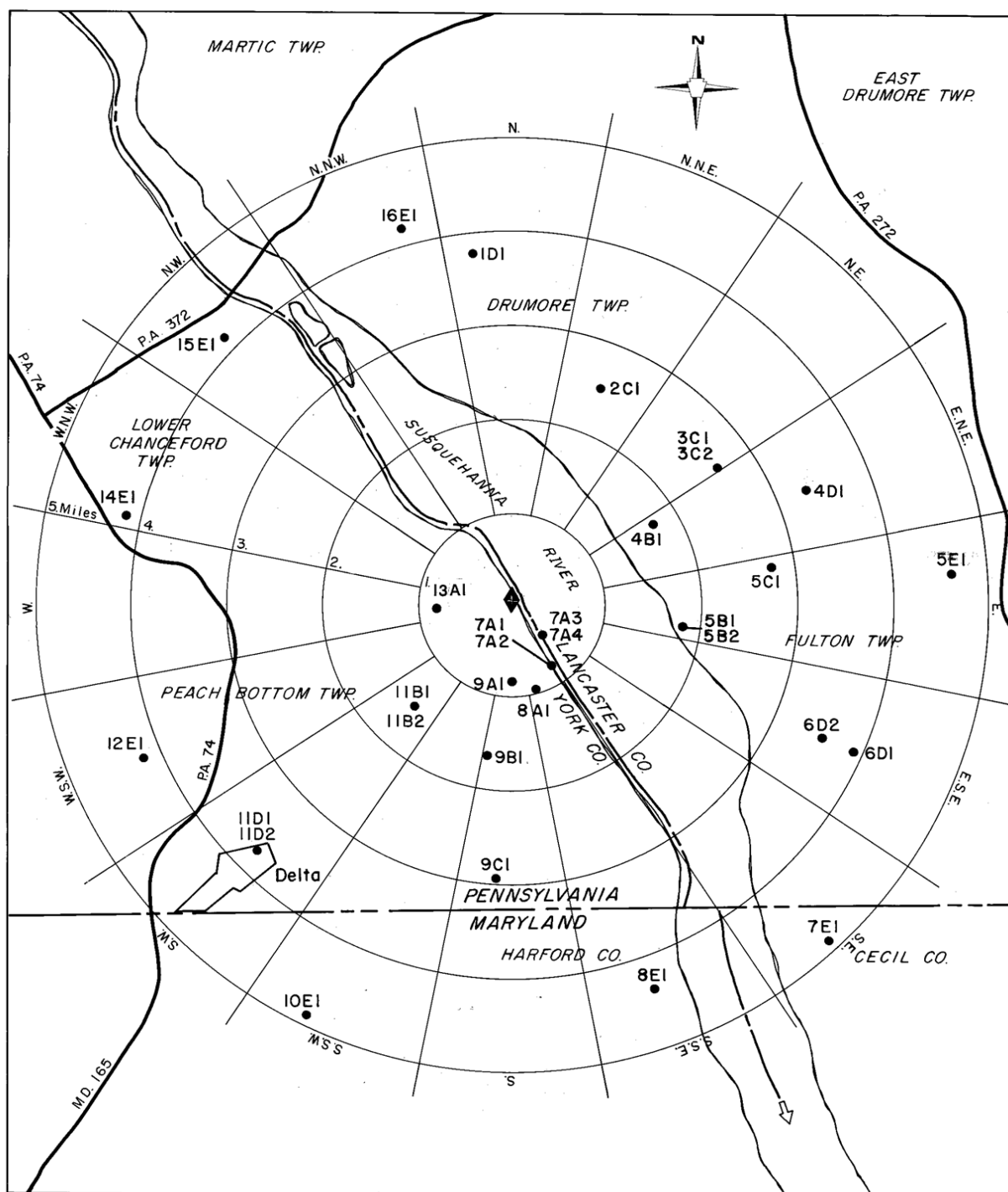
## **PEACH BOTTOM FISH, PRODUCE AND SEDIMENT**

During the reporting period, vegetation from local gardens and fish and sediment from Conowingo Pond were collected by a utility contractor and split with BRP.

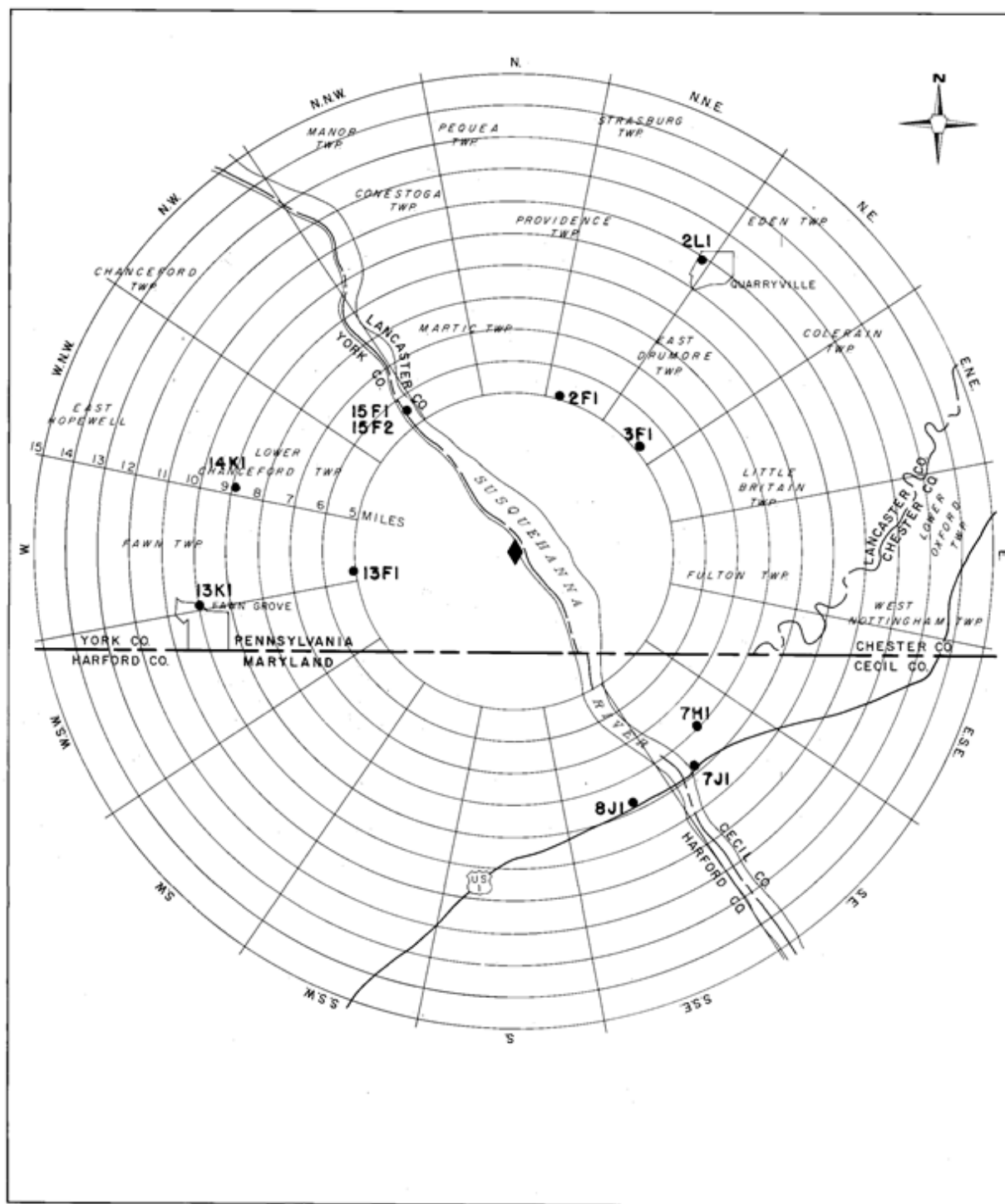
The samples of predatory and bottom-feeding fish were collected downstream from the station discharge. Cabbage was sampled four times at monthly intervals from a garden located 0.8 miles west northwest of the site. Field corn leaves were collected in September as the final 2013 vegetation sample. The sediment sample was collected downstream of the discharge point. Analysis was by gamma spectroscopy.

No reactor-related radionuclides were detected in the 2013 produce, sediment or fish samples. (See Appendix 4.G.)

### Peach Bottom Atomic Power Station Locations of Environmental Monitoring Stations Within 5 Miles of the Site



**Peach Bottom Atomic Power Station  
Locations of Environmental Monitoring Stations  
Greater than 5 Miles from the Site**



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## SUSQUEHANNA STEAM ELECTRIC STATION

Susquehanna Steam Electric Station Units 1 and 2 are boiling water reactors, each rated at 1180 megawatts electrical (Mwe). The site is located on the west bank of the Susquehanna River in Salem Township, Luzerne County, Pennsylvania.

The facility is operated by PPL.



## SUSQUEHANNA STEAM THERMOLUMINESCENCE DOSIMETRY

The BRP TLD program in the environs of Susquehanna Steam Electric Station includes 30 dosimeter stations exchanged quarterly. Dosimeters and quarterly readout services were provided by MT during 2013. The locations range in distance from 0.3 to 19.6 miles from the site.

Contractor cross-check dosimeters were collocated with four MT dosimeters to provide a check on the MT data. RDC provided cross-check dosimeter services in 2013.

All dosimeters are changed by BRP staff.

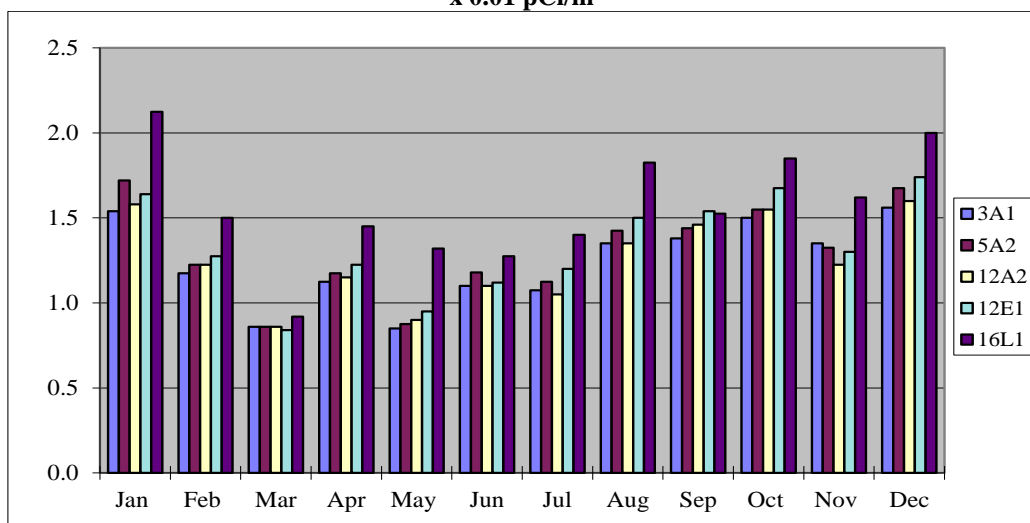
The annual average exposure for the 30 MT TLD locations was 45.1 mR in 2013 (see Appendix 5.B), compared to 39.4 in 2012. The annual average for the four RDC cross-check TLDs collocated with MT contractor TLDs was 54.9 mR (corrected for transit exposure). The corresponding MT contractor values averaged 45.5 mR (corrected for transit exposure). (See Appendices 5.A and 5.B.)

## SUSQUEHANNA STEAM AIR SAMPLING

In 2013, air sampling in the environs of the Susquehanna Steam Electric Station continued at four stations. A control sampler is located at Harrisburg. (See Appendix 6.C.5.) The samplers continuously collect air particulates and radioiodines. The particulate filters were analyzed individually for gross activity and composited quarterly for gamma spectrum analysis. Activated charcoal canisters impregnated with TEDA, a chelating agent, were analyzed individually by gamma spectroscopy for iodine-131. The filters and canisters were changed by BRP on a weekly basis.

The airborne gross activity in the environs of the Susquehanna Steam Electric Station was relatively uniform throughout the year. Air monitoring data from the Susquehanna station are similar to analogous data from other nuclear power plants in Pennsylvania and the 2013 control station (16L1) at Harrisburg. (See Appendices 5.C and 5.D.)

**2013**  
**Average Gross Beta Concentrations in Airborne**  
**Particulates At Susquehanna Steam Electric Station**  
**x 0.01 pCi/m<sup>3</sup>**



## **SUSQUEHANNA STEAM WATER SAMPLING**

The Susquehanna Steam Electric Station uses the Susquehanna River for station water and the discharge of liquid effluents.

Raw river water is sampled at two locations. Weekly sampling for a monthly composite is conducted at the station's water intake on the Susquehanna River. The location near the discharge is also sampled weekly for a monthly composite. Finished drinking water is sampled downstream at the Danville municipal water treatment plant. This sample is collected daily for a monthly composite.

The samples were analyzed for gross beta activity, tritium and gamma emitters. No reactor-related radioisotopes were detected in water samples during 2013. (See Appendix 5.E.)

All data compare favorably with the EPA National Interim Primary Drinking Water regulations. Those criteria were 15 pCi/L gross alpha, 50 picocuries gross beta and 20,000 pCi/L tritium before the December 2000 revisions went into effect. Drinking water criteria, at present, maintain the 15 pCi/L gross alpha limit, but make gross beta and tritium criteria contingent on activity levels for isotopes that are not analyzed in this program.

## **SUSQUEHANNA STEAM MILK SAMPLING**

During 2013, milk sampling near the Susquehanna Steam Electric Station continued monthly at one of the local farms, but the other discontinued production in June. A suitable alternative farm was not found, so sampling was supplemented with sampling of vegetation (pasture grass) that could be consumed by cattle. The grab samples of raw milk were analyzed by gamma spectroscopy.

No reactor-related isotopes were detected in samples during 2013. Natural potassium-40 concentrations are equivalent to potassium content of 1.4 to 1.7 grams per liter. (See Appendices 5.F and 5.G.)

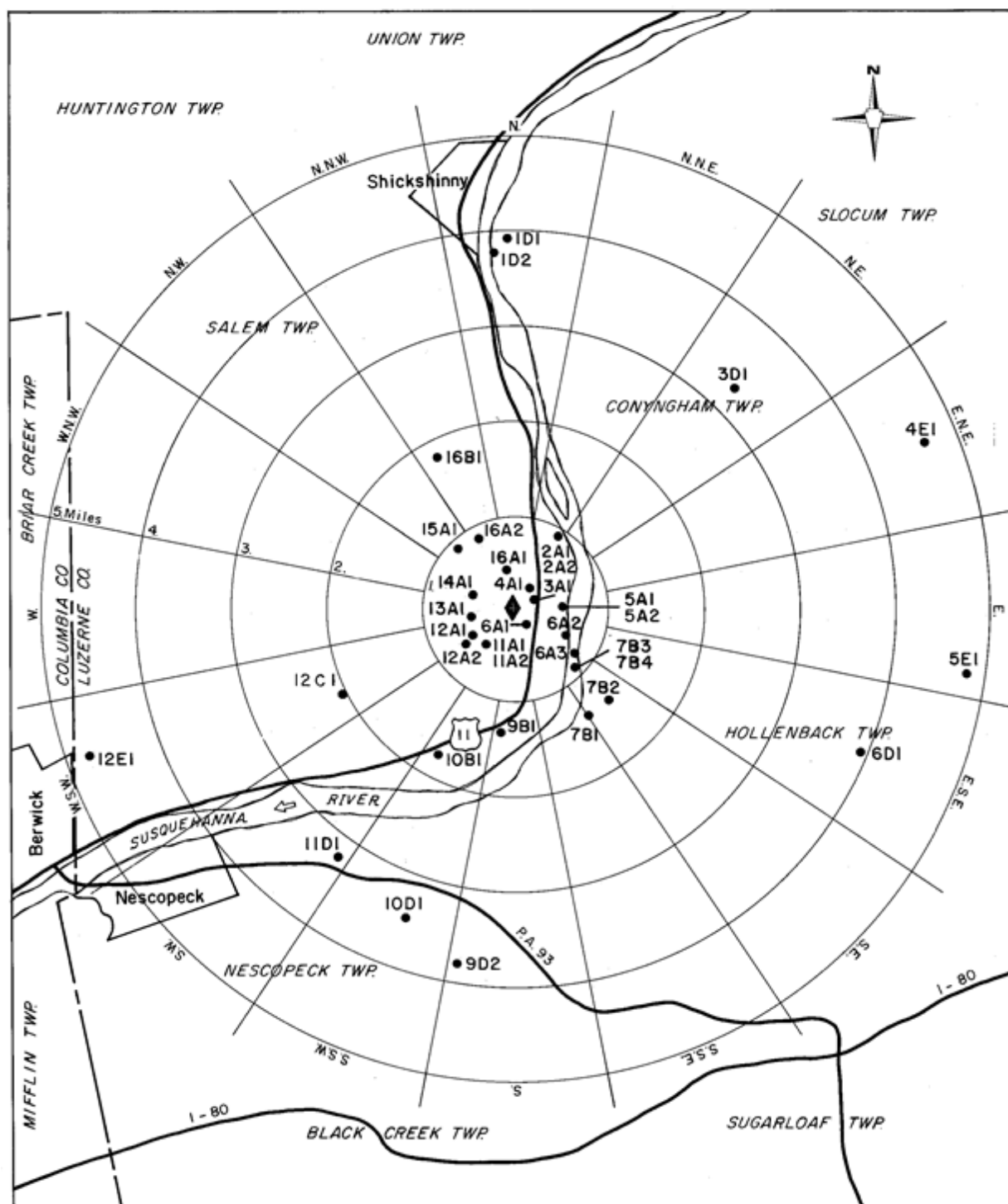
## **SUSQUEHANNA STEAM FISH, PRODUCE AND SEDIMENT**

During 2013, fish and sediment from the Susquehanna River and locally grown produce were collected by a utility contractor and split with BRP.

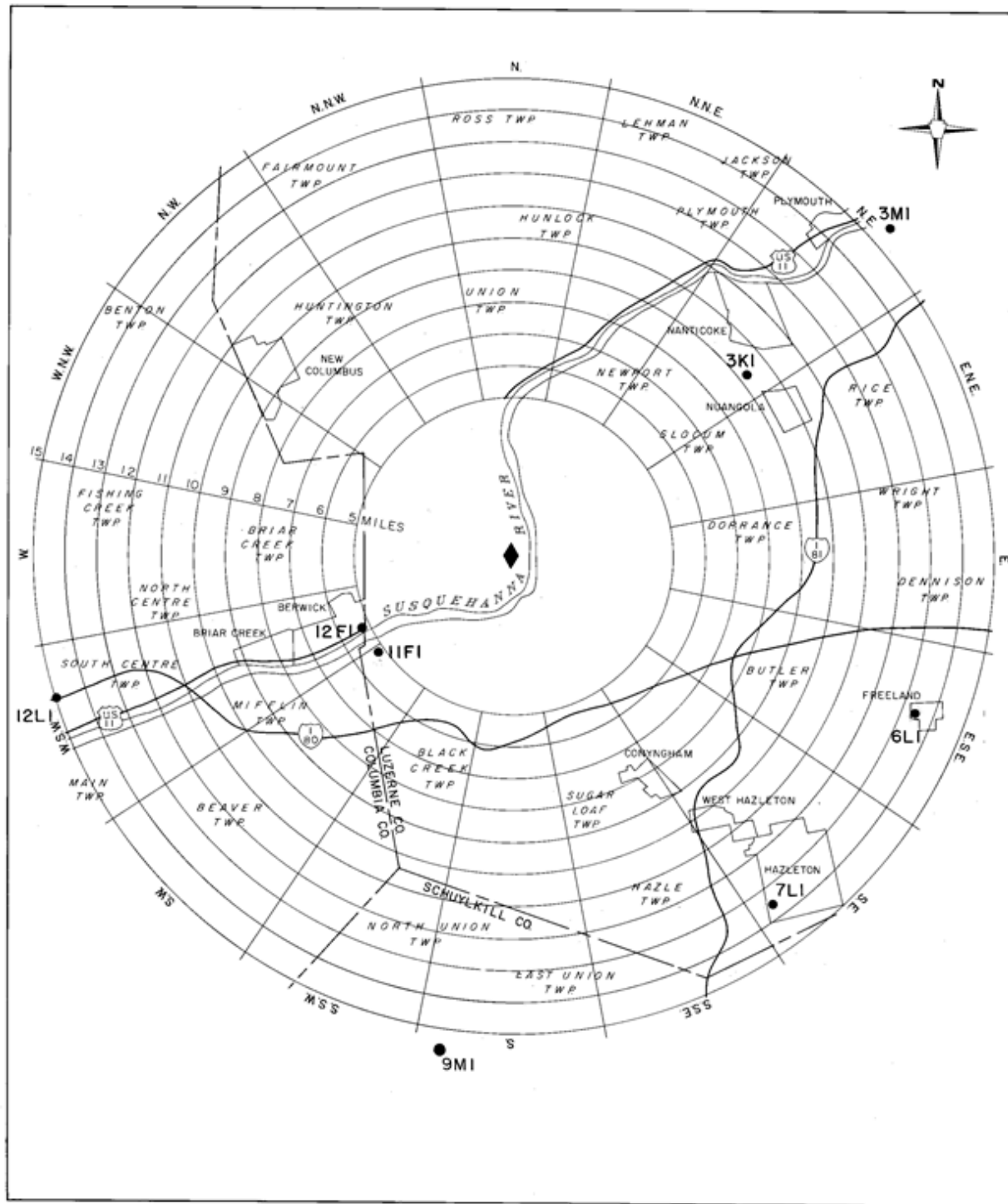
The fish sample was collected in the vicinity of the discharge. The produce samples of Swiss Chard and potatoes were collected from a truck garden 3.3 miles southwest of the plant which uses downstream river water for irrigation. Sediment was collected both upstream and downstream of the discharge. Analysis was by gamma spectroscopy.

No reactor-related radioisotopes were detected in any of these samples during 2013. (See Appendix 5.G.)

**Susquehanna Steam Electric Station  
Locations of Environmental Monitoring Stations  
Within 5 Miles of the Site**



**Susquehanna Steam Electric Station  
Locations of Environmental Monitoring Stations  
Greater than 5 Miles from the Site**



## THREE MILE ISLAND NUCLEAR STATION

Three Mile Island Nuclear Station Unit 1 is a pressurized water reactor, rated at 871 megawatts electrical (Mwe). The facility is located on an island in the Susquehanna River, Londonderry Township, Dauphin County, Pennsylvania.

The facility is operated by Exelon Nuclear.



### THREE MILE ISLAND THERMOLUMINESCENCE DOSIMETRY

The BRP TLD program in the environs of Three Mile Island Nuclear Station includes 30 dosimeter stations exchanged quarterly. Dosimeters and quarterly readout services were provided by MT during 2013. The locations range in distance from 0.5 to 16.4 miles from the site.

Contractor cross-check dosimeters were collocated with four MT dosimeters to provide a check on the MT data. RDC provided cross-check dosimeter services in 2013.

All dosimeters are changed by BRP staff.

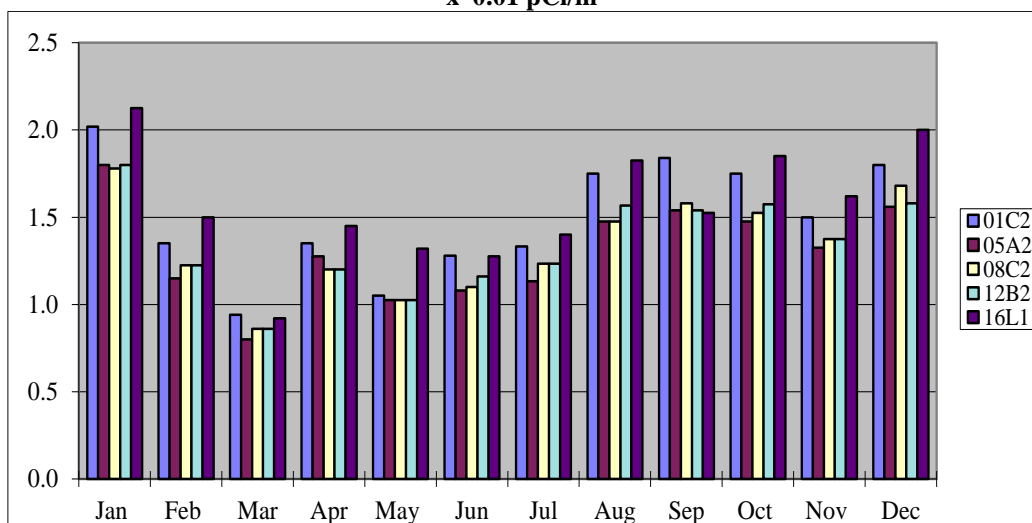
The annual average exposure for the 30 MT TLD locations was 31.8 mR in 2013 (see Appendix 6.B), compared to 28.6 in 2012. The annual average for the four RDC cross-check TLDs collocated with MT contractor TLDs was 31.5 mR (corrected for transit exposure). The corresponding MT contractor values averaged 25.2 mR (corrected for transit exposure). (See Appendices 6.A and 6.B.)

### THREE MILE ISLAND AIR SAMPLING

In 2013, air sampling in the environs of Three Mile Island continued at four stations. A control sampler is located at Harrisburg. The samplers continuously collect air particulates and radioiodines. The particulate filters were individually analyzed for gross activity and composited quarterly for gamma spectrum analysis. Activated charcoal canisters impregnated with TEDA, a chelating agent, were individually analyzed by gamma spectroscopy for iodine-131. The filters and canisters were changed by BRP on a weekly basis.

The airborne gross activity in the environs of the Three Mile Island Nuclear Station was relatively uniform throughout the year. Air monitoring data from the Three Mile Island station are similar to analogous data from other nuclear power plants in Pennsylvania and the 2013 control station (16L1) at Harrisburg. (See Appendix 6.C.)

**2013**  
**Average Gross Beta Concentrations In**  
**Airborne Particulates Around Three Mile Island**  
**x 0.01 pCi/m<sup>3</sup>**



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## THREE MILE ISLAND WATER SAMPLING

The Three Mile Island Nuclear Station uses the Susquehanna River for station water and discharge of liquid effluents.

Finished drinking water is sampled upstream at the Steelton Water Treatment Plant and downstream at the Columbia Water Co. The monthly samples represent essentially continuous composites.

The samples were analyzed for gross beta activity, tritium and gamma emitters. Low levels of tritium were detected in samples collected during July, September and October from the downstream site at Columbia. Presence of this isotope is attributable to fallout from weapons testing and the accident at Chernobyl in April 1986. No other reactor-related isotopes were detected. (See Appendix 6.E.)

All data compare favorably with the EPA National Interim Primary Drinking Water regulations. Those criteria were 15 pCi/L gross alpha, 50 picocuries gross beta and 20,000 pCi/L tritium before the December 2000 revisions went in effect. Drinking water criteria, at present, maintain the 15 pCi/L gross alpha limit, but make gross beta and tritium criteria contingent on activity levels for isotopes that are not analyzed in this program.



### **THREE MILE ISLAND MILK SAMPLING**

In 2013, monthly milk sampling near Three Mile Island Nuclear Station continued at two local farms.

The grab samples were analyzed by gamma spectroscopy.

No reactor-related isotopes were detected in any of the 2013 samples. Natural potassium-40 concentrations are equivalent to potassium content of 0.8 to 1.7 grams per liter. (See Appendix 6.F.)

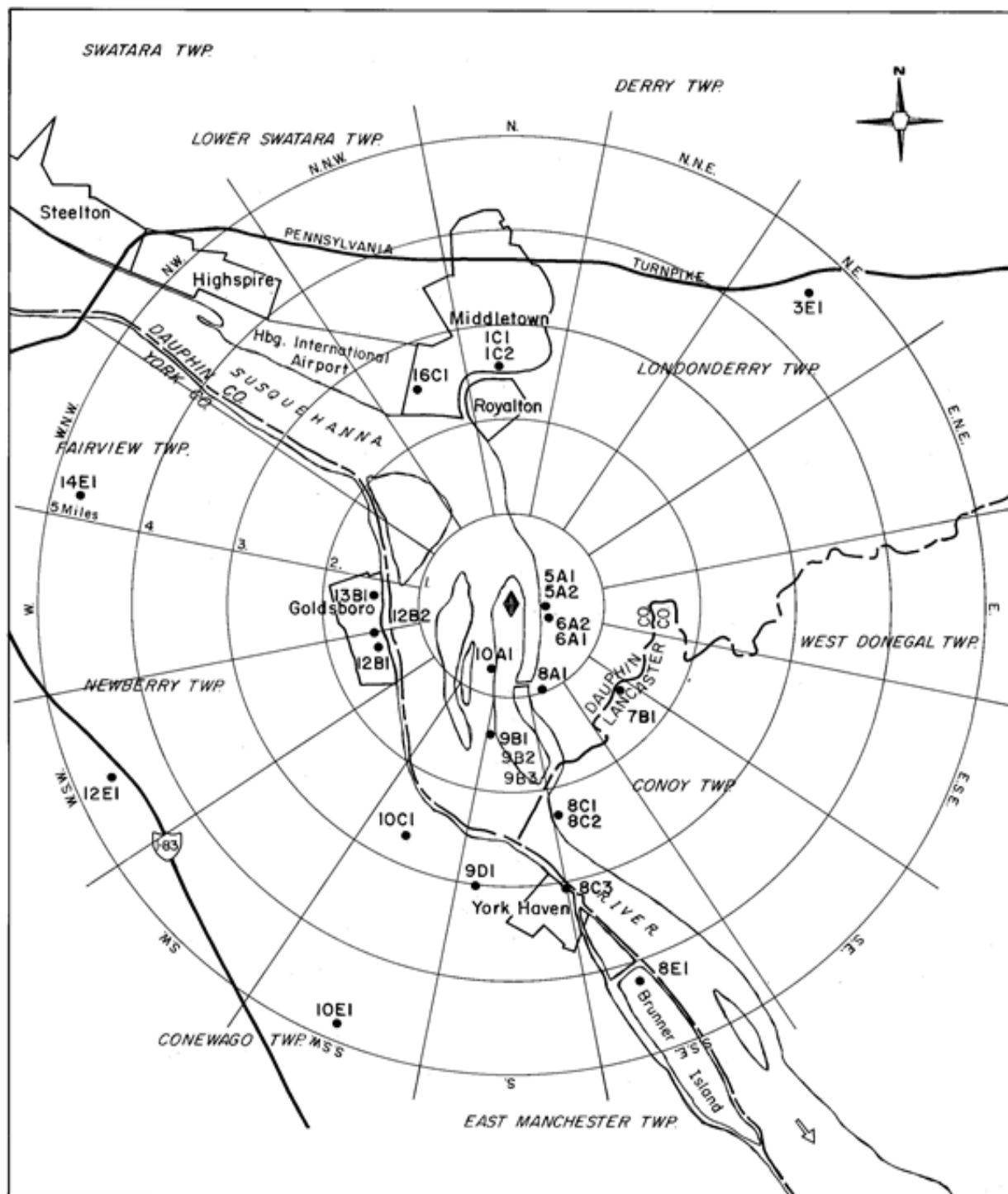
### **THREE MILE ISLAND FISH, PRODUCE AND SEDIMENT**

During the reporting period, fish, vegetation and sediment from the Susquehanna River were collected by the utility and split with BRP.

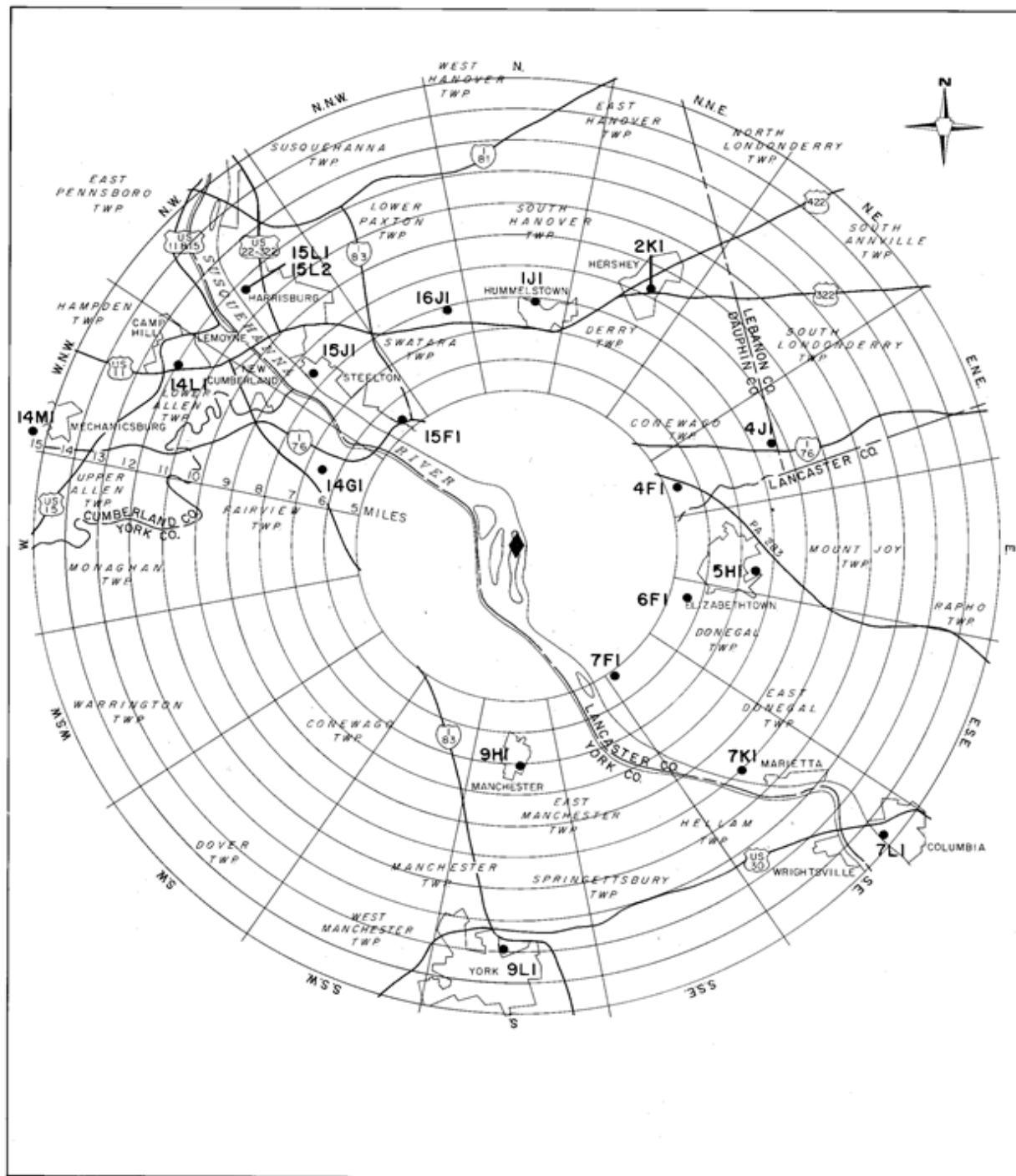
The fish sample was collected in the vicinity of the discharge. The produce samples of turnip and zucchini leaves were collected from a truck garden 0.9 miles south southeast of the plant and at a garden maintained by the utility's contractor located 0.4 miles east of the site. Sediment was collected upstream and downstream of the discharge. Analysis was by gamma spectroscopy.

No reactor-related radioisotopes were detected in any of the fish, sediment or produce samples. (See Appendix 6.G.)

**Three Mile Island Nuclear Station  
Locations of Environmental Monitoring Stations  
Within 5 Miles of the Site**



**Three Mile Island Nuclear Station  
Locations of Environmental Monitoring Stations  
Greater Than 5 Miles from the Site**



### **References**

ICRP, Principles of Monitoring for the Radiation Protection of the Population. ICRP-43. 1984.

Kathren, Ronald L., Radioactivity in the Environment. Harwood Academic Publishers, New York, 1984.

U.S. EPA, Environmental Radioactivity Surveillance Guide. ORP/SID 72-2. USEPA. June 1972.

# **PENNSYLVANIA BUREAU OF RADIATION PROTECTION**

**2013**

**Appendix**

**1.A.1**  
**PENNSYLVANIA WATER QUALITY NETWORK DATA**

Station Number	Location	City	Collection Date	Concentration (pCi/L)	
				Alpha	Beta
341	Tioga River	Mansfield	01/02/13	< 3	1 +/- 1
			03/06/13	< 2	1 +/- 1
			05/20/13	< 2	1 +/- 1
			07/22/13	< 2	2 +/- 1
			09/03/13	< 3	2 +/- 1
			12/12/13	< 2	2 +/- 1
402	Susquehanna River	Williamsport	01/07/13	2 +/- 1	1 +/- 1
			03/12/13	< 2	< 2
			05/02/13	< 1	< 2
			07/09/13	< 2	1 +/- 1
			09/04/13	< 3	2 +/- 1
			10/30/13	< 2	1 +/- 1
			12/17/13	3 +/- 1	1 +/- 1
701	Monongahela River	Braddock	01/14/13	< 3	< 2
			02/26/13	< 2	< 2
			03/11/13	< 3	< 2
			04/16/13	< 3	1 +/- 1
			05/23/13	< 2	3 +/- 1
			06/24/13	< 2	2 +/- 1
			07/15/13	< 2	3 +/- 1
			08/21/13	< 3	2 +/- 1
			09/05/13	< 2	2 +/- 1
			10/22/13	< 3	1 +/- 1
			11/13/13	< 2	2 +/- 1
			12/04/13	< 3	2 +/- 1
702	Monongahela River	Millcreek	01/09/13	< 2	1 +/- 1
			02/25/13	< 2	2 +/- 1
			03/13/13	< 2	1 +/- 1
			04/11/13	< 2	< 2
			05/16/13	< 2	2 +/- 1
			06/20/13	< 2	2 +/- 1
			07/18/13	< 2	2 +/- 1
			08/19/13	< 2	2 +/- 1
			09/23/13	< 3	2 +/- 1
			10/21/13	< 3	2 +/- 1
			11/20/13	< 2	< 2
			12/09/13	3 +/- 1	3 +/- 1

**1.A.2**  
**PENNSYLVANIA WATER QUALITY NETWORK DATA**

Station Number	Location	City	Collection Date	Concentration (pCi/L)	
				Alpha	Beta
713	Ten Mile Creek (South Fork)	Jefferson	01/28/13	< 3	< 2
			02/27/13	7 +/- 2	7 +/- 1
			03/14/13	< 2	< 2
			04/11/13	< 3	2 +/- 1
			05/20/13	< 5	< 2
			06/18/13	< 4	2 +/- 1
			07/23/13	< 3	2 +/- 1
			08/15/13	< 3	3 +/- 1
			10/28/13	< 3	< 3
			11/12/13	< 8	< 3
810	Conemaugh River	Tunnelton	01/10/13	3 +/- 2	3 +/- 1
			03/21/13	< 3	< 2
			05/15/13	< 3	1 +/- 1
			07/24/13	< 3	3 +/- 1
			10/30/13	4 +/- 2	7 +/- 1
867	Allegheny River	Kennerdell	01/07/13	< 3	< 2
			02/13/13	< 2	< 2
			03/21/13	< 2	1 +/- 1
			04/09/13	< 2	< 2
			05/23/13	< 2	< 1
			06/26/13	< 2	2 +/- 1
			07/24/13	< 3	1 +/- 1
			08/20/13	< 3	1 +/- 1
			09/24/13	< 2	2 +/- 1
			10/23/13	< 3	2 +/- 1
			11/26/13	< 3	< 1
			12/18/13	< 2	< 2
906	Beaver River	Wampum Boro	01/15/13	2 +/- 2	4 +/- 1
			02/21/13	< 3	4 +/- 1
			03/19/13	< 3	4 +/- 1
			04/22/13	< 2	4 +/- 1
			05/21/13	< 2	6 +/- 1
			06/25/13	< 3	5 +/- 1
			07/22/13	< 2	6 +/- 1
			08/26/13	< 3	< 2
			09/26/13	< 3	5 +/- 1
			10/17/13	< 3	6 +/- 1
			11/26/13	< 3	5 +/- 1
			12/03/13	< 3	3 +/- 1

**1.B**  
**PRECIPITATION MONITORING DATA**

Collection Period Ending	Concentration (pCi/L)			Deposition (nCi/m2)	
	Alpha	Beta	Tritium	Alpha	Beta
01/14/13	2 +/- 1	4 +/- 1	< 150	0.03 +/- 0.02	0.06 +/- 0.02
02/01/13	1 +/- 1	< 2	< 150	0.04 +/- 0.04	< 0.07
02/11/13	4 +/- 1	5 +/- 1	< 150	0.05 +/- 0.01	0.06 +/- 0.01
02/21/13	8 +/- 1	10 +/- 1	< 150	0.06 +/- 0.01	0.08 +/- 0.01
02/27/13	2 +/- 1	3 +/- 1	< 150	0.05 +/- 0.03	0.08 +/- 0.03
03/13/13	< 1	1 +/- 1	< 150	< 0.02	0.02 +/- 0.02
03/20/13	1 +/- 1	4 +/- 1	< 140	0.02 +/- 0.02	0.08 +/- 0.02
04/15/13	1 +/- 1	2 +/- 1	< 150	0.01 +/- 0.01	0.03 +/- 0.01
04/22/13	2 +/- 1	3 +/- 1	< 150	0.04 +/- 0.02	0.07 +/- 0.02
05/08/13	4 +/- 1	6 +/- 1	< 150	0.06 +/- 0.01	0.09 +/- 0.01
05/13/13	< 1	2 +/- 1	< 150	< 0.04	0.07 +/- 0.04
05/28/13	3 +/- 1	5 +/- 1	< 150	0.04 +/- 0.01	0.07 +/- 0.01
05/28/13	< 2	2 +/- 1	< 150	< 0.02	0.02 +/- 0.01
06/07/13	1 +/- 1	2 +/- 1	< 140	0.01 +/- 0.01	0.03 +/- 0.01
06/11/13	< 2	< 2	< 140	< 0.08	< 0.08
06/14/13	< 1	3 +/- 1	< 140	< 0.02	0.06 +/- 0.02
07/01/13	< 4	< 5	< 140	< 0.18	< 0.22
07/15/13	< 4	< 8	< 150	< 0.05	< 0.10
07/22/13	1 +/- 1	4 +/- 1	< 150	0.01 +/- 0.01	0.06 +/- 0.01
07/23/13	1 +/- 1	3 +/- 1	< 150	0.04 +/- 0.04	0.13 +/- 0.04
07/29/13	< 2	2 +/- 1	< 150	< 0.03	0.03 +/- 0.01
08/09/13	2 +/- 1	3 +/- 1	< 140	0.02 +/- 0.01	0.03 +/- 0.01
08/12/13	< 1	4 +/- 1	< 140	< 0.02	0.06 +/- 0.02
08/13/13	< 2	< 2	< 140	< 0.03	< 0.03
08/26/13	1 +/- 1	2 +/- 1	< 150	0.01 +/- 0.01	0.03 +/- 0.01
09/03/13	< 2	4 +/- 1	< 140	< 0.02	0.04 +/- 0.01
09/13/13	1 +/- 1	4 +/- 1	< 140	0.04 +/- 0.04	0.16 +/- 0.04
09/23/13	< 1	1 +/- 1	< 140	< 0.03	0.03 +/- 0.03
10/08/13	< 1	< 2	< 150	< 0.02	< 0.05
10/11/13	< 2	< 2	< 150	< 0.08	< 0.08
10/15/13	< 1	< 2	< 150	< 0.03	< 0.05
11/18/13	1 +/- 1	4 +/- 1	< 150	0.02 +/- 0.02	0.06 +/- 0.02
11/27/13	< 2	< 3	< 150	< 0.08	< 0.13
12/09/13	1 +/- 1	2 +/- 1	< 150	0.03 +/- 0.03	0.06 +/- 0.03
12/17/13	5 +/- 1	9 +/- 1	< 150	0.09 +/- 0.02	0.15 +/- 0.02
12/23/13	* 16 +/- 1	* 22 +/- 1	< 150	0.20 +/- 0.01	0.27 +/- 0.01
12/30/13	1 +/- 1	2 +/- 1	< 150	0.02 +/- 0.02	0.05 +/- 0.02

\* Possible interference by particulates from precipitation collector.

**2.A**  
**BEAVER VALLEY POWER STATION**  
**QUARTERLY TLD INTERCOMPARISON**  
**(mR/std. mo.)**

Station Number	Location	Collection Period	RDC Results	MT Results
3B1	Shippingport	1/22/2013 - 4/17/2013	4.3	3.3 +/- 0.2
		4/17/2013 - 7/10/2013	3.6	5.4 +/- 0.7
		7/10/2013 - 10/23/2013	4.3	3.5 +/- 0.2
		10/23/2013 - 1/22/2014	4.7	3.6 +/- 0.2
3C1	Industry	1/22/2013 - 4/17/2013	4.3	2.9 +/- 0.2
		4/17/2013 - 7/10/2013	4.3	3.5 +/- 0.8
		7/10/2013 - 10/23/2013	3.5	3.1 +/- 0.3
		10/23/2013 - 1/22/2014	4.7	3.4 +/- 0.5
5C1	Mt. Pleasant Church	1/22/2013 - 4/17/2013	5.7	3.5 +/- 0.1
		4/17/2013 - 7/10/2013	4.7	3.7 +/- 0.4
		7/10/2013 - 10/23/2013	4.1	3.7 +/- 0.2
		10/23/2013 - 1/22/2014	4.7	3.9 +/- 0.1
11B1	Meyer Farm	1/22/2013 - 4/17/2013	4.6	3.4 +/- 0.2
		4/17/2013 - 7/10/2013	3.3	3.4 +/- 0.3
		7/10/2013 - 10/23/2013	4.1	3.5 +/- 0.2
		10/23/2013 - 1/22/2014	4.3	3.1 +/- 0.3
Annual Average:			51.9	42.6 +/- 1.9



**2.C.1**  
**BEAVER VALLEY AIR SAMPLING DATA**  
**INDUSTRY (3C2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/31/12 - 01/07/13	0.2 +/- 0.1	2.6 +/- 0.1	< 0.7
01/07/13 - 01/14/13	0.4 +/- 0.1	2.4 +/- 0.1	< 0.6
01/14/13 - 01/22/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.3
01/22/13 - 01/28/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.6
01/28/13 - 02/04/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.5
02/04/13 - 02/11/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.3
02/11/13 - 02/19/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.4
02/19/13 - 02/25/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.5
02/25/13 - 03/04/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.6
03/04/13 - 03/11/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.4
03/11/13 - 03/18/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.6
03/18/13 - 03/25/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
03/25/13 - 04/01/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.4
04/01/13 - 04/08/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.4
04/08/13 - 04/15/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.5
04/15/13 - 04/22/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
04/22/13 - 04/29/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.6
04/29/13 - 05/06/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.4
05/06/13 - 05/13/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.4
05/13/13 - 05/20/13	0.4 +/- 0.1	1.3 +/- 0.1	< 0.6
05/20/13 - 05/28/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5
05/28/13 - 06/03/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.7
06/03/13 - 06/10/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.4
06/10/13 - 06/17/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.5
06/17/13 - 06/24/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.4
06/24/13 - 07/01/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
07/01/13 - 07/08/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.4
07/08/13 - 07/15/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.3
07/15/13 - 07/22/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.3
07/22/13 - 07/29/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.3
07/29/13 - 08/05/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
08/05/13 - 08/12/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5
08/12/13 - 08/19/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.4
08/19/13 - 08/26/13	< 0.1	< 0.1	< 0.4
08/26/13 - 09/03/13	0.4 +/- 0.1	2.3 +/- 0.1	< 0.4
09/03/13 - 09/09/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.7
09/09/13 - 09/16/13	0.3 +/- 0.1	2.1 +/- 0.1	< 0.4
09/16/13 - 09/23/13	0.4 +/- 0.1	1.9 +/- 0.1	< 0.3
09/23/13 - 09/30/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.6
09/30/13 - 10/07/13	0.4 +/- 0.1	2.1 +/- 0.1	< 0.4
10/07/13 - 10/15/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
10/15/13 - 10/21/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.4
10/21/13 - 10/28/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.3
10/28/13 - 11/04/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.3
11/04/13 - 11/12/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.6
11/12/13 - 11/19/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.4
11/19/13 - 11/25/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.5
11/25/13 - 12/02/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.5
12/02/13 - 12/09/13	0.4 +/- 0.1	2.4 +/- 0.1	< 0.5
12/09/13 - 12/16/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.5
12/16/13 - 12/23/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.3
12/23/13 - 12/30/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.4

**2.C.2**  
**BEAVER VALLEY AIR SAMPLING DATA**  
**COOKS FERRY SUBSTATION (4A2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/31/12 - 01/07/13	0.3 +/- 0.1	2.5 +/- 0.1	< 0.5
01/07/13 - 01/14/13	0.3 +/- 0.1	2.3 +/- 0.1	< 0.6
01/14/13 - 01/22/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.5
01/22/13 - 01/28/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5
01/28/13 - 02/04/13	0.4 +/- 0.1	2.0 +/- 0.1	< 0.6
02/04/13 - 02/11/13	0.2 +/- 0.1	1.8 +/- 0.1	< 0.5
02/11/13 - 02/19/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
02/19/13 - 02/25/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.7
02/25/13 - 03/04/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.6
03/04/13 - 03/11/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.5
03/11/13 - 03/18/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.6
03/18/13 - 03/25/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5
03/25/13 - 04/01/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.6
04/01/13 - 04/08/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.5
04/08/13 - 04/15/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.7
04/15/13 - 04/22/13	0.1 +/- 0.1	1.1 +/- 0.1	< 0.5
04/22/13 - 04/29/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.5
04/29/13 - 05/06/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5
05/06/13 - 05/13/13	0.2 +/- 0.1	0.6 +/- 0.1	< 0.5
05/13/13 - 05/20/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.6
05/20/13 - 05/28/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.4
05/28/13 - 06/03/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.7
06/03/13 - 06/10/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5
06/10/13 - 06/17/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.4
06/17/13 - 06/24/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.6
06/24/13 - 07/01/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.4
07/01/13 - 07/08/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.6
07/08/13 - 07/15/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.5
07/15/13 - 07/22/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.5
07/22/13 - 07/29/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.4
07/29/13 - 08/05/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.6
08/05/13 - 08/12/13	0.1 +/- 0.1	1.3 +/- 0.1	< 0.5
08/12/13 - 08/19/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.6
08/19/13 - 08/26/13	0.3 +/- 0.1	2.0 +/- 0.1	< 0.6
08/26/13 - 09/03/13	0.4 +/- 0.1	2.1 +/- 0.1	< 0.4
09/03/13 - 09/09/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.7
09/09/13 - 09/16/13	0.4 +/- 0.1	2.5 +/- 0.1	< 0.5
09/16/13 - 09/23/13	0.4 +/- 0.1	1.7 +/- 0.1	< 0.6
09/23/13 - 09/30/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
09/30/13 - 10/07/13	0.4 +/- 0.1	2.2 +/- 0.1	< 0.4
10/07/13 - 10/15/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.4
10/15/13 - 10/21/13	0.4 +/- 0.1	1.7 +/- 0.1	< 0.7
10/21/13 - 10/28/13	0.1 +/- 0.1	1.1 +/- 0.1	< 0.6
10/28/13 - 11/04/13	0.3 +/- 0.1	2.0 +/- 0.1	< 0.6
11/04/13 - 11/12/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.6
11/12/13 - 11/19/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.5
11/19/13 - 11/25/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5
11/25/13 - 12/02/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.6
12/02/13 - 12/09/13	0.4 +/- 0.1	2.3 +/- 0.1	< 0.5
12/09/13 - 12/16/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.7
12/16/13 - 12/23/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.6
12/23/13 - 12/30/13	0.1 +/- 0.1	1.5 +/- 0.1	< 0.4

**2.C.3**  
**BEAVER VALLEY AIR SAMPLING DATA**  
**MEYER FARM (11B2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/31/12 - 01/07/13	0.3 +/- 0.1	2.9 +/- 0.1	< 0.5
01/07/13 - 01/14/13	0.3 +/- 0.1	2.3 +/- 0.1	< 0.7
01/14/13 - 01/22/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.5
01/22/13 - 01/28/13	0.2 +/- 0.1	1.9 +/- 0.1	< 0.4
01/28/13 - 02/04/13	0.3 +/- 0.1	2.0 +/- 0.1	< 0.7
02/04/13 - 02/11/13	0.2 +/- 0.1	1.8 +/- 0.1	< 0.4
02/11/13 - 02/19/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.6
02/19/13 - 02/25/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.6
02/25/13 - 03/04/13	0.2 +/- 0.1	0.7 +/- 0.1	< 0.4
03/04/13 - 03/11/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.7
03/11/13 - 03/18/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.5
03/18/13 - 03/25/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.6
03/25/13 - 04/01/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.7
04/01/13 - 04/08/13	0.5 +/- 0.1	1.6 +/- 0.1	< 0.6
04/08/13 - 04/15/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.6
04/15/13 - 04/22/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.7
04/22/13 - 04/29/13	0.4 +/- 0.1	1.5 +/- 0.1	< 0.5
04/29/13 - 05/06/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.5
05/06/13 - 05/13/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.6
05/13/13 - 05/20/13	0.4 +/- 0.1	1.5 +/- 0.1	< 0.6
05/20/13 - 05/28/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.6
05/28/13 - 06/03/13		*	
06/03/13 - 06/10/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.9
06/10/13 - 06/17/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
06/17/13 - 06/24/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.5
06/24/13 - 07/01/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.9
07/01/13 - 07/08/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.6
07/08/13 - 07/15/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.8
07/15/13 - 07/22/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.5
07/22/13 - 07/29/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.6
07/29/13 - 08/05/13	0.1 +/- 0.1	1.4 +/- 0.1	< 0.5
08/05/13 - 08/12/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.7
08/12/13 - 08/19/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.5
08/19/13 - 08/26/13	0.4 +/- 0.1	3.2 +/- 0.1	< 0.9
08/26/13 - 09/03/13	0.3 +/- 0.1	2.3 +/- 0.1	< 0.4
09/03/13 - 09/09/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.9
09/09/13 - 09/16/13	0.4 +/- 0.1	2.4 +/- 0.1	< 0.9
09/16/13 - 09/23/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.4
09/23/13 - 09/30/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.4
09/30/13 - 10/07/13	0.4 +/- 0.1	2.1 +/- 0.1	< 0.7
10/07/13 - 10/15/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5
10/15/13 - 10/21/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.6
10/21/13 - 10/28/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
10/28/13 - 11/04/13	0.2 +/- 0.1	2.3 +/- 0.1	< 0.7
11/04/13 - 11/12/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.7
11/12/13 - 11/19/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
11/19/13 - 11/25/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.7
11/25/13 - 12/02/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.6
12/02/13 - 12/09/13	0.3 +/- 0.1	2.2 +/- 0.1	< 0.5
12/09/13 - 12/16/13	0.3 +/- 0.1	2.0 +/- 0.1	< 0.6
12/16/13 - 12/23/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.6
12/23/13 - 12/30/13	0.2 +/- 0.1	1.9 +/- 0.1	< 0.6

\*No sample available

**2.C.4**  
**BEAVER VALLEY AIR SAMPLING DATA**  
**MIDLAND SUBSTATION (15A2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/31/12 - 01/07/13	0.3 +/- 0.1	2.4 +/- 0.1	< 0.5
01/07/13 - 01/14/13	0.5 +/- 0.1	2.6 +/- 0.1	< 0.6
01/14/13 - 01/22/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.6
01/22/13 - 01/28/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.5
01/28/13 - 02/04/13	0.2 +/- 0.1	1.9 +/- 0.1	< 0.4
02/04/13 - 02/11/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.4
02/11/13 - 02/19/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.4
02/19/13 - 02/25/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.5
02/25/13 - 03/04/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.6
03/04/13 - 03/11/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.5
03/11/13 - 03/18/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.5
03/18/13 - 03/25/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.4
03/25/13 - 04/01/13	0.2 +/- 0.1	0.7 +/- 0.1	< 0.4
04/01/13 - 04/08/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
04/08/13 - 04/15/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.5
04/15/13 - 04/22/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.4
04/22/13 - 04/29/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.6
04/29/13 - 05/06/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
05/06/13 - 05/13/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.5
05/13/13 - 05/20/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
05/20/13 - 05/28/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.3
05/28/13 - 06/03/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5
06/03/13 - 06/10/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
06/10/13 - 06/17/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.4
06/17/13 - 06/24/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.3
06/24/13 - 07/01/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.4
07/01/13 - 07/08/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.6
07/08/13 - 07/15/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
07/15/13 - 07/22/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.3
07/22/13 - 07/29/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.5
07/29/13 - 08/05/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
08/05/13 - 08/12/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5
08/12/13 - 08/19/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.3
08/19/13 - 08/26/13	0.4 +/- 0.1	1.9 +/- 0.1	< 0.5
08/26/13 - 09/03/13	0.3 +/- 0.1	2.3 +/- 0.1	< 0.6
09/03/13 - 09/09/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
09/09/13 - 09/16/13	0.4 +/- 0.1	2.3 +/- 0.1	< 0.6
09/16/13 - 09/23/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.3
09/23/13 - 09/30/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
09/30/13 - 10/07/13	0.4 +/- 0.1	2.1 +/- 0.1	< 0.4
10/07/13 - 10/15/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
10/15/13 - 10/21/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.5
10/21/13 - 10/28/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
10/28/13 - 11/04/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.6
11/04/13 - 11/12/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
11/12/13 - 11/19/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.4
11/19/13 - 11/25/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.7
11/25/13 - 12/02/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.6
12/02/13 - 12/09/13	0.3 +/- 0.1	2.3 +/- 0.1	< 0.5
12/09/13 - 12/16/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.4
12/16/13 - 12/23/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.5
12/23/13 - 12/30/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.6

**2.D**  
**BEAVER VALLEY AIR PARTICULATE COMPOSITES**  
**(fCi/m3)**

<b>Station Number</b>	<b>Location</b>	<b>Collection Period</b>	<b>Cs-134</b>	<b>Cs-137</b>
3C2	Industry	12/31/2012 - 04/01/2013	< 0.2	< 0.2
		04/01/2013 - 07/01/2013	< 0.2	< 0.2
		07/01/2013 - 09/30/2013	< 0.3	< 0.3
		09/30/2013 - 12/30/2013	< 0.2	< 0.2
4A2	Ferry Hill Substation	12/31/2012 - 04/01/2013	< 0.2	< 0.2
		04/01/2013 - 07/01/2013	< 0.2	< 0.2
		07/01/2013 - 09/30/2013	< 0.2	< 0.2
		09/30/2013 - 12/30/2013	< 0.2	< 0.2
11B2	Meyer Farm	12/31/2012 - 04/01/2013	< 0.2	< 0.2
		04/01/2013 - 07/01/2013	< 0.2	< 0.2
		07/01/2013 - 09/30/2013	< 0.2	< 0.2
		09/30/2013 - 12/30/2013	< 0.2	< 0.2
15A2	Midland Substation	12/31/2012 - 04/01/2013	< 0.2	< 0.2
		04/01/2013 - 07/01/2013	< 0.2	< 0.2
		07/01/2013 - 09/30/2013	< 0.2	< 0.2
		09/30/2013 - 12/30/2013	< 0.2	< 0.2

**2.E.1**  
**BEAVER VALLEY SURFACE WATER DATA**  
**ARCO POLYMER (4F1)**  
**(pCi/L)**

Collection Period Ending	Beta	Tritium	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-140
1/29/13	2 +/- 1	< 150	< 2	< 5	< 3	< 3	< 5	< 4 / < 3	< 3	< 3	< 3	< 8
2/26/13	3 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
3/26/13	1 +/- 1	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 2	< 2	< 2	< 6
4/30/13	3 +/- 1	< 160	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 2	< 2	< 2	< 6
5/28/13	2 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
6/25/13	1 +/- 1	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 4	< 2	< 2	< 8
7/30/13	< 2	< 140	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 3	< 2	< 2	< 16
8/27/13	1 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
9/24/13	2 +/- 1	< 140	< 2	< 4	< 2	< 2	< 4	< 4 / < 3	< 5	< 2	< 3	< 11
10/29/13	2 +/- 1	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 2	< 2	< 2	< 5
11/26/13	2 +/- 1	< 150	< 2	< 6	< 3	< 2	< 5	< 5 / < 4	< 27	< 2	< 2	< 34
12/31/13	4 +/- 1	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7

**J & L STEEL, MIDLAND (14B1)**  
**(pCi/L)**

Collection Period Ending	Beta	Tritium	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-140
1/29/13	3 +/- 1	< 150	< 3	< 5	< 2	< 3	< 5	< 4 / < 3	< 3	< 3	< 3	< 10
2/26/13	1 +/- 1	< 150	< 2	< 4	< 2	< 2	< 4	< 3 / < 2	< 4	< 2	< 2	< 9
4/02/13	< 2	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 4	< 2	< 2	< 8
4/30/13	1 +/- 1	< 160	< 3	< 6	< 3	< 3	< 6	< 5 / < 3	< 4	< 3	< 3	< 11
5/28/13	3 +/- 1	< 150	< 2	< 4	< 2	< 2	< 4	< 3 / < 2	< 4	< 2	< 2	< 9
7/02/13	3 +/- 1	< 140	< 3	< 4	< 3	< 3	< 4	< 4 / < 3	< 4	< 3	< 3	< 10
7/30/13	4 +/- 1	< 140	< 3	< 4	< 3	< 3	< 5	< 4 / < 3	< 3	< 3	< 3	< 9
9/03/13	7 +/- 1	< 140	< 2	< 5	< 2	< 2	< 4	< 4 / < 3	< 27	< 2	< 2	< 29
10/01/13	3 +/- 1	< 150	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 3	< 2	< 2	< 8
10/29/13	3 +/- 1	< 140	< 3	< 5	< 3	< 3	< 4	< 4 / < 3	< 3	< 3	< 3	< 9
12/03/13	2 +/- 1	< 140	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 4	< 2	< 2	< 10
12/31/13	2 +/- 1	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7

**2.E.2**  
**BEAVER VALLEY SURFACE WATER DATA**  
**EAST LIVERPOOL (14F1)**  
**(pCi/L)**

Collection Period Ending	Beta	Tritium	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-140
1/29/13	2 +/- 1	< 150	< 2	< 4	< 2	< 3	< 4	< 4 / < 2	< 3	< 2	< 2	< 8
2/26/13	3 +/- 1	< 150	< 2	< 3	< 2	< 2	< 4	< 3 / < 2	< 3	< 2	< 2	< 8
4/02/13	2 +/- 1	< 140	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 5	< 2	< 2	< 11
4/30/13	3 +/- 1	< 160	< 5	< 9	< 5	< 5	< 12	< 8 / < 5	< 6	< 5	< 5	< 17
5/28/13	< 2	< 150	< 2	< 3	< 2	< 2	< 4	< 3 / < 2	< 3	< 2	< 2	< 8
7/02/13	5 +/- 1	< 140	< 3	< 5	< 3	< 3	< 5	< 4 / < 3	< 4	< 3	< 3	< 11
7/30/13	3 +/- 1	< 150	< 2	< 5	< 3	< 3	< 6	< 4 / < 3	< 4	< 3	< 3	< 10
9/03/13	6 +/- 1	< 140	< 2	< 5	< 2	< 2	< 4	< 4 / < 3	< 25	< 2	< 2	< 30
10/01/13	2 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 2	< 2	< 2	< 6
10/29/13	3 +/- 1	< 140	< 5	< 16	< 7	< 5	< 10	< 12 / < 10	< 254	< 4	< 4	< 176
12/03/13	4 +/- 1	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
12/31/13	3 +/- 1	< 140	< 3	< 7	< 4	< 3	< 7	< 6 / < 4	< 6	< 3	< 3	< 15

**2.F**  
**BEAVER VALLEY MILK SAMPLING DATA**  
**(pCi/L)**

<b>Station Number</b>	<b>Collection Date</b>	<b>I-131</b>	<b>Cs-134</b>	<b>Cs-137</b>	<b>Ba-140</b>	<b>K-40</b>
07G2-18	1/14/13	< 4	< 3	< 3	< 12	1330 +/- 101
	2/12/13	< 3	< 3	< 3	< 9	1310 +/- 100
	3/11/13	< 3	< 2	< 2	< 7	1380 +/- 98
	4/15/13	< 4	< 3	< 3	< 11	1250 +/- 102
	5/13/13	< 3	< 2	< 3	< 8	1350 +/- 104
	6/10/13	< 4	< 3	< 3	< 11	1330 +/- 104
	7/22/13	< 6	< 5	< 6	< 19	1440 +/- 121
	8/19/13	< 3	< 2	< 2	< 8	1360 +/- 105
	9/16/13	< 3	< 2	< 2	< 8	1360 +/- 15
	10/14/13	< 5	< 3	< 3	< 12	1390 +/- 103
	11/18/13	< 4	< 3	< 4	< 12	1350 +/- 107
	12/16/13	< 2	< 2	< 2	< 7	1360 +/- 98

<b>Station Number</b>	<b>Collection Date</b>	<b>I-131</b>	<b>Cs-134</b>	<b>Cs-137</b>	<b>Ba-140</b>	<b>K-40</b>
11C1-18	1/14/13	< 4	< 3	< 4	< 12	1140 +/- 93
	2/11/13	< 4	< 3	< 3	< 12	1110 +/- 92
	3/11/13	< 3	< 2	< 2	< 7	1230 +/- 96
	4/15/13	< 4	< 3	< 4	< 12	1110 +/- 90
	5/13/13	< 3	< 2	< 2	< 7	1170 +/- 86
	6/10/13	< 4	< 3	< 3	< 11	1050 +/- 88
	7/22/13	< 5	< 4	< 4	< 14	1070 +/- 97
	8/19/13	< 4	< 3	< 3	< 10	1130 +/- 85
	9/17/13	< 5	< 4	< 4	< 14	1120 +/- 100
	10/14/13	< 3	< 2	< 2	< 8	1140 +/- 85
	11/18/13	< 3	< 3	< 3	< 9	1120 +/- 91
	December	No sample available				

**2.G**  
**BEAVER VALLEY FISH, PRODUCE & SEDIMENT DATA**  
**(pCi/kg)**

	<b>13A2-14</b>		<b>14D2-15</b>	<b>03B2-15</b>	<b>13A3-12</b>
	<b>Predator Fish*</b>		<b>Georgetown Produce*</b>	<b>Shippingport Produce*</b>	<b>Sediment**</b>
			<b>Cabbage</b>		
<b>Isotope</b>	<b>4/13/2013</b>	<b>9/19/2013</b>	<b>7/24/2013</b>	<b>8/20/2013</b>	<b>10/18/2013</b>
I-131	< 257	< 75	< 19	< 126	< 431
Mn-54	< 6	< 6	< 7	< 5	< 7
Fe-59	< 25	< 19	< 19	< 18	< 33
Co-58	< 8	< 6	< 7	< 6	< 8
Co-60	< 6	< 6	< 8	< 5	< 8
Zn-65	< 16	< 14	< 18	< 13	< 29
Zr-95	< 15	< 12	< 13	< 10	< 17
Nb-95	< 13	< 9	< 9	< 9	< 25
Cs-134	< 5	< 5	< 6	< 4	< 10
Cs-137	< 5	< 5	< 7	< 5	< 58
Ba-140	< 207	< 90	< 44	< 122	< 315

\* Wet Weight

\*\* Dry Weight

**3.A**  
**LIMERICK GENERATING STATION**  
**QUARTERLY TLD INTERCOMPARISON**  
**(mR/std. mo.)**

Station Number	Location	Collection Period	RDC Results	MT Results
2B1	Sanatoga	1/24/2013 - 4/3/2013	5.3	4.1 +/- 0.5
		4/3/2013 - 7/11/2013	5.2	3.9 +/- 0.3
		7/11/2013 - 10/3/2013	4.0	4.1 +/- 0.1
		10/3/2013 - 1/16/2014	4.9	3.9 +/- 0.0
6A1	Information Center	1/24/2013 - 4/3/2013	7.0	4.7 +/- 0.4
		4/3/2013 - 7/11/2013	7.4	4.8 +/- 0.2
		7/11/2013 - 10/3/2013	5.4	4.9 +/- 0.5
		10/3/2013 - 1/16/2014	6.4	5.3 +/- 0.1
8B1	Linfield	1/24/2013 - 4/3/2013	4.4	2.8 +/- 0.2
		4/3/2013 - 7/11/2013	3.7	3.3 +/- 0.2
		7/11/2013 - 10/3/2013	3.6	3.3 +/- 0.5
		10/3/2013 - 1/16/2014	4.6	2.6 +/- 0.1
14B1	Industrial Highway	1/24/2013 - 4/3/2013	5.7	3.7 +/- 0.5
		4/3/2013 - 7/11/2013	4.3	4.1 +/- 0.4
		7/11/2013 - 10/3/2013	4.0	3.5 +/- 0.1
		10/3/2013 - 1/16/2014	4.3	3.0 +/- 0.0
Annual Average:			60.2	46.5 +/- 2.0

## 3.B

Control corrected-net exposure.

**LIMERICK GENERATING STATION  
THERMOLUMINESCENCE DOSIMETRY (TLD) DATA  
(mR/std. mo.)**

Station Number	Location	1/24/13 to 4/3/13	4/4/13 to 7/11/13	7/11/13 to 10/3/13	10/3/13 to 1/16/14	Annual Dose
01A1	Evergreen & Sanatoga Roads	4.3 +/- 0.3	4.6 +/- 0.3	4.5 +/- 0.2	4.3 +/- 0.3	52.8 +/- 1.7
02B1	Sanatoga	4.1 +/- 0.5	3.9 +/- 0.3	4.1 +/- 0.1	3.9 +/- 0.0	47.8 +/- 1.7
02E1	Camp Laughing Waters	3.7 +/- 0.1	4.4 +/- 0.2	4.3 +/- 0.2	4.3 +/- 0.3	50.1 +/- 1.2
03E1	Neiffer Road	2.6 +/- 0.2	3.0 +/- 0.3	2.8 +/- 0.1	2.9 +/- 0.1	33.7 +/- 1.1
04C1	Pottstown-Limerick Airport	4.1 +/- 0.3	4.4 +/- 0.4	4.6 +/- 0.4	4.4 +/- 0.1	52.8 +/- 1.9
04C2	Limerick School	3.8 +/- 0.2	3.8 +/- 0.4	3.6 +/- 0.3	3.9 +/- 0.1	45.2 +/- 1.5
04E1	Game Farm	4.1 +/- 0.4	4.6 +/- 0.5	4.1 +/- 0.5	4.5 +/- 0.2	51.9 +/- 2.5
04G1	Schwenksville	4.1 +/- 0.7	4.4 +/- 0.3	4.0 +/- 0.5	4.7 +/- 0.5	51.3 +/- 3.2
06A1	Information Center	4.7 +/- 0.4	4.8 +/- 0.2	4.9 +/- 0.5	5.3 +/- 0.1	59.0 +/- 2.1
06C1	Stanley Tools	3.4 +/- 0.1	3.7 +/- 0.3	3.7 +/- 0.4	3.7 +/- 0.2	43.4 +/- 1.7
06G1	Collegeville	3.3 +/- 0.5	3.6 +/- 0.1	3.0 +/- 0.4	3.8 +/- 0.0	41.2 +/- 1.9
07C1	King Road	2.5 +/- 0.1	2.2 +/- 0.2	2.2 +/- 0.1	2.8 +/- 0.2	29.2 +/- 1.1
07D1	Spring City	3.8 +/- 0.2	4.4 +/- 0.4	4.4 +/- 0.5	4.5 +/- 0.2	51.0 +/- 2.2
07E1	Royersford	2.6 +/- 0.4	3.3 +/- 0.1	3.0 +/- 0.4	3.3 +/- 0.2	36.2 +/- 1.9
07H1	Phoenixville	4.0 +/- 0.3	4.7 +/- 0.4	4.2 +/- 0.3	3.1 +/- 0.3	48.0 +/- 2.1
08B1	Linfield	2.8 +/- 0.2	3.3 +/- 0.2	3.3 +/- 0.5	2.6 +/- 0.1	36.1 +/- 1.7
08F1	Pikeland Substation	4.1 +/- 0.5	3.9 +/- 0.4	4.0 +/- 0.6	3.6 +/- 0.2	46.7 +/- 2.6
09B1	Parker Ford	4.2 +/- 0.5	4.2 +/- 0.3	3.4 +/- 0.2	3.0 +/- 0.1	44.2 +/- 1.8
09D1	Snowden Substation	3.9 +/- 0.6	4.0 +/- 0.1	3.8 +/- 0.4	2.8 +/- 0.1	43.8 +/- 2.4
10D1	Ellis Woods Road	3.1 +/- 0.5	4.0 +/- 0.5	3.2 +/- 0.6	2.6 +/- 0.3	38.9 +/- 2.9
11E1	Porters Mill Substation	3.5 +/- 0.4	3.4 +/- 0.5	3.3 +/- 0.7	2.5 +/- 0.3	38.3 +/- 3.0
12A1	Fricks Lock	2.8 +/- 0.3	3.5 +/- 0.2	3.0 +/- 0.3	2.9 +/- 0.8	36.4 +/- 2.7
12E1	Hoffecker Road & Keim Street	2.7 +/- 0.5	3.1 +/- 0.4	3.0 +/- 0.1	2.0 +/- 0.1	32.6 +/- 1.8
13C1	Kenilworth	2.8 +/- 0.5	3.6 +/- 0.5	3.5 +/- 0.4	2.9 +/- 0.3	38.1 +/- 2.6
14B1	Industrial Highway	3.7 +/- 0.5	4.1 +/- 0.4	3.5 +/- 0.1	3.0 +/- 0.0	42.9 +/- 2.0
14L1	Birdsboro	3.1 +/- 0.2	3.1 +/- 0.1	2.7 +/- 0.1	2.4 +/- 0.1	33.7 +/- 0.9
15D1	Pottstown	4.6 +/- 0.3	5.1 +/- 0.5	4.7 +/- 0.4	4.6 +/- 0.2	57.0 +/- 2.3
16B1	Pleasantview Road	3.9 +/- 0.3	4.1 +/- 0.2	3.6 +/- 0.3	3.2 +/- 0.1	46.2 +/- 2.2
16E1	Yarnall Road	3.8 +/- 0.6	4.1 +/- 0.1	3.5 +/- 0.2	3.4 +/- 0.4	44.7 +/- 2.4
16H1	Boyertown	2.9 +/- 0.4	3.1 +/- 0.2	2.6 +/- 0.2	2.2 +/- 0.0	32.2 +/- 1.5
Annual Average:						43.5 +/- 2.0

**3.C.1**  
**LIMERICK AIR SAMPLING DATA**  
**SANATOGA SUBSTATION (2B2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/27/12 - 01/03/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.5
01/03/13 - 01/10/13	0.4 +/- 0.1	3.2 +/- 0.1	< 0.4
01/10/13 - 01/18/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4
01/18/13 - 01/24/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.4
01/24/13 - 01/31/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.4
01/31/13 - 02/07/13	0.3 +/- 0.1	2.0 +/- 0.1	< 0.3
02/07/13 - 02/14/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.4
02/14/13 - 02/22/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.3
02/22/13 - 02/28/13	< 0.1	0.7 +/- 0.1	< 0.6
02/28/13 - 03/07/13	0.2 +/- 0.1	0.7 +/- 0.1	< 0.3
03/07/13 - 03/13/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.6
03/13/13 - 03/20/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
03/20/13 - 03/27/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.5
03/27/13 - 04/03/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
04/03/13 - 04/11/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.4
04/11/13 - 04/19/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.4
04/19/13 - 04/25/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.6
04/25/13 - 05/02/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.5
05/02/13 - 05/09/13		*	
05/09/13 - 05/16/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
05/16/13 - 05/23/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
05/23/13 - 05/30/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
05/30/13 - 06/06/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.4
06/06/13 - 06/13/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.4
06/13/13 - 06/20/13	0.4 +/- 0.1	1.2 +/- 0.1	< 0.3
06/20/13 - 06/27/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4
06/27/13 - 07/05/13	0.3 +/- 0.1	1.0 +/- 0.1	< 0.5
07/05/13 - 07/11/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.5
07/11/13 - 07/18/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4
07/18/13 - 07/26/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
07/26/13 - 08/01/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5
08/01/13 - 08/08/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.5
08/08/13 - 08/15/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.4
08/15/13 - 08/22/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.3
08/22/13 - 08/29/13	0.2 +/- 0.1	1.8 +/- 0.1	< 0.3
08/29/13 - 09/06/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.5
09/06/13 - 09/13/13	0.3 +/- 0.1	2.5 +/- 0.1	< 0.5
09/13/13 - 09/19/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.6
09/19/13 - 09/27/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5
09/27/13 - 10/03/13	0.4 +/- 0.1	2.1 +/- 0.1	< 0.5
10/03/13 - 10/11/13	0.4 +/- 0.1	2.0 +/- 0.1	< 0.4
10/11/13 - 10/17/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.5
10/17/13 - 10/24/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.5
10/24/13 - 10/31/13	0.4 +/- 0.1	1.7 +/- 0.1	< 0.3
10/31/13 - 11/07/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.4
11/07/13 - 11/14/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
11/14/13 - 11/21/13	0.4 +/- 0.1	1.6 +/- 0.1	< 0.3
11/21/13 - 11/27/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
11/27/13 - 12/05/13	0.4 +/- 0.1	2.4 +/- 0.1	< 0.3
12/05/13 - 12/13/13	0.4 +/- 0.1	1.5 +/- 0.1	< 0.5
12/13/13 - 12/19/13	0.5 +/- 0.1	1.9 +/- 0.1	< 0.6
12/19/13 - 12/27/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4
12/27/13 - 01/02/14	0.3 +/- 0.1	1.8 +/- 0.1	< 0.4

\*No Sample Collected: 5/16 is a two week sample

**3.C.2**  
**LIMERICK AIR SAMPLING DATA**  
**INFORMATION CENTER (6A2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/27/12 - 01/03/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.5
01/03/13 - 01/10/13	0.4 +/- 0.1	2.5 +/- 0.1	< 0.3
01/10/13 - 01/18/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
01/18/13 - 01/24/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.5
01/24/13 - 01/31/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.6
01/31/13 - 02/07/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.7
02/07/13 - 02/14/13		*	
02/14/13 - 02/22/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
02/22/13 - 02/28/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.8
02/28/13 - 03/07/13	0.1 +/- 0.1	0.5 +/- 0.1	< 0.4
03/07/13 - 03/13/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.5
03/13/13 - 03/20/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
03/20/13 - 03/27/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.4
03/27/13 - 04/03/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.4
04/03/13 - 04/11/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
04/11/13 - 04/19/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.4
04/19/13 - 04/25/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.5
04/25/13 - 05/02/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.4
05/02/13 - 05/09/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.4
05/09/13 - 05/16/13	0.3 +/- 0.1	1.0 +/- 0.1	< 0.4
05/16/13 - 05/23/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5
05/23/13 - 05/30/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.4
05/30/13 - 06/06/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
06/06/13 - 06/13/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.4
06/13/13 - 06/20/13	0.3 +/- 0.1	1.0 +/- 0.1	< 0.5
06/20/13 - 06/27/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
06/27/13 - 07/05/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.4
07/05/13 - 07/11/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.9
07/11/13 - 07/18/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.7
07/18/13 - 07/26/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.6
07/26/13 - 08/01/13	0.1 +/- 0.1	1.1 +/- 0.1	< 0.5
08/01/13 - 08/08/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5
08/08/13 - 08/15/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.3
08/15/13 - 08/22/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.5
08/22/13 - 08/29/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.5
08/29/13 - 09/06/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
09/06/13 - 09/13/13	0.3 +/- 0.1	2.0 +/- 0.1	< 0.5
09/13/13 - 09/19/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.6
09/19/13 - 09/27/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
09/27/13 - 10/03/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.8
10/03/13 - 10/11/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.5
10/11/13 - 10/17/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
10/17/13 - 10/24/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.5
10/24/13 - 10/31/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.3
10/31/13 - 11/07/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
11/07/13 - 11/14/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.6
11/14/13 - 11/21/13	0.4 +/- 0.1	1.4 +/- 0.1	< 0.5
11/21/13 - 11/27/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.4
11/27/13 - 12/05/13	0.5 +/- 0.1	2.2 +/- 0.1	< 0.4
12/05/13 - 12/13/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
12/13/13 - 12/19/13	0.5 +/- 0.1	1.8 +/- 0.1	< 0.7
12/19/13 - 12/27/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.4
12/27/13 - 01/02/14	0.3 +/- 0.1	1.4 +/- 0.1	< 0.4

\*Insufficient volume to create a sample

**3.C.3**  
**LIMERICK AIR SAMPLING DATA**  
**LINFIELD SUBSTATION (9B2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/27/12 - 01/03/13	0.4 +/- 0.1	2.5 +/- 0.1	< 0.3
01/03/13 - 01/10/13	0.4 +/- 0.1	2.5 +/- 0.1	< 0.3
01/10/13 - 01/18/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4
01/18/13 - 01/24/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.6
01/24/13 - 01/31/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.5
01/31/13 - 02/07/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.5
02/07/13 - 02/14/13	0.1 +/- 0.1	1.0 +/- 0.1	< 0.4
02/14/13 - 02/22/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.3
02/22/13 - 02/28/13	0.1 +/- 0.1	0.5 +/- 0.1	< 0.6
02/28/13 - 03/07/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.4
03/07/13 - 03/13/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.7
03/13/13 - 03/20/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.3
03/20/13 - 03/27/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.5
03/27/13 - 04/03/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.5
04/03/13 - 04/11/13	0.4 +/- 0.1	1.5 +/- 0.1	< 0.6
04/11/13 - 04/19/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.6
04/19/13 - 04/25/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.7
04/25/13 - 05/02/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.3
05/02/13 - 05/09/13	0.2 +/- 0.1	0.6 +/- 0.1	< 0.4
05/09/13 - 05/16/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
05/16/13 - 05/23/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.3
05/23/13 - 05/30/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.6
05/30/13 - 06/06/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.6
06/06/13 - 06/13/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.5
06/13/13 - 06/20/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.6
06/20/13 - 06/27/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.5
06/27/13 - 07/05/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.7
07/05/13 - 07/11/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.5
07/11/13 - 07/18/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.6
07/18/13 - 07/26/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.6
07/26/13 - 08/01/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.6
08/01/13 - 08/08/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
08/08/13 - 08/15/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.7
08/15/13 - 08/22/13	0.3 +/- 0.1	2.7 +/- 0.1	< 0.4
08/22/13 - 08/29/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.3
08/29/13 - 09/06/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.6
09/06/13 - 09/13/13	0.4 +/- 0.1	2.2 +/- 0.1	< 0.6
09/13/13 - 09/19/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.7
09/19/13 - 09/27/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
09/27/13 - 10/03/13	0.4 +/- 0.1	1.6 +/- 0.1	< 0.9
10/03/13 - 10/11/13	0.4 +/- 0.1	1.9 +/- 0.1	< 0.3
10/11/13 - 10/17/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.7
10/17/13 - 10/24/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.4
10/24/13 - 10/31/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
10/31/13 - 11/07/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.3
11/07/13 - 11/14/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.5
11/14/13 - 11/21/13	0.4 +/- 0.1	1.5 +/- 0.1	< 0.4
11/21/13 - 11/27/13	0.3 +/- 0.1	1.0 +/- 0.1	< 0.4
11/27/13 - 12/05/13	0.4 +/- 0.1	2.2 +/- 0.1	< 0.6
12/05/13 - 12/13/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.4
12/13/13 - 12/19/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.5
12/19/13 - 12/27/13	0.4 +/- 0.1	1.4 +/- 0.1	< 0.5
12/27/13 - 01/02/14	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6

**3.C.4**  
**LIMERICK AIR SAMPLING DATA**  
**SCHUYLKILL ROAD (13B1)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/27/12 - 01/03/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
01/03/13 - 01/10/13	0.3 +/- 0.1	2.7 +/- 0.1	< 0.5
01/10/13 - 01/18/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.3
01/18/13 - 01/24/13	0.4 +/- 0.1	1.5 +/- 0.1	< 0.4
01/24/13 - 01/31/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.4
01/31/13 - 02/07/13	0.2 +/- 0.1	1.8 +/- 0.1	< 0.6
02/07/13 - 02/14/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.5
02/14/13 - 02/22/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.3
02/22/13 - 02/28/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.7
02/28/13 - 03/07/13	0.2 +/- 0.1	0.6 +/- 0.1	< 0.5
03/07/13 - 03/13/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.6
03/13/13 - 03/20/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.7
03/20/13 - 03/27/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.5
03/27/13 - 04/03/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.6
04/03/13 - 04/11/13	0.4 +/- 0.1	1.7 +/- 0.1	< 0.5
04/11/13 - 04/19/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.8
04/19/13 - 04/25/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.6
04/25/13 - 05/02/13	0.4 +/- 0.1	1.7 +/- 0.1	< 0.7
05/02/13 - 05/09/13	0.2 +/- 0.1	0.7 +/- 0.1	< 0.7
05/09/13 - 05/16/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.5
05/16/13 - 05/23/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.4
05/23/13 - 05/30/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.6
05/30/13 - 06/06/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.6
06/06/13 - 06/13/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.4
06/13/13 - 06/20/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.5
06/20/13 - 06/27/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.8
06/27/13 - 07/05/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
07/05/13 - 07/11/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
07/11/13 - 07/18/13	0.4 +/- 0.1	1.5 +/- 0.1	< 0.4
07/18/13 - 07/26/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.7
07/26/13 - 08/01/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
08/01/13 - 08/08/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.5
08/08/13 - 08/15/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.7
08/15/13 - 08/22/13	< 0.1	< 0.1	< 0.5
08/22/13 - 08/29/13	0.4 +/- 0.1	1.8 +/- 0.1	< 0.4
08/29/13 - 09/06/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.4
09/06/13 - 09/13/13	0.4 +/- 0.1	2.6 +/- 0.1	< 0.4
09/13/13 - 09/19/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.7
09/19/13 - 09/27/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.5
09/27/13 - 10/03/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.5
10/03/13 - 10/11/13	0.4 +/- 0.1	2.2 +/- 0.1	< 0.4
10/11/13 - 10/17/13	0.4 +/- 0.1	1.7 +/- 0.1	< 0.7
10/17/13 - 10/24/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.7
10/24/13 - 10/31/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.6
10/31/13 - 11/07/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.4
11/07/13 - 11/14/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.7
11/14/13 - 11/21/13	0.4 +/- 0.1	1.7 +/- 0.1	< 0.4
11/21/13 - 11/27/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.4
11/27/13 - 12/05/13	0.5 +/- 0.1	2.4 +/- 0.1	< 0.5
12/05/13 - 12/13/13	0.4 +/- 0.1	1.9 +/- 0.1	< 0.7
12/13/13 - 12/19/13	0.5 +/- 0.1	2.0 +/- 0.1	< 0.6
12/19/13 - 12/27/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
12/27/13 - 01/02/14	0.2 +/- 0.1	1.6 +/- 0.1	< 0.8

**3.D**  
**LIMERICK AIR PARTICULATE COMPOSITES**  
**(fCi/m3)**

<b>Station Number</b>	<b>Location</b>	<b>Collection Period</b>	<b>Cs-134</b>	<b>Cs-137</b>
2B2	Sanatoga Substation	12/27/2012 - 03/27/2013	< 0.1	< 0.1
		03/27/2013 - 06/27/2013	< 0.1	< 0.1
		06/27/2013 - 10/03/2013	< 0.3	< 0.3
		10/03/2013 - 01/02/2014	< 0.1	< 0.1
6A2	Information Center	12/27/2012 - 03/27/2013	< 0.1	< 0.1
		03/27/2013 - 06/27/2013	< 0.1	< 0.1
		06/27/2013 - 10/03/2013	< 0.1	< 0.1
		10/03/2013 - 01/02/2014	< 0.1	< 0.1
9B2	Linfield Substation	12/27/2012 - 03/27/2013	< 0.2	< 0.2
		03/27/2013 - 06/27/2013	< 0.1	< 0.1
		06/27/2013 - 10/03/2013	< 0.2	< 0.2
		10/03/2013 - 01/02/2014	< 0.2	< 0.2
13B1	Schuykill Road	12/27/2012 - 03/27/2013	< 0.2	< 0.2
		03/27/2013 - 06/27/2013	< 0.2	< 0.2
		06/27/2013 - 10/03/2013	< 0.1	< 0.1
		10/03/2013 - 01/02/2014	< 0.2	< 0.2

**3.E.1**  
**LIMERICK SURFACE WATER DATA**  
**VINCENT DAM (7B1)**  
(pCi/L)

Collection Period Ending	Beta	Tritium	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-140
1/29/13	3 +/- 1	< 150	< 3	< 7	< 3	< 3	< 7	< 6 / < 4	< 5	< 3	< 3	< 15
2/26/13	2 +/- 1	< 150	< 3	< 6	< 4	< 4	< 7	< 6 / < 4	< 5	< 3	< 3	< 14
4/01/13	3 +/- 1	< 140	< 2	< 5	< 2	< 2	< 4	< 4 / < 3	< 5	< 2	< 2	< 11
4/29/13	2 +/- 1	< 160	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 3	< 2	< 2	< 8
6/04/13	3 +/- 1	< 140	< 3	< 5	< 3	< 3	< 7	< 4 / < 3	< 3	< 3	< 3	< 10
7/01/13	4 +/- 1	< 150	< 3	< 7	< 3	< 3	< 6	< 6 / < 4	< 30	< 3	< 3	< 39
7/30/13	4 +/- 1	< 150	< 3	< 5	< 3	< 3	< 5	< 5 / < 3	< 4	< 3	< 3	< 11
8/27/13	4 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 8
9/30/13	2 +/- 1	< 150	< 3	< 5	< 2	< 2	< 5	< 4 / < 3	< 4	< 2	< 3	< 11
10/29/13	3 +/- 1	< 140	< 2	< 5	< 3	< 3	< 5	< 4 / < 2	< 3	< 2	< 3	< 8
12/03/13	4 +/- 1	< 140	< 4	< 9	< 4	< 4	< 9	< 7 / < 4	< 7	< 4	< 4	< 19
12/30/13	3 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 2	< 2	< 2	< 6

**AQUA PENNSYLVANIA, INC. (07H2)**  
(pCi/L)

Collection Period Ending	Beta	Tritium	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-140
1/29/13	< 2	< 150	< 2	< 4	< 2	< 2	< 4	< 3 / < 2	< 4	< 2	< 2	< 9
2/26/13	2 +/- 1	< 150	< 4	< 7	< 3	< 3	< 7	< 6 / < 4	< 6	< 4	< 4	< 15
4/01/13	2 +/- 1	< 140	< 3	< 6	< 4	< 3	< 9	< 5 / < 4	< 7	< 3	< 3	< 16
4/29/13	2 +/- 1	< 160	< 3	< 5	< 3	< 3	< 5	< 4 / < 3	< 3	< 2	< 3	< 9
6/04/13	1 +/- 1	< 140	< 2	< 4	< 3	< 3	< 5	< 4 / < 3	< 3	< 2	< 3	< 8
7/01/13	2 +/- 1	< 150	< 2	< 6	< 3	< 2	< 4	< 5 / < 4	< 24	< 2	< 2	< 30
7/30/13	3 +/- 1	< 150	< 3	< 5	< 3	< 3	< 5	< 4 / < 3	< 4	< 3	< 3	< 11
8/27/13	3 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
9/30/13	3 +/- 1	< 150	< 3	< 5	< 3	< 3	< 6	< 4 / < 3	< 4	< 3	< 3	< 11
10/29/13	4 +/- 1	< 140	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 3	< 2	< 2	< 8
12/03/13	4 +/- 1	< 140	< 2	< 5	< 2	< 2	< 4	< 4 / < 2	< 4	< 2	< 2	< 10
12/30/13	2 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 6

**3.E.2**  
**LIMERICK SURFACE WATER DATA**  
**LIMERICK INTAKE (10A1)**  
**(pCi/L)**

<b>Collection Period Ending</b>	<b>Beta</b>	<b>Tritium</b>	<b>Mn-54</b>	<b>Fe-59</b>	<b>Co-58</b>	<b>Co-60</b>	<b>Zn-65</b>	<b>Zr-Nb-95</b>	<b>I-131</b>	<b>Cs-134</b>	<b>Cs-137</b>	<b>Ba-140</b>
1/29/13	8 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
2/26/13	11 +/- 1	< 150	< 2	< 5	< 2	< 2	< 5	< 4 / < 2	< 4	< 2	< 2	< 10
4/01/13	7 +/- 1	< 140	< 3	< 5	< 2	< 3	< 5	< 4 / < 2	< 6	< 3	< 3	< 13
4/29/13	6 +/- 1	< 160	< 3	< 5	< 3	< 3	< 5	< 5 / < 3	< 4	< 3	< 3	< 10
6/04/13	5 +/- 1	< 140	< 4	< 8	< 4	< 4	< 8	< 7 / < 4	< 5	< 4	< 4	< 14
7/01/13	23 +/- 1	< 150	< 3	< 8	< 4	< 3	< 7	< 7 / < 5	< 31	< 3	< 3	< 44
7/30/13	12 +/- 1	< 150	< 3	< 6	< 3	< 3	< 6	< 5 / < 3	< 4	< 3	< 3	< 11
8/27/13	8 +/- 1	< 150	< 3	< 6	< 3	< 4	< 6	< 5 / < 3	< 6	< 3	< 4	< 15
9/30/13	5 +/- 1	< 150	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 4	< 2	< 2	< 10
10/29/13	8 +/- 1	< 140	< 3	< 5	< 3	< 3	< 6	< 4 / < 3	< 3	< 3	< 3	< 11
12/03/13	4 +/- 1	< 140	< 3	< 5	< 3	< 3	< 5	< 4 / < 3	< 5	< 3	< 3	< 11
12/30/13	6 +/- 1	< 150	< 3	< 6	< 3	< 3	< 7	< 5 / < 3	< 4	< 3	< 3	< 12

**3.F**  
**LIMERICK MILK SAMPLING DATA**  
**(pCi/L)**

<b>Station Number</b>	<b>Collection Date</b>	<b>I-131</b>	<b>Cs-134</b>	<b>Cs-137</b>	<b>Ba-140</b>	<b>K-40</b>
10B1	1/08/13	< 3	< 2	< 2	< 7	1440 +/- 102
	2/12/13	< 3	< 2	< 2	< 7	1360 +/- 97
	3/12/13	< 2	< 2	< 2	< 6	1380 +/- 98
	4/02/13	< 4	< 3	< 3	< 10	1320 +/- 103
	5/14/13	< 6	< 3	< 4	< 16	1370 +/- 108
	6/11/13	< 4	< 4	< 4	< 12	1350 +/- 107
	7/09/13	< 15	< 3	< 3	< 27	1240 +/- 102
	8/06/13	< 4	< 3	< 4	< 10	1370 +/- 106
	9/03/13	< 3	< 2	< 2	< 8	1380 +/- 101
	10/01/13	< 5	< 3	< 3	< 13	1370 +/- 107
	11/12/13	< 4	< 4	< 4	< 12	1380 +/- 108
	12/10/13	< 3	< 2	< 2	< 9	1440 +/- 102

<b>Station Number</b>	<b>Collection Date</b>	<b>I-131</b>	<b>Cs-134</b>	<b>Cs-137</b>	<b>Ba-140</b>	<b>K-40</b>
12C1	1/08/13	< 3	< 3	< 3	< 9	1390 +/- 103
	2/12/13	< 3	< 3	< 3	< 9	1410 +/- 104
	3/12/13	< 3	< 3	< 3	< 8	1370 +/- 102
	4/02/13	< 4	< 4	< 4	< 12	1360 +/- 107
	5/14/13	< 5	< 3	< 3	< 13	1310 +/- 102
	6/11/13	< 3	< 3	< 3	< 9	1320 +/- 101
	7/09/13	< 15	< 3	< 3	< 26	1350 +/- 105
	8/06/13	< 4	< 3	< 4	< 12	1360 +/- 107
	9/03/13	< 3	< 2	< 2	< 9	1380 +/- 98
	10/01/13	< 6	< 3	< 4	< 15	1290 +/- 103
	11/12/13	< 4	< 3	< 3	< 11	1330 +/- 104
	12/10/13	< 4	< 3	< 3	< 11	1320 +/- 102

**3.G**  
**LIMERICK FISH, PRODUCE & SEDIMENT DATA**  
 (pCi/kg)

08C1-14		08C1-14		07A1-15		06A2-15		08B3-12			
Bottomfeeding Fish*		Predator Fish*		500 KV Yard Produce*		Information Center Produce* Swiss Chard		Sediment**			
				Swiss Chard							
Isotope	6/6/2013	10/22/2013	6/6/2013	10/22/2013	6/18/2013	7/16/2013	8/19/2013	9/9/2013	10/15/2013	6/6/2013	10/30/2013
I-131	< 33	< 191	< 46	< 396	< 10	< 27	< 177	< 42	< 8	< 334	< 600
Mn-54	< 5	< 4	< 7	< 8	< 4	< 5	< 7	< 339	< 6	< 13	< 38
Fe-59	< 14	< 17	< 22	< 35	< 10	< 16	< 30	< 29	< 14	< 63	< 125
Co-58	< 5	< 5	< 8	< 11	< 4	< 6	< 9	< 10	< 6	< 24	< 45
Co-60	< 5	< 4	< 8	< 8	< 4	< 6	< 8	< 10	< 7	< 19	< 40
Zn-65	< 12	< 10	< 18	< 20	< 10	< 14	< 21	< 25	< 15	< 57	< 110
Zr-95	< 9	< 8	< 14	< 18	< 7	< 9	< 16	< 18	< 10	< 38	< 91
Nb-95	< 6	< 8	< 9	< 17	< 4	< 7	< 14	< 12	< 6	< 42	< 68
Cs-134	< 4	< 6	< 6	< 6	< 3	< 4	< 6	< 8	< 5	< 29	< 44
Cs-137	< 4	< 3	< 7	< 7	< 3	< 5	< 6	< 8	< 6	86 +/- 15	< 37
Ba-140	< 50	< 138	< 75	< 299	< 21	< 47	< 178	< 79	< 24	< 369	< 737

\* Wet Weight

\*\*\* Dry Weight

**4.A**  
**PEACH BOTTOM ATOMIC POWER STATION**  
**QUARTERLY TLD INTERCOMPARISON**  
**(mR/std. mo.)**

Station Number	Location	Collection Period	RDC Results	MT Results
1D1	Silver Spring Road	1/22/2013 - 4/9/2013	5.5	3.8 +/- 0.2
		4/9/2013 - 7/2/2013	4.7	3.8 +/- 0.7
		7/2/2013 - 10/1/2013	4.7	3.7 +/- 0.3
		10/1/2013 - 1/14/2014	5.2	4.2 +/- 0.1
5B1	Peter's Creek	1/22/2013 - 4/9/2013	4.7	4.0 +/- 0.1
		4/9/2013 - 7/2/2013	4.3	3.8 +/- 0.2
		7/2/2013 - 10/1/2013	5.0	3.4 +/- 0.6
		10/1/2013 - 1/14/2014	4.6	3.9 +/- 0.2
7A1	Burk's Hill	1/22/2013 - 4/9/2013	4.3	3.7 +/- 0.3
		4/9/2013 - 7/2/2013	4.3	3.9 +/- 0.4
		7/2/2013 - 10/1/2013	5.4	3.6 +/- 0.3
		10/1/2013 - 1/14/2014	5.8	3.9 +/- 0.1
11D1	Delta	1/22/2013 - 4/9/2013	2.8	1.6 +/- 0.1
		4/9/2013 - 7/2/2013	2.5	2.1 +/- 0.3
		7/2/2013 - 10/1/2013	3.0	1.6 +/- 0.3
		10/1/2013 - 1/14/2014	2.6	4.6 +/- 0.1
Annual Average:			52.2	41.9 +/- 3.3

**4.B**  
**PEACH BOTTOM ATOMIC POWER STATION**  
**THERMOLUMINESCENCE DOSIMETRY (TLD) DATA**  
(mR/std. mo.)

Control corrected-net exposure.

Station Number	Location	1/22/13 to 4/9/13	4/9/13 to 7/2/13	7/2/13 to 10/1/13	10/1/13 to 1/14/14	Annual Dose
01D1	Silver Spring Road	3.8 +/- 0.2	3.8 +/- 0.7	3.7 +/- 0.3	4.2 +/- 0.1	46.5 +/- 2.3
02C1	Bald Eagle Road	3.7 +/- 0.3	4.4 +/- 0.6	3.7 +/- 0.3	3.9 +/- 0.2	47.2 +/- 2.3
02F1	Drumore Twp. School	4.8 +/- 0.3	4.6 +/- 0.5	4.4 +/- 0.5	4.5 +/- 0.1	55.0 +/- 2.4
02L1	Quarryville	3.9 +/- 0.3	3.9 +/- 0.4	3.8 +/- 0.3	3.7 +/- 0.3	45.6 +/- 1.9
03C1	Slate Hill Road	4.1 +/- 0.2	4.1 +/- 0.4	4.1 +/- 0.6	4.5 +/- 0.0	50.3 +/- 2.3
03F1	Goshen Mill Road	3.5 +/- 0.3	3.6 +/- 0.3	3.4 +/- 0.3	3.5 +/- 0.1	41.9 +/- 1.7
04B1	Fulton Weather Station	3.7 +/- 0.3	3.9 +/- 0.3	3.4 +/- 0.2	3.7 +/- 0.1	44.2 +/- 1.5
04D1	Keeney Power Line	3.5 +/- 0.3	4.5 +/- 0.5	4.3 +/- 0.6	4.4 +/- 0.1	49.8 +/- 2.6
05B1	Peter's Creek	4.0 +/- 0.1	3.8 +/- 0.2	3.4 +/- 0.6	3.9 +/- 0.2	45.3 +/- 2.0
05C1	Peach Bottom Road	3.7 +/- 0.6	4.3 +/- 0.7	4.1 +/- 0.6	4.0 +/- 0.1	48.2 +/- 3.3
05E1	Wakefield	2.8 +/- 0.2	3.2 +/- 0.9	2.5 +/- 0.7	2.8 +/- 0.1	33.7 +/- 3.5
06A1	B Cooling Tower	2.1 +/- 0.1	2.1 +/- 0.7	1.6 +/- 0.3	1.8 +/- 0.1	22.7 +/- 2.3
06D1	Riverview Road	4.7 +/- 0.4	5.1 +/- 0.4	4.6 +/- 0.4	4.9 +/- 0.1	58.0 +/- 2.2
07A1	Burk's Hill	3.7 +/- 0.3	3.9 +/- 0.4	3.6 +/- 0.3	3.9 +/- 0.1	45.7 +/- 1.8
07A5	D & E Cooling Tower	2.5 +/- 0.2	2.0 +/- 0.4	1.3 +/- 0.2	2.5 +/- 0.1	25.0 +/- 1.6
07A6	Burk Trailer	2.9 +/- 0.4	3.7 +/- 0.4	3.3 +/- 0.2	3.8 +/- 0.0	41.3 +/- 1.8
07B1	Canal Discharge	0.9 +/- 0.2	1.1 +/- 0.4	0.8 +/- 0.6	1.3 +/- 0.1	12.3 +/- 2.2
07E1	Pilottown Road	2.3 +/- 0.1	2.3 +/- 0.1	2.1 +/- 0.2	2.6 +/- 0.1	27.9 +/- 0.9
07H1	Conowingo, MD	2.7 +/- 0.3	2.6 +/- 0.6	2.4 +/- 0.0	2.8 +/- 0.1	31.4 +/- 2.1
08A1	SSE Sector Hill	3.4 +/- 0.3	4.0 +/- 0.3	3.6 +/- 0.4	3.9 +/- 0.2	44.8 +/- 1.8
08A2	Transmission Line Hill	5.7 +/- 0.1	6.1 +/- 0.1	6.1 +/- 0.9	6.3 +/- 0.2	72.6 +/- 2.7
08A3	Burk Residence	3.2 +/- 0.2	3.3 +/- 0.3	3.4 +/- 0.6	3.4 +/- 0.0	40.0 +/- 2.0
08E1	Broad Creek	2.6 +/- 0.4	3.4 +/- 0.6	2.9 +/- 0.4	2.9 +/- 0.1	35.3 +/- 2.5
08J1	Darlington, MD	2.4 +/- 0.2	2.3 +/- 0.4	2.0 +/- 0.5	2.3 +/- 0.1	27.1 +/- 2.0
09A1	South Substation Road	3.7 +/- 0.3	4.0 +/- 0.6	3.5 +/- 0.4	4.1 +/- 0.2	46.0 +/- 2.4
09C1	North Cooper Road	3.8 +/- 0.2	3.8 +/- 0.4	4.2 +/- 0.0	4.1 +/- 0.2	47.8 +/- 1.5
10E1	Macton Substation	3.6 +/- 0.2	3.9 +/- 0.6	4.8 +/- 0.2	4.0 +/- 0.2	47.2 +/- 1.9
11B1	Atom Road	3.8 +/- 0.1	4.5 +/- 0.5	4.3 +/- 0.1	4.0 +/- 0.2	41.6 +/- 2.0
11D1	Delta	1.6 +/- 0.1	2.1 +/- 0.3	1.6 +/- 0.3	4.6 +/- 0.1	35.6 +/- 1.2
12E1	Conastone Line	3.4 +/- 0.2	3.4 +/- 0.5	3.5 +/- 0.2	2.1 +/- 0.2	42.0 +/- 2.2
13F1	Transco Pipeline	4.6 +/- 0.6	4.5 +/- 0.5	5.1 +/- 0.5	3.8 +/- 0.1	51.0 +/- 2.5
13K1	Fawn Grove	3.9 +/- 0.1	3.8 +/- 0.4	4.1 +/- 0.3	4.7 +/- 0.1	47.8 +/- 1.9
14E1	Fin Substation	3.2 +/- 0.4	3.1 +/- 0.5	3.5 +/- 0.5	4.1 +/- 0.0	38.8 +/- 2.4
14K1	Airville	2.2 +/- 0.4	2.3 +/- 0.6	2.5 +/- 0.4	3.3 +/- 0.2	37.1 +/- 2.6
15E1	Slab Road	4.0 +/- 0.1	4.3 +/- 0.1	4.5 +/- 0.4	2.6 +/- 0.0	40.4 +/- 1.1
16E1	Muddy Run	2.7 +/- 0.0	2.7 +/- 0.4	2.6 +/- 0.3	4.7 +/- 0.3	38.1 +/- 1.8
Annual Average:						41.8 +/- 2.1

**4.C.1**  
**PEACH BOTTOM AIR SAMPLING DATA**  
**SLATE HILL ROAD (3C2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )	
	Alpha	Beta		
12/26/12 - 01/02/13	0.3 +/- 0.1	1.2 +/- 0.1		< 0.7
01/02/13 - 01/08/13	0.3 +/- 0.1	3.1 +/- 0.1		< 0.4
01/08/13 - 01/15/13	0.4 +/- 0.1	1.7 +/- 0.1		< 0.6
01/15/13 - 01/22/13	0.3 +/- 0.1	1.5 +/- 0.1		< 0.5
01/22/13 - 01/29/13	0.3 +/- 0.1	1.8 +/- 0.1		< 0.5
01/29/13 - 02/04/13	0.3 +/- 0.1	1.9 +/- 0.1		< 0.7
02/04/13 - 02/13/13	0.2 +/- 0.1	1.3 +/- 0.1		< 0.4
02/13/13 - 02/19/13	0.2 +/- 0.1	1.1 +/- 0.1		< 0.4
02/19/13 - 02/26/13	0.1 +/- 0.1	0.7 +/- 0.1		< 0.4
02/26/13 - 03/05/13	0.1 +/- 0.1	0.8 +/- 0.1		< 0.5
03/05/13 - 03/12/13	0.2 +/- 0.1	0.6 +/- 0.1		< 0.5
03/12/13 - 03/19/13	0.1 +/- 0.1	1.2 +/- 0.1		< 0.5
03/19/13 - 03/26/13	0.2 +/- 0.1	0.8 +/- 0.1		< 0.5
03/26/13 - 04/01/13	0.1 +/- 0.1	0.8 +/- 0.1		< 0.6
04/01/13 - 04/09/13	0.3 +/- 0.1	1.6 +/- 0.1		< 0.5
04/09/13 - 04/15/13	0.1 +/- 0.1	1.1 +/- 0.1		< 0.9
04/15/13 - 04/23/13	0.2 +/- 0.1	0.9 +/- 0.1		< 0.4
04/23/13 - 04/30/13	0.2 +/- 0.1	1.3 +/- 0.1		< 0.4
04/30/13 - 05/07/13	0.1 +/- 0.1	0.9 +/- 0.1		< 0.5
05/07/13 - 05/14/13	0.1 +/- 0.1	0.9 +/- 0.1		< 0.4
05/14/13 - 05/21/13	0.3 +/- 0.1	1.2 +/- 0.1		< 0.4
05/21/13 - 05/28/13	0.2 +/- 0.1	1.0 +/- 0.1		< 0.6
05/28/13 - 06/04/13	0.2 +/- 0.1	1.4 +/- 0.1		< 0.5
06/04/13 - 06/11/13	0.1 +/- 0.1	0.8 +/- 0.1		< 0.4
06/11/13 - 06/18/13	0.3 +/- 0.1	1.2 +/- 0.1		< 0.7
06/18/13 - 06/24/13	0.2 +/- 0.1	1.0 +/- 0.1		< 0.7
06/24/13 - 07/02/13		*		
07/02/13 - 07/09/13	0.1 +/- 0.1	0.9 +/- 0.1		< 0.4
07/09/13 - 07/16/13		**		
07/16/13 - 07/23/13	0.2 +/- 0.1	1.5 +/- 0.1		< 0.5
07/23/13 - 07/30/13	< 0.1	1.0 +/- 0.1		< 0.6
07/30/13 - 08/05/13	0.2 +/- 0.1	1.5 +/- 0.1		< 0.8
08/05/13 - 08/13/13	0.2 +/- 0.1	1.3 +/- 0.1		< 0.3
08/13/13 - 08/20/13	0.2 +/- 0.1	1.0 +/- 0.1		< 0.4
08/20/13 - 08/27/13	0.2 +/- 0.1	1.4 +/- 0.1		< 0.5
08/27/13 - 09/03/13	0.2 +/- 0.1	1.9 +/- 0.1		< 0.7
09/03/13 - 09/10/13	0.2 +/- 0.1	1.3 +/- 0.1		< 0.5
09/10/13 - 09/17/13	0.4 +/- 0.1	1.9 +/- 0.1		< 0.5
09/17/13 - 09/24/13	0.2 +/- 0.1	1.1 +/- 0.1		< 0.3
09/24/13 - 10/01/13	0.2 +/- 0.1	1.1 +/- 0.1		< 0.5
10/01/13 - 10/08/13	0.4 +/- 0.1	2.3 +/- 0.1		< 0.6
10/08/13 - 10/15/13	0.2 +/- 0.1	1.1 +/- 0.1		< 0.4
10/15/13 - 10/22/13	0.2 +/- 0.1	1.4 +/- 0.1		< 0.7
10/22/13 - 10/29/13	0.2 +/- 0.1	1.2 +/- 0.1		< 0.3
10/29/13 - 11/05/13	0.3 +/- 0.1	1.7 +/- 0.1		< 0.3
11/05/13 - 11/12/13	0.2 +/- 0.1	1.2 +/- 0.1		< 0.4
11/12/13 - 11/19/13	0.4 +/- 0.1	1.5 +/- 0.1		< 0.3
11/19/13 - 11/25/13	0.1 +/- 0.1	1.1 +/- 0.1		< 0.4
11/25/13 - 12/02/13		**		
12/02/13 - 12/10/13	0.3 +/- 0.1	1.8 +/- 0.1		< 0.4
12/10/13 - 12/17/13	0.3 +/- 0.1	2.0 +/- 0.1		< 0.4
12/17/13 - 12/24/13	0.2 +/- 0.1	1.3 +/- 0.1		< 0.5
12/24/13 - 12/30/13	0.2 +/- 0.1	1.4 +/- 0.1		< 0.6

\*No power at station

\*\*Insufficient volume to create a sample

**4.C.2**  
**PEACH BOTTOM AIR SAMPLING DATA**  
**PETER'S CREEK (5B2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )	
	Alpha	Beta		
12/26/12 - 01/02/13	0.2 +/- 0.1	1.4 +/- 0.1		< 0.4
01/02/13 - 01/08/13	0.7 +/- 0.1	3.0 +/- 0.1		< 0.5
01/08/13 - 01/15/13	0.4 +/- 0.1	1.9 +/- 0.1		< 0.3
01/15/13 - 01/22/13	0.2 +/- 0.1	1.7 +/- 0.1		< 0.5
01/22/13 - 01/29/13	0.4 +/- 0.1	1.6 +/- 0.1		< 0.4
01/29/13 - 02/04/13	0.3 +/- 0.1	1.9 +/- 0.1		< 0.5
02/04/13 - 02/13/13	0.1 +/- 0.1	1.4 +/- 0.1		< 0.3
02/13/13 - 02/19/13	0.2 +/- 0.1	1.2 +/- 0.1		< 0.5
02/19/13 - 02/26/13	< 0.1	0.8 +/- 0.1		< 0.3
02/26/13 - 03/05/13	0.1 +/- 0.1	0.7 +/- 0.1		< 0.4
03/05/13 - 03/12/13	0.1 +/- 0.1	0.7 +/- 0.1		< 0.4
03/12/13 - 03/19/13	0.3 +/- 0.1	1.2 +/- 0.1		< 0.4
03/19/13 - 03/26/13	0.1 +/- 0.1	1.0 +/- 0.1		< 0.5
03/26/13 - 04/01/13	0.1 +/- 0.1	0.7 +/- 0.1		< 0.5
04/01/13 - 04/09/13	0.3 +/- 0.1	1.6 +/- 0.1		< 0.4
04/09/13 - 04/15/13	0.2 +/- 0.1	1.0 +/- 0.1		< 0.5
04/15/13 - 04/23/13	0.1 +/- 0.1	1.1 +/- 0.1		< 0.5
04/23/13 - 04/30/13	0.3 +/- 0.1	1.4 +/- 0.1		< 0.5
04/30/13 - 05/07/13	0.2 +/- 0.1	1.0 +/- 0.1		< 0.5
05/07/13 - 05/14/13	0.2 +/- 0.1	0.9 +/- 0.1		< 0.4
05/14/13 - 05/21/13	0.2 +/- 0.1	1.3 +/- 0.1		< 0.5
05/21/13 - 05/28/13	0.2 +/- 0.1	1.0 +/- 0.1		< 0.5
05/28/13 - 06/04/13	0.2 +/- 0.1	1.5 +/- 0.1		< 0.5
06/04/13 - 06/11/13	0.2 +/- 0.1	0.8 +/- 0.1		< 0.5
06/11/13 - 06/18/13	0.3 +/- 0.1	1.3 +/- 0.1		< 0.6
06/18/13 - 06/24/13	0.2 +/- 0.1	1.1 +/- 0.1		< 0.5
06/24/13 - 07/02/13	0.2 +/- 0.1	1.2 +/- 0.1		< 0.5
07/02/13 - 07/09/13	0.2 +/- 0.1	0.9 +/- 0.1		< 0.4
07/09/13 - 07/16/13	0.3 +/- 0.1	1.3 +/- 0.1		< 0.5
07/16/13 - 07/23/13	0.2 +/- 0.1	1.6 +/- 0.1		< 0.7
07/23/13 - 07/30/13	0.1 +/- 0.1	1.0 +/- 0.1		< 0.6
07/30/13 - 08/05/13	0.2 +/- 0.1	1.6 +/- 0.1		< 0.7
08/05/13 - 08/13/13	0.2 +/- 0.1	1.3 +/- 0.1		< 0.5
08/13/13 - 08/20/13	0.2 +/- 0.1	1.1 +/- 0.1		< 0.6
08/20/13 - 08/27/13	0.3 +/- 0.1	1.7 +/- 0.1		< 0.6
08/27/13 - 09/03/13	0.3 +/- 0.1	1.9 +/- 0.1		< 0.4
09/03/13 - 09/10/13	0.2 +/- 0.1	1.2 +/- 0.1		< 0.3
09/10/13 - 09/17/13	0.3 +/- 0.1	2.0 +/- 0.1		< 0.6
09/17/13 - 09/24/13	0.2 +/- 0.1	1.1 +/- 0.1		< 0.5
09/24/13 - 10/01/13	0.3 +/- 0.1	1.4 +/- 0.1		< 0.4
10/01/13 - 10/08/13	0.3 +/- 0.1	2.6 +/- 0.1		< 0.4
10/08/13 - 10/15/13	0.2 +/- 0.1	1.3 +/- 0.1		< 0.3
10/15/13 - 10/22/13	0.3 +/- 0.1	1.6 +/- 0.1		< 0.6
10/22/13 - 10/29/13	0.3 +/- 0.1	1.3 +/- 0.1		< 0.4
10/29/13 - 11/05/13	0.2 +/- 0.1	1.7 +/- 0.1		< 0.4
11/05/13 - 11/12/13	0.1 +/- 0.1	1.3 +/- 0.1		< 0.4
11/12/13 - 11/19/13	0.3 +/- 0.1	1.6 +/- 0.1		< 0.4
11/19/13 - 11/25/13	0.2 +/- 0.1	1.1 +/- 0.1		< 0.5
11/25/13 - 12/02/13	0.3 +/- 0.1	1.4 +/- 0.1		< 0.6
12/02/13 - 12/10/13	0.3 +/- 0.1	1.8 +/- 0.1		< 0.4
12/10/13 - 12/17/13	0.3 +/- 0.1	2.0 +/- 0.1		< 0.6
12/17/13 - 12/24/13	0.4 +/- 0.1	1.6 +/- 0.1		< 0.3
12/24/13 - 12/30/13	0.2 +/- 0.1	1.4 +/- 0.1		< 0.7

**4.C.3**  
**PEACH BOTTOM AIR SAMPLING DATA**  
**South Substation (9A2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )	
	Alpha	Beta		
12/26/12 - 01/02/13	0.2 +/- 0.1	1.2 +/- 0.1		< 0.6
01/02/13 - 01/08/13	0.4 +/- 0.1	2.4 +/- 0.1		< 0.5
01/08/13 - 01/15/13	0.2 +/- 0.1	1.9 +/- 0.1		< 0.4
01/15/13 - 01/22/13	0.2 +/- 0.1	1.7 +/- 0.1		< 0.4
01/22/13 - 01/29/13	0.2 +/- 0.1	1.5 +/- 0.1		< 0.6
01/29/13 - 02/04/13	0.3 +/- 0.1	1.8 +/- 0.1		< 0.4
02/04/13 - 02/13/13	0.2 +/- 0.1	1.2 +/- 0.1		< 0.5
02/13/13 - 02/19/13	0.1 +/- 0.1	1.3 +/- 0.1		< 0.6
02/19/13 - 02/26/13	0.1 +/- 0.1	0.7 +/- 0.1		< 0.6
02/26/13 - 03/05/13	0.1 +/- 0.1	0.7 +/- 0.1		< 0.4
03/05/13 - 03/12/13	< 0.1	0.6 +/- 1.1		< 0.6
03/12/13 - 03/19/13	0.2 +/- 0.1	1.0 +/- 0.1		< 0.3
03/19/13 - 03/26/13	0.1 +/- 0.1	0.9 +/- 0.1		< 0.5
03/26/13 - 04/01/13	< 0.2	0.7 +/- 0.1		< 0.7
04/01/13 - 04/09/13	0.3 +/- 0.1	1.4 +/- 0.1		< 0.6
04/09/13 - 04/15/13	0.1 +/- 0.1	1.0 +/- 0.1		< 0.4
04/15/13 - 04/23/13	0.2 +/- 0.1	0.9 +/- 0.1		< 0.4
04/23/13 - 04/30/13	0.2 +/- 0.1	1.2 +/- 0.1		< 0.5
04/30/13 - 05/07/13	0.2 +/- 0.1	0.9 +/- 0.1		< 0.6
05/07/13 - 05/14/13	0.1 +/- 0.1	0.8 +/- 0.1		< 0.3
05/14/13 - 05/21/13	0.3 +/- 0.1	1.3 +/- 0.1		< 0.5
05/21/13 - 05/28/13	0.2 +/- 0.1	1.0 +/- 0.1		< 0.4
05/28/13 - 06/04/13	0.3 +/- 0.1	1.4 +/- 0.1		< 0.8
06/04/13 - 06/11/13	0.2 +/- 0.1	0.8 +/- 0.1		< 0.6
06/11/13 - 06/18/13	0.1 +/- 0.1	1.3 +/- 0.1		< 0.4
06/18/13 - 06/24/13	0.2 +/- 0.1	0.9 +/- 0.1		< 0.5
06/24/13 - 07/02/13	0.2 +/- 0.1	1.1 +/- 0.1		< 0.4
07/02/13 - 07/09/13	0.1 +/- 0.1	0.7 +/- 0.1		< 0.4
07/09/13 - 07/16/13	0.2 +/- 0.1	1.1 +/- 0.1		< 0.6
07/16/13 - 07/23/13	0.3 +/- 0.1	1.8 +/- 0.1		< 0.7
07/23/13 - 07/30/13	0.1 +/- 0.1	1.1 +/- 0.1		< 0.4
07/30/13 - 08/05/13	0.3 +/- 0.1	1.4 +/- 0.1		< 0.7
08/05/13 - 08/13/13	< 0.2	1.2 +/- 0.1		*
08/13/13 - 08/20/13	0.1 +/- 0.1	1.1 +/- 0.1		< 0.5
08/20/13 - 08/27/13	0.3 +/- 0.1	1.6 +/- 0.1		< 0.6
08/27/13 - 09/03/13	0.2 +/- 0.1	1.8 +/- 0.1		< 0.7
09/03/13 - 09/10/13	0.1 +/- 0.1	1.2 +/- 0.1		< 0.7
09/10/13 - 09/17/13	0.3 +/- 0.1	1.9 +/- 0.1		< 0.8
09/17/13 - 09/24/13	0.1 +/- 0.1	0.9 +/- 0.1		< 0.4
09/24/13 - 10/01/13	0.2 +/- 0.1	1.2 +/- 0.1		< 0.7
10/01/13 - 10/08/13	0.3 +/- 0.1	2.3 +/- 0.1		< 0.7
10/08/13 - 10/15/13	0.1 +/- 0.1	1.1 +/- 0.1		< 0.2
10/15/13 - 10/22/13	0.4 +/- 0.1	1.4 +/- 0.1		< 0.7
10/22/13 - 10/29/13	0.2 +/- 0.1	1.2 +/- 0.1		< 0.5
10/29/13 - 11/05/13	0.2 +/- 0.1	1.8 +/- 0.1		< 0.6
11/05/13 - 11/12/13	0.2 +/- 0.1	1.2 +/- 0.1		< 0.5
11/12/13 - 11/19/13	0.3 +/- 0.1	1.6 +/- 0.1		< 0.4
11/19/13 - 11/25/13	0.1 +/- 0.1	0.9 +/- 0.1		< 0.4
11/25/13 - 12/02/13	0.2 +/- 0.1	1.3 +/- 0.1		< 0.5
12/02/13 - 12/10/13	0.3 +/- 0.1	1.8 +/- 0.1		< 0.6
12/10/13 - 12/17/13	0.2 +/- 0.1	2.0 +/- 0.1		< 0.6
12/17/13 - 12/24/13	0.2 +/- 0.1	1.4 +/- 0.1		< 0.4
12/24/13 - 12/30/13	0.1 +/- 0.1	1.5 +/- 0.1		< 0.6

\*No iodine test

**4.C.4**  
**PEACH BOTTOM AIR SAMPLING DATA**  
**DELTA (11D2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )	
	Alpha	Beta		
12/26/12 - 01/02/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4	
01/02/13 - 01/08/13	0.5 +/- 0.1	2.5 +/- 0.1	< 0.5	
01/08/13 - 01/15/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.3	
01/15/13 - 01/22/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.4	
01/22/13 - 01/29/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.6	
01/29/13 - 02/04/13	0.2 +/- 0.1	2.0 +/- 0.1	< 0.6	
02/04/13 - 02/13/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4	
02/13/13 - 02/19/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.6	
02/19/13 - 02/26/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.3	
02/26/13 - 03/05/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.4	
03/05/13 - 03/12/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.5	
03/12/13 - 03/19/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.6	
03/19/13 - 03/26/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.4	
03/26/13 - 04/01/13	0.2 +/- 0.1	0.7 +/- 0.1	< 0.6	
04/01/13 - 04/09/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.4	
04/09/13 - 04/15/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5	
04/15/13 - 04/23/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.3	
04/23/13 - 04/30/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5	
04/30/13 - 05/07/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.4	
05/07/13 - 05/14/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.5	
05/14/13 - 05/21/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.4	
05/21/13 - 05/28/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5	
05/28/13 - 06/04/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.6	
06/04/13 - 06/11/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.5	
06/11/13 - 06/18/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.5	
06/18/13 - 06/24/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.6	
06/24/13 - 07/02/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.6	
07/02/13 - 07/09/13	0.2 +/- 0.1	0.7 +/- 0.1	< 0.6	
07/09/13 - 07/16/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.7	
07/16/13 - 07/23/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.7	
07/23/13 - 07/30/13	0.1 +/- 0.1	1.0 +/- 0.1	< 0.4	
07/30/13 - 08/05/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5	
08/05/13 - 08/13/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5	
08/13/13 - 08/20/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4	
08/20/13 - 08/27/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.6	
08/27/13 - 09/03/13	0.3 +/- 0.1	2.4 +/- 0.1	< 0.7	
09/03/13 - 09/10/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.8	
09/10/13 - 09/17/13	0.4 +/- 0.1	2.0 +/- 0.1	< 0.6	
09/17/13 - 09/24/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5	
09/24/13 - 10/01/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.7	
10/01/13 - 10/08/13	0.3 +/- 0.1	2.5 +/- 0.1	< 0.6	
10/08/13 - 10/15/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4	
10/15/13 - 10/22/13	0.4 +/- 0.1	1.5 +/- 0.1	< 0.6	
10/22/13 - 10/29/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5	
10/29/13 - 11/05/13	0.2 +/- 0.1	1.8 +/- 0.1	< 0.7	
11/05/13 - 11/12/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4	
11/12/13 - 11/19/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.4	
11/19/13 - 11/25/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4	
11/25/13 - 12/02/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4	
12/02/13 - 12/10/13	0.2 +/- 0.1	1.9 +/- 0.1	< 0.5	
12/10/13 - 12/17/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.4	
12/17/13 - 12/24/13	0.4 +/- 0.1	1.8 +/- 0.1	< 0.5	
12/24/13 - 12/30/13	0.1 +/- 0.1	1.4 +/- 0.1	< 0.7	

**4.D**  
**PEACH BOTTOM AIR PARTICULATE COMPOSITES**  
**(fCi/m3)**

<b>Station Number</b>	<b>Location</b>	<b>Collection Period</b>	<b>Cs-134</b>	<b>Cs-137</b>
3C2	Slate Hill Rd.	12/26/2012 - 04/01/2013	< 0.2	< 0.2
		04/01/2013 - 06/24/2013	< 0.2	< 0.2
		06/24/2013 - 10/01/2013	< 0.1	< 0.1
		10/01/2013 - 12/30/2013	< 0.2	< 0.2
5B2	Peter's Creek	12/26/2012 - 04/01/2013	< 0.2	< 0.2
		04/01/2013 - 06/24/2013	< 0.2	< 0.2
		06/24/2013 - 10/01/2013	< 0.2	< 0.2
		10/01/2013 - 12/30/2013	< 0.2	< 0.2
9A2	Burk's Hill	12/26/2012 - 04/01/2013	< 0.2	< 0.2
		04/01/2013 - 06/24/2013	< 0.2	< 0.2
		06/24/2013 - 10/01/2013	< 0.2	< 0.2
		10/01/2013 - 12/30/2013	< 0.2	< 0.2
11D2	Delta	12/26/2012 - 04/01/2013	< 0.2	< 0.2
		04/01/2013 - 06/24/2013	< 0.2	< 0.2
		06/24/2013 - 10/01/2013	< 0.3	< 0.3
		10/01/2013 - 12/30/2013	< 0.2	< 0.2

**4.E**  
**PEACH BOTTOM SURFACE WATER DATA**  
**CONOWINGO DAM (7J1)**  
(pCi/L)

Collection Period Ending	Beta	Tritium	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-140
1/31/13	1 +/- 1	< 150	< 3	< 5	< 3	< 2	< 5	< 4 / < 3	< 4	< 3	< 3	< 11
2/28/13	1 +/- 1	< 150	< 3	< 5	< 3	< 3	< 6	< 5 / < 3	< 5	< 3	< 3	< 13
3/28/13	1 +/- 1	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
5/02/13	2 +/- 1	< 160	< 4	< 8	< 4	< 4	< 8	< 7 / < 4	< 6	< 4	< 4	< 16
5/29/13	< 2	< 150	< 3	< 5	< 3	< 3	< 5	< 5 / < 3	< 5	< 3	< 3	< 12
6/27/13	< 2	320 +/- 98	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 8
8/01/13	2 +/- 1	140 +/- 90	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 3	< 2	< 2	< 9
8/29/13	3 +/- 1	< 140	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 4	< 2	< 3	< 9
10/02/13	3 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
10/31/13	3 +/- 1	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
11/27/13	3 +/- 1	< 150	< 2	< 4	< 2	< 3	< 5	< 4 / < 3	< 4	< 3	< 3	< 10
01/02/14	< 2	< 140	< 2	< 5	< 3	< 3	< 5	< 4 / < 3	< 4	< 2	< 3	< 11

**HOLTWOOD HYDROELECTRIC PLANT (15F1)**  
(pCi/L)

Collection Period Ending	Beta	Tritium	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-140
1/31/13	2 +/- 1	< 150	< 3	< 5	< 3	< 3	< 5	< 5 / < 3	< 4	< 3	< 3	< 11
2/28/13	2 +/- 1	< 150	< 2	< 5	< 3	< 3	< 5	< 4 / < 3	< 5	< 3	< 3	< 11
3/28/13	2 +/- 1	< 140	< 2	< 3	< 2	< 2	< 4	< 3 / < 2	< 3	< 2	< 2	< 7
5/02/13	< 2	< 150	< 2	< 4	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
5/29/13	< 2	< 150	< 3	< 5	< 3	< 3	< 4	< 4 / < 3	< 4	< 3	< 3	< 10
6/27/13	2 +/- 1	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
8/01/13	3 +/- 1	< 150	< 3	< 5	< 3	< 3	< 5	< 5 / < 3	< 4	< 3	< 3	< 11
8/29/13	2 +/- 1	< 140	< 3	< 5	< 3	< 3	< 5	< 4 / < 3	< 4	< 2	< 3	< 11
10/02/13	1 +/- 1	< 150	< 3	< 5	< 3	< 3	< 5	< 4 / < 3	< 4	< 3	< 3	< 10
10/31/13	3 +/- 1	< 140	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 4	< 2	< 2	< 10
11/27/13	2 +/- 1	< 150	< 2	< 5	< 3	< 3	< 5	< 4 / < 3	< 4	< 2	< 3	< 11
01/02/14	3 +/- 1	< 140	< 3	< 3	< 2	< 3	< 6	< 4 / < 3	< 5	< 3	< 3	< 12

**4.F**  
**PEACH BOTTOM MILK SAMPLING DATA**  
**(pCi/L)**

<b>Station Number</b>	<b>Collection Date</b>	<b>I-131</b>	<b>Cs-134</b>	<b>Cs-137</b>	<b>Ba-140</b>	<b>K-40</b>
07D1	1/08/13	< 4	< 3	< 3	< 11	1400 +/- 106
	2/04/13	< 3	< 3	< 3	< 9	1400 +/- 103
	3/04/13	< 3	< 3	< 3	< 10	1420 +/- 110
	4/01/13	< 4	< 3	< 3	< 10	1340 +/- 104
	4/16/13	< 3	< 2	< 3	< 9	1360 +/- 103
	5/13/13	< 4	< 3	< 4	< 13	1400 +/- 110
	6/10/13	< 4	< 3	< 4	< 11	1340 +/- 105
	7/08/13	< 9	< 3	< 3	< 18	1360 +/- 103
	8/05/13	< 2	< 2	< 2	< 7	1430 +/- 101
	9/02/13	< 4	< 3	< 4	< 12	1420 +/- 111
	10/14/13	< 4	< 3	< 4	< 12	1440 +/- 112
	11/11/13	< 3	< 3	< 3	< 9	1430 +/- 108
	12/09/13	< 3	< 3	< 3	< 10	1380 +/- 108

<b>Station Number</b>	<b>Collection Date</b>	<b>I-131</b>	<b>Cs-134</b>	<b>Cs-137</b>	<b>Ba-140</b>	<b>K-40</b>
13A1	1/08/13	< 4	< 3	< 4	< 12	1450 +/- 113
	2/04/13	< 3	< 2	< 2	< 7	1470 +/- 113
	3/04/13	< 4	< 3	< 4	< 12	1430 +/- 112
	4/01/13	< 4	< 3	< 4	< 12	1360 +/- 107
	4/16/13	< 4	< 4	< 4	< 14	1300 +/- 113
	5/13/13	< 4	< 3	< 3	< 10	1330 +/- 104
	6/10/13	< 3	< 3	< 3	< 10	1390 +/- 107
	7/08/13	< 10	< 3	< 4	< 21	1350 +/- 109
	8/05/13	< 2	< 2	< 2	< 7	1380 +/- 107
	9/02/13	< 4	< 3	< 3	< 10	1350 +/- 105
	10/14/13	< 3	< 3	< 3	< 10	1360 +/- 106
	11/11/13	< 4	< 4	< 4	< 12	1440 +/- 115
	12/09/13	< 4	< 3	< 4	< 11	1390 +/- 112

**4.G**  
**PEACH BOTTOM FISH, PRODUCE & SEDIMENT DATA**  
 (pCi/kg)

Isotope	07A3-14		07A3-14		14A1-15		14A1-15		14A1-15		07A4-12	
	Bottomfeeding Fish*	Flathead/ Channel Catfish	Predator Fish*	Smallmouth/ Largemouth Bass	Van Hart Garden Produce*	Unwashed Green Cabbage	Van Hart Garden Produce*	Unwashed Field Corn Leaves	Van Hart Garden Produce*	Unwashed Field Corn Leaves	Sediment**	
	10/1/2013	10/1/2013	10/04/02013	10/04/02013	5/31/2013	6/24/2013	7/24/2013	8/26/2013	9/23/2013	11/25/2013		
I-131	< 14	< 12	< 3	< 6	< 77	< 15	< 8	< 120	< 16	***		
Mn-54	< 4	< 3	< 10	< 20	< 6	< 9	< 3	< 7	< 9	< 9		
Fe-59	< 10	< 4	< 4	< 8	< 26	< 10	< 3	< 24	< 21	< 84		
Co-58	< 4	< 4	< 9	< 7	< 12	< 26	< 7	< 8	< 10	< 21		
Co-60	< 9	< 7	< 4	< 16	< 13	< 17	< 5	< 19	< 23	< 8		
Zn-65	< 7	< 4	< 9	< 13	< 10	< 10	< 4	< 16	< 16	< 42		
Zr-95	< 5	< 3	< 3	< 5	< 9	< 10	< 3	< 13	< 10	< 46		
Nb-95	< 3	< 3	< 3	< 5	< 5	< 10	< 3	< 7	< 10	< 78		
Cs-134	< 3	< 3	< 3	< 5	< 5	< 10	< 3	< 7	< 9	< 12		
Cs-137	< 29	< 24	< 24	< 92	< 44	< 18	< 135	< 43	< 3330			

\* Wet Weight/small sample size

\*\* Dry Weight

\*\*\*Not reported

**5.A**  
**SUSQUEHANNA STEAM ELECTRIC STATION**  
**QUARTERLY TLD INTERCOMPARISON**  
**(mR/std. mo.)**

Station Number	Location	Collection Period	RDC Results	MT Results
1D1	Mocanaqua	1/23/2013 - 4/10/2013	4.3	3.6 +/- 0.1
		4/10/2013 - 7/3/2013	5.8	4.1 +/- 0.2
		7/3/2013 - 10/2/2013	5.0	4.6 +/- 0.2
		10/2/2013 - 1/15/2014	5.2	4.0 +/- 0.3
2A1	Information Center	1/23/2013 - 4/10/2013	3.9	3.1 +/- 0.1
		4/10/2013 - 7/3/2013	3.6	3.3 +/- 0.1
		7/3/2013 - 10/2/2013	4.3	3.6 +/- 0.1
		10/2/2013 - 1/15/2014	4.1	3.6 +/- 0.2
7B1	Wapwallopen	1/23/2013 - 4/10/2013	4.7	3.6 +/- 0.2
		4/10/2013 - 7/3/2013	5.1	4.1 +/- 0.4
		7/3/2013 - 10/2/2013	5.0	4.6 +/- 0.2
		10/2/2013 - 1/15/2014	4.9	4.2 +/- 0.2
12F1	Berwick Substation	1/23/2013 - 4/10/2013	4.7	3.3 +/- 0.4
		4/10/2013 - 7/3/2013	4.3	3.5 +/- 0.1
		7/3/2013 - 10/2/2013	4.0	3.9 +/- 0.2
		10/2/2013 - 1/15/2014	4.1	3.5 +/- 0.3
Annual Average:			54.9	45.5 +/- 2.4

**5.B**  
**SUSQUEHANNA STEAM ELECTRIC STATION**  
**THERMOLUMINESCENCE DOSIMETRY (TLD) DATA**  
**(mR/std. mo.)**

Control corrected-net exposure.

Station Number	Location	1/23/13		4/10/13		7/3/13		10/2/13		1/15/14		Annual Dose
		to	4/10/13	to	7/3/13	to	10/2/13	to	1/15/14			
01D1	Mocanaqua	3.6 +/- 0.1	4.1 +/- 0.2	4.6 +/- 0.2	4.0 +/- 0.3	4.0 +/- 0.3	49.0 +/- 1.2					
02A1	InformationCenter	3.1 +/- 0.1	3.3 +/- 0.1	3.6 +/- 0.1	3.6 +/- 0.2	3.6 +/- 0.2	40.9 +/- 0.8					
03D1	Pond Hill	3.4 +/- 0.1	3.6 +/- 0.3	3.7 +/- 0.0	3.7 +/- 0.0	3.7 +/- 0.0	43.1 +/- 1.0					
03K1	Nanticoke	3.3 +/- 0.3	3.1 +/- 0.1	3.5 +/- 0.2	3.3 +/- 0.2	3.3 +/- 0.2	39.9 +/- 1.2					
03M1	Wilkes-Barre	3.9 +/- 0.1	4.1 +/- 0.1	4.3 +/- 0.4	4.2 +/- 0.1	4.2 +/- 0.1	49.3 +/- 1.2					
04A1	PP&L Construction Dept.	3.2 +/- 0.3	3.5 +/- 0.1	3.9 +/- 0.0	3.8 +/- 0.3	3.8 +/- 0.3	43.4 +/- 1.2					
04E1	Ruckles Hill Road	3.8 +/- 0.1	3.9 +/- 0.2	4.6 +/- 0.1	4.0 +/- 0.3	4.0 +/- 0.3	48.6 +/- 1.2					
05A1	Biological Lab	2.8 +/- 0.2	3.0 +/- 0.3	2.6 +/- 0.1	3.1 +/- 0.1	3.1 +/- 0.1	34.3 +/- 1.1					
05E1	Bloss Farm	3.9 +/- 0.1	3.7 +/- 0.1	4.1 +/- 0.1	3.8 +/- 0.1	3.8 +/- 0.1	46.7 +/- 0.4					
06A1	SSES Sewage Plant	2.9 +/- 0.2	3.4 +/- 0.1	4.0 +/- 0.3	3.2 +/- 0.0	3.2 +/- 0.0	40.5 +/- 1.2					
06A2	River Water Intake	2.9 +/- 0.1	3.2 +/- 0.1	3.7 +/- 0.2	3.5 +/- 0.1	3.5 +/- 0.1	40.0 +/- 0.9					
06D1	Hobbie	3.5 +/- 0.1	3.9 +/- 0.4	3.8 +/- 0.3	3.9 +/- 0.1	3.9 +/- 0.1	45.3 +/- 1.4					
06L1	Freeland	4.3 +/- 0.6	4.3 +/- 0.2	4.6 +/- 0.5	4.3 +/- 0.4	4.3 +/- 0.4	52.5 +/- 2.8					
07B1	Wapwallopen	3.6 +/- 0.2	4.1 +/- 0.4	4.6 +/- 0.2	4.2 +/- 0.2	4.2 +/- 0.2	49.7 +/- 1.5					
07B2	Heller's Orchard	2.9 +/- 0.1	3.1 +/- 0.2	3.1 +/- 0.4	3.4 +/- 0.2	3.4 +/- 0.2	37.5 +/- 1.4					
07L1	Hazelton	3.2 +/- 0.2	3.1 +/- 0.1	*	3.3 +/- 0.2	3.3 +/- 0.2	38.0 +/- 1.1					
09B1	South Transmission Line	3.1 +/- 0.2	3.1 +/- 0.3	2.9 +/- 0.2	2.9 +/- 0.2	2.9 +/- 0.2	36.0 +/- 1.2					
09M1	Shenandoah	3.0 +/- 0.2	3.5 +/- 0.3	3.6 +/- 0.2	3.5 +/- 0.1	3.5 +/- 0.1	40.8 +/- 1.3					
10B1	Beach Haven/Gen Tank	3.3 +/- 0.1	3.3 +/- 0.0	3.6 +/- 0.2	3.6 +/- 0.3	3.6 +/- 0.3	41.4 +/- 1.1					
11A1	Golomb House	3.9 +/- 1.4	3.7 +/- 0.1	3.9 +/- 0.3	3.7 +/- 0.2	3.7 +/- 0.2	45.6 +/- 4.5					
11F1	Nescopeck	3.4 +/- 0.4	3.7 +/- 0.1	4.4 +/- 0.3	3.6 +/- 0.2	3.6 +/- 0.2	45.2 +/- 1.5					
12A1	WSW Perimeter Fence	3.8 +/- 0.1	4.8 +/- 0.3	5.3 +/- 0.4	4.9 +/- 0.3	4.9 +/- 0.3	56.2 +/- 1.6					
12F1	Berwick Substation	3.3 +/- 0.4	3.5 +/- 0.1	3.9 +/- 0.2	3.5 +/- 0.3	3.5 +/- 0.3	42.6 +/- 1.7					
12L1	Bloomsburg	2.9 +/- 0.0	2.8 +/- 0.3	3.2 +/- 0.4	3.1 +/- 0.2	3.1 +/- 0.2	35.9 +/- 1.6					
13A1	West Perimeter Fence	6.0 +/- 0.5	5.7 +/- 0.1	6.4 +/- 0.4	5.9 +/- 0.3	5.9 +/- 0.3	71.5 +/- 2.3					
14A1	WNW Perimeter Fence	3.7 +/- 0.2	4.1 +/- 0.1	4.7 +/- 0.3	4.2 +/- 0.0	4.2 +/- 0.0	50.0 +/- 1.2					
15A1	Serafin Farm	2.9 +/- 0.3	3.4 +/- 0.1	3.6 +/- 0.2	3.4 +/- 0.0	3.4 +/- 0.0	39.7 +/- 1.1					
16A1	NNW Perimeter Fence	5.3 +/- 0.2	5.2 +/- 0.1	6.7 +/- 0.4	5.9 +/- 0.1	5.9 +/- 0.1	69.2 +/- 1.3					
16A2	Rupinski Farm	3.1 +/- 0.3	3.3 +/- 0.3	4.0 +/- 0.3	3.3 +/- 0.3	3.3 +/- 0.3	41.2 +/- 1.8					
16B1	Walton Power Line	3.3 +/- 0.2	3.4 +/- 0.1	3.5 +/- 0.2	3.2 +/- 0.3	3.2 +/- 0.3	40.0 +/- 1.4					
Annual Average: 45.1 +/- 1.4												
*Invalid - disturbed during placement												

\*Invalid - disturbed during placement

**5.C.1**  
**SUSQUEHANNA STEAM AIR SAMPLING DATA**  
**BEACH GROVE ROAD (3A1)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/26/12 - 01/03/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.3
01/03/13 - 01/09/13	0.4 +/- 0.1	3.1 +/- 0.1	< 0.5
01/09/13 - 01/17/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
01/17/13 - 01/23/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5
01/23/13 - 01/31/13	0.1 +/- 0.1	1.0 +/- 0.1	< 0.4
01/31/13 - 02/06/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.4
02/06/13 - 02/12/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
02/12/13 - 02/20/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.4
02/20/13 - 02/28/13	0.1 +/- 0.1	0.5 +/- 0.1	< 0.4
02/28/13 - 03/08/13	0.2 +/- 0.1	0.6 +/- 0.1	< 0.3
03/08/13 - 03/14/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.5
03/14/13 - 03/19/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.6
03/19/13 - 03/26/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.5
03/26/13 - 04/04/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.3
04/04/13 - 04/10/13	0.4 +/- 0.1	1.4 +/- 0.1	< 0.5
04/10/13 - 04/16/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.5
04/16/13 - 04/24/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.3
04/24/13 - 05/01/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.6
05/01/13 - 05/08/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.4
05/08/13 - 05/15/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.5
05/15/13 - 05/22/13	0.3 +/- 0.1	1.0 +/- 0.1	< 0.5
05/22/13 - 05/29/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.4
05/29/13 - 06/05/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4
06/05/13 - 06/12/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.4
06/12/13 - 06/19/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.3
06/19/13 - 06/26/13	0.5 +/- 0.1	1.4 +/- 0.1	< 0.5
06/26/13 - 07/03/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.6
07/03/13 - 07/10/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
07/10/13 - 07/17/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
07/17/13 - 07/24/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4
07/24/13 - 07/31/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.3
07/31/13 - 08/06/13	0.1 +/- 0.1	1.1 +/- 0.1	< 0.5
08/06/13 - 08/14/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.5
08/14/13 - 08/21/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.3
08/21/13 - 08/28/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.4
08/28/13 - 09/05/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.4
09/05/13 - 09/11/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.5
09/11/13 - 09/18/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
09/18/13 - 09/25/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
09/25/13 - 10/02/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
10/02/13 - 10/09/13	0.4 +/- 0.1	2.1 +/- 0.1	< 0.3
10/09/13 - 10/16/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.6
10/16/13 - 10/23/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.4
10/23/13 - 10/30/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.3
10/30/13 - 11/06/13	0.2 +/- 0.1	1.8 +/- 0.1	< 0.3
11/06/13 - 11/13/13	0.4 +/- 0.1	1.1 +/- 0.1	< 0.4
11/13/13 - 11/20/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.4
11/20/13 - 11/26/13	0.1 +/- 0.1	1.1 +/- 0.1	< 0.6
11/26/13 - 12/04/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.4
12/04/13 - 12/11/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.4
12/11/13 - 12/18/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.3
12/18/13 - 12/24/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
12/24/13 - 12/31/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4

**5.C.2**  
**SUSQUEHANNA STEAM AIR SAMPLING DATA**  
**BIOLOGICAL LABORATORY (5A2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/26/12 - 01/03/13	0.1 +/- 0.1	1.6 +/- 0.1	< 0.5
01/03/13 - 01/09/13	0.4 +/- 0.1	3.0 +/- 0.1	< 0.5
01/09/13 - 01/17/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.7
01/17/13 - 01/23/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.5
01/23/13 - 01/31/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.3
01/31/13 - 02/06/13	0.3 +/- 0.1	2.0 +/- 0.1	< 0.4
02/06/13 - 02/12/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5
02/12/13 - 02/20/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
02/20/13 - 02/28/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.6
02/28/13 - 03/08/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.4
03/08/13 - 03/14/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.5
03/14/13 - 03/19/13	0.1 +/- 0.1	1.3 +/- 0.1	< 0.5
03/19/13 - 03/26/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.6
03/26/13 - 04/04/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.1
04/04/13 - 04/10/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.8
04/10/13 - 04/16/13	< 0.2	0.8 +/- 0.1	< 0.5
04/16/13 - 04/24/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
04/24/13 - 05/01/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.5
05/01/13 - 05/08/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.7
05/08/13 - 05/15/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.6
05/15/13 - 05/22/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.7
05/22/13 - 05/29/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.7
05/29/13 - 06/05/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.6
06/05/13 - 06/12/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.7
06/12/13 - 06/19/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.6
06/19/13 - 06/26/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.7
06/26/13 - 07/03/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.6
07/03/13 - 07/10/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
07/10/13 - 07/17/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.6
07/17/13 - 07/24/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.5
07/24/13 - 07/31/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.7
07/31/13 - 08/06/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5
08/06/13 - 08/14/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
08/14/13 - 08/21/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.8
08/21/13 - 08/28/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.6
08/28/13 - 09/05/13	0.4 +/- 0.1	1.9 +/- 0.1	< 0.3
09/05/13 - 09/11/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.5
09/11/13 - 09/18/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.6
09/18/13 - 09/25/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.6
09/25/13 - 10/02/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.7
10/02/13 - 10/09/13	0.4 +/- 0.1	2.1 +/- 0.1	< 0.6
10/09/13 - 10/16/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.7
10/16/13 - 10/23/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.6
10/23/13 - 10/30/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5
10/30/13 - 11/06/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.7
11/06/13 - 11/13/13	0.1 +/- 0.1	1.1 +/- 0.1	< 0.6
11/13/13 - 11/20/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.5
11/20/13 - 11/26/13	0.1 +/- 0.1	1.0 +/- 0.1	< 0.6
11/26/13 - 12/04/13	0.2 +/- 0.1	1.9 +/- 0.1	< 0.4
12/04/13 - 12/11/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.4
12/11/13 - 12/18/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.4
12/18/13 - 12/24/13		*	
12/24/13 - 12/31/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.3

\*No access to facility: 12/31/2013 is a two week sample

**5.C.3**  
**SUSQUEHANNA STEAM AIR SAMPLING DATA**  
**EMERGENCY OPERATING FACILITY (12A2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/26/12 - 01/03/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4
01/03/13 - 01/09/13	0.4 +/- 0.1	2.8 +/- 0.1	< 0.4
01/09/13 - 01/17/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5
01/17/13 - 01/23/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.7
01/23/13 - 01/31/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.3
01/31/13 - 02/06/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.6
02/06/13 - 02/12/13	0.1 +/- 0.1	1.3 +/- 0.1	< 0.4
02/12/13 - 02/20/13	0.1 +/- 0.1	1.2 +/- 0.1	< 0.4
02/20/13 - 02/28/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.5
02/28/13 - 03/08/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.4
03/08/13 - 03/14/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.6
03/14/13 - 03/19/13	0.1 +/- 0.1	1.3 +/- 0.1	< 0.4
03/19/13 - 03/26/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.5
03/26/13 - 04/04/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.3
04/04/13 - 04/10/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.7
04/10/13 - 04/16/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.6
04/16/13 - 04/24/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.3
04/24/13 - 05/01/13	0.4 +/- 0.1	1.4 +/- 0.1	< 0.5
05/01/13 - 05/08/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.5
05/08/13 - 05/15/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.6
05/15/13 - 05/22/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
05/22/13 - 05/29/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.6
05/29/13 - 06/05/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
06/05/13 - 06/12/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.5
06/12/13 - 06/19/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.4
06/19/13 - 06/26/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.7
06/26/13 - 07/03/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
07/03/13 - 07/10/13	0.3 +/- 0.1	1.0 +/- 0.1	< 0.6
07/10/13 - 07/17/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.6
07/17/13 - 07/24/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.7
07/24/13 - 07/31/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.4
07/31/13 - 08/06/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
08/06/13 - 08/14/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
08/14/13 - 08/21/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
08/21/13 - 08/28/13	0.4 +/- 0.1	1.8 +/- 0.1	< 0.4
08/28/13 - 09/05/13	0.4 +/- 0.1	1.9 +/- 0.1	< 0.6
09/05/13 - 09/11/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.8
09/11/13 - 09/18/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.5
09/18/13 - 09/25/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
09/25/13 - 10/02/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.6
10/02/13 - 10/09/13	0.4 +/- 0.1	2.1 +/- 0.1	< 0.6
10/09/13 - 10/16/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.6
10/16/13 - 10/23/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.4
10/23/13 - 10/30/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.6
10/30/13 - 11/06/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.5
11/06/13 - 11/13/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.6
11/13/13 - 11/20/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.3
11/20/13 - 11/26/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.5
11/26/13 - 12/04/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.6
12/04/13 - 12/11/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.6
12/11/13 - 12/18/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.4
12/18/13 - 12/24/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.5
12/24/13 - 12/31/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.6

**5.C.4**  
**SUSQUEHANNA STEAM AIR SAMPLING DATA**  
**BERWICK HOSPITAL (12E1)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/26/12 - 01/03/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
01/03/13 - 01/09/13	0.4 +/- 0.1	3.0 +/- 0.1	< 0.5
01/09/13 - 01/17/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.3
01/17/13 - 01/23/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
01/23/13 - 01/31/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
01/31/13 - 02/06/13	0.2 +/- 0.1	2.1 +/- 0.1	< 0.5
02/06/13 - 02/12/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5
02/12/13 - 02/20/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.3
02/20/13 - 02/28/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.5
02/28/13 - 03/08/13	0.2 +/- 0.1	0.6 +/- 0.1	< 0.3
03/08/13 - 03/14/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.5
03/14/13 - 03/19/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.7
03/19/13 - 03/26/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.4
03/26/13 - 04/04/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.3
04/04/13 - 04/10/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.6
04/10/13 - 04/16/13	0.4 +/- 0.1	0.9 +/- 0.1	< 0.5
04/16/13 - 04/24/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
04/24/13 - 05/01/13	0.4 +/- 0.1	1.4 +/- 0.1	< 0.6
05/01/13 - 05/08/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.7
05/08/13 - 05/15/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.7
05/15/13 - 05/22/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.7
05/22/13 - 05/29/13	0.3 +/- 0.1	1.0 +/- 0.1	< 0.6
05/29/13 - 06/05/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.6
06/05/13 - 06/12/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.5
06/12/13 - 06/19/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
06/19/13 - 06/26/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.8
06/26/13 - 07/03/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.7
07/03/13 - 07/10/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
07/10/13 - 07/17/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.8
07/17/13 - 07/24/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.6
07/24/13 - 07/31/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.5
07/31/13 - 08/06/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
08/06/13 - 08/14/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5
08/14/13 - 08/21/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.5
08/21/13 - 08/28/13	0.4 +/- 0.1	1.9 +/- 0.1	< 0.5
08/28/13 - 09/05/13	0.3 +/- 0.1	2.1 +/- 0.1	< 0.3
09/05/13 - 09/11/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.7
09/11/13 - 09/18/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.7
09/18/13 - 09/25/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
09/25/13 - 10/02/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.6
10/02/13 - 10/09/13	0.4 +/- 0.1	2.4 +/- 0.1	< 0.5
10/09/13 - 10/16/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.8
10/16/13 - 10/23/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.7
10/23/13 - 10/30/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.3
10/30/13 - 11/06/13	0.4 +/- 0.1	1.9 +/- 0.1	< 0.4
11/06/13 - 11/13/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5
11/13/13 - 11/20/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4
11/20/13 - 11/26/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.6
11/26/13 - 12/04/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.5
12/04/13 - 12/11/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.5
12/11/13 - 12/18/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.3
12/18/13 - 12/24/13	0.4 +/- 0.1	1.6 +/- 0.1	< 0.5
12/24/13 - 12/31/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.6

**5.D**  
**SUSQUEHANNA STEAM AIR PARTICULATE COMPOSITE**  
**(fCi/m3)**

<b>Station Number</b>	<b>Location</b>	<b>Collection Period</b>	<b>Cs-134</b>	<b>Cs-137</b>
03A1	Beach Grove Rd.	12/26/2012 - 03/26/2013	< 0.2	< 0.2
		03/26/2013 - 06/26/2013	< 0.2	< 0.2
		06/26/2013 - 10/02/2013	< 0.2	< 0.2
		10/02/2013 - 12/31/2013	< 0.1	< 0.1
5A2	Biological Lab	12/26/2012 - 03/26/2013	< 0.2	< 0.2
		03/26/2013 - 06/26/2013	< 0.2	< 0.2
		06/26/2013 - 10/02/2013	< 0.2	< 0.2
		10/02/2013 - 12/31/2013	< 0.1	< 0.1
12A2	Emergency Operations Facility	12/26/2012 - 03/26/2013	< 0.2	< 0.2
		03/26/2013 - 06/26/2013	< 0.2	< 0.2
		06/26/2013 - 10/02/2013	< 0.2	< 0.2
		10/02/2013 - 12/31/2013	< 0.2	< 0.2
12E1	Berwick Hospital	12/26/2012 - 03/26/2013	< 0.2	< 0.2
		03/26/2013 - 06/26/2013	< 0.2	< 0.2
		06/26/2013 - 10/02/2013	< 0.2	< 0.2
		10/02/2013 - 12/31/2013	< 0.2	< 0.1

**5.E.1**  
**SUSQUEHANNA STEAM SURFACE WATER DATA**  
**DOWNSTREAM OF DISCHARGE (06A3)**  
**(pCi/L)**

Collection Period Ending	Beta	Tritium	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-140
1/22/13	2 +/- 1	< 150	< 3	< 6	< 3	< 3	< 6	< 6 / < 3	< 5	< 4	< 4	< 13
2/26/13	2 +/- 1	< 150	< 3	< 5	< 3	< 3	< 5	< 5 / < 3	< 5	< 3	< 3	< 11
4/04/13	< 2	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 1	< 7
4/23/13	1 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 2	< 2	< 2	< 6
5/28/13	3 +/- 1	< 150	< 3	< 5	< 3	< 3	< 5	< 4 / < 3	< 3	< 3	< 3	< 10
6/25/13	1 +/- 1	< 140	< 2	< 5	< 3	< 3	< 4	< 4 / < 2	< 4	< 2	< 3	< 10
7/23/13	2 +/- 1	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 4	< 2	< 2	< 8
8/27/13	2 +/- 1	< 150	< 3	< 5	< 3	< 3	< 5	< 4 / < 3	< 3	< 3	< 3	< 10
9/24/13	2 +/- 1	< 140	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 3	< 2	< 2	< 8
10/22/13	3 +/- 1	< 150	< 3	< 7	< 4	< 4	< 7	< 6 / < 4	< 6	< 3	< 3	< 16
11/26/13	2 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 5	< 2	< 2	< 11
12/31/13	2 +/- 1	< 140	< 2	< 5	< 2	< 2	< 4	< 3 / < 2	< 4	< 2	< 2	< 11

**WATER INTAKE (06A4)**  
**(pCi/L)**

Collection Period Ending	Beta	Tritium	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-140
1/22/13	< 2	< 150	< 3	< 6	< 4	< 3	< 7	< 6 / < 3	< 6	< 3	< 4	< 15
2/26/13	1 +/- 1	< 150	< 3	< 6	< 3	< 3	< 5	< 4 / < 3	< 5	< 3	< 3	< 12
4/04/13	1 +/- 1	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 2	< 2	< 2	< 6
4/23/13	1 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 2	< 2	< 2	< 6
5/28/13	2 +/- 1	< 150	< 3	< 6	< 3	< 3	< 6	< 6 / < 3	< 4	< 3	< 3	< 11
6/25/13	2 +/- 1	< 140	< 3	< 6	< 3	< 3	< 5	< 5 / < 3	< 5	< 3	< 3	< 12
7/23/13	3 +/- 1	< 140	< 3	< 7	< 4	< 3	< 7	< 6 / < 4	< 7	< 3	< 3	< 16
8/27/13	2 +/- 1	< 150	< 3	< 4	< 2	< 3	< 5	< 4 / < 2	< 3	< 2	< 3	< 8
9/24/13	2 +/- 1	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 2	< 2	< 2	< 6
10/22/13	1 +/- 1	< 150	< 2	< 5	< 2	< 2	< 4	< 4 / < 3	< 5	< 2	< 2	< 11
11/26/13	< 2	< 150	< 2	< 4	< 2	< 2	< 4	< 3 / < 2	< 6	< 2	< 2	< 11
12/16/13*	2 +/- 1	< 140	< 3	< 6	< 3	< 3	< 5	< 5 / < 4	< 20	< 3	< 3	< 29

\*wks 1-3

**5.E.2**  
**SUSQUEHANNA STEAM SURFACE WATER DATA**  
**BIOLOGICAL LAB (05A3)**  
**(pCi/L)**

<b>Collection Period Ending</b>	<b>Beta</b>	<b>Tritium</b>	<b>Mn-54</b>	<b>Fe-59</b>	<b>Co-58</b>	<b>Co-60</b>	<b>Zn-65</b>	<b>Zr-Nb-95</b>	<b>I-131</b>	<b>Cs-134</b>	<b>Cs-137</b>	<b>Ba-140</b>
12/31/13*	4 +/- 1	< 140	< 2	< 3	< 2	< 2	< 2	< 3 / < 2	< 4	< 2	< 2	< 8

\*wks 4-5

**DANVILLE WATER (12N1)**  
**(pCi/L)**

<b>Collection Period Ending</b>	<b>Beta</b>	<b>Tritium</b>	<b>Mn-54</b>	<b>Fe-59</b>	<b>Co-58</b>	<b>Co-60</b>	<b>Zn-65</b>	<b>Zr-Nb-95</b>	<b>I-131</b>	<b>Cs-134</b>	<b>Cs-137</b>	<b>Ba-140</b>
1/31/13	1 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
2/28/13	1 +/- 1	< 150	< 2	< 4	< 2	< 2	< 4	< 3 / < 2	< 4	< 2	< 2	< 9
3/31/13	< 2	< 140	< 3	< 7	< 3	< 3	< 7	< 6 / < 4	< 6	< 3	< 3	< 15
4/30/13	1 +/- 1	< 150	< 4	< 9	< 4	< 4	< 9	< 8 / < 5	< 11	< 4	< 4	< 25
5/31/13	< 2	< 150	< 3	< 5	< 3	< 3	< 5	< 4 / < 3	< 4	< 3	< 3	< 11
6/30/13	< 2	< 140	< 3	< 6	< 3	< 3	< 8	< 5 / < 4	< 6	< 3	< 3	< 15
7/31/13	2 +/- 1	< 140	< 4	< 9	< 4	< 5	< 9	< 7 / < 4	< 4	< 4	< 4	< 14
8/31/13	2 +/- 1	< 140	< 3	< 10	< 4	< 3	< 8	< 8 / < 6	< 68	< 3	< 3	< 70
9/30/13	< 2	< 140	< 4	< 8	< 4	< 4	< 9	< 6 / < 4	< 5	< 4	< 4	< 14
10/31/13	4 +/- 1	< 140	< 3	< 6	< 3	< 3	< 6	< 5 / < 4	< 5	< 3	< 4	< 14
11/30/13	1 +/- 1	< 140	< 3	< 7	< 3	< 4	< 7	< 6 / < 4	< 8	< 3	< 3	< 17
12/31/13	< 2	< 150	< 4	< 9	< 5	< 4	< 9	< 8 / < 5	< 10	< 4	< 5	< 24

**5.F**  
**SUSQUEHANNA STEAM MILK SAMPLING DATA**  
**(pCi/L)**

<b>Station Number</b>	<b>Collection Date</b>	<b>I-131</b>	<b>Cs-134</b>	<b>Cs-137</b>	<b>Ba-140</b>	<b>K-40</b>
10D2	1/07/13	< 4	< 3	< 4	< 11	1230 +/- 95
	2/04/13	< 4	< 3	< 4	< 12	1300 +/- 103
	3/11/13	< 5	< 4	< 4	< 15	1340 +/- 106
	4/08/13	< 5	< 4	< 3	< 15	1330 +/- 106
	5/06/13	< 5	< 3	< 3	< 13	1380 +/- 107

Producer retired; increased vegetation sampling

<b>Station Number</b>	<b>Collection Date</b>	<b>I-131</b>	<b>Cs-134</b>	<b>Cs-137</b>	<b>Ba-140</b>	<b>K-40</b>
13E1	1/07/13	< 4	< 4	< 4	< 13	1430 +/- 112
	2/04/13	< 3	< 3	< 3	< 10	1400 +/- 106
	3/11/13	< 4	< 3	< 3	< 11	1400 +/- 109
	4/08/13	< 4	< 4	< 4	< 12	1430 +/- 111
	5/06/13	< 6	< 3	< 4	< 16	1450 +/- 113
	6/03/13	< 4	< 3	< 4	< 13	1480 +/- 115
	7/01/13	< 5	< 3	< 4	< 13	1430 +/- 112
	8/12/13	< 4	< 2	< 2	< 10	1450 +/- 112
	9/09/13	< 4	< 3	< 4	< 13	1460 +/- 114
	10/07/13	< 4	< 3	< 4	< 13	1430 +/- 112
	11/11/13	< 4	< 3	< 4	< 12	1430 +/- 112
	12/09/13	< 3	< 3	< 3	< 10	1530 +/- 118

**5.G**  
**SUSQUEHANNA STEAM FISH, PRODUCE & SEDIMENT DATA**  
 (pCi/kg)

Isotope	07B3-14	10D2-15	10B1-15		12F1-15		Control 02B1-12	07B4-12
	Bottomfeeding Fish* Shorthhead Redfish	Produce** Pasture Grass	Produce* Swiss Chard		Irrigated Potato		Sediment**	Sediment**
	10/2/2013	7/1/2013	8/26/2013	9/23/2013	10/22/2013	10/8/2013	10/14/2013	10/14/2013
I-131	< 18	< 194	< 71	< 11	< 270	< 20	< 717	< 657
Mn-54	< 5	< 9	< 5	< 7	< 5	< 9	< 8	< 8
Fe-59	< 14	< 32	< 19	< 20	< 22	< 25	< 46	< 46
Co-58	< 6	< 12	< 6	< 8	< 7	< 10	< 16	< 11
Co-60	< 6	< 10	< 5	< 8	< 5	< 10	< 12	< 11
Zn-65	< 12	< 23	< 14	< 21	< 13	< 25	< 40	< 37
Zr-95	< 9	< 20	< 10	< 12	< 12	< 16	< 21	< 21
Nb-95	< 6	< 17	< 8	< 8	< 11	< 11	< 18	< 23
Cs-134	< 4	< 9	< 4	< 7	< 4	< 8	< 17	< 125
Cs-137	< 4	< 9	< 4	< 7	< 4	< 9	< 16	< 13
Ba-140	< 35	< 203	< 82	< 30	< 194	< 49	< 524	< 468

\* Wet Weight

\*\*\* Dry Weight

**6.A**  
**THREE MILE ISLAND NUCLEAR STATION**  
**QUARTERLY TLD INTERCOMPARISON**  
**(mR/std. mo.)**

Station Number	Location	Collection Period	RDC Results	MT Results
1C1	Mill Street Substation	1/24/2013 - 4/5/2013	3.0	1.4 +/- 0.2
		4/5/2013 - 7/1/2013	2.1	1.7 +/- 0.2
		7/1/2013 - 10/4/2013	2.2	1.9 +/- 0.1
		10/4/2013 - 1/23/2014	2.5	1.9 +/- 0.3
5A1	Visitors Center	1/24/2013 - 4/5/2013	4.3	2.2 +/- 0.1
		4/5/2013 - 7/1/2013	2.8	2.5 +/- 0.2
		7/1/2013 - 10/4/2013	2.9	2.9 +/- 0.2
		10/4/2013 - 1/23/2014	2.7	2.9 +/- 0.1
8C1	Falmouth	1/24/2013 - 4/5/2013	2.6	1.7 +/- 0.2
		4/5/2013 - 7/1/2013	1.4	1.3 +/- 0.2
		7/1/2013 - 10/4/2013	2.6	2.1 +/- 0.3
		10/4/2013 - 1/23/2014	2.5	2.0 +/- 0.2
12B1	Goldsboro	1/24/2013 - 4/5/2013	3.0	2.2 +/- 0.3
		4/5/2013 - 7/1/2013	2.4	1.6 +/- 0.3
		7/1/2013 - 10/4/2013	2.6	2.5 +/- 0.2
		10/4/2013 - 1/23/2014	2.5	2.8 +/- 0.1
Annual Average:			31.5	25.2 +/- 2.3

## 6.B

Control corrected-net exposure.

**THREE MILE ISLAND NUCLEAR STATION**  
**THERMOLUMINESCENCE DOSIMETRY (TLD) DATA**  
(mR/std. mo.)

Station Number	Location	1/24/13 to 4/5/13	4/5/13 to 7/1/13	7/1/13 to 10/4/13	10/4/13 to 1/23/14	Annual Dose
01C1	Mill Street Substation	1.4 +/- 0.2	1.7 +/- 0.2	1.9 +/- 0.1	1.9 +/- 0.3	20.9 +/- 1.2
01J1	Hummelstown	2.5 +/- 0.2	2.5 +/- 0.2	2.3 +/- 0.2	2.3 +/- 0.1	28.6 +/- 1.0
02K1	Hershey	N/A	2.3 +/- 0.2	2.0 +/- 0.2	2.8 +/- 0.2	28.6 +/- 1.4
03E1	Kennedy Lane	2.5 +/- 0.5	2.8 +/- 0.0	2.5 +/- 0.2	3.3 +/- 0.2	33.0 +/- 1.6
04F1	Beagle Road	3.0 +/- 0.4	3.1 +/- 0.0	3.4 +/- 0.2	4.3 +/- 0.2	40.9 +/- 1.5
04J1	Bellaire	3.8 +/- 0.2	4.2 +/- 0.4	4.3 +/- 0.1	2.4 +/- 0.1	44.2 +/- 1.4
05A1	Visitors Center	2.2 +/- 0.1	2.5 +/- 0.2	2.9 +/- 0.2	2.9 +/- 0.1	31.4 +/- 0.8
05H1	Elizabethtown	3.2 +/- 0.3	2.9 +/- 0.6	3.4 +/- 0.4	2.6 +/- 0.2	36.4 +/- 2.4
06A1	500 Ke V Substation	2.4 +/- 0.4	2.2 +/- 0.2	2.8 +/- 0.1	3.1 +/- 0.1	31.6 +/- 1.3
06F1	Elizabethtown Sewage Plant	2.9 +/- 0.3	2.8 +/- 0.2	3.8 +/- 0.2	3.7 +/- 0.3	39.6 +/- 1.4
07F1	Bainbridge	3.9 +/- 0.3	3.6 +/- 0.4	3.6 +/- 0.2	4.8 +/- 0.4	47.9 +/- 2.0
07K1	Marietta	4.5 +/- 0.3	5.2 +/- 0.5	5.5 +/- 0.2	1.7 +/- 0.1	50.6 +/- 1.9
08C1	Falmouth	1.7 +/- 0.2	1.3 +/- 0.2	2.1 +/- 0.3	2.0 +/- 0.2	21.2 +/- 1.5
08C3	York Haven	1.9 +/- 0.2	1.6 +/- 0.3	2.1 +/- 0.1	2.6 +/- 0.2	24.5 +/- 1.3
08E1	Brunners Island	2.2 +/- 0.3	2.1 +/- 0.2	2.8 +/- 0.3	2.7 +/- 0.1	29.4 +/- 1.6
09D1	Cly Substation	2.4 +/- 0.2	1.8 +/- 0.3	2.3 +/- 0.2	3.5 +/- 0.2	30.3 +/- 1.4
09H1	Manchester	2.8 +/- 0.3	2.7 +/- 0.4	3.1 +/- 0.4	2.0 +/- 0.1	32.2 +/- 1.8
09L1	York	3.5 +/- 0.2	2.6 +/- 0.3	3.6 +/- 0.2	2.0 +/- 0.1	35.3 +/- 1.2
10C1	Pleasant Grove	1.8 +/- 0.2	1.4 +/- 0.0	2.1 +/- 0.1	2.0 +/- 0.3	22.1 +/- 1.1
10E1	Strinestown	1.9 +/- 0.1	1.5 +/- 0.2	2.1 +/- 0.3	2.2 +/- 0.2	23.5 +/- 1.3
12B1	Goldsboro	2.2 +/- 0.3	1.6 +/- 0.3	2.5 +/- 0.2	2.8 +/- 0.1	27.1 +/- 1.4
12E1	Newberrytown	2.4 +/- 0.4	1.8 +/- 0.1	2.4 +/- 0.2	2.5 +/- 0.3	27.3 +/- 1.7
13B1	Goldsboro Marina	2.4 +/- 0.3	2.0 +/- 0.3	2.6 +/- 0.4	3.0 +/- 0.1	29.7 +/- 1.7
14E1	Redland Acres	2.4 +/- 0.2	2.3 +/- 0.5	2.6 +/- 0.3	3.4 +/- 0.4	31.9 +/- 2.3
14L1	Camp Hill	3.0 +/- 0.3	2.7 +/- 0.1	3.4 +/- 0.1	2.9 +/- 0.2	36.2 +/- 1.0
14M1	Mechanicsburg	2.8 +/- 0.2	2.7 +/- 0.3	3.4 +/- 0.3	1.5 +/- 0.2	31.2 +/- 1.4
15F1	Highspire	2.9 +/- 0.3	2.5 +/- 0.3	3.3 +/- 0.4	3.2 +/- 0.1	35.6 +/- 1.6
15L1	Harrisburg	1.4 +/- 0.2	1.3 +/- 0.1	1.4 +/- 0.1	2.7 +/- 0.3	20.5 +/- 1.2
16C1	Crawford Station	2.8 +/- 0.1	2.8 +/- 0.0	3.4 +/- 0.4	2.5 +/- 0.1	34.5 +/- 1.3
16J1	Rutherford Fire Co.	2.1 +/- 0.2	2.1 +/- 0.2	2.8 +/- 0.3	2.1 +/- 0.2	27.5 +/- 1.4
Annual Average:						31.8 +/- 1.5

**6.C.1**  
**THREE MILE ISLAND AIR SAMPLING DATA**  
**MILL STREET SUBSTATION (1C2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/26/12 - 01/02/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.3
01/02/13 - 01/09/13	0.4 +/- 0.1	3.5 +/- 0.1	< 0.4
01/09/13 - 01/16/13	0.4 +/- 0.1	1.8 +/- 0.1	< 0.3
01/16/13 - 01/24/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.4
01/24/13 - 01/30/13	0.2 +/- 0.1	1.8 +/- 0.1	< 0.4
01/30/13 - 02/06/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.3
02/06/13 - 02/13/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.3
02/13/13 - 02/20/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.3
02/20/13 - 02/27/13	< 0.1	0.7 +/- 0.1	< 0.5
02/27/13 - 03/06/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.3
03/06/13 - 03/13/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.3
03/13/13 - 03/20/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.4
03/20/13 - 03/27/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.4
03/27/13 - 04/03/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.4
04/03/13 - 04/10/13	0.4 +/- 0.1	1.7 +/- 0.1	< 0.4
04/10/13 - 04/17/13	0.3 +/- 0.1	1.0 +/- 0.1	< 0.3
04/17/13 - 04/24/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
04/24/13 - 05/01/13	0.4 +/- 0.1	1.6 +/- 0.1	< 0.6
05/01/13 - 05/08/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.4
05/08/13 - 05/15/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
05/15/13 - 05/22/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.4
05/22/13 - 05/29/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
05/29/13 - 06/05/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.3
06/05/13 - 06/12/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5
06/12/13 - 06/19/13	0.4 +/- 0.1	1.3 +/- 0.1	< 0.3
06/19/13 - 06/26/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.5
06/26/13 - 07/03/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
07/03/13 - 07/10/13		*	
07/10/13 - 07/17/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.2
07/17/13 - 07/25/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.3
07/25/13 - 07/31/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.7
07/31/13 - 08/07/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.3
08/07/13 - 08/14/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.5
08/14/13 - 08/21/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.4
08/21/13 - 08/28/13	0.3 +/- 0.1	2.2 +/- 0.1	< 0.5
08/28/13 - 09/04/13	0.4 +/- 0.1	2.4 +/- 0.1	< 0.4
09/04/13 - 09/11/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.5
09/11/13 - 09/18/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.3
09/18/13 - 09/26/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.3
09/26/13 - 10/02/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.5
10/02/13 - 10/09/13	0.5 +/- 0.1	2.5 +/- 0.1	< 0.4
10/09/13 - 10/16/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.4
10/16/13 - 10/23/13	0.2 +/- 0.1	1.8 +/- 0.1	< 0.3
10/23/13 - 10/30/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.3
10/30/13 - 11/06/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.4
11/06/13 - 11/13/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
11/13/13 - 11/20/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.3
11/20/13 - 11/26/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4
11/26/13 - 12/05/13	0.2 +/- 0.1	2.0 +/- 0.1	< 0.3
12/05/13 - 12/11/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.6
12/11/13 - 12/19/13	0.4 +/- 0.1	2.2 +/- 0.1	< 0.3
12/19/13 - 12/27/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.3
12/27/13 - 01/02/14	0.3 +/- 0.1	1.7 +/- 0.1	< 0.6

\*No collection 7/17 is a two week sample

**6.C.2**  
**THREE MILE ISLAND AIR SAMPLING DATA**  
**VISITORS CENTER (5A2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/26/12 - 01/02/13	0.1 +/- 0.1	1.3 +/- 0.1	< 0.4
01/02/13 - 01/09/13	0.4 +/- 0.1	2.9 +/- 0.1	< 0.4
01/09/13 - 01/16/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.3
01/16/13 - 01/24/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.5
01/24/13 - 01/30/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.4
01/30/13 - 02/06/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.6
02/06/13 - 02/13/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5
02/13/13 - 02/20/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
02/20/13 - 02/27/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.5
02/27/13 - 03/06/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.4
03/06/13 - 03/13/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.4
03/13/13 - 03/20/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
03/20/13 - 03/27/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.5
03/27/13 - 04/03/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.4
04/03/13 - 04/10/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.4
04/10/13 - 04/17/13	0.7 +/- 0.1	1.2 +/- 0.1	< 0.4
04/17/13 - 04/24/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5
04/24/13 - 05/01/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.3
05/01/13 - 05/08/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.6
05/08/13 - 05/15/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5
05/15/13 - 05/22/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.7
05/22/13 - 05/29/13	0.1 +/- 0.1	1.1 +/- 0.1	< 0.4
05/29/13 - 06/05/13	0.1 +/- 0.1	1.1 +/- 0.1	< 0.4
06/05/13 - 06/12/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.5
06/12/13 - 06/19/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.6
06/19/13 - 06/26/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
06/26/13 - 07/03/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.4
07/03/13 - 07/10/13		*	
07/10/13 - 07/17/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.3
07/17/13 - 07/25/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
07/25/13 - 07/31/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.6
07/31/13 - 08/07/13	0.1 +/- 0.1	1.4 +/- 0.1	< 0.4
08/07/13 - 08/14/13	0.4 +/- 0.1	1.4 +/- 0.1	< 0.6
08/14/13 - 08/21/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.4
08/21/13 - 08/28/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.7
08/28/13 - 09/04/13	0.4 +/- 0.1	1.8 +/- 0.1	< 0.4
09/04/13 - 09/11/13	0.4 +/- 0.1	1.6 +/- 0.1	< 0.4
09/11/13 - 09/18/13	0.1 +/- 0.1	1.6 +/- 0.1	< 0.4
09/18/13 - 09/26/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
09/26/13 - 10/02/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
10/02/13 - 10/09/13	0.4 +/- 0.1	2.1 +/- 0.1	< 0.3
10/09/13 - 10/16/13	0.1 +/- 0.1	1.3 +/- 0.1	< 0.3
10/16/13 - 10/23/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.4
10/23/13 - 10/30/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
10/30/13 - 11/06/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.5
11/06/13 - 11/13/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5
11/13/13 - 11/20/13	0.4 +/- 0.1	1.3 +/- 0.1	< 0.4
11/20/13 - 11/26/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
11/26/13 - 12/05/13	0.2 +/- 0.1	1.8 +/- 0.1	< 0.4
12/05/13 - 12/11/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.7
12/11/13 - 12/19/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.3
12/19/13 - 12/27/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
12/27/13 - 01/02/14	0.3 +/- 0.1	1.5 +/- 0.1	< 0.6

\*No collection 7/17 is a two week sample

**6.C.3**  
**THREE MILE ISLAND AIR SAMPLING DATA**  
**COLLINS SUBSTATION (8C2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/26/12 - 01/02/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.3
01/02/13 - 01/09/13	0.4 +/- 0.1	2.8 +/- 0.1	< 0.5
01/09/13 - 01/16/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.4
01/16/13 - 01/24/13	0.4 +/- 0.1	1.6 +/- 0.1	< 0.5
01/24/13 - 01/30/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.5
01/30/13 - 02/06/13	0.2 +/- 0.1	1.7 +/- 0.1	< 0.4
02/06/13 - 02/13/13	0.1 +/- 0.1	1.3 +/- 0.1	< 0.5
02/13/13 - 02/20/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.3
02/20/13 - 02/27/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.5
02/27/13 - 03/06/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.4
03/06/13 - 03/13/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.4
03/13/13 - 03/20/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.3
03/20/13 - 03/27/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.7
03/27/13 - 04/03/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.4
04/03/13 - 04/10/13	0.4 +/- 0.1	1.6 +/- 0.1	< 0.4
04/10/13 - 04/17/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.5
04/17/13 - 04/24/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.6
04/24/13 - 05/01/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5
05/01/13 - 05/08/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.5
05/08/13 - 05/15/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5
05/15/13 - 05/22/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.6
05/22/13 - 05/29/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.7
05/29/13 - 06/05/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.7
06/05/13 - 06/12/13	0.3 +/- 0.1	0.8 +/- 0.1	< 0.6
06/12/13 - 06/19/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5
06/19/13 - 06/26/13	0.4 +/- 0.1	1.3 +/- 0.1	< 0.8
06/26/13 - 07/03/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.6
07/03/13 - 07/10/13		*	
07/10/13 - 07/17/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.4
07/17/13 - 07/25/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.6
07/25/13 - 07/31/13	0.1 +/- 0.1	1.2 +/- 0.1	< 0.8
07/31/13 - 08/07/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
08/07/13 - 08/14/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
08/14/13 - 08/21/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.8
08/21/13 - 08/28/13	0.2 +/- 0.1	1.8 +/- 0.1	< 0.6
08/28/13 - 09/04/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.9
09/04/13 - 09/11/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.6
09/11/13 - 09/18/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.7
09/18/13 - 09/26/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.5
09/26/13 - 10/02/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.9
10/02/13 - 10/09/13	0.3 +/- 0.1	2.1 +/- 0.1	< 0.5
10/09/13 - 10/16/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.7
10/16/13 - 10/23/13	0.4 +/- 0.1	1.4 +/- 0.1	< 0.7
10/23/13 - 10/30/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
10/30/13 - 11/06/13	0.2 +/- 0.1	1.8 +/- 0.1	< 0.8
11/06/13 - 11/13/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.6
11/13/13 - 11/20/13	0.4 +/- 0.1	1.4 +/- 0.1	< 0.3
11/20/13 - 11/26/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.7
11/26/13 - 12/05/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.5
12/05/13 - 12/11/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.7
12/11/13 - 12/19/13	0.4 +/- 0.1	2.1 +/- 0.1	< 0.5
12/19/13 - 12/27/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.3
12/27/13 - 01/02/14	0.3 +/- 0.1	1.5 +/- 0.1	< 0.4

\*No collection 7/17 is a two week sample

**6.C.4**  
**THREE MILE ISLAND AIR SAMPLING DATA**  
**GOLDSBORO (12B2)**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/26/12 - 01/02/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
01/02/13 - 01/09/13	0.5 +/- 0.1	2.9 +/- 0.1	< 0.6
01/09/13 - 01/16/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.6
01/16/13 - 01/24/13	0.4 +/- 0.1	1.5 +/- 0.1	< 0.6
01/24/13 - 01/30/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.4
01/30/13 - 02/06/13	0.2 +/- 0.1	1.8 +/- 0.1	< 0.7
02/06/13 - 02/13/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5
02/13/13 - 02/20/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
02/20/13 - 02/27/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.5
02/27/13 - 03/06/13	0.1 +/- 0.1	0.6 +/- 0.1	< 0.5
03/06/13 - 03/13/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.4
03/13/13 - 03/20/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.7
03/20/13 - 03/27/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.5
03/27/13 - 04/03/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.3
04/03/13 - 04/10/13	0.4 +/- 0.1	1.6 +/- 0.1	< 0.3
04/10/13 - 04/17/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.3
04/17/13 - 04/24/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5
04/24/13 - 05/01/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
05/01/13 - 05/08/13	0.1 +/- 0.1	0.9 +/- 0.1	< 0.5
05/08/13 - 05/15/13	0.3 +/- 0.1	1.0 +/- 0.1	< 0.4
05/15/13 - 05/22/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.5
05/22/13 - 05/29/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.5
05/29/13 - 06/05/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.6
06/05/13 - 06/12/13	0.2 +/- 0.1	0.9 +/- 0.1	< 0.8
06/12/13 - 06/19/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.5
06/19/13 - 06/26/13	0.5 +/- 0.1	1.3 +/- 0.1	< 0.7
06/26/13 - 07/03/13	0.2 +/- 0.1	1.0 +/- 0.1	< 0.6
07/03/13 - 07/10/13		*	
07/10/13 - 07/17/13	0.3 +/- 0.1	1.1 +/- 0.1	< 0.3
07/17/13 - 07/25/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.5
07/25/13 - 07/31/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.8
07/31/13 - 08/07/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.4
08/07/13 - 08/14/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.5
08/14/13 - 08/21/13	< 0.1	< 0.1	< 0.5
08/21/13 - 08/28/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.4
08/28/13 - 09/04/13	0.3 +/- 0.1	2.1 +/- 0.1	< 0.4
09/04/13 - 09/11/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.5
09/11/13 - 09/18/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.6
09/18/13 - 09/26/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.4
09/26/13 - 10/02/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.7
10/02/13 - 10/09/13	0.4 +/- 0.1	2.5 +/- 0.1	< 0.6
10/09/13 - 10/16/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5
10/16/13 - 10/23/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
10/23/13 - 10/30/13	0.1 +/- 0.1	1.2 +/- 0.1	< 0.3
10/30/13 - 11/06/13	0.2 +/- 0.1	1.6 +/- 0.1	< 0.6
11/06/13 - 11/13/13	0.3 +/- 0.1	1.2 +/- 0.1	< 0.5
11/13/13 - 11/20/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.3
11/20/13 - 11/26/13	0.2 +/- 0.1	1.1 +/- 0.1	< 0.7
11/26/13 - 12/05/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.3
12/05/13 - 12/11/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.4
12/11/13 - 12/19/13	0.3 +/- 0.1	1.9 +/- 0.1	< 0.4
12/19/13 - 12/27/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.3
12/27/13 - 01/02/14	0.2 +/- 0.1	1.5 +/- 0.1	< 0.5

\*No collection 7/17 is a two week sample

**6.C.5**  
**CONTROL AIR SAMPLING DATA**  
**16L1**

Collection Period	Particulates (x 0.01 pCi/m <sup>3</sup> )		Iodine-131 (x 0.01 pCi/m <sup>3</sup> )
	Alpha	Beta	
12/31/12 - 01/07/13	0.2 +/- 0.1	2.6 +/- 0.1	< 0.4
01/07/13 - 01/14/13	0.4 +/- 0.1	2.8 +/- 0.1	< 0.4
01/14/13 - 01/22/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.4
01/22/13 - 01/28/13	0.3 +/- 0.1	1.5 +/- 0.1	< 0.5
01/28/13 - 02/04/13	0.3 +/- 0.1	2.2 +/- 0.1	< 0.5
02/04/13 - 02/11/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.4
02/11/13 - 02/19/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
02/19/13 - 02/25/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.4
02/25/13 - 03/04/13	0.1 +/- 0.1	0.7 +/- 0.1	< 0.5
03/04/13 - 03/11/13	0.2 +/- 0.1	0.8 +/- 0.1	< 0.6
03/11/13 - 03/18/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
03/18/13 - 03/25/13	0.1 +/- 0.1	1.0 +/- 0.1	< 0.6
03/25/13 - 04/01/13	< 0.2	0.7 +/- 0.1	< 0.5
04/01/13 - 04/08/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.6
04/08/13 - 04/15/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5
04/15/13 - 04/22/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5
04/22/13 - 04/29/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.4
04/29/13 - 05/06/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4
05/06/13 - 05/13/13	0.2 +/- 0.1	0.7 +/- 0.1	< 0.5
05/13/13 - 05/20/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.5
05/20/13 - 05/28/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
05/28/13 - 06/03/13	0.2 +/- 0.1	1.9 +/- 0.1	< 0.6
06/03/13 - 06/10/13	0.1 +/- 0.1	1.0 +/- 0.1	< 0.5
06/10/13 - 06/17/13	0.3 +/- 0.1	1.3 +/- 0.1	< 0.5
06/17/13 - 06/24/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
06/24/13 - 07/01/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
07/01/13 - 07/08/13	0.1 +/- 0.1	0.8 +/- 0.1	< 0.5
07/08/13 - 07/15/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.5
07/15/13 - 07/22/13	0.2 +/- 0.1	1.9 +/- 0.1	< 0.4
07/22/13 - 07/29/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.6
07/29/13 - 08/05/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.4
08/05/13 - 08/12/13	0.2 +/- 0.1	1.5 +/- 0.1	< 0.4
08/12/13 - 08/19/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
08/19/13 - 08/26/13	< 0.1	< 0.1	< 0.5
08/26/13 - 09/03/13	0.4 +/- 0.1	2.8 +/- 0.1	< 0.4
09/03/13 - 09/09/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.8
09/09/13 - 09/16/13	0.3 +/- 0.1	2.0 +/- 0.1	< 0.4
09/16/13 - 09/23/13	0.3 +/- 0.1	1.4 +/- 0.1	< 0.5
09/23/13 - 09/30/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.6
09/30/13 - 10/07/13	0.5 +/- 0.1	2.9 +/- 0.1	< 0.5
10/07/13 - 10/15/13	0.2 +/- 0.1	1.3 +/- 0.1	< 0.4
10/15/13 - 10/21/13	0.4 +/- 0.1	1.8 +/- 0.1	< 0.8
10/21/13 - 10/28/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.7
10/28/13 - 11/04/13	0.3 +/- 0.1	2.2 +/- 0.1	< 0.5
11/04/13 - 11/12/13	0.2 +/- 0.1	1.4 +/- 0.1	< 0.4
11/12/13 - 11/18/13	0.3 +/- 0.1	1.7 +/- 0.1	< 0.5
11/18/13 - 11/25/13	0.2 +/- 0.1	1.2 +/- 0.1	< 0.5
11/25/13 - 12/02/13	0.3 +/- 0.1	1.6 +/- 0.1	< 0.4
12/02/13 - 12/09/13	0.4 +/- 0.1	2.9 +/- 0.1	< 0.5
12/09/13 - 12/16/13	0.4 +/- 0.1	1.9 +/- 0.1	< 0.3
12/16/13 - 12/23/13	0.3 +/- 0.1	1.8 +/- 0.1	< 0.5
12/23/13 - 12/30/13	0.1 +/- 0.1	1.4 +/- 0.1	< 0.4

**6.D**  
**THREE MILE ISLAND AIR PARTICULATE COMPOSITES**  
**(fCi/m3)**

<b>Station Number</b>	<b>Location</b>	<b>Collection Period</b>	<b>Cs-134</b>	<b>Cs-137</b>
1C2	Mill St. Substation	12/26/2012 - 04/03/2013	< 0.2	< 0.2
		04/03/2013 - 06/26/2013	< 0.1	< 0.1
		06/26/2013 - 10/02/2013	< 0.1	< 0.1
		10/02/2013 - 01/02/2014	< 0.1	< 0.1
5A2	Visitors Center	12/26/2012 - 04/03/2013	< 0.1	< 0.1
		04/03/2013 - 06/26/2013	< 0.2	< 0.2
		06/26/2013 - 10/02/2013	< 0.1	< 0.1
		10/02/2013 - 01/02/2014	< 0.2	< 0.2
8C2	Collins Substation	12/26/2012 - 04/03/2013	< 0.2	< 0.2
		04/03/2013 - 06/26/2013	< 0.1	< 0.1
		06/26/2013 - 10/02/2013	< 0.2	< 0.2
		10/02/2013 - 01/02/2014	< 0.1	< 0.1
12B2	Goldsboro	12/26/2012 - 04/03/2013	< 0.1	< 0.1
		04/03/2013 - 06/26/2013	< 0.1	< 0.1
		06/26/2013 - 10/02/2013	< 0.2	< 0.2
		10/02/2013 - 01/02/2014	< 0.2	< 0.2
16L1	Harrisburg	12/31/2012 - 04/01/2013	< 0.1	< 0.1
		04/01/2013 - 07/01/2013	< 0.2	< 0.2
		07/01/2013 - 09/23/2013	< 0.1	< 0.1
		09/23/2013 - 12/30/2013	< 0.3	< 0.3

6.E  
THREE MILE ISLAND SURFACE WATER DATA  
COLUMBIA (7L1)  
(pCi/L)

Collection Period Ending	Beta	Tritium	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-140
1/29/13	1 +/- 1	< 150	< 3	< 5	< 3	< 3	< 5	< 4 / < 3	< 3	< 3	< 3	< 9
2/26/13	1 +/- 1	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 2	< 2	< 2	< 5
4/02/13	< 2	< 140	< 3	< 6	< 3	< 3	< 7	< 6 / < 4	< 6	< 3	< 3	< 15
4/30/13	< 2	< 150	< 3	< 5	< 3	< 3	< 5	< 4 / < 3	< 3	< 3	< 3	< 9
5/28/13	< 2	< 150	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
7/02/13	2 +/- 1	< 140	< 3	< 6	< 3	< 3	< 7	< 5 / < 3	< 4	< 3	< 3	< 12
7/30/13	2 +/- 1	470 +/- 100	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 7
9/03/13	2 +/- 1	< 140	< 2	< 6	< 3	< 2	< 4	< 5 / < 4	< 38	< 2	< 2	< 40
10/01/13	1 +/- 1	260 +/- 95	< 3	< 5	< 3	< 3	< 6	< 4 / < 3	< 3	< 3	< 3	< 9
10/29/13	3 +/- 1	490 +/- 105	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 2	< 2	< 2	< 6
12/03/13	< 2	< 140	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 4	< 2	< 3	< 10
12/31/13	< 2	< 140	< 3	< 5	< 3	< 3	< 5	< 4 / < 3	< 3	< 3	< 3	< 10

STEELTON (15J1)  
(pCi/L)

Collection Period Ending	Beta	Tritium	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-140
1/29/13	< 2	< 150	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 3	< 2	< 3	< 8
2/26/13	< 2	< 150	< 2	< 4	< 2	< 2	< 4	< 3 / < 2	< 3	< 2	< 2	< 7
4/02/13	2 +/- 1	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 3	< 2	< 2	< 8
4/30/13	< 2	< 160	< 2	< 4	< 2	< 2	< 4	< 4 / < 3	< 3	< 2	< 3	< 8
5/28/13	1 +/- 1	< 140	< 3	< 5	< 3	< 3	< 5	< 5 / < 3	< 5	< 3	< 3	< 11
7/02/13	1 +/- 1	< 140	< 4	< 8	< 4	< 4	< 9	< 7 / < 4	< 5	< 4	< 4	< 15
7/30/13	< 2	< 140	< 3	< 6	< 3	< 3	< 6	< 5 / < 3	< 5	< 3	< 3	< 13
9/03/13	1 +/- 1	< 140	< 2	< 4	< 2	< 2	< 3	< 4 / < 3	< 24	< 2	< 2	< 26
10/01/13	< 2	< 140	< 3	< 4	< 2	< 3	< 5	< 4 / < 3	< 3	< 3	< 3	< 8
10/29/13	< 2	< 140	< 2	< 3	< 2	< 2	< 3	< 3 / < 2	< 2	< 2	< 2	< 6
12/03/13	1 +/- 1	< 140	< 3	< 5	< 3	< 3	< 5	< 5 / < 3	< 5	< 3	< 3	< 11
12/31/13	< 2	< 140	< 2	< 4	< 2	< 2	< 4	< 4 / < 2	< 3	< 2	< 2	< 8

**6.F**  
**THREE MILE ISLAND MILK SAMPLING DATA**  
**(pCi/L)**

<b>Station Number</b>	<b>Collection Date</b>	<b>I-131</b>	<b>Cs-134</b>	<b>Cs-137</b>	<b>Ba-140</b>	<b>K-40</b>
07B1	1/16/13	< 4	< 4	< 4	< 11	1260 +/- 99
	2/13/13	< 3	< 3	< 3	< 9	1280 +/- 98
	3/13/13	< 5	< 5	< 5	< 15	817 +/- 70
	4/10/13	< 8	< 7	< 7	< 24	827 +/- 75
	5/08/13	< 5	< 4	< 4	< 14	1370 +/- 105
	6/05/13	< 7	< 7	< 4	< 24	924 +/- 83
	7/03/13	< 5	< 5	< 5	< 15	702 +/- 63
	8/14/13	< 4	< 3	< 3	< 12	994 +/- 73
	9/11/13	< 5	< 5	< 5	< 14	1120 +/- 90
	10/09/13	< 6	< 6	< 5	< 19	785 +/- 72
	11/06/13	< 4	< 4	< 3	< 13	979 +/- 80
	12/11/13	< 3	< 3	< 3	< 9	1340 +/- 107

<b>Station Number</b>	<b>Collection Date</b>	<b>I-131</b>	<b>Cs-134</b>	<b>Cs-137</b>	<b>Ba-140</b>	<b>K-40</b>
10K1	1/16/13	< 2	< 2	< 2	< 6	1350 +/- 100
	2/13/13	< 3	< 3	< 3	< 10	1380 +/- 111
	3/13/13	< 2	< 2	< 2	< 6	1350 +/- 99
	4/10/13	< 3	< 3	< 3	< 9	1280 +/- 101
	5/08/13	< 4	< 3	< 3	< 12	1380 +/- 111
	6/05/13	< 3	< 3	< 3	< 9	1270 +/- 100
	7/03/13	< 3	< 3	< 4	< 10	1220 +/- 61
	8/14/13	< 5	< 3	< 3	< 11	1450 +/- 107
	9/11/13	< 3	< 3	< 3	< 10	1370 +/- 111
	10/09/13	< 3	< 3	< 4	< 11	1400 +/- 110
	11/06/13	< 2	< 2	< 2	< 6	1370 +/- 100
	12/04/13	< 3	< 2	< 2	< 8	1410 +/- 110

**6.G**  
**THREE MILE ISLAND FISH, PRODUCE & SEDIMENT DATA**  
 (pCi/kg)

Isotope	10A1-14	08A1-15		08A1-15		Control	09B1-12
	Predator Fish* Smallmouth/Largemouth Bass, Crappie, Rock Bass	6/10/2013	6/25/2013	7/22/2013	8/28/2013	6/14/2013	6/14/2013
			Red Hill Market Produce*		Red Hill Market Produce*	Sediment**	Sediment**
			Unwashed Zucchini Leaves		Unwashed Turnip Greens		
I-131	< 17	< 8	< 14	< 54	< 19	< 86	< 68
Mn-54	< 4	< 6	< 5	< 4	< 4	< 9	< 8
Fe-59	< 11	< 14	< 13	< 14	< 12	< 32	< 30
Co-58	< 4	< 6	< 5	< 5	< 4	< 15	< 12
Co-60	< 4	< 7	< 5	< 5	< 5	< 13	< 12
Zn-65	< 10	< 16	< 12	< 12	< 10	< 46	< 38
Zr-95	< 7	< 5	< 8	< 9	< 8	< 27	< 24
Nb-95	< 5	< 6	< 6	< 8	< 6	< 25	< 20
Cs-134	< 3	< 5	< 4	< 4	< 4	< 17	< 14
Cs-137	< 3	< 6	< 4	< 4	< 4	< 9	< 8
Ba-140	< 32	< 24	< 31	< 63	< 36	< 145	< 121

\* Wet Weight

\*\* Dry Weight



For more information, visit DEP's website at [www.dep.state.pa.us](http://www.dep.state.pa.us), keyword: DEP Radiation Protection.

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