State of Illinois
Illinois Emergency Management Agency

2017 Radiological Environmental Monitoring Report for Illinois Nuclear Power Stations

IEMA

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Executive Summary

The Illinois Emergency Management Agency (IEMA) is mandated with protecting public health and safety and the environment from the potentially harmful effects of ionizing radiation. In support of that mission, IEMA conducts radiological environmental monitoring around Illinois' six operating nuclear power stations and the Zion Nuclear Power Station, which ceased operation in 1997 and is currently in the decommissioning process.

IEMA's radiological environmental monitoring program has three primary functions: 1) collection of diverse samples from carefully chosen locations on a routine basis, including simultaneous field surveillance; 2) analyzing samples for radionuclides; and 3) evaluation of test results on both an annual and historical basis.

Federal regulations establish standards for protection of the public against ionizing radiation from activities conducted under U.S. Nuclear Regulatory Commission (US NRC) licenses, such as operation of nuclear power stations. The U.S. Environmental Protection Agency (US EPA) and the Illinois Environmental Protection Agency (IEPA) set drinking water and Class I groundwater standards for several types of radioactive contaminants; the limit for tritium in both drinking water and Class I groundwater, 20,000 picocuries per liter, is used for comparison purposes within this report.

In 2017, 675 environmental samples were collected and analyzed for radioactivity. The samples collected by IEMA included water, sediment, soil, air, vegetation and fish. In addition, 1684 environmental dosimeters (Optically Stimulated Luminescence Dosimeters or OSLs) were strategically deployed around each of the nuclear power station sites to measure direct radiation.

Environmental dosimetry results provide a baseline of ambient gamma radiation levels within a 10-mile radius of each nuclear power station and other background reference locations across the state.

In 2017, all test results for samples collected as part of IEMA's environmental monitoring program for nuclear power stations were below federal and state safety standards and guidelines.

In parallel with environmental monitoring, IEMA operates a state-of-the-art Remote Monitoring System (RMS) at all six operating nuclear power stations. This one-of-a-kind RMS consists of three separate subsystems: the Reactor Data Link (RDL), the Gaseous Effluent Monitoring System (GEMS) and Gamma Detection Network (GDN). The GEMS is used to measure and identify gaseous effluent radioactivity from each nuclear power station effluent stack, and the GDN is capable of measuring direct radiation in the surrounding environment. IEMA's radiological environmental monitoring program independently monitors the environs around each nuclear power station to ensure releases to the environment are not affecting public health and safety. Results from the GDN are provided in this report.

Illinois Emergency Management Agency

Radiological Environmental Monitoring Program for Nuclear Power Stations Report for Calendar Year 2017

Introduction

With 11 operating reactors at six nuclear power stations, Illinois is home to more commercial nuclear power generation than any other state in the country. Although direct regulatory authority for the operation of U.S. nuclear power stations resides with the U.S. Nuclear Regulatory Commission (US NRC), the Illinois Emergency Management Agency (IEMA) is mandated with protecting public health and safety and the environment from the potentially harmful effects of ionizing radiation. In support of that mission, IEMA conducts radiological environmental monitoring in the environs of Illinois' six operating nuclear power stations. IEMA also maintains a radiological environmental monitoring program at Zion Nuclear Power Station, which ceased operation in 1997 and is currently undergoing decommissioning. Control sample locations are chosen in areas where the samples are not influenced by plant operations. Control location samples are sampled quarterly and the results are compared with indicator sample results. Control environmental samples are taken at Sangchris Lake State Park near Kincaid, Illinois and air monitoring samples are collected in Springfield, Illinois. Sample results for control locations can be found in Appendix H.

In addition to "traditional" radiological environmental monitoring, IEMA has a Remote Monitoring System (RMS) around each nuclear power station. IEMA's RMS is an advanced, integrated computer-based system that continually monitors selected plant operational parameters at each facility and is capable of identifying and measuring the presence of radioactive materials in station effluents and direct radiation in the surrounding environment. This one-of-a-kind system consists of three separate subsystems: the Reactor Data Link (RDL), the Gaseous Effluent Monitoring System (GEMS) and the Gamma Detection Network (GDN).

Data from the RMS is collected and monitored continuously. IEMA has developed software that continually monitors and analyzes the collected data. Additionally, the software provides notification of unusual occurrences to on-call IEMA personnel.

This report details IEMA's radiological environmental monitoring program, including data from the RMS, for the period January 2017 through December 2017 for the six operating nuclear power stations in Illinois and the one nuclear power station undergoing decommissioning.

Program Overview

Critical pathways for potential radiation exposure to the public include direct radiation, airborne, waterborne, aquatic, and ingestion. IEMA has strategically identified sampling locations that provide early indication of any potential public health and safety issues regarding Illinois nuclear power station operation. Data from the program is used to establish a baseline data set that can be used to perform exposure assessments in the event of a significant release from a nuclear power station.

IEMA collects samples from designated indicator sampling locations on a routine basis. IEMA analyzes these samples for the presence of radionuclides and the results are evaluated on both an annual and historical basis.

Sample matrices monitored by IEMA include soil, vegetation and air, as well as water, sediment, and fish from nearby waterways. In 2017, 675 samples were collected, analyzed and evaluated. In addition, 1684 radiological environmental dosimeters were deployed around the nuclear power stations in Illinois.

IEMA makes every effort to collect all scheduled environmental samples; however, occasionally samples are unobtainable due to weather conditions, water levels, obstructed access, or other reasons beyond our control.

Results at a Glance

Federal regulations establish standards for protection of the public against ionizing radiation resulting from activities conducted under U.S. NRC licenses, such as operation of nuclear power stations. The U.S. Environmental Protection Agency (US EPA) sets drinking water standards for several types of radioactive contaminants; the limit for tritium in drinking water is used for comparison purposes within this report.

Detectable levels of tritium were found in surface water samples taken near the Braidwood and Dresden stations. The elevated levels found near both stations can be attributed to the liquid effluent releases from the Braidwood station. Tritium is a normal part of the effluent stream of nuclear power stations and its presence in nearby surface waters supplies can be expected. The concentrations detected were well below the US EPA limit for tritium in drinking water.

Detectable levels of tritium were also found in ground water samples taken from a well located at the Braidwood station. In 2005, it was discovered that a leak in the line that transported effluents to the Kankakee River had allowed for the unpermitted release of effluents to groundwater. Subsequently, tritium was found in ground water and a pond outside the boundaries of the plant. As a result, IEMA continues to analyze split ground water samples collected by Exelon from two locations on site. Sample MW-4 is taken near the turbine building and sample DS-2 from F-ditch. Results for these sampling locations can be found in Table A-1. Detectable levels of tritium were consistently found in the groundwater split samples from location MW-4. The concentrations detected were well below the US EPA limit for tritium in drinking water.

Environmental dosimetry test results provide direct radiation levels within a 10-mile radius of each nuclear power station.

In 2017, all test results for samples collected as part of IEMA's radiological environmental monitoring program for nuclear power stations were below federal and state safety standards and guidelines.

Limits of Detection

All analytical methods have limitations: amounts that are just too small to be detected. The Minimum Detectable Concentration (MDC) is an "a priori" measure of that limitation – an estimate of the lower limit of detection. It is defined as the smallest quantity that an analytical method has 95% likelihood of detecting. For example, the MDC for IEMA's method for tritium in water is 200

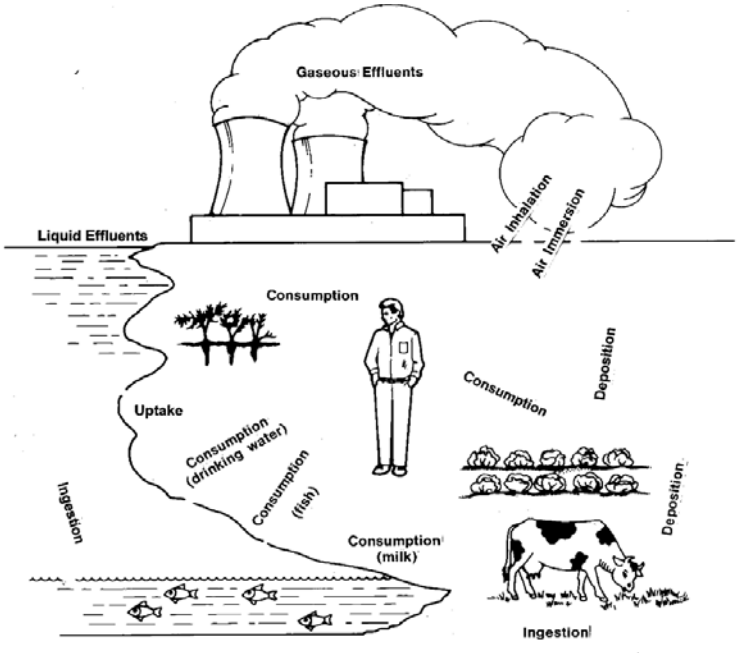
picocuries per liter (pCi/L). Given a sample with a tritium concentration of 200 pCi/L, our laboratory would detect that tritium approximately 95 times out of 100. Samples with less than 200 pCi/L could be detected, but with less certainty. Conversely, samples with more than 200 pCi/L would be more likely to be detected, approaching 100% as concentrations increase.

Analytical methods are chosen, in part, on their MDC. As a general rule, methods are chosen such that their MDC is less than 10% of any applicable regulatory limit.

Radiation Exposure Pathways to Humans

Samples collected for the IEMA radiological environmental monitoring program reflect critical pathways where radionuclides could be transported to and ingested and/or inhaled by the general population. Figure 1 depicts the different exposure pathways through which people may be exposed to radiation, or may ingest radioactive material.

Figure 1. Radiation Exposure Pathways to Humans



Water Samples

Nuclear power stations use large volumes of water and sometimes discharge a portion of this water to rivers and lakes. This discharge is regulated by the US NRC and the Illinois Environmental Protection Agency (IEPA). Impacted bodies of water include the Kankakee, Illinois, Rock and Mississippi rivers, and Clinton Lake. Samples are collected and analyzed from each these bodies of water.

Plant operations can also impact groundwater; therefore, IEMA also analyzes samples collected from wells in and around the nuclear power stations, specifically at Braidwood due to the 2005 groundwater tritium leak. Groundwater samples are collected and analyzed quarterly. Water samples are analyzed for gross beta, tritium (H-3) and gamma radionuclides (See Appendix J for radionuclide abbreviations).

Tritium is the primary radionuclide released in the effluent stream of nuclear power plants. Liquid effluents from the nuclear power stations are released in accordance with the plant's U.S. NRC operating license to waterways, as per the station's National Pollutant Discharge Elimination System permit, which is issued by the IEPA.

Water samples are collected to assure that there are no adverse radiological impacts to local water supplies. The Public Water Supplies (PWS) limits for radionuclides are based upon the U.S. Environmental Protection Agency (USEPA) and Illinois Environmental Protection Agency's (IEPA) drinking water standards. The US EPA drinking water standard (National Primary Drinking Water Regulations: Maximum Contaminant Levels and Maximum Residual Disinfectant Levels, 2000) and the IEPA groundwater standard (Groundwater Quality Standards for Class I: Potable Resource Groundwater, 2013) both set the limit for tritium in groundwater at 20,000 pCi/L. Drinking Water Standards are regulated by the USEPA and IEPA, IEMA's purpose for sampling private wells and public water supplies is solely to screen for the presence of radionuclides in drinking water.

Detectable levels of tritium were found in surface water samples taken near the Braidwood and Dresden stations. The elevated levels are attributable to the liquid effluent releases from the Braidwood station. Detectable levels of tritium were also in one ground water sample collected from a well at the Braidwood station. Elevated levels of tritium are known to exist at this well are due to the 2005 groundwater tritium leak. IEMA will continue to collect samples and monitor tritium levels at these locations.

Soil Samples

Radionuclides released into the air would be expected to eventually settle to the ground in locations downwind. IEMA analyzes soil samples collected from land around the nuclear power stations. Soil samples are collected semi-annually in the spring and the summer. Soil samples are then analyzed for radioactivity by gamma spectroscopy.

Soil sample results indicated no concentrations of reactor-produced radionuclides above background.

Historically, environmental soil samples contain Cs-137 concentrations ranging between 0.1 – 0.2 pCi/g as a result of atmospheric nuclear weapons testing.

Sediment Samples

Radionuclides released into rivers would be expected to accumulate in sediments downstream. IEMA analyzes sediment samples that are collected from the rivers and lakes downstream of the nuclear power stations' effluent points. Sediments are collected semi-annually in the spring and summer. All sediment samples are analyzed by gamma spectroscopy. Historically, environmental sediment samples typically contain Cs-137 concentrations ranging between 0.1 – 0.2 pCi/g as a result of atmospheric nuclear weapons testing.

Sediment sample results indicated no concentrations of reactor-produced radionuclides above background.

Fish Samples

Fish are excellent bio-accumulators of radionuclides. Fish samples are collected from rivers, near nuclear power station discharge points. At each location, two different species of fish are collected and are referenced as top-feeders and bottom-feeders. Edible portions of the fish are harvested and analyzed by gamma spectroscopy.

Fish sample results indicated no concentrations of reactor-produced radionuclides above background.

Vegetation Samples

Radionuclides released to atmosphere deposit on the ground downwind from the nuclear power station and are subsequently transported to the root system of plants. Plants may take up or metabolize radioactive materials in the soil. Vegetation samples are collected in the vicinity of each power station in the spring and summer. All vegetation samples are analyzed by gamma spectroscopy.

A vegetation sample collected on 06/19/2017 from the Zion Nuclear Power Station area indicated the presence of Co-60 at a concentration above background. Analysis of a sample taken from the same location on 07/11/2017 indicated a Co-60 concentration of less than MDC. All other vegetation sample results indicated no concentrations of reactor produced radionuclides above background.

Air Samples

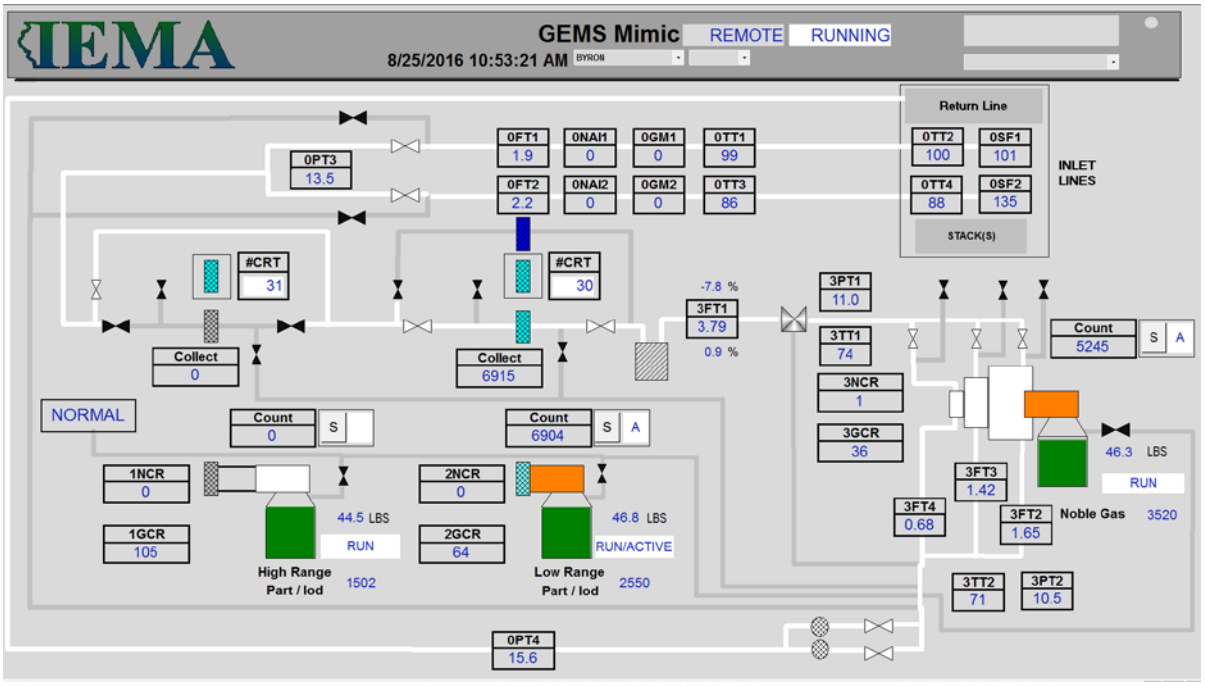
The Zion Nuclear Power Station permanently ceased operation in February 1998, and has been storing spent fuel on-site. Due to decommissioning activities, IEMA maintains a network of air monitoring stations around the Zion Station. Air samples are collected continuously, with the air filters being changed and analyzed weekly. The air filters are analyzed for gross alpha and beta by gas flow proportional counting.

Air sample results indicated slightly elevated concentrations of gross beta on a few occasions. These elevated concentrations are likely due to the decommissioning activities taking place at the site.

Gaseous Effluent Monitoring System (GEMS)

IEMA continuously monitors gaseous effluents from all operating nuclear power stations with the GEMS. The GEMS provides automatic, online, continuous sampling of each nuclear power plant effluent stack. The GEMS is capable of measurement and identification of particulates, noble gases and iodines over a wide range of concentration, from background levels to releases under emergency conditions. The GEMS can be controlled remotely during nuclear power plant emergencies to provide flexibility in sampling (Figure 2).

Figure 2. Computer Display of GEMS Data



Ambient Gamma Monitoring

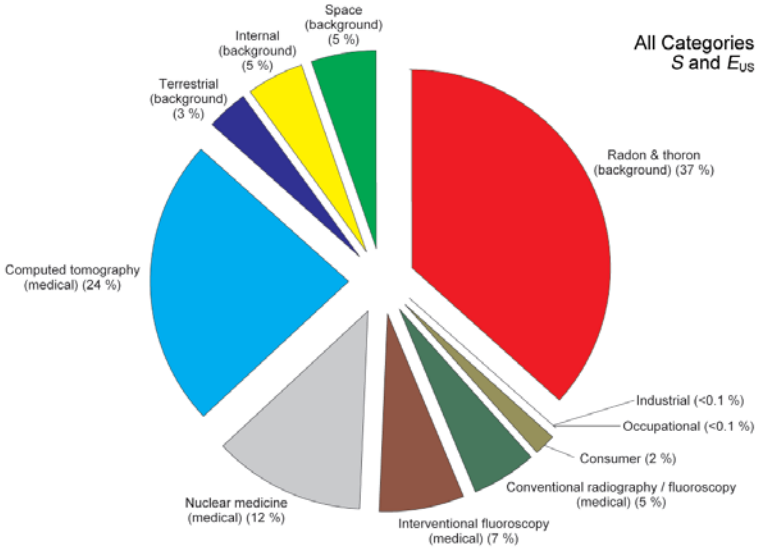
IEMA maintains a network of 406 environmental dosimeters around the six operating nuclear power stations and the now defunct Zion Nuclear Power Station. Unlike the environmental samples described previously, dosimeters do not provide information on what radionuclides are found in the environment. Instead, dosimeters provide a direct measurement of the total dose produced by all sources of gamma radiation, including naturally occurring radionuclides and cosmic rays, integrated over time. The dosimeters are arrayed within a 10-mile radius of each plant and are exchanged and analyzed quarterly by IEMA. The dosimeters are used to monitor ambient background levels of gamma radiation around each nuclear power station during normal operations. In addition, the environmental dosimeters can be used to determine the extent and magnitude of radiation dose to the public following a significant release of radioactive materials into the environment.

Results for environmental dosimeters analyzed during 2017 are included in the site-specific sections of this report. In addition to the quarterly results, the approximate millirem per year an individual would receive at that location has been calculated. Those numbers can be compared to the average

radiation exposure to an individual of 620 millirem per year from various sources (according to the 2009 National Council on Radiation Protection's Report 160). Approximately 8% (49.6 mR/year) of that exposure is from terrestrial and cosmic radiation (background radiation).

The ambient gamma monitoring results indicated no radiation levels statistically above background.

Figure 4. Sources of Radiation Exposure to Man



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Gamma Detection Network (GDN)

In addition to placing dosimeters around the nuclear power stations, IEMA manages the GDN. The GDN consists of a network of detectors placed radially around each of the nuclear power station to detect gamma radiation levels in the environment. Each of the 16 detectors for each site is placed approximately two to five miles from the plant. This system is capable of detecting gamma radiation in the range of background levels up to 10 Rem per hour.

Figure 5 is an analytical display for the Clinton Nuclear Station with meteorological, GDN, and GEMS radiation information. During an incident at one of the plants, the information would be used by health physics experts in IEMA's Radiological Emergency Assessment Center to evaluate environmental impacts of a release.

Figure 5. Display of Gamma Detection Network around Clinton Nuclear Station

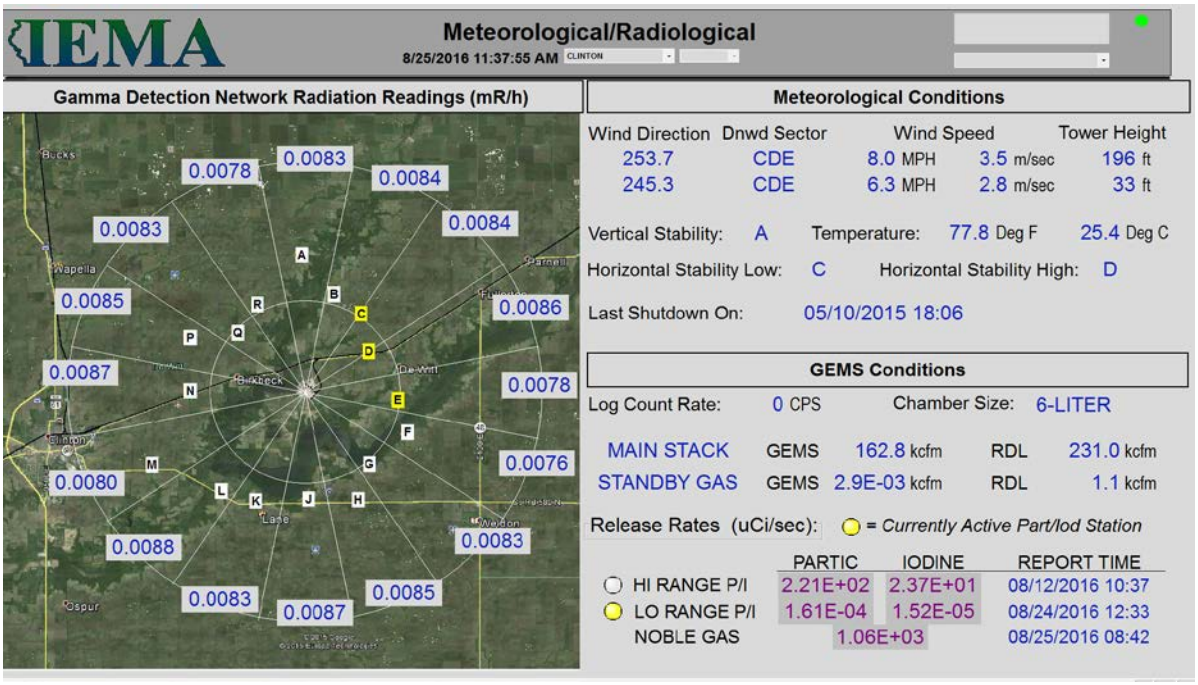


Figure 6. Typical IEMA GDN Field Installation

Braidwood Nuclear Power Station

The Braidwood Nuclear Power Station, consisting of two 3,587 Megawatt (MW) pressurized water reactors (PWR) is owned and operated by Exelon Corporation, and is located in Will County, Illinois. Unit 1 began operation on May 29, 1987 and Unit 2 on March 8, 1988. The site is located in northeastern Illinois, approximately 15 miles south-southwest of Joliet and 60 miles southwest of Chicago, near the Kankakee River.

Liquid effluents from the Braidwood Station are released in controlled batches to the Kankakee River in accordance to release limits governed by the station's license with the NRC and the plant's IEPA National Pollutant Discharge Elimination System permit.

Surface water samples taken from the Kankakee River at the Des Plaines Conservation Area and Wilmington Island Park were found to contain detectable levels of tritium due to liquid effluent releases from Braidwood Station.

In 2005, it was discovered that a leak in the line that transported effluents to the Kankakee River had allowed for the unpermitted release of effluents to groundwater. Subsequently, tritium was found in ground water and a pond outside the boundaries of the plant. As a result, IEMA continues to analyze split ground water samples collected by Exelon from two locations on site by the turbine building and in F-ditch (Table A-1). Detectable levels of tritium were consistently found in the groundwater split samples from location MW-4.

All tritium levels detected were below the 20,000 pCi/L drinking water limit set by the USEPA and IEPA.

Figures 7 and 8 provide an overview of all sampling and monitoring locations in the vicinity of the Braidwood Nuclear Power Station (yellow star in the center). The second yellow star near the top of Figure 8 is the Dresden Nuclear Power Station.

Results for all samples collected in the environs of the Braidwood Nuclear Power Station can be found in Appendix A.

Figure 7. Overview of IEMA's OSL and GDN Monitoring Locations for Braidwood

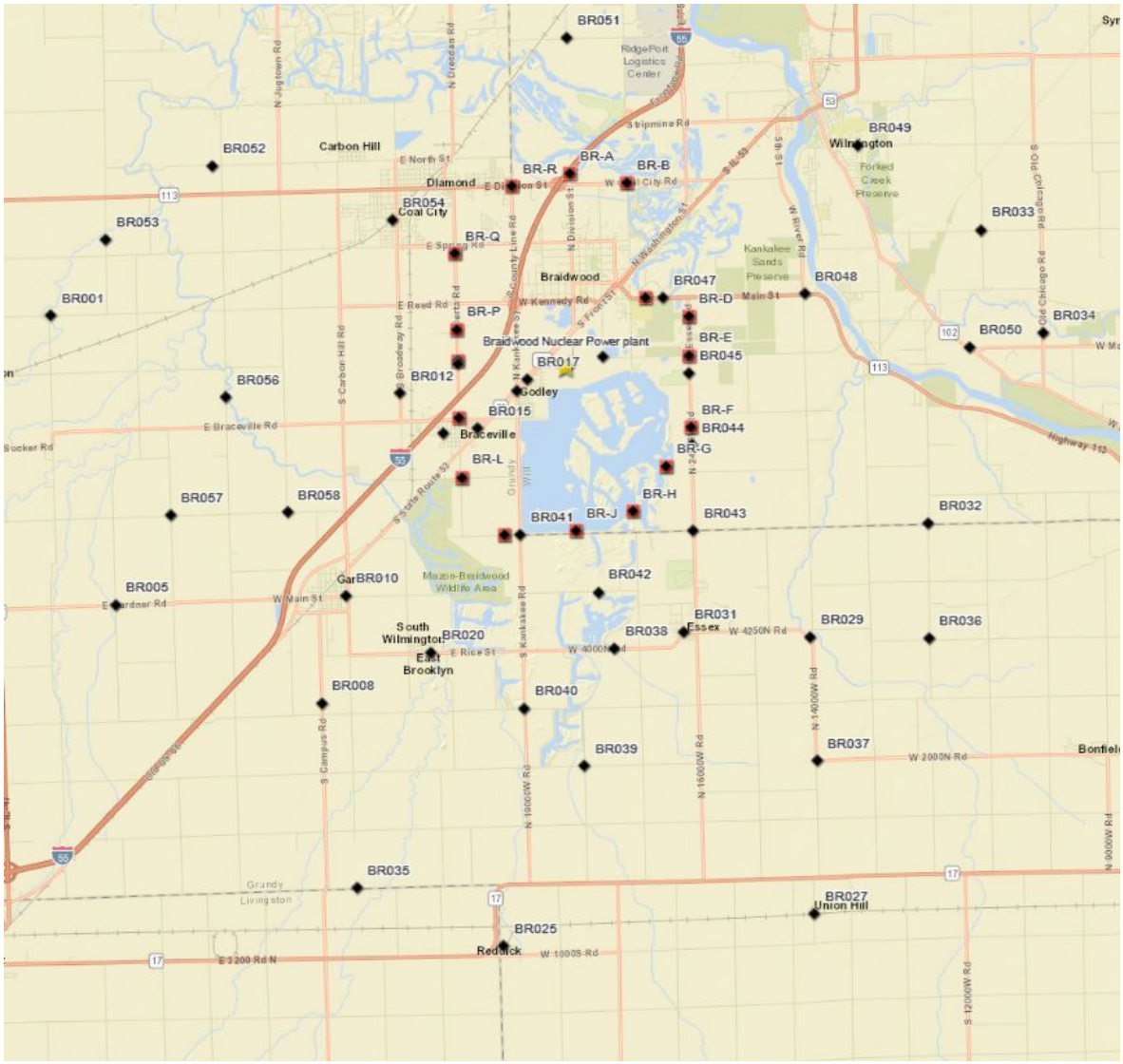
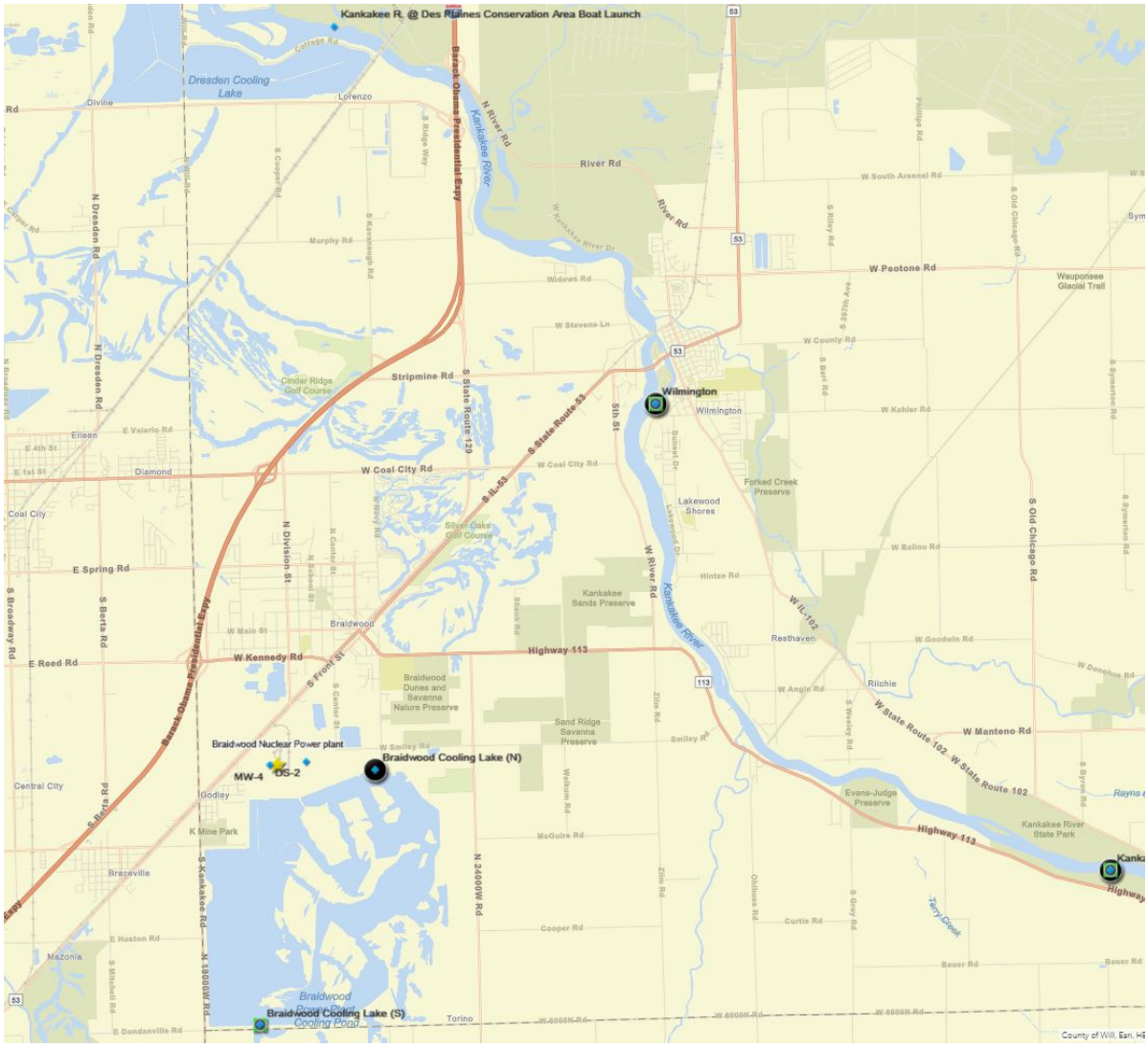


Figure 8. Overview of IEMA's Environmental Sampling Locations for Braidwood



Map Key:

- **Water**
- **Sediment**
- **Vegetation/Soil**
- **Nuclear Power Plant**

Sample icons are stacked to indicate multiple types of samples collected at the same location

Dresden Nuclear Power Station

The Dresden Nuclear Power Station, consisting of one retired reactor and two operating 867 Megawatt boiling water reactors (BWR) is owned and operated by the Exelon Corporation, and is located in Grundy County, Illinois. Dresden 1 was activated in 1960 and retired in 1978. Dresden units 2 and 3 began operations in 1970. The site is located approximately 12 miles southwest of Joliet, Illinois at the confluence of the Des Plaines and Kankakee rivers where they form the Illinois River.

Liquid effluents from the Dresden Station are released in controlled batches to the Illinois River in accordance to release limits governed by the station's license with the NRC. No liquid batch releases of radioactive effluents were discharged during this reporting period.

Surface water samples taken from the Illinois River at the Dresden Lock and Dam and at Morris were found to contain detectable levels of tritium due to liquid effluent releases from Braidwood Station.

All tritium levels detected were below the 20,000 pCi/L drinking water limit set by the USEPA and IEPA.

Figures 9 and 10 provide an overview of all sampling and monitoring locations in the vicinity of the Dresden Nuclear Power Station (yellow star in the middle of the map). The second yellow star near the bottom of Figure 9 is the Braidwood Nuclear Power Station.

Results for all samples collected in the environs of the Dresden Nuclear Power Station can be found in Appendix B.

Figure 9. Overview of IEMA's OSL and GDN Monitoring Locations for Dresden

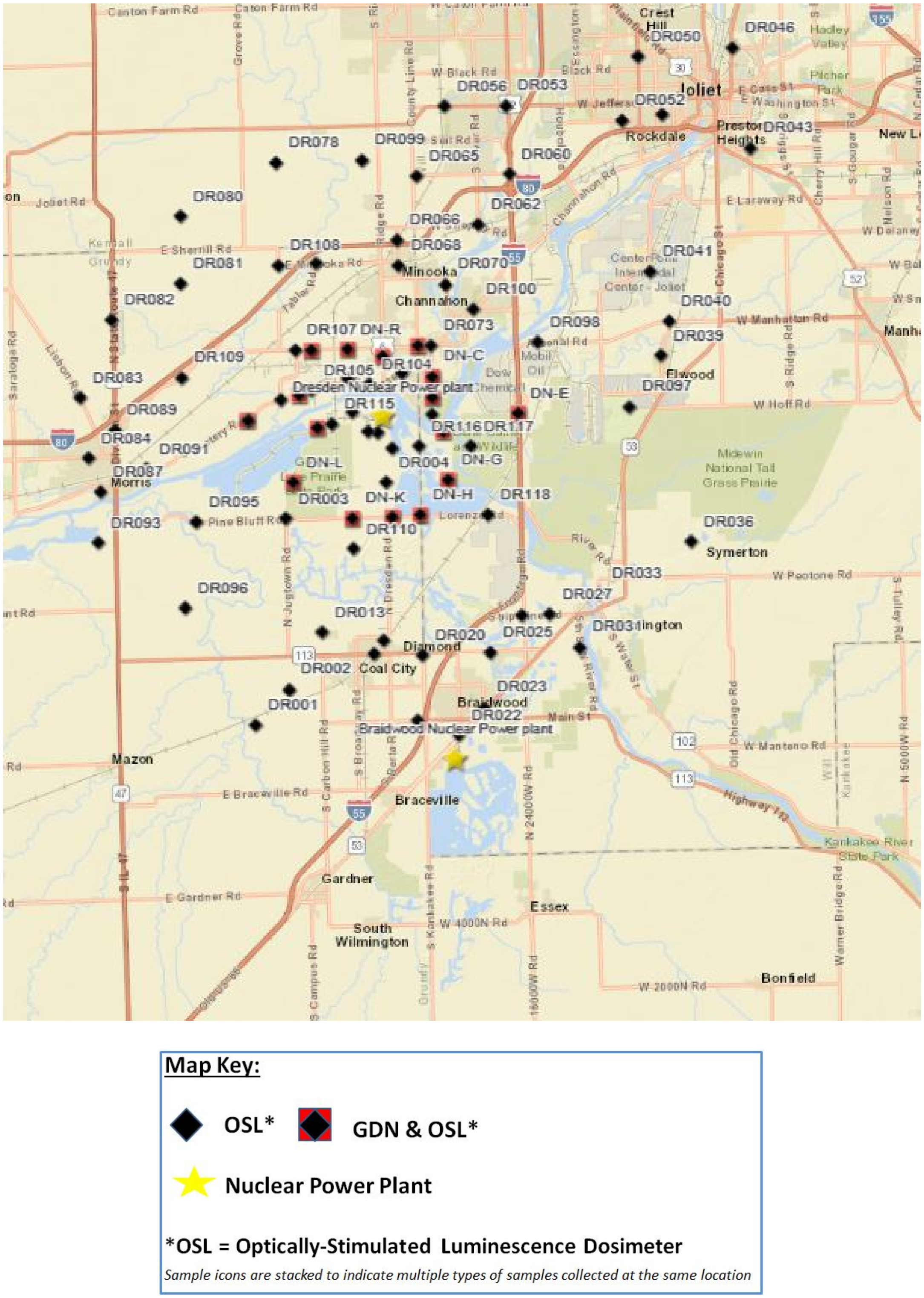
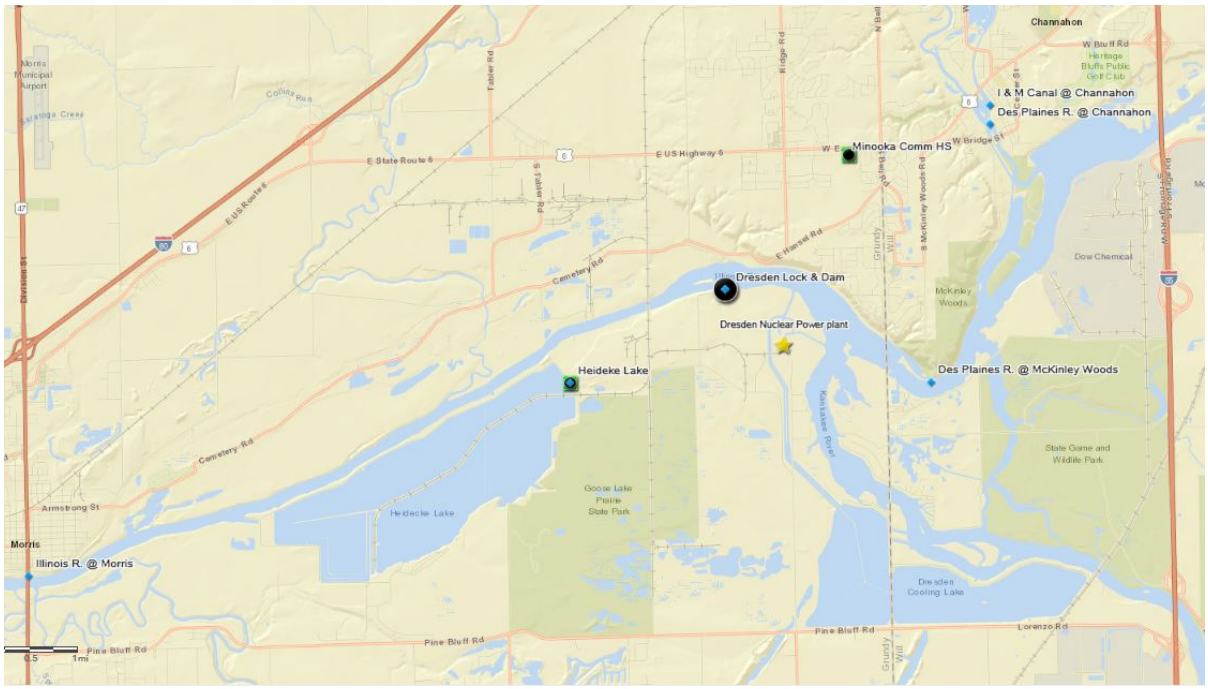


Figure 10. Overview of IEMA's Environmental Sampling Locations for Dresden



Map Key:

- Water
- Sediment
- Vegetation/Soil
- Nuclear Power Plant

Sample icons are stacked to indicate multiple types of samples collected at the same location

Byron Nuclear Power Station

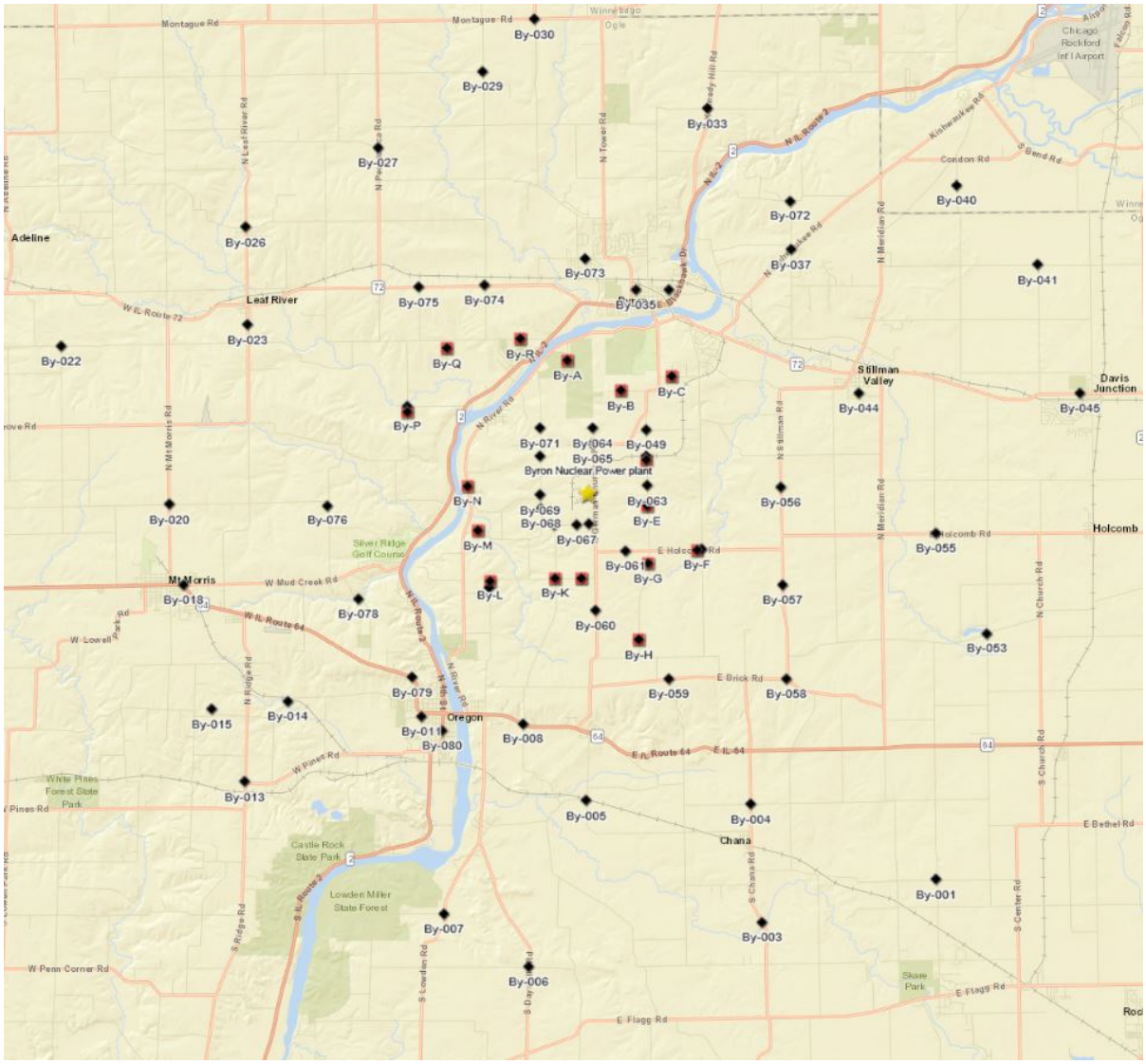
The Byron Station, consisting of two approximately 1,250 Megawatt PWRs is owned and operated by the Exelon Corporation and located in Ogle County, Illinois. Unit 1 began operation on February 2, 1985, and Unit 2 on January 9, 1987. The site is located approximately three miles southwest of Byron, Illinois and about two miles east of the Rock River.

Liquid effluents from the Byron Station are released to the Rock River in accordance to release limits governed by the station's license with the NRC.

Figures 11 and 12 provide an overview of all sampling and monitoring locations in the vicinity of the Byron Nuclear Power Station (yellow star).

Results for all samples collected in the environs of the Byron Nuclear Power Station can be found in Appendix C.

Figure 11. Overview of IEMA's OSL and GDN Monitoring Locations for Byron



Map Key:

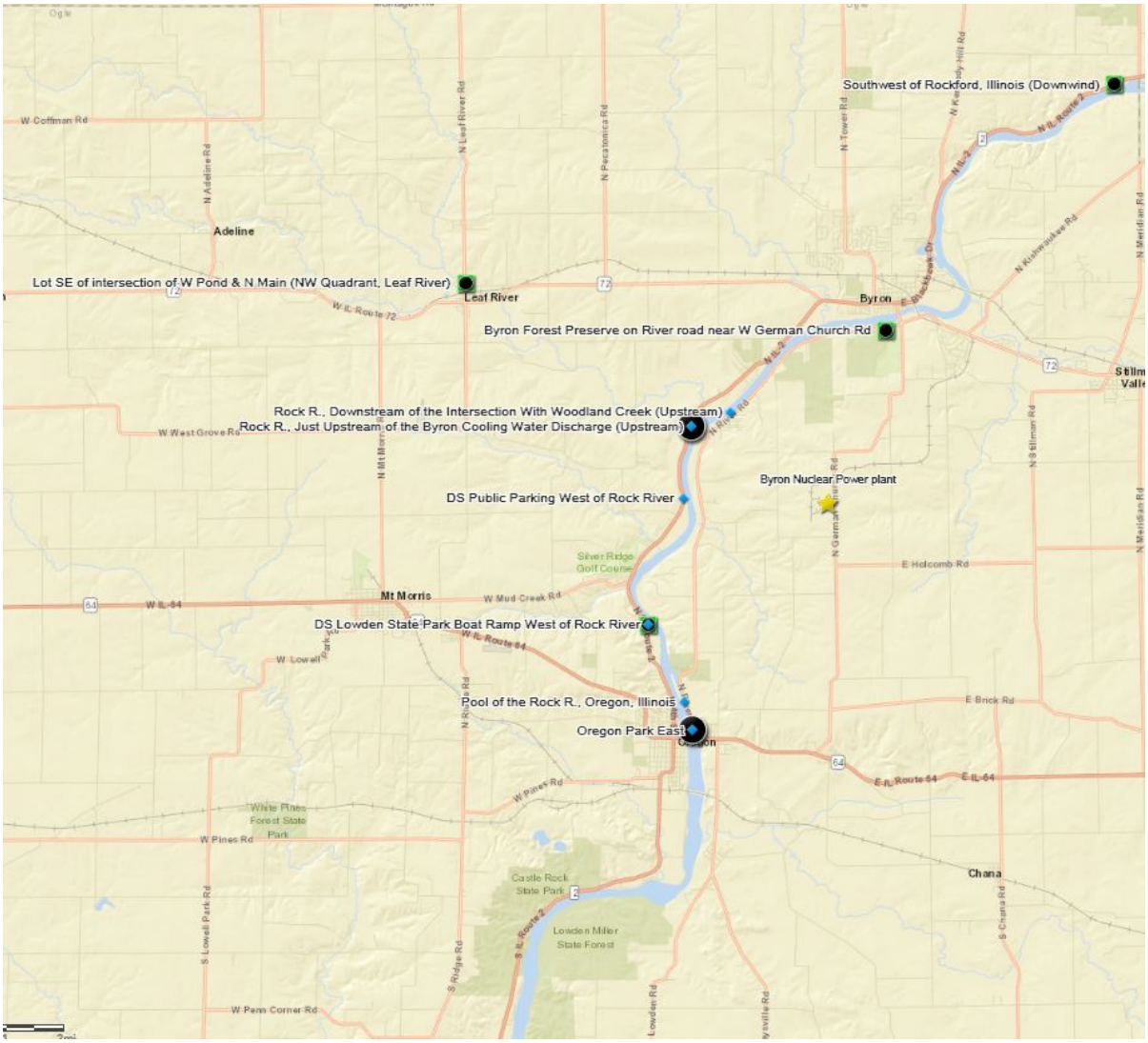
OSL* GDN & OSL*

Nuclear Power Plant

***OSL = Optically-Stimulated Luminescence Dosimeter**

Sample icons are stacked to indicate multiple types of samples collected at the same location

Figure 12. Overview of IEMA's Environmental Sampling Locations for Byron



Clinton Nuclear Power Station

The Clinton Nuclear Power Station, consisting of one approximately 1,140 Megawatt BWR is owned and operated by the Exelon Corporation, and is located in Dewitt County, Illinois. The station began operations on February 15, 1987. The site is approximately six miles east of the city of Clinton, Illinois.

Liquid effluents from the Clinton Station are released into the eastern arm of Clinton Lake, a 4,900-acre man-made cooling lake, in accordance to release limits governed by the station's license with the NRC. No liquid batch releases of radioactive effluents were discharged during this reporting period. The outflow from Clinton Lake falls into Salt Creek, a tributary of the Sangamon River.

Figures 13 and 14 provide an overview of all sampling and monitoring locations in the vicinity of the Clinton Nuclear Power Station (yellow star). Results for all samples collected in the environs of the Clinton Nuclear Power Station can be found in Appendix D.

Figure 13. Overview of IEMA's OSL and GDN Monitoring Locations for Clinton

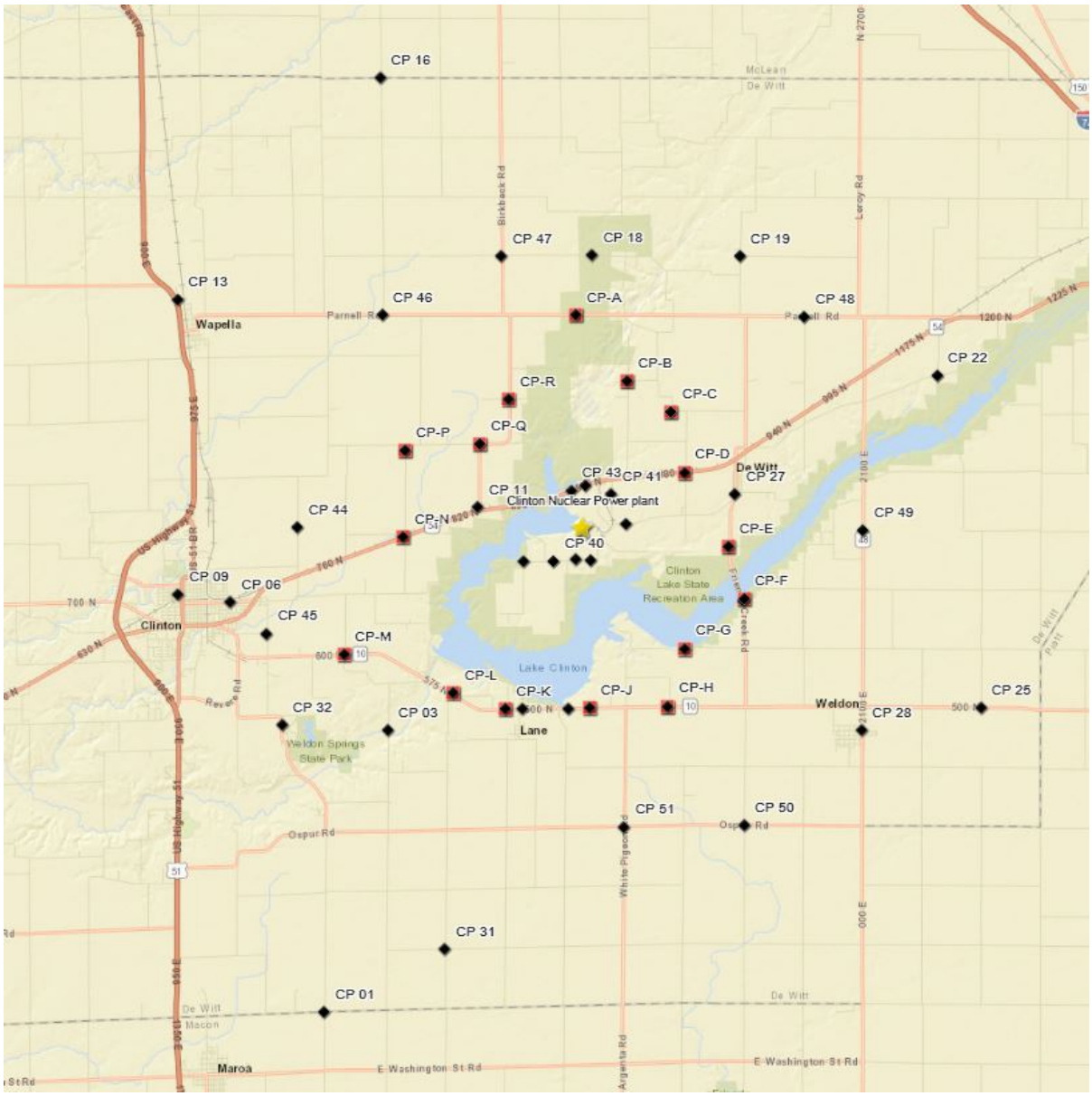
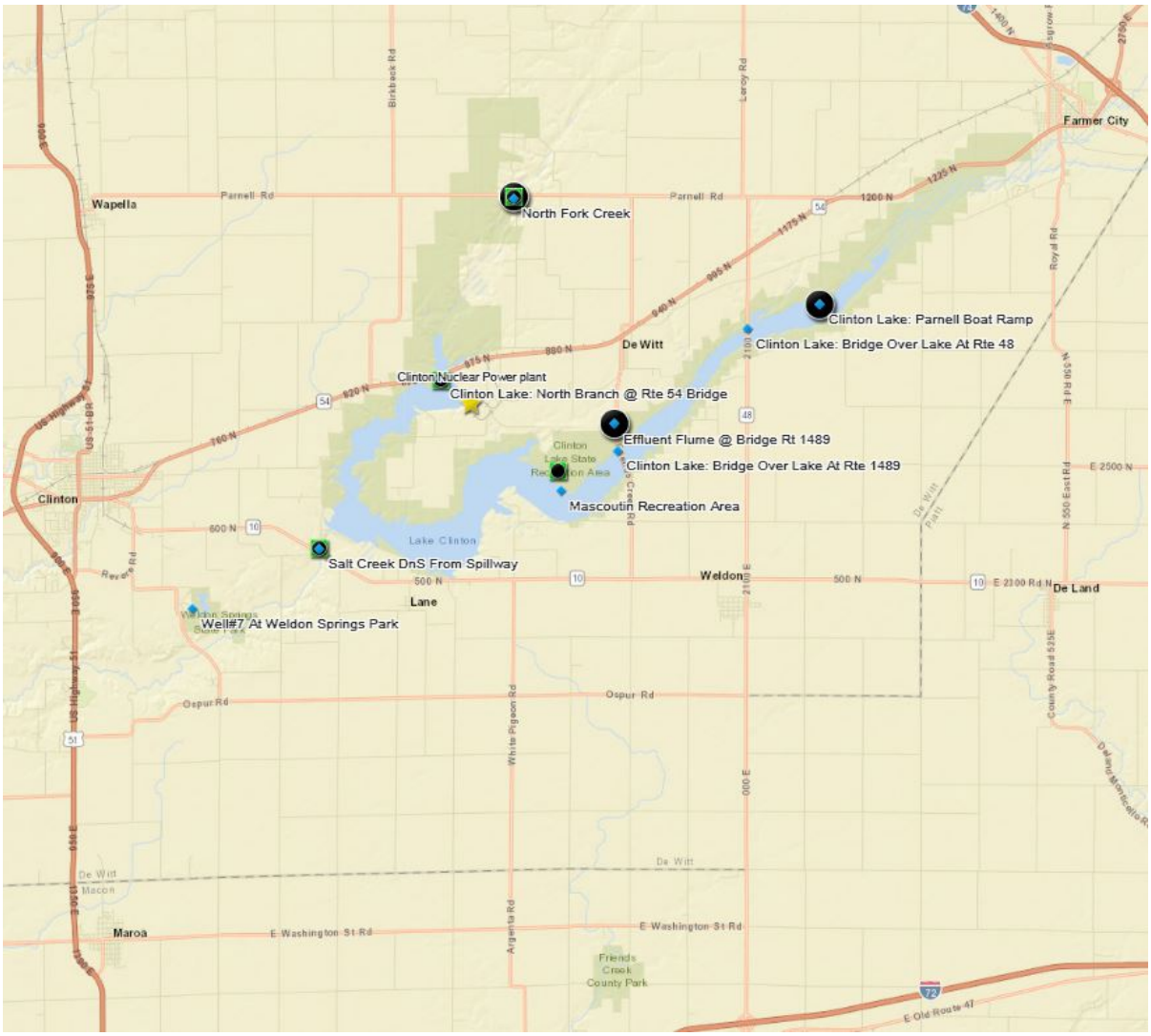


Figure 14. Overview of IEMA's Environmental Sampling Locations for Clinton



Map Key:

- Water
- Sediment
- Vegetation/Soil
- Nuclear Power Plant

Sample icons are stacked to indicate multiple types of samples collected at the same location

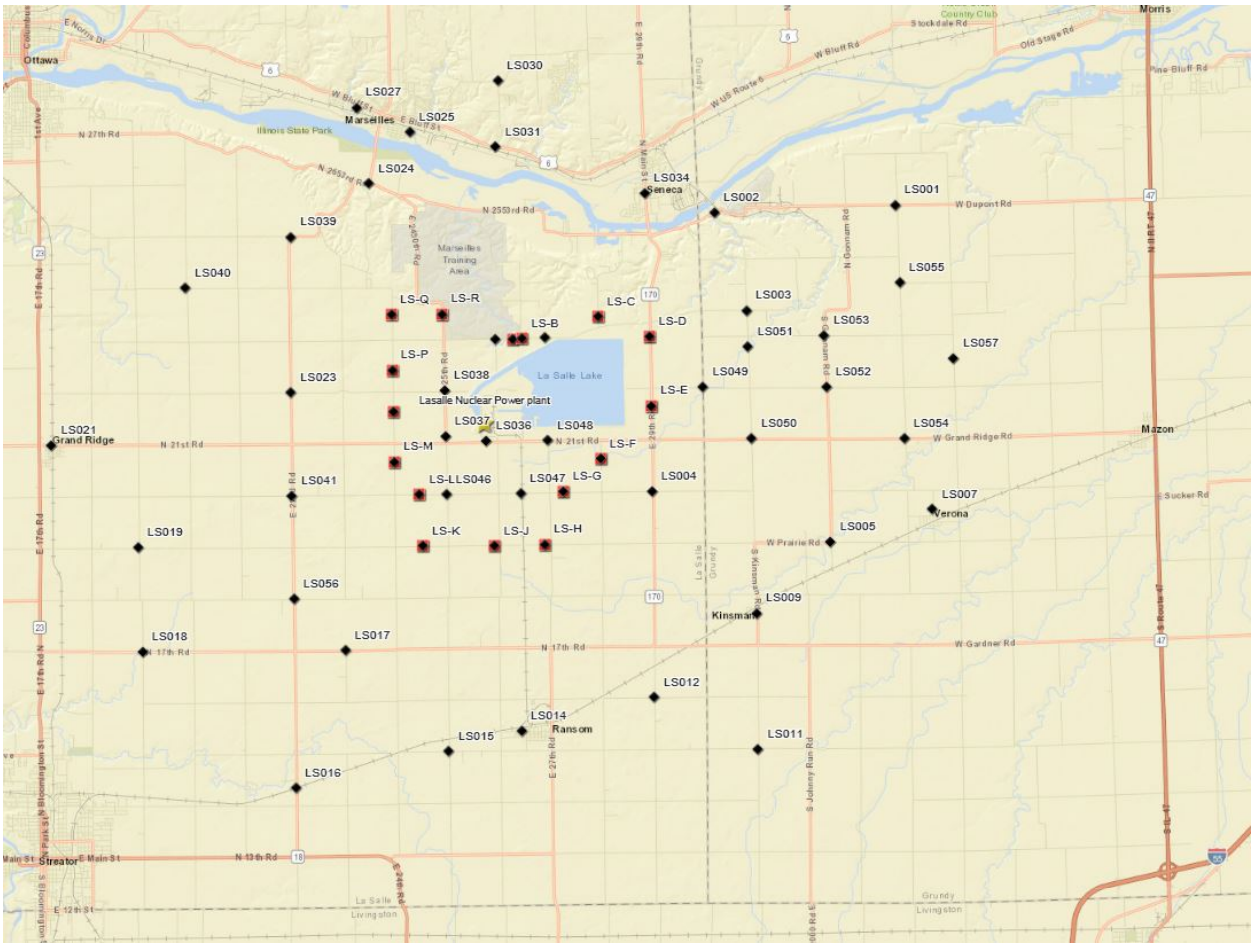
LaSalle Nuclear Power Station

The LaSalle Nuclear Power Station, consisting of two 3,546 Megawatt BWRs is owned and operated by the Exelon Corporation, and is located in LaSalle County, Illinois. Unit 1 began operation on March 16, 1982, and Unit 2 on December 2, 1983. The site is located approximately 75 miles southwest of Chicago, Illinois.

Liquid effluents from the LaSalle Station are released to the LaSalle cooling lake in accordance to release limits governed by the station's license with the NRC, and from there to the Illinois River at a point 3.5 miles north of the station. However, the discharge point is approximately 20 miles downriver of the Dresden Nuclear Power Station. Effectively, samples taken downstream of Dresden station are upstream controls for the LaSalle station. No liquid batch releases were discharged during this reporting period.

Figures 15 and 16 provide an overview of all sampling and monitoring locations in the vicinity of the LaSalle Nuclear Power Station (yellow star). Results for all samples collected in the environs of the LaSalle Nuclear Power Station can be found in Appendix E.

Figure 15. Overview of IEMA's OSL and GDN Monitoring Locations for LaSalle



Map Key:

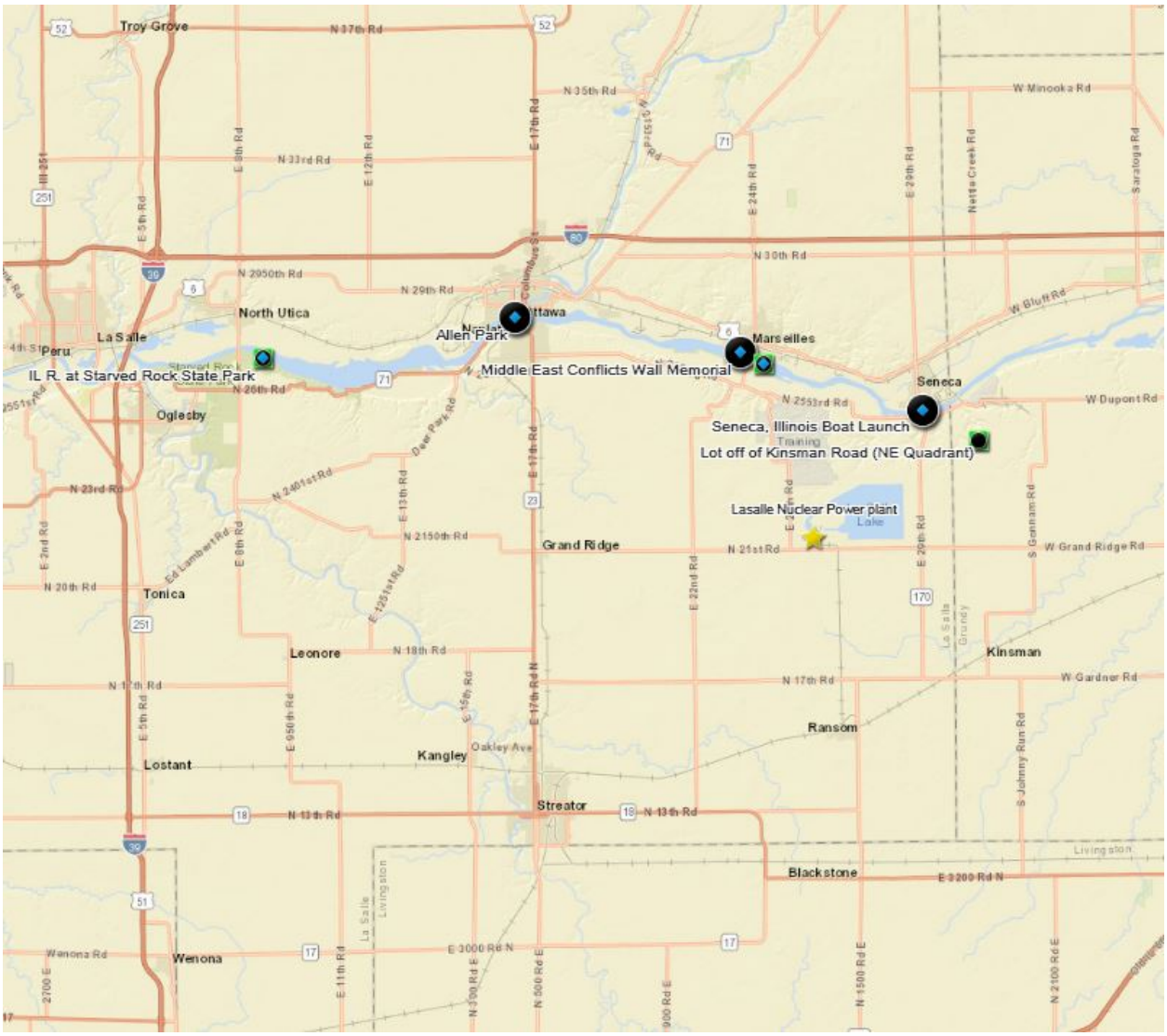
OSL* GDN & OSL*

Nuclear Power Plant

*OSL = Optically-Stimulated Luminescence Dosimeter

Sample icons are stacked to indicate multiple types of samples collected at the same location

Figure 16. Overview of IEMA's Environmental Sampling Locations for LaSalle



Quad Cities Nuclear Power Station

The Quad Cities Nuclear Power Station, consisting of two 2,957 Megawatt BWRs is owned and operated by the Exelon Corporation, and is located in Rock Island County, Illinois. Unit 1 began operations on March 16, 1972 and Unit 2 on December 2, 1973. The site is located near Cordova, Illinois on the Mississippi River.

Liquid effluents from the Quad Cities Station are released to the adjacent Mississippi River in accordance to release limits governed by the station's license with the NRC. No liquid batch releases of radioactive effluents were discharged during this reporting period.

Figures 17 and 18 provide an overview of all sampling and monitoring locations in the vicinity of the Quad Cities Nuclear Power Station (yellow star). Results for all samples collected in the environs of the Quad Cities Nuclear Power Station can be found in Appendix F.

Figure 17. Overview of IEMA's OSL and GDN Monitoring Locations for Quad Cities

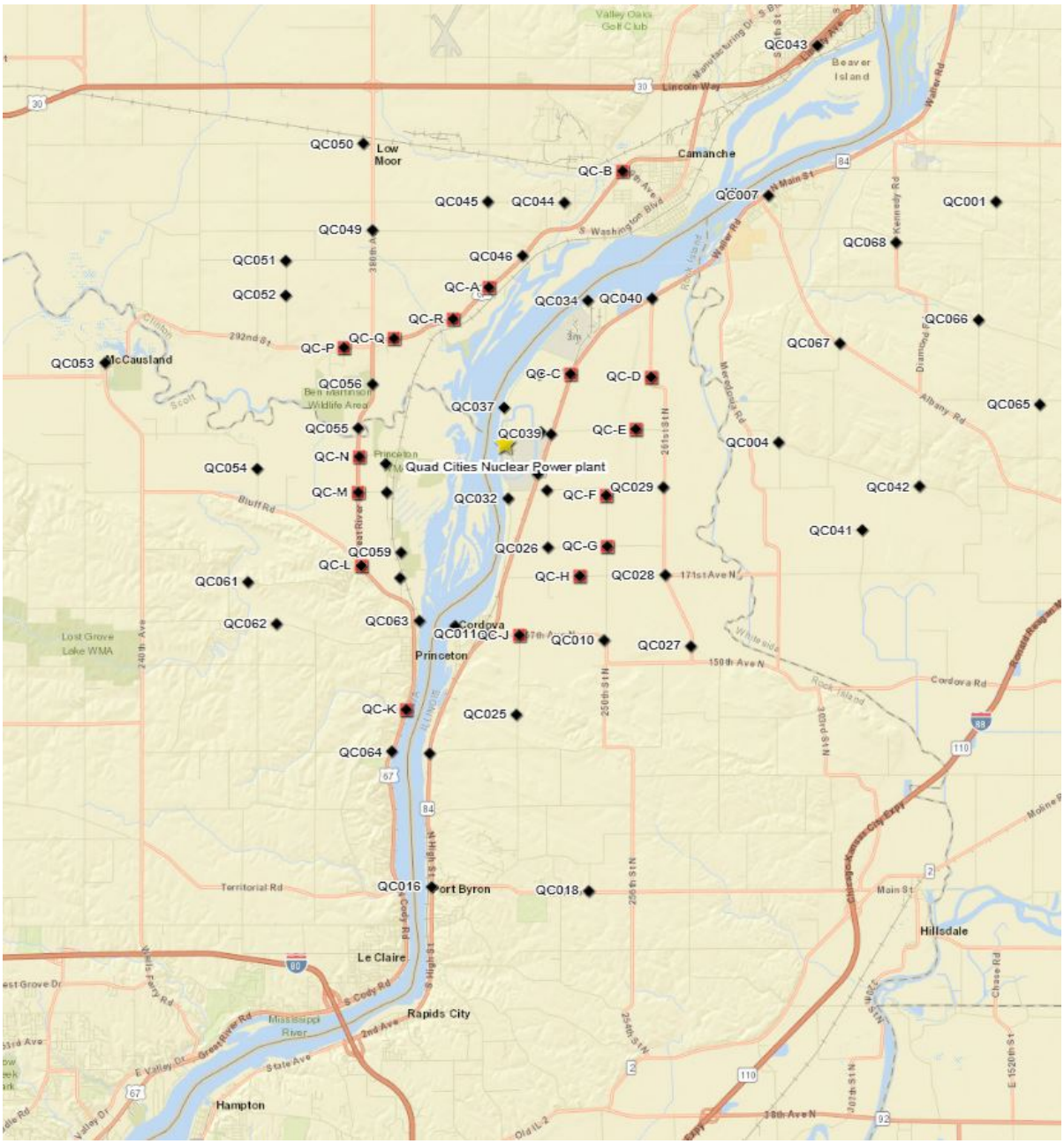


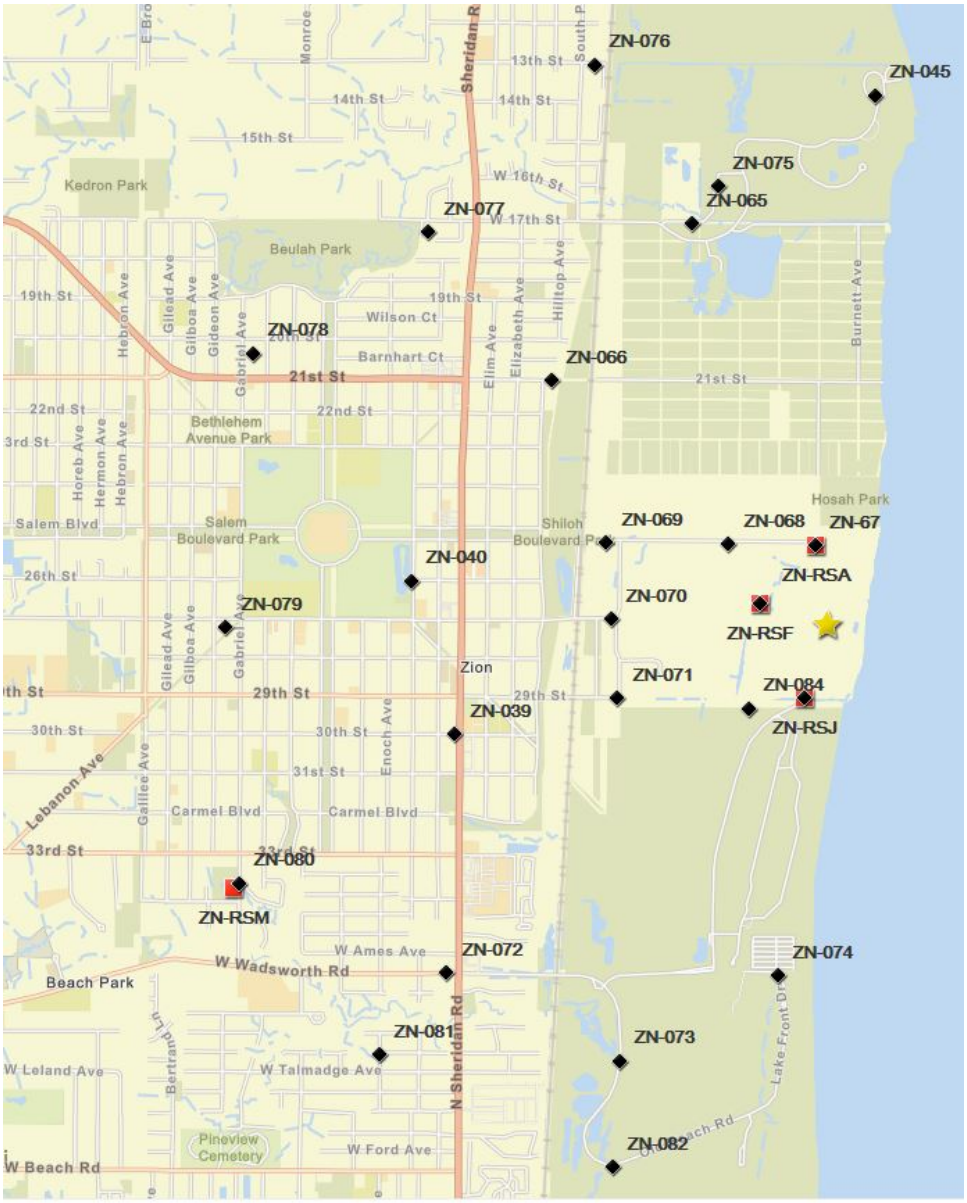
Figure 18. Overview of IEMA's Environmental Sampling Locations for Quad Cities

Zion Nuclear Power Station

Zion Nuclear Power Station consisted of two PWRs that were owned and operated by the Exelon Corporation, and located in Lake County, Illinois. The site is located near Zion, Illinois approximately 40 miles north of Chicago, and adjacent to Lake Michigan. The plant ceased operation permanently in February 1998 and was defueled soon thereafter. In September 2010, the facility license was transferred from Exelon to ZionSolutions for the express purpose of expediting the decommissioning of the site. In 2017, the plant continued decommissioning to levels that permit release for unrestricted use. Decommissioning efforts progressed during 2017 and remain on schedule for a 2019 end date. The site continues to store 61 dry casks that store spent nuclear fuel as well as four dry casks that contain greater than Class C waste. These 65 casks are stored on the on-site Independent Spent Fuel Storage Installation (ISFSI), which falls within IEMA's environmental monitoring area for Zion.

Figure 19 is an overview of all sampling and monitoring locations in the vicinity of the Zion Nuclear Power Station (yellow star). Results for all samples collected in the environs of the Zion Nuclear Power Station can be found in Appendix G.

Figure 19. Overview of IEMA's GDN, OSL, and Air Monitoring and Sampling Locations for Zion



Air samples not collected at ZN-RSM.

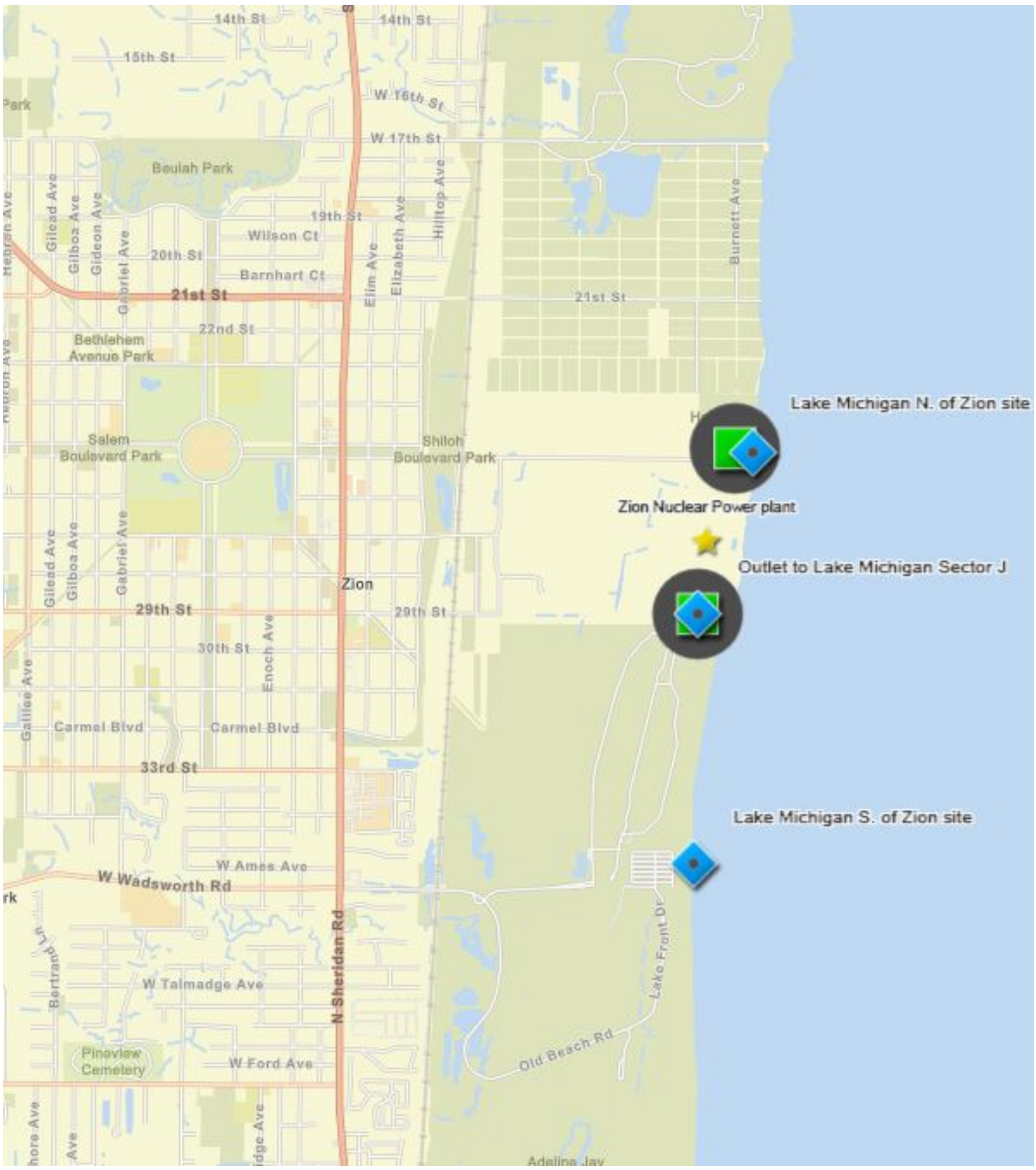
Map Key:

- OSL
- GDN, OSL & Air
- Nuclear Power Plant

*OSL = Optically-Stimulated Luminescence Dosimeter

Sample icons are stacked to indicate multiple types of samples collected at the same location

Figure 20. Overview of IEMA's Environmental Sampling Locations for Zion



Map Key:

- Vegetation/Soil
- Sediment
- Nuclear Power Plant
- Water

***OSL = Optically-Stimulated Luminescence Dosimeter**

Sample icons are stacked to indicate multiple types of samples collected at the same location

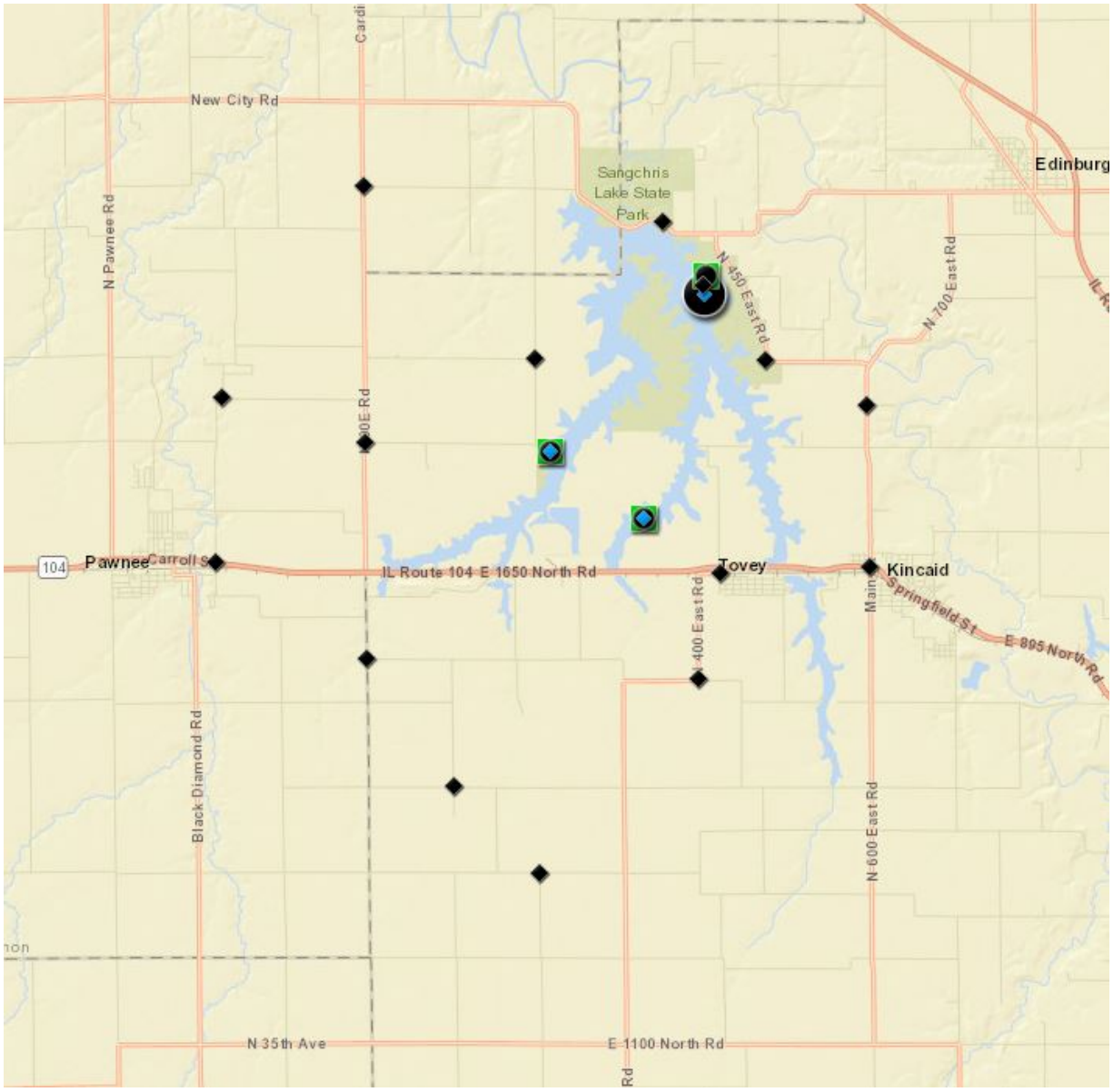
Background Sampling Locations

IEMA has established the environs of Sangchris Lake State Park, a cooling lake for a coal-fired power station near Kincaid, IL, as a Background Sampling Location. To establish "background" radiation levels, water, soil, sediment, vegetation, and fish samples are collected and analyzed utilizing the same procedures and methodologies used for Nuclear Power Station samples. In addition, there is an array of environmental dosimeters around the power plant, similar to what can be found around each nuclear power station.

IEMA routinely collects air samples around the Zion facility; therefore, a background sampling location for air samples has been established. A continuous air sampling station is located near the IEMA laboratory in Springfield, and samples are exchanged weekly, similar to the air samplers in the vicinity of Zion.

Figure 21 is an overview of all sampling and monitoring locations in the vicinity of Sangchris Lake State Park. Results for background samples can be found in Appendix H.

Figure 21. Overview of IEMA Monitoring and Sampling Locations for Sangchris Lake State Park



Map Key:

- OSL*
- Water
- GDN & OSL*
- Sediment
- Nuclear Power Plant
- Vegetation/Soil

*OSL = Optically-Stimulated Luminescence Dosimeter

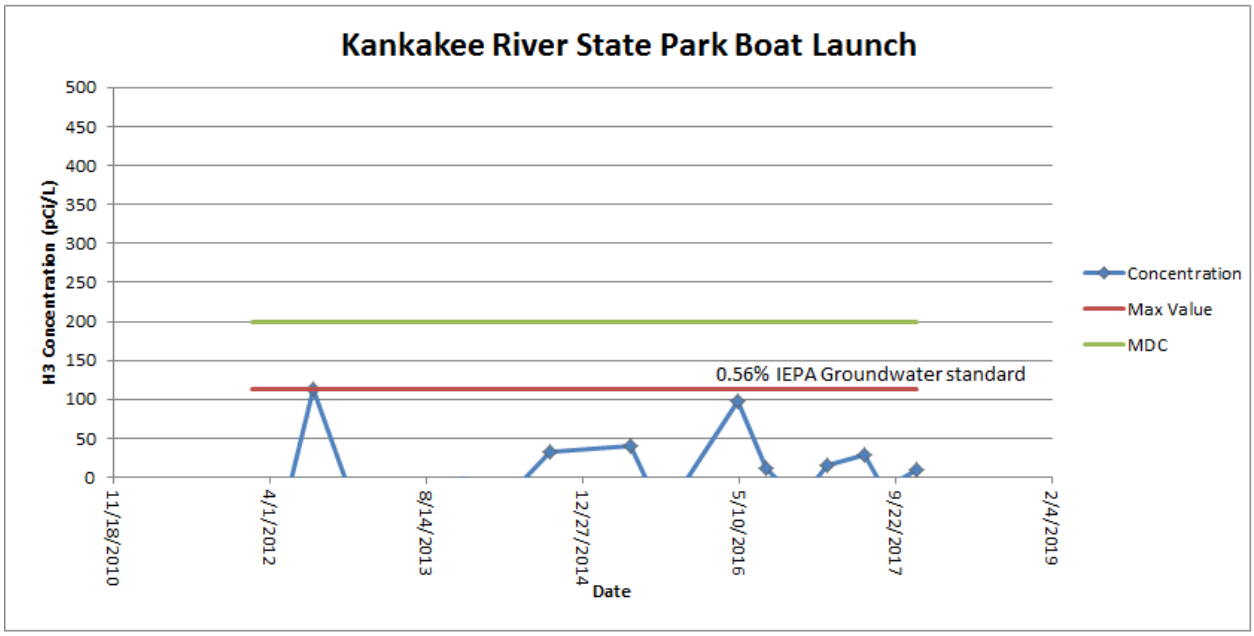
Sample icons are stacked to indicate multiple types of samples collected at the same location

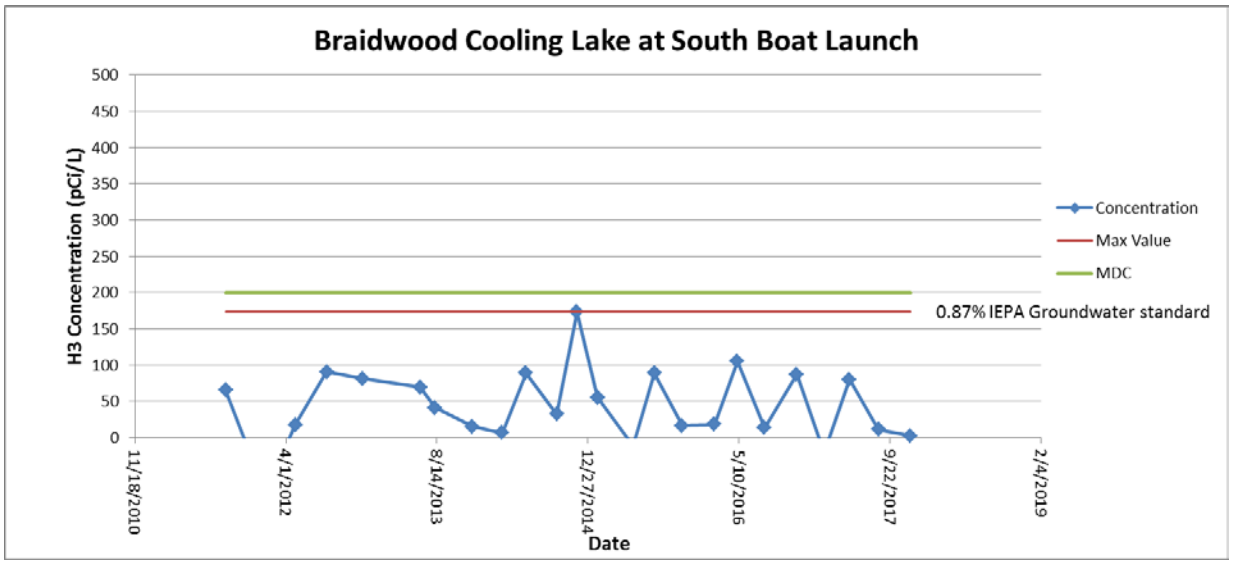
Appendix A
Braidwood Sample Results

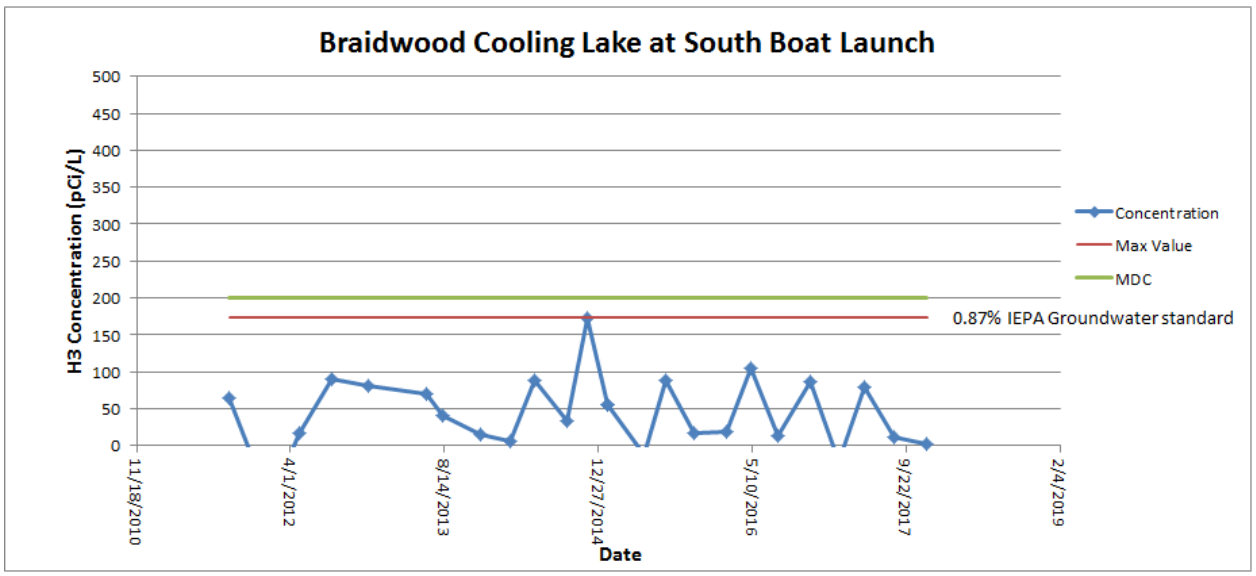
Table A-1. Tritium in Water Sample Results for Braidwood Area
Results are in picocuries per liter (pCi/L)

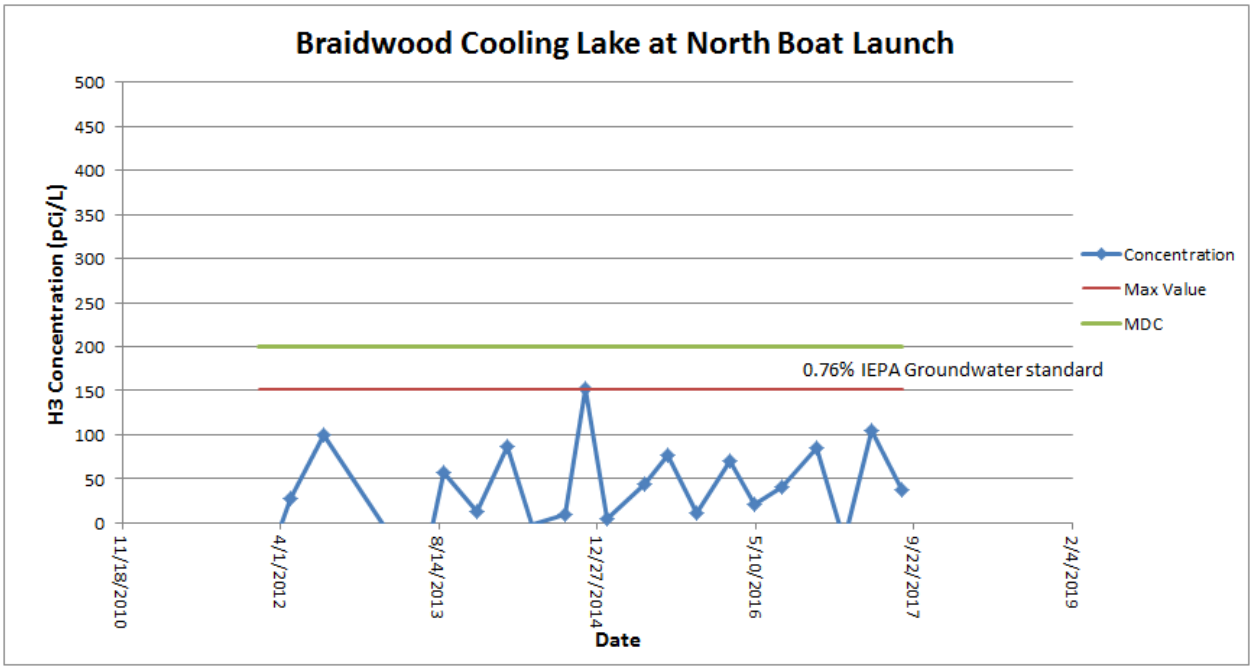
Location	H-3	
Date	Result	MDC
DS-2		
3/7/2017	<MDC	200
4/23/2017	<MDC	200
8/27/2017	<MDC	200
11/14/2017	<MDC	200
MW-4		
1/25/2017	754	200
5/15/2017	966	200
8/25/2017	827	200
10/30/2017	662	200
Braidwood Cooling Lake (N)		
2/15/2017	<MDC	200
5/10/2017	<MDC	200
8/15/2017	<MDC	200
Braidwood Cooling Lake (S)		
2/15/2017	<MDC	200
5/10/2017	<MDC	200
8/15/2017	<MDC	200
11/29/2017	<MDC	200
Kankakee River at Des Plaines Conservation Area Boat Launch		
5/10/2017	<MDC	200
6/13/2017	<MDC	200
8/16/2017	2160	200
11/29/2017	211	200
Kankakee River at Kankakee River State Park Boat Launch		
2/15/2017	<MDC	200
6/13/2017	<MDC	200
8/15/2017	<MDC	200
11/29/2017	<MDC	200
Kankakee River at Wilmington Island Park		
2/15/2017	<MDC	200
5/10/2017	<MDC	200
6/13/2017	<MDC	200
8/15/2017	1080	200
11/29/2017	<MDC	200

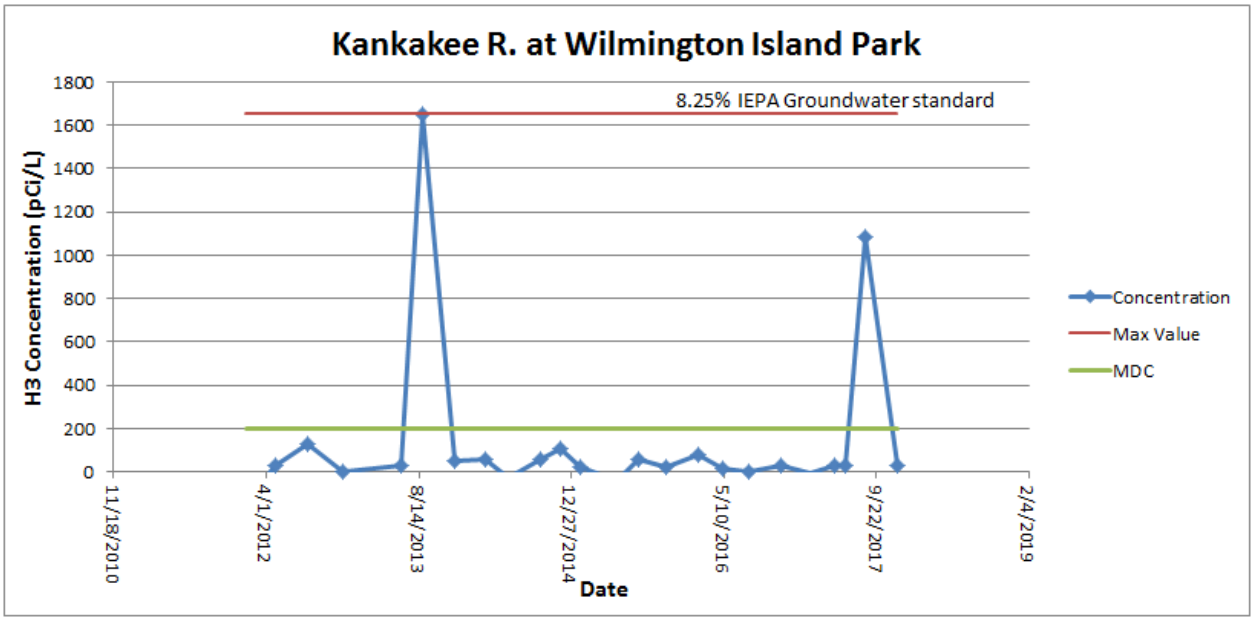
Tables A-2. Trending Graphs for Water from the Braidwood Area
(Max value compared to IEPA Class I groundwater standard of 20,000 pCi/L)

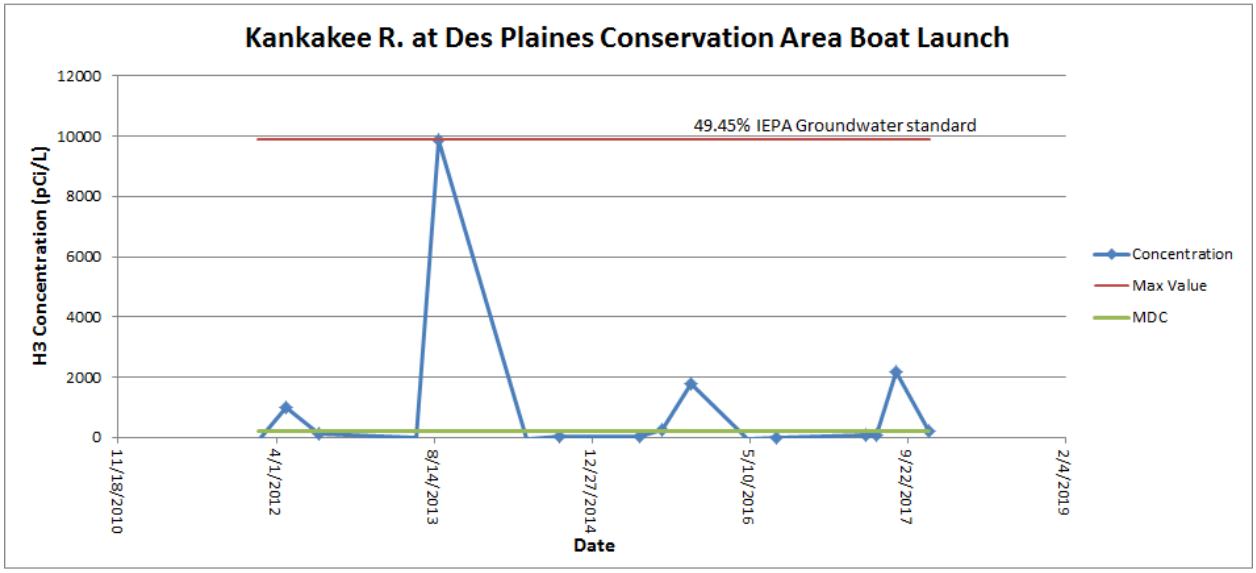


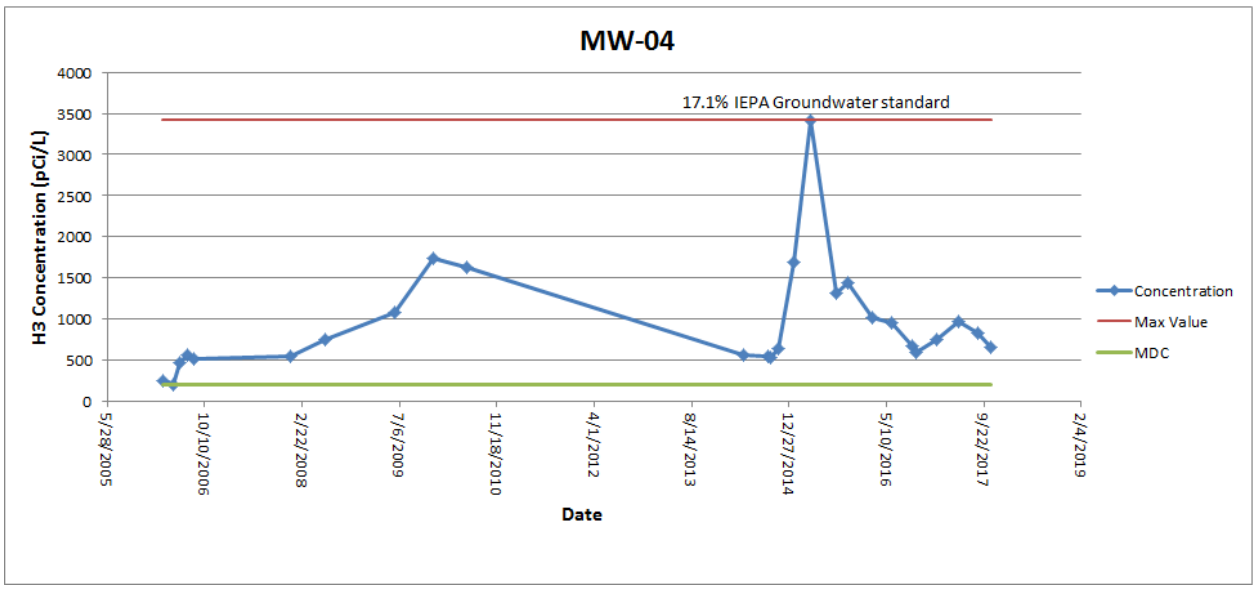



Braidwood Cooling Lake at South Boat Launch
H3 Concentration (pCi/L)
500
450
400
350
300
250
200
150
100
50
0
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC
0.87% IEPA Groundwater standard


Braidwood Cooling Lake at North Boat Launch
H3 Concentration (pCi/L)
500
450
400
350
300
250
200
150
100
50
0
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC
0.76% IEPA Groundwater standard


Kankakee R. at Wilmington Island Park
8.25% IEPA Groundwater standard
H3 Concentration (pCi/L)
1800
1600
1400
1200
1000
800
600
400
200
0
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC


Kankakee R. at Des Plaines Conservation Area Boat Launch
49.45% IEPA Groundwater standard
H3 Concentration (pCi/L)
12000
10000
8000
6000
4000
2000
0
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC


MW-04
17.1% IEPA Groundwater standard
H3 Concentration (pCi/L)
4000
3500
3000
2500
2000
1500
1000
500
0
5/28/2005
10/10/2006
2/22/2008
7/6/2009
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC

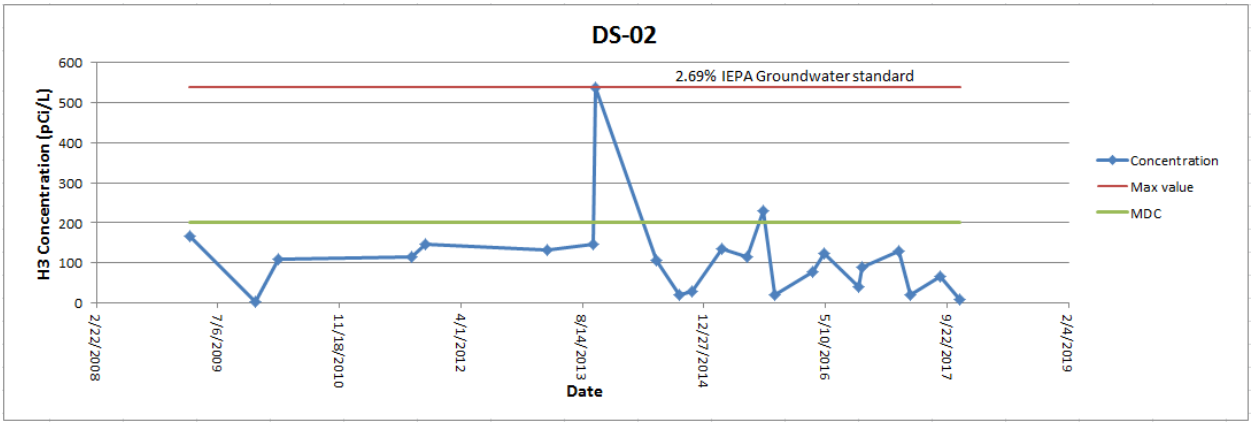

DS-02
2.69% IEPA Groundwater standard
H3 Concentration (pCi/L)
600
500
400
300
200
100
0
2/22/2008
7/6/2009
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max value
MDC

Table A-3. Sample Results for Gross Beta Screening of Water from the Braidwood Area
Results are in picocuries per liter (pCi/L)

Location	Beta	
Date	Result	MDC
Braidwood Cooling Lake (N)		
2/15/2017	4.7	4.2
5/10/2017	<MDC	4.2
8/15/2017	5.4	4.2
Braidwood Cooling Lake (S)		
2/15/2017	6.5	4.2
5/10/2017	5.1	4.2
8/15/2017	<MDC	4.2
11/29/2017	4.8	4.2
Kankakee River at Des Plaines Conservation Area Boat Launch		
5/10/2017	<MDC	4.2
8/16/2017	<MDC	4.2
11/29/2017	<MDC	4.2
Kankakee River at Kankakee River State Park Boat Launch		
2/15/2017	<MDC	4.2
8/15/2017	<MDC	4.2
11/29/2017	<MDC	4.2
Kankakee River at Wilmington Island Park		
2/15/2017	<MDC	4.2
5/10/2017	<MDC	4.2
8/15/2017	<MDC	4.2
11/29/2017	<MDC	4.2

Table A-4. Gamma Spectroscopy Sample Results for Other Radionuclides in Water from the Braidwood Area
Results are in picocuries per liter (pCi/L)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Braidwood Cooling Lake (N)																								
2/15/2017	<MDC	101			<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
5/10/2017	<MDC	101			<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
8/15/2017	<MDC	101	<MDC	390	<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
Braidwood Cooling Lake (S)																								
2/15/2017	<MDC	101			<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
5/10/2017	<MDC	101			<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
8/15/2017	<MDC	101	<MDC	390	<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
11/29/2017	<MDC	101	<MDC	390	<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
Kankakee River at Des Plaines Conservation Area Boat Launch																								
5/10/2017	<MDC	101			<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
8/16/2017	<MDC	101	<MDC	390	<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
11/29/2017	<MDC	101	<MDC	390	<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
Kankakee River at Kankakee River State Park Boat Launch																								
2/15/2017	<MDC	101			<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
8/15/2017	<MDC	101	<MDC	390	<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
11/29/2017	<MDC	101	<MDC	390	<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
Kankakee River at Wilmington Island Park																								
2/15/2017	<MDC	101			<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
5/10/2017	<MDC	101			<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
8/15/2017	<MDC	101	<MDC	390	<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1
11/29/2017	<MDC	101	<MDC	390	<MDC	4.6	<MDC	4.4	<MDC	4	<MDC	4	<MDC	13	<MDC	111	<MDC	4.2	<MDC	7.1	<MDC	9	<MDC	9.1

Table A-5. Total Strontium Results in Water Samples from the Braidwood Area
Results are in picocuries per liter (pCi/L)

Location	Date	Nuclide	Result	MDC
Braidwood Cooling Lake (S)	5/10/2017	Strontium	<MDC	1.5
Kankakee River at Des Plaines Conservation Area Boat Launch	5/10/2017	Strontium	<MDC	1.5

Table A-6. Soil Sample Results for Braidwood Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Braidwood Cooling Lake (S)																						
5/11/2017	<MDC	2.05			<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.03	<MDC	0.15	<MDC	0.03	<MDC	0.10	<MDC	0.09	<MDC	0.13
8/15/2017	<MDC	2.05	<MDC	0.17	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.03	<MDC	0.15	<MDC	0.03	<MDC	0.10	<MDC	0.09	<MDC	0.13
Kankakee River at Kankakee River State Park Boat Launch																						
8/15/2017	<MDC	2.05	<MDC	0.17	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.04	0.03	<MDC	0.15	<MDC	0.03	<MDC	0.10	<MDC	0.09	<MDC	0.13
Kankakee River at Wilmington Island Park																						
5/11/2017	<MDC	2.05			<MDC	0.04	<MDC	0.03	<MDC	0.03	0.10	0.03	<MDC	0.15	<MDC	0.03	<MDC	0.10	<MDC	0.09	<MDC	0.13
8/15/2017	<MDC	2.05	<MDC	0.17	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.10	0.03	<MDC	0.15	<MDC	0.03	<MDC	0.10	<MDC	0.09	<MDC	0.13

Table A-7. Sediment Sample Results for Braidwood Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Braidwood Cooling Lake (N)																						
5/11/2017	<MDC	1.05			<MDC	0.03	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.10
8/15/2017	<MDC	1.05	<MDC	0.20	<MDC	0.03	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.10
Kankakee River at Kankakee River State Park Boat Launch																						
8/15/2017	<MDC	1.05	<MDC	0.20	<MDC	0.03	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.10
Kankakee River at Wilmington Island Park																						
8/15/2017	<MDC	1.05	<MDC	0.20	<MDC	0.03	<MDC	0.03	<MDC	0.03	0.09	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.10

Table A-8. Vegetation Sample Results for Braidwood Area
Results are in picocuries per gram (pCi/kg)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Braidwood Cooling Lake (S)																								
5/11/2017	<MDC	2.51			<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.05	<MDC	0.20	<MDC	4.10	<MDC	0.06	<MDC	0.10	<MDC	0.14	<MDC	0.14
8/15/2017	<MDC	2.51	<MDC	1.26	<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.05	<MDC	0.20	<MDC	4.10	<MDC	0.06	<MDC	0.10	<MDC	0.14	<MDC	0.14
Kankakee River at Kankakee River State Park Boat Launch																								
8/15/2017	<MDC	2.51	<MDC	1.26	<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.05	<MDC	0.20	<MDC	4.10	<MDC	0.06	<MDC	0.10	<MDC	0.14	<MDC	0.14
Kankakee River at Wilmington Island Park																								
5/11/2017	<MDC	2.51			<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.05	<MDC	0.20	<MDC	4.10	<MDC	0.06	<MDC	0.10	<MDC	0.14	<MDC	0.14
8/15/2017	<MDC	2.51	<MDC	1.26	<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.05	<MDC	0.20	<MDC	4.10	<MDC	0.06	<MDC	0.10	<MDC	0.14	<MDC	0.14

Table A-9. Braidwood Gamma Detection Network Results

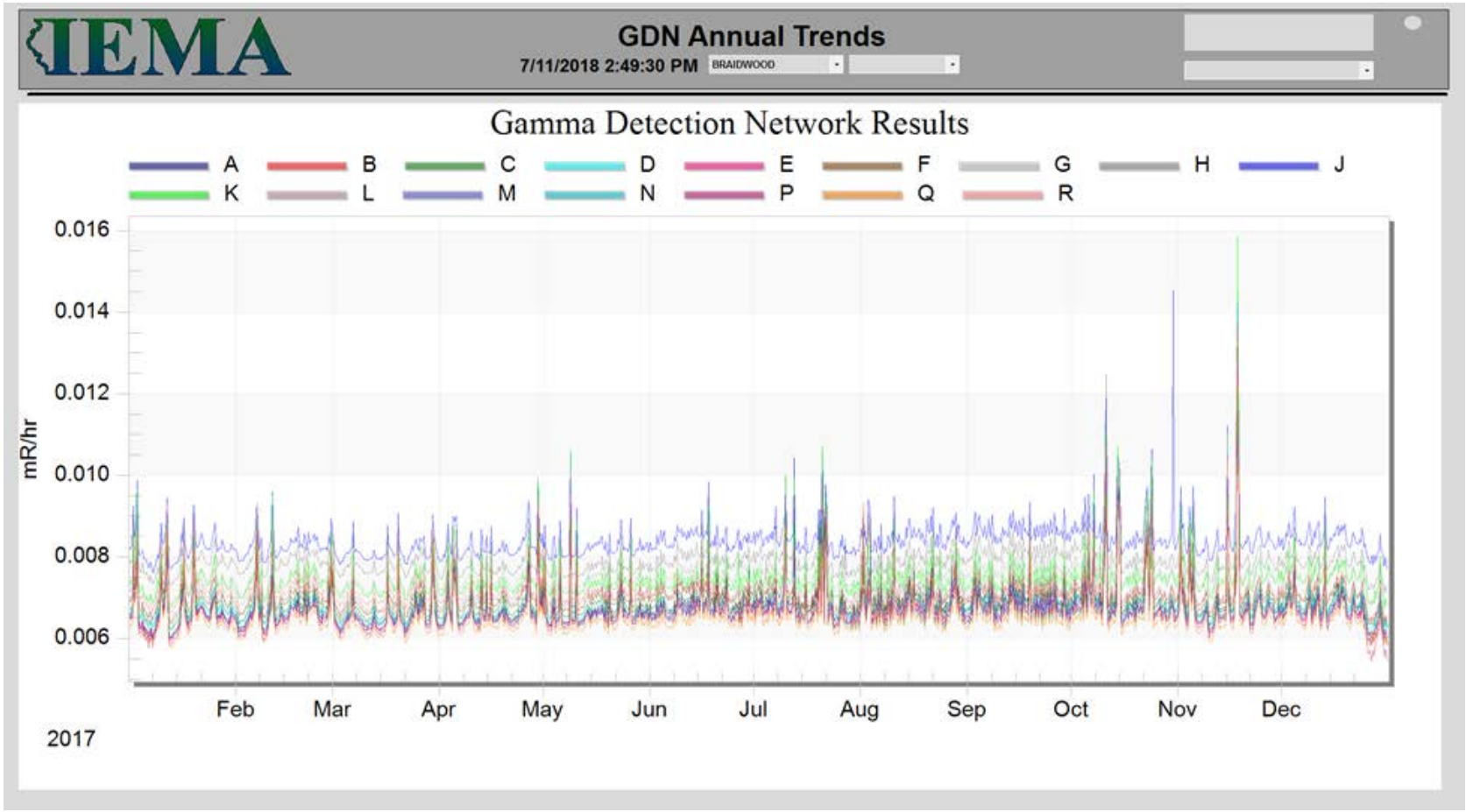


Table A-10. Summary of Ambient Gamma Results for Braidwood Area

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
BR001	9.95	10.68	11.86	11.77	44.26
BR005	9.13	9.58	9.86	10.13	38.69
BR008	9.95	12.14		10.77	43.80
BR010	9.31	8.58	10.04	7.48	35.41
BR012	5.11	6.48	6.30	6.30	24.18
BR014	6.30	6.39	4.56	6.39	23.63
BR015	4.75	6.57	5.57	5.20	22.08
BR016	6.75	7.39	5.84	6.84	26.83
BR020	6.66	6.30	6.39	7.03	26.37
BR025		10.22		7.30	35.04
BR027	5.38		6.84	6.30	24.70
BR029	7.12	6.84	5.66	7.03	26.65
BR031	5.38	6.30		4.38	21.41
BR032	5.38		6.66	6.57	24.82
BR033	7.03	8.67	6.94	8.40	31.03
BR034	10.77	11.86	10.04	10.31	42.98
BR035	8.40	10.40	9.67	10.49	38.96
BR036	5.38	6.11	5.02	5.84	22.36
BR037	6.94	7.39	5.75	6.11	26.19
BR038	7.94	7.12	6.21	6.84	28.11
BR039	8.67	8.49	8.21	9.40	34.77
BR040	9.31	9.58	9.03	10.31	38.23
BR041	5.84	7.94	6.57	4.75	25.09
BR042	9.13	8.67	8.12	9.13	35.04
BR043	4.56	7.39	5.75	5.02	22.72
BR046	4.75	5.93	4.38	5.38	20.44
BR048	5.48	7.21	6.30	5.20	24.18
BR049	5.20	6.75	5.84	5.75	23.54
BR050	7.76	8.30	7.67	7.85	31.57
BR051	5.57	5.29	5.11	6.48	22.45
BR052	6.30	7.30	6.39	6.84	26.83
BR053	9.49	8.85	9.49	9.86	37.69
BR054	5.66	5.93	5.29	4.29	21.17
BR056	7.67	9.67	7.67	8.58	33.58
BR057	8.67	11.32	10.49	9.22	39.69
BR058	9.13	11.68	9.49	9.40	39.69

Table A-10. Summary of Ambient Gamma Results for Braidwood Area (continued)

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
BR-RSA	6.66	6.48	4.84	5.84	23.82
BR-RSB	5.48		6.84	5.29	23.48
BR-RSC	5.93	6.57	4.93	5.29	22.72
BR-RSD	6.39	7.03	5.02	5.48	23.91
BR-RSE	5.57	6.02	4.84	5.66	22.08
BR-RSF	6.02	6.66	6.21	5.57	24.46
BR-RSG	8.12	7.48	6.48	6.48	28.56
BR-RSH	8.21	8.76	7.85	7.57	32.39
BR-RSJ	9.76	9.86	9.67	8.67	37.96
BR-RSK	6.21	6.48	5.11	5.38	23.18
BR-RSL	6.48	7.30	5.57	5.84	25.19
BR-RSM	4.84	5.48	6.11	5.11	21.54
BR-RSN	5.84	6.66	5.84	5.11	23.45
BR-RSP	5.02	6.39	3.92	6.57	21.90
BR-RSQ	4.38	5.75	4.02	5.48	19.62
BR-RSR	8.76	9.31	7.12	7.12	32.30

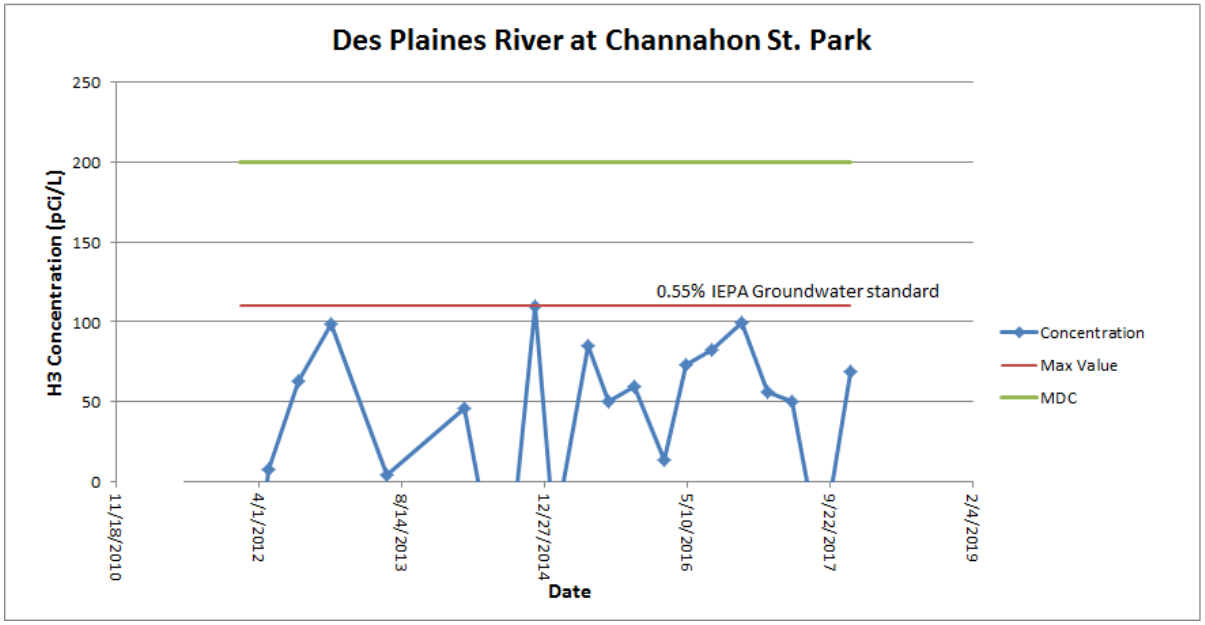
Blanks in the table indicate that dosimeters were missing at the end of the quarter.
Annual Exposure column based on averages of all available data.
Quarter length is estimated to be 91.25 days.

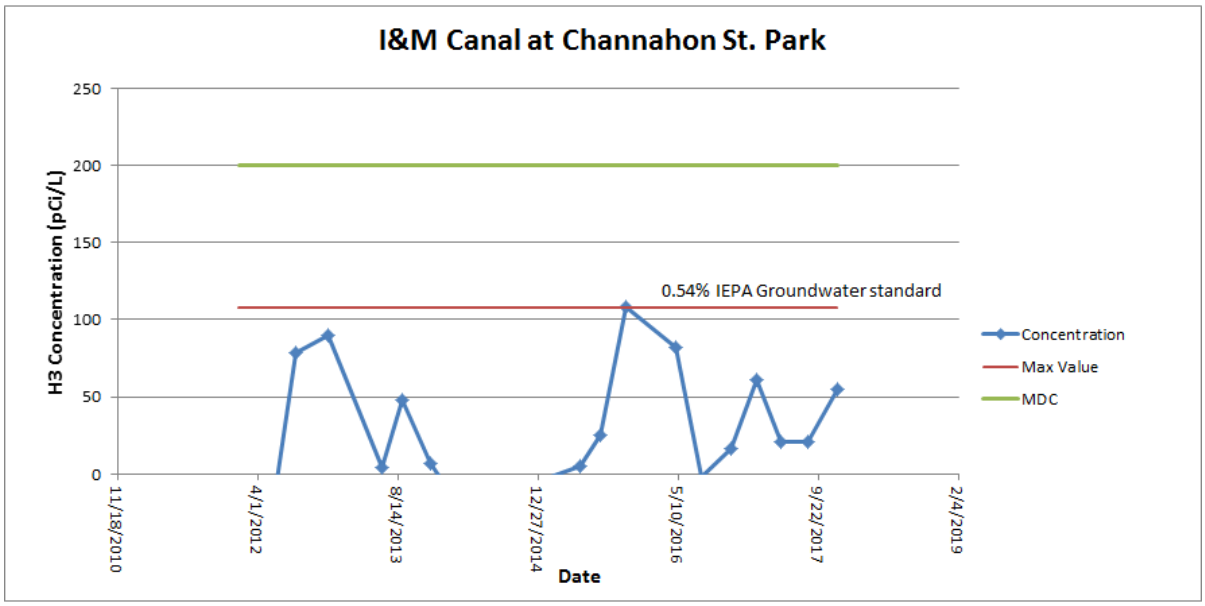
Appendix B
Dresden Sample Results

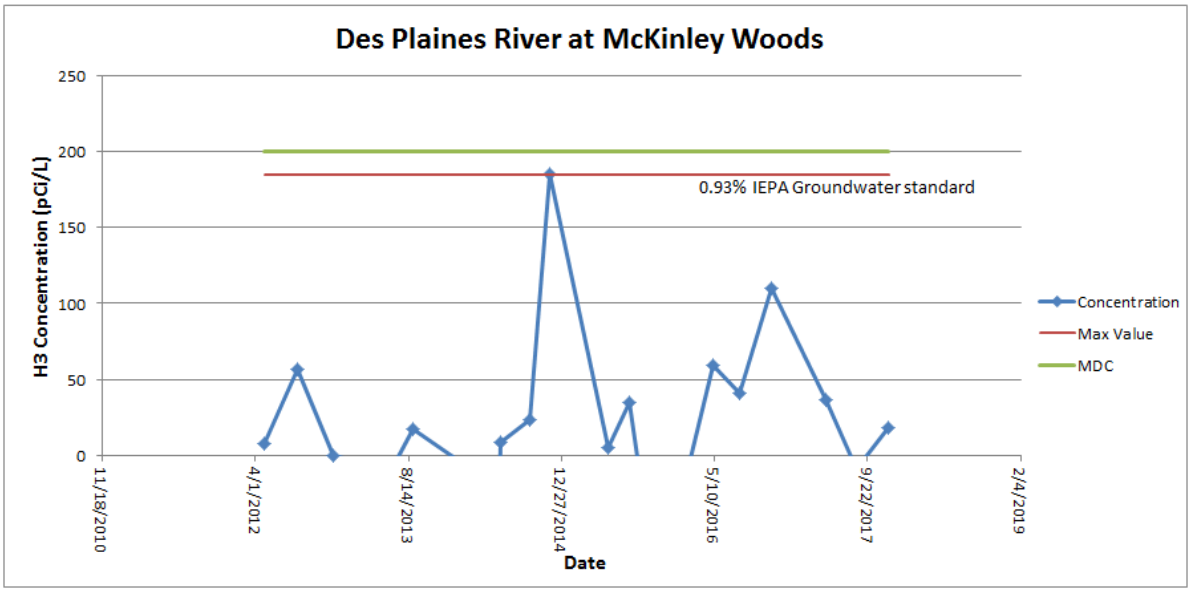
Table B-1. Tritium in Water Sample Results for Dresden Area
Results are in picocuries per liter (pCi/L)

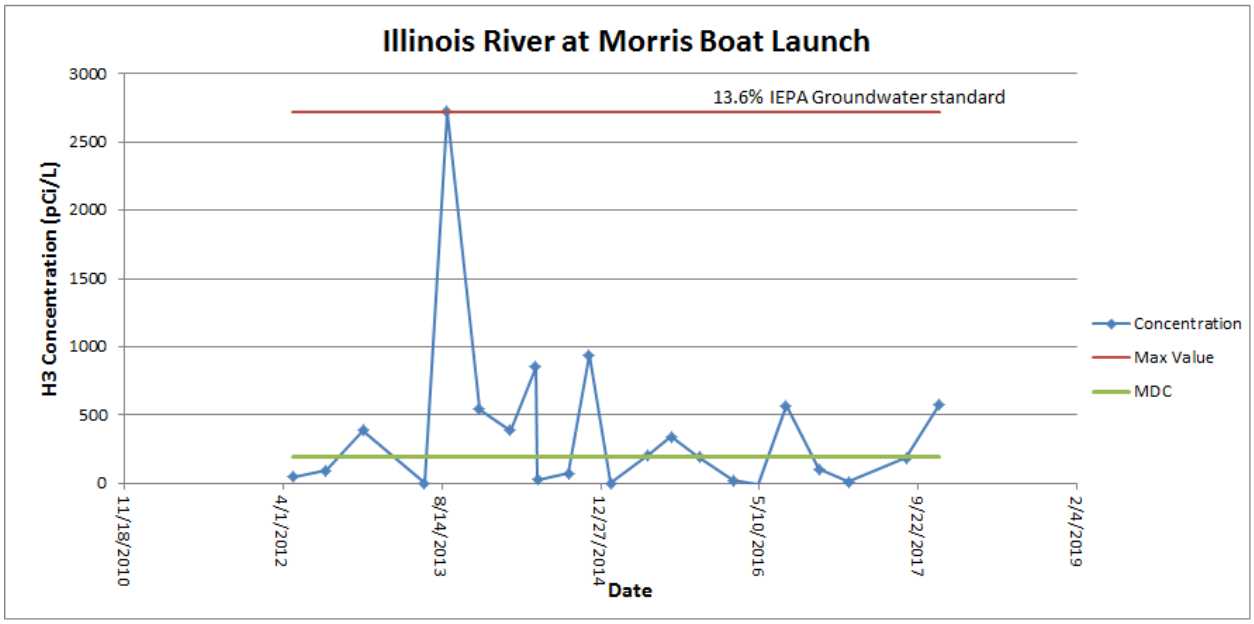
Location	H-3	
Date	Result	MDC
Des Plaines River at Channahon		
2/15/2017	<MDC	200
5/11/2017	<MDC	200
8/16/2017	<MDC	200
11/29/2017	<MDC	200
Des Plaines River at McKinley Woods		
5/10/2017	<MDC	200
8/16/2017	<MDC	200
11/29/2017	<MDC	200
Heideke Lake		
5/10/2017	<MDC	200
8/15/2017	<MDC	200
I & M Canal at Channahon		
2/15/2017	<MDC	200
5/11/2017	<MDC	200
8/16/2017	<MDC	200
11/29/2017	<MDC	200
Illinois River at Dresden Lock & Dam		
2/15/2017	<MDC	200
5/10/2017	<MDC	200
8/15/2017	<MDC	200
11/28/2017	769	200
Illinois River at Morris		
2/15/2017	<MDC	200
8/16/2017	<MDC	200
11/28/2017	578	200
Well at Dresden Lock & Dam		
2/15/2017	<MDC	200
5/10/2017	<MDC	200
8/15/2017	<MDC	200
11/28/2017	<MDC	200

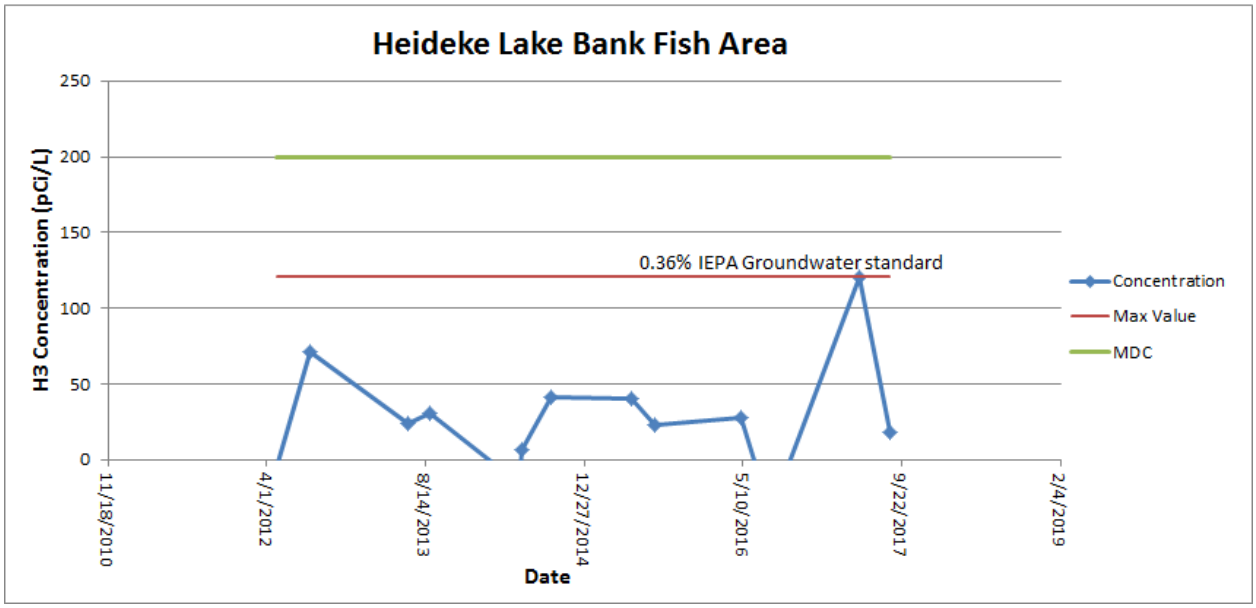
Tables B-2. Trending Graphs for Water from the Dresden Area
(Max value compared to IEPA Class I groundwater standard of 20,000 pCi/L)

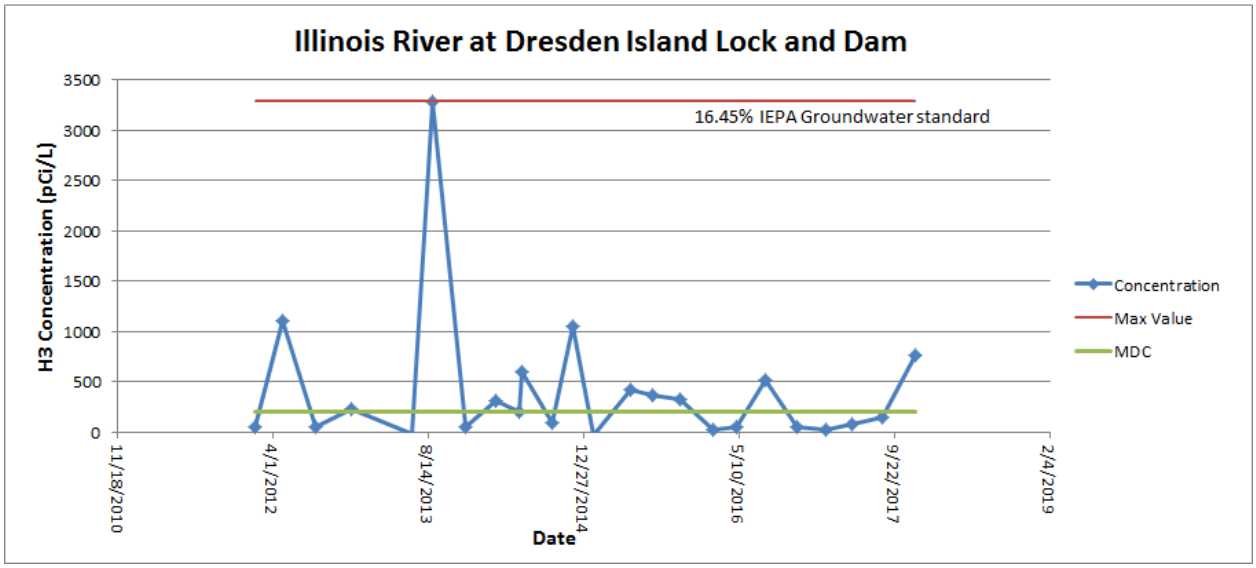





Des Plaines River at McKinley Woods
H3 Concentration (pCi/L)
250
200
150
100
50
0
0.93% IEPA Groundwater standard
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC


Illinois River at Morris Boat Launch
H3 Concentration (pCi/L)
3000
2500
2000
1500
1000
500
0
13.6% IEPA Groundwater standard
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC


Heideke Lake Bank Fish Area
H3 Concentration (pCi/L)
250
200
150
100
50
0
0.36% IEPA Groundwater standard
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC


Illinois River at Dresden Island Lock and Dam
H3 Concentration (pCi/L)
3500
3000
2500
2000
1500
1000
500
0
16.45% IEPA Groundwater standard
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC

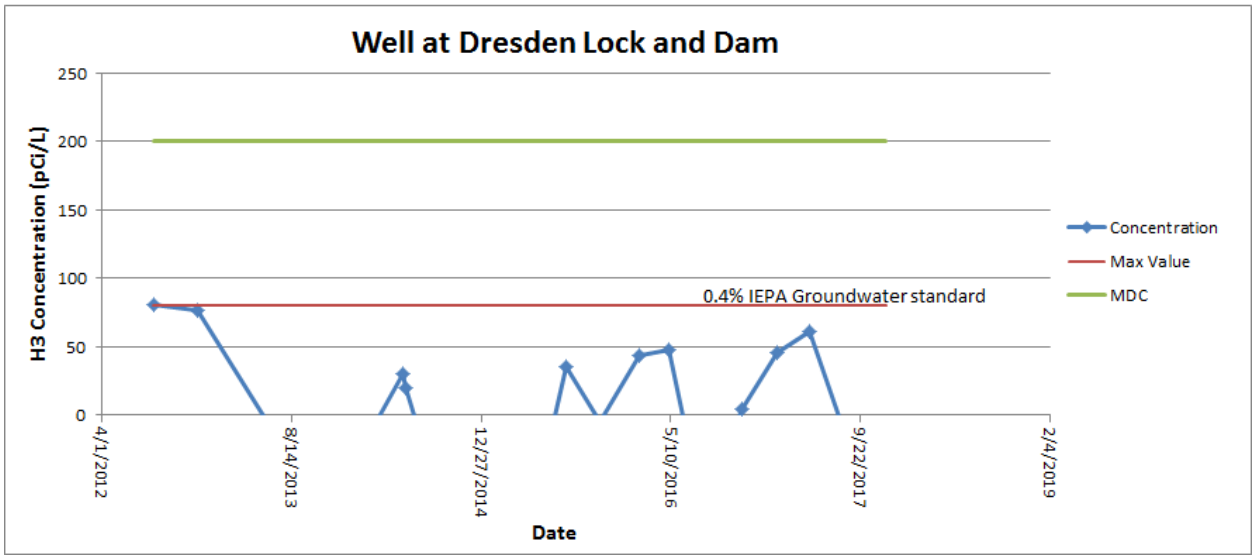

Well at Dresden Lock and Dam
250
200
150
100
50
0
H3 Concentration (pCi/L)
0.4% IEPA Groundwater standard
Concentration
Max Value
MDC
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date

Table B-3. Sample Results for Beta Screening of Water from the Dresden Area
Results are in picocuries per liter (pCi/L)

Location	Beta	
Date	Result	MDC
Des Plaines River at Channahon		
2/15/2017	<MDC	4.2
5/11/2017	<MDC	4.2
8/16/2017	7.7	4.2
11/29/2017	5.6	4.2
Des Plaines River at McKinley Woods		
5/10/2017	<MDC	4.2
8/16/2017	7.0	4.2
11/29/2017	5.9	4.2
Heideke Lake		
5/10/2017	<MDC	4.2
8/15/2017	<MDC	4.2
I & M Canal at Channahon		
2/15/2017	4.6	4.2
5/11/2017	<MDC	4.2
8/16/2017	<MDC	4.2
11/29/2017	4.8	4.2
Illinois River at Dresden Lock & Dam		
2/15/2017	<MDC	4.2
5/10/2017	<MDC	4.2
8/15/2017	4.9	4.2
11/28/2017	5.0	4.2
Illinois River at Morris		
2/15/2017	<MDC	4.2
8/16/2017	4.5	4.2
11/28/2017	4.3	4.2
Well at Dresden Lock & Dam		
2/15/2017	14.5	4.2
5/10/2017	11.9	4.2
8/15/2017	13.0	4.2
11/28/2017	14.7	4.2

Table B-4. Gamma Spectroscopy Sample Results for Other Radionuclides in Water from the Dresden Area
Results are in picocuries per liter (pCi/L)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Des Plaines River at Channahon																								
2/15/2017	<MDC	142			<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
5/11/2017	<MDC	142			<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
8/16/2017	<MDC	142	<MDC	390	<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
11/29/2017	<MDC	142	<MDC	390	<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
Des Plaines River at McKinley Woods																								
5/10/2017	<MDC	142			<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
8/16/2017	<MDC	142	<MDC	390	<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
11/29/2017	<MDC	142	<MDC	390	<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
Heideke Lake																								
5/10/2017	<MDC	142			<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
8/15/2017	<MDC	142	<MDC	390	<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
I & M Canal at Channahon																								
2/15/2017	<MDC	142			<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
5/11/2017	<MDC	142			<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
8/16/2017	<MDC	142	<MDC	390	<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
11/29/2017	<MDC	142	<MDC	390	<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
Illinois River at Dresden Lock & Dam																								
2/15/2017	<MDC	142			<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
5/10/2017	<MDC	142			<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
8/15/2017	<MDC	142	<MDC	390	<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
11/28/2017	<MDC	142	<MDC	390	<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
Illinois River at Morris																								
2/15/2017	<MDC	142			<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
8/16/2017	<MDC	142	<MDC	390	<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
11/28/2017	<MDC	142	<MDC	390	<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
Well at Dresden Lock & Dam																								
2/15/2017	<MDC	142			<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
5/10/2017	<MDC	142			<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
8/15/2017	<MDC	142	<MDC	390	<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4
11/28/2017	<MDC	142	<MDC	390	<MDC	4.9	<MDC	4.5	<MDC	4.5	<MDC	3.7	<MDC	13.5	<MDC	178	<MDC	4	<MDC	8	<MDC	9.1	<MDC	9.4

Table B-5. Total Strontium Results for Water Samples Collected in the Dresden Area
Results are in picocuries per liter (pCi/L)

Location	Date	Nuclide	Result	MDC
Illinois River at Dresden Lock & Dam	5/10/2017	Strontium	<MDC	1.2

Table B-6. Soil Sample Results for Dresden Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Heideke Lake																						
5/11/2017	<MDC	2.13			<MDC	0.04	<MDC	0.03	<MDC	0.02	0.03	0.03	<MDC	0.14	<MDC	0.03	<MDC	0.09	<MDC	0.08	<MDC	0.11
8/15/2017	<MDC	2.13	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.17	0.03	<MDC	0.14	<MDC	0.03	<MDC	0.09	<MDC	0.08	<MDC	0.11
Minooka Community High School																						
5/11/2017	<MDC	2.13			<MDC	0.04	<MDC	0.03	<MDC	0.02	0.08	0.03	<MDC	0.14	<MDC	0.03	<MDC	0.09	<MDC	0.08	<MDC	0.11
8/16/2017	<MDC	2.13	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.08	0.03	<MDC	0.14	<MDC	0.03	<MDC	0.09	<MDC	0.08	<MDC	0.11

Table B-7. Vegetation Sample Results for Dresden Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Heideke Lake																								
5/11/2017	<MDC	5.0			<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	9.5	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
8/15/2017	<MDC	5.0	<MDC	3.3	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	9.5	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
Minooka Community High School																								
5/11/2017	<MDC	5.0			<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	9.5	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
8/16/2017	<MDC	5.0	<MDC	3.3	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	9.5	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2

Table B-8. Gamma Detection Network Results for Dresden Area

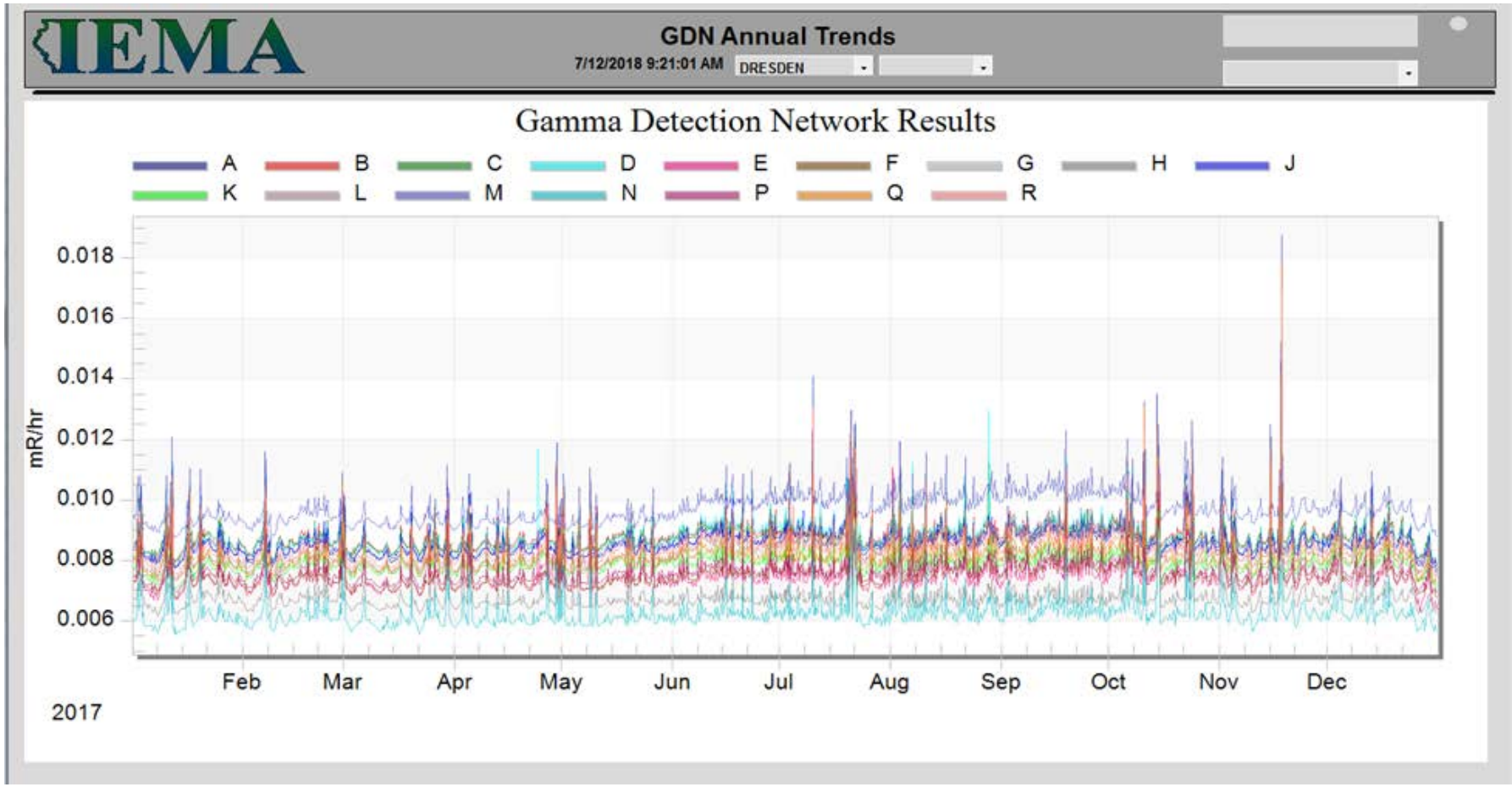


Table B-9. Summary of Ambient Gamma Results for Dresden Area

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
DR001	5.93	6.66	6.21	6.11	24.91
DR002	7.94	6.02	6.84	7.12	27.92
DR003	6.66	6.11	6.30	5.75	24.82
DR004	9.67	7.76	9.22	8.58	35.22
DR007	7.76	6.48	7.39	7.76	29.38
DR013	9.13	6.94	7.12	8.76	31.94
DR021	7.30	5.84	6.57	7.30	27.01
DR022	6.84			8.40	30.48
DR023	7.39	4.20	6.21	6.84	24.64
DR026	7.39	5.75	5.20	7.21	25.55
DR027	6.57	7.48	7.03	7.03	28.11
DR031	6.94	5.02	5.66	7.94	25.55
DR033	6.84	3.92	5.20	5.38	21.35
DR036	9.58	7.85	8.40	9.40	35.22
DR039	10.68	11.13	10.86	11.50	44.17
DR040	10.31	10.49	10.22	8.94	39.97
DR041		7.48	7.21	9.13	31.76
DR043	8.40	9.31	11.68	10.68	40.06
DR046	5.20	5.48	8.94	4.65	24.27
DR048	8.76	9.49	8.94	8.21	35.41
DR050	6.75	6.94	7.76	8.40	29.84
DR052	9.95	9.40	10.86	9.49	39.69
DR053	6.21	5.11	6.75	5.29	23.36
DR056	10.49	9.40	9.13	12.32	41.34
DR060	8.40	7.48	8.49	8.49	32.85
DR062	9.76	7.30	9.86	9.58	36.50
DR065	10.40	10.13	10.95	10.95	42.43
DR066	6.48	7.03	5.38	8.21	27.10
DR068	7.39	6.84	8.03	8.03	30.30
DR070	9.31	7.57	8.94	9.67	35.50
DR073	9.86		8.49	9.76	37.47
DR075	9.03	8.49		10.04	36.74
DR076	5.84	4.84	7.21	6.94	24.82
DR077	7.67	5.84	7.94	8.12	29.57
DR078	8.03	10.68		10.68	39.18
DR080	10.59		11.22	11.32	44.17
DR081	9.22	9.31	10.04	8.67	37.23
DR082		9.22	9.86		38.14
DR083	8.21	7.57	7.76	8.58	32.12
DR084	7.57	8.94	8.40	8.67	33.58
DR087		8.76	8.03	8.58	33.82
DR089	7.30	7.57	7.48	7.85	30.20

Table B-9. Summary of Ambient Gamma Results for Dresden Area (continued)

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
DR091	7.21	7.67	8.30	8.12	31.30
DR093	8.30	8.85	8.40	9.31	34.86
DR095	9.22	7.48	8.85	8.30	33.85
DR096	9.31	8.49	8.94	9.58	36.32
DR097	10.22	9.49	10.31	11.22	41.25
DR098	6.11	5.84	7.03	7.48	26.46
DR099	11.86	10.68	8.76		41.73
DR100	7.57	8.49	8.03	7.57	31.66
DR102	10.13	8.03	10.49	9.03	37.69
DR103	11.13	10.77	12.68	10.77	45.35
DR104	11.32	10.49	11.41	11.77	44.99
DR105	5.84		6.75	7.94	27.38
DR107	7.94		7.30	9.49	32.97
DR108	10.59	7.94	10.22	10.86	39.60
DR109	9.67	10.68	10.77		41.49
DR110	5.57	4.29	4.38	5.75	19.98
DR111	6.75	6.48	6.48	8.30	28.01
DR113	12.14	10.86	11.77	11.68	46.45
DR114	10.77	10.04	11.86	11.13	43.80
DR115	9.40	8.76	10.49	10.49	39.15
DR116	6.21	5.48	6.11	8.03	25.82
DR117	8.94	7.03	8.85	9.67	34.49
DR118	7.12	5.93	7.57	8.12	28.74
DR119			8.67	10.04	37.41
DR-RSA	9.22	7.39	8.49	9.58	34.68
DR-RSB	9.95	9.03	10.40	11.59	40.97
DR-RSC	10.68	10.04	9.40	10.22	40.33
DR-RSD	11.50	11.41	13.23	12.96	49.09
DR-RSE	9.40	7.12	6.30	8.03	30.84
DR-RSF	7.85	6.21	6.75	8.12	28.93
DR-RSG	8.40	6.39	7.48	8.49	30.75
DR-RSH	7.76	6.94	6.39	8.12	29.20
DR-RSJ	7.85	8.58	8.30	9.58	34.31
DR-RSK	7.94	6.48	7.67	7.39	29.47
DR-RSL	8.12	7.21	8.40	9.67	33.40
DR-RSM	10.95	9.22	11.68	12.68	44.53
DR-RSN	5.66	4.75	4.29	6.30	20.99
DR-RSP	6.57	6.75	6.02	7.57	26.92
DR-RSQ	8.12	8.76	7.67	8.58	33.12
DR-RSR	7.94	9.86	8.85	10.40	37.05

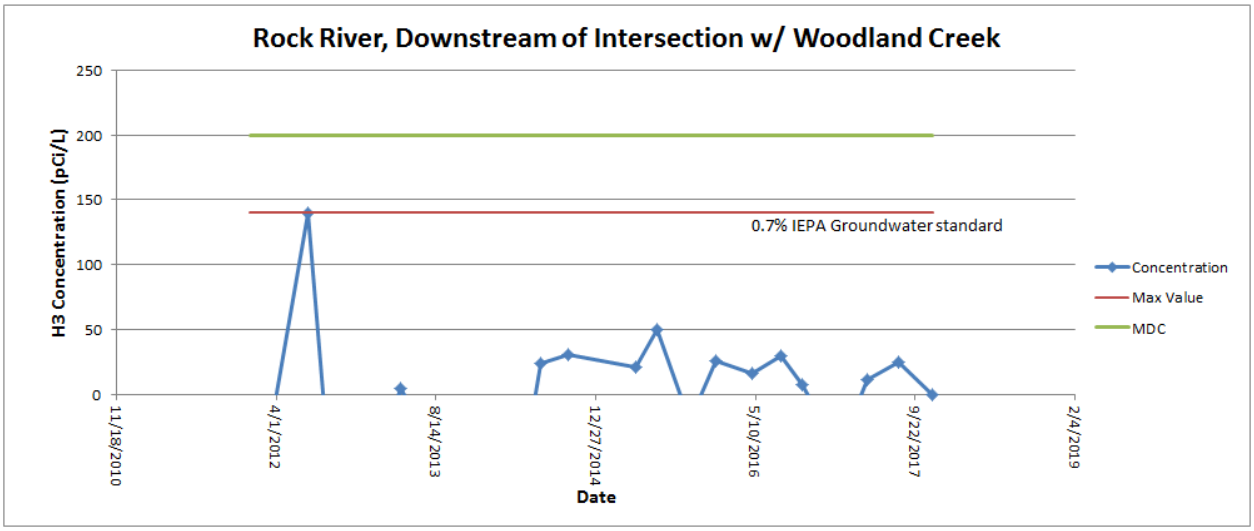
Blanks in the table indicate that dosimeters were missing at the end of the quarter.
Annual Exposure column based on averages of all available data.
Quarter length is estimated to be 91.25 days.

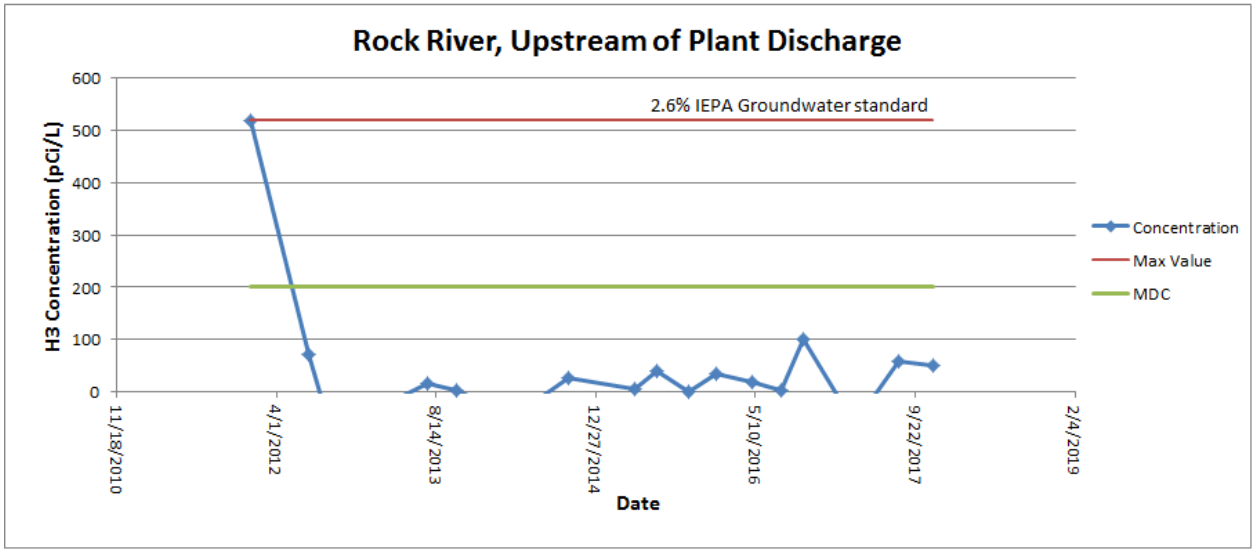
Appendix C
Byron Sample Results

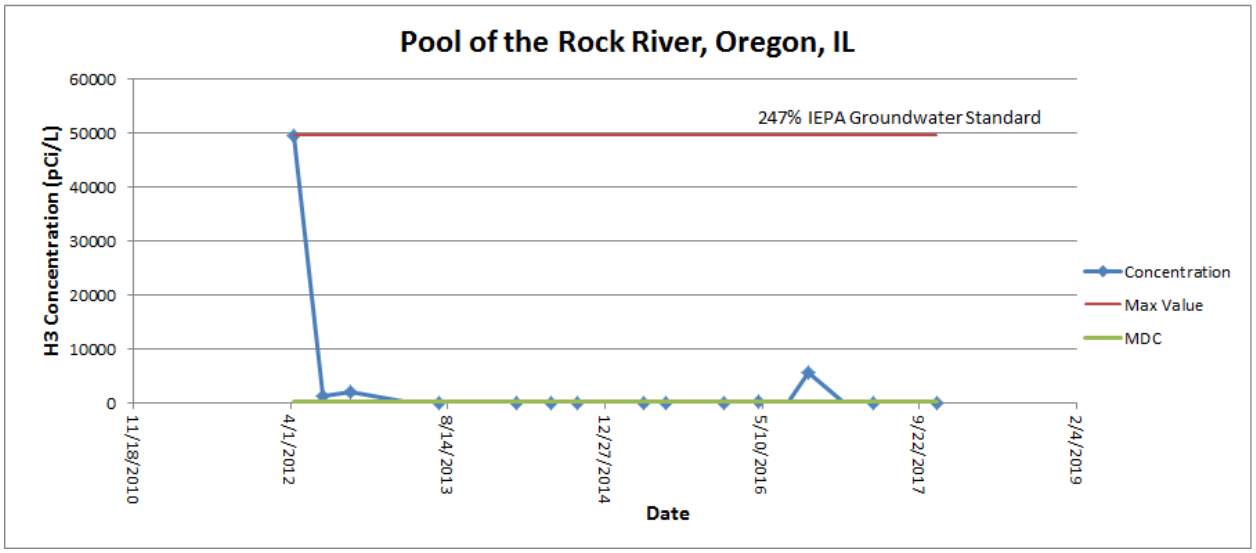
Table C-1. Tritium in Water Sample Results for Byron Area
Results are in picocuries per liter (pCi/L)

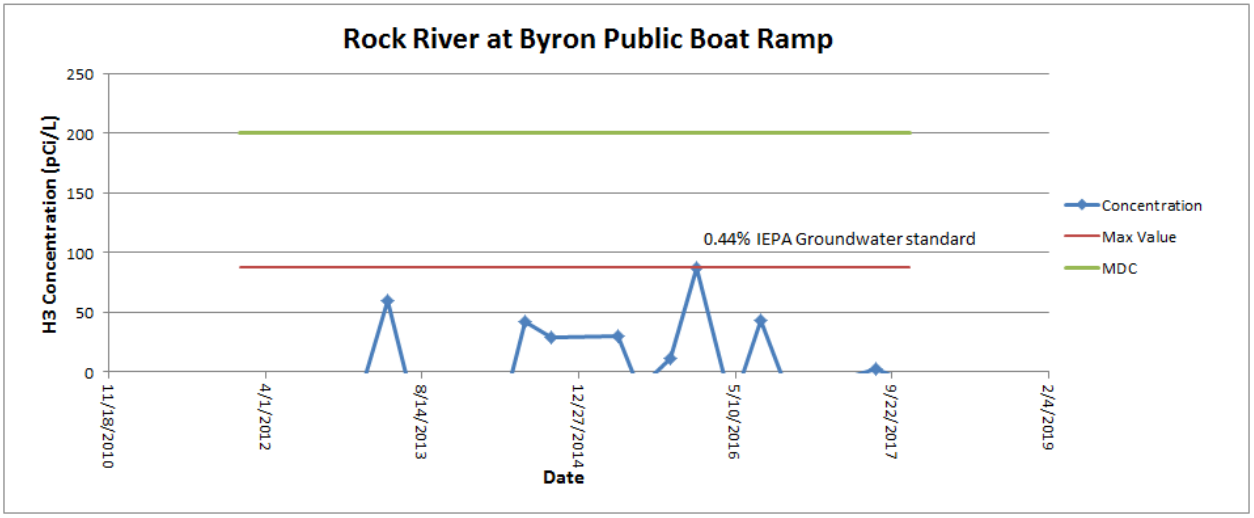
Location	H-3	
Date	Result	MDC
Lowden State Park Boat Ramp		
1/26/2017	<MDC	200
4/26/2017	<MDC	200
8/2/2017	<MDC	200
11/16/2017	<MDC	200
Oregon Park East		
1/26/2017	<MDC	200
4/26/2017	<MDC	200
8/2/2017	<MDC	200
11/16/2017	<MDC	200
Pool of the Rock River, Oregon		
1/26/2017	<MDC	200
4/26/2017	<MDC	200
11/16/2017	<MDC	200
Public Parking W. of Rock River		
1/26/2017	<MDC	200
4/26/2017	<MDC	200
8/2/2017	<MDC	200
11/16/2017	<MDC	200
Rock River Byron Boat Ramp		
1/26/2017	<MDC	200
4/26/2017	<MDC	200
8/2/2017	<MDC	200
11/16/2017	<MDC	200
Rock River, UpS of the Byron Cooling Water Discharge		
1/26/2017	<MDC	200
4/26/2017	<MDC	200
8/2/2017	<MDC	200
11/16/2017	<MDC	200
Rock River, DnS of Woodland Creek		
1/26/2017	<MDC	200
4/26/2017	<MDC	200
8/2/2017	<MDC	200
11/16/2017	<MDC	200

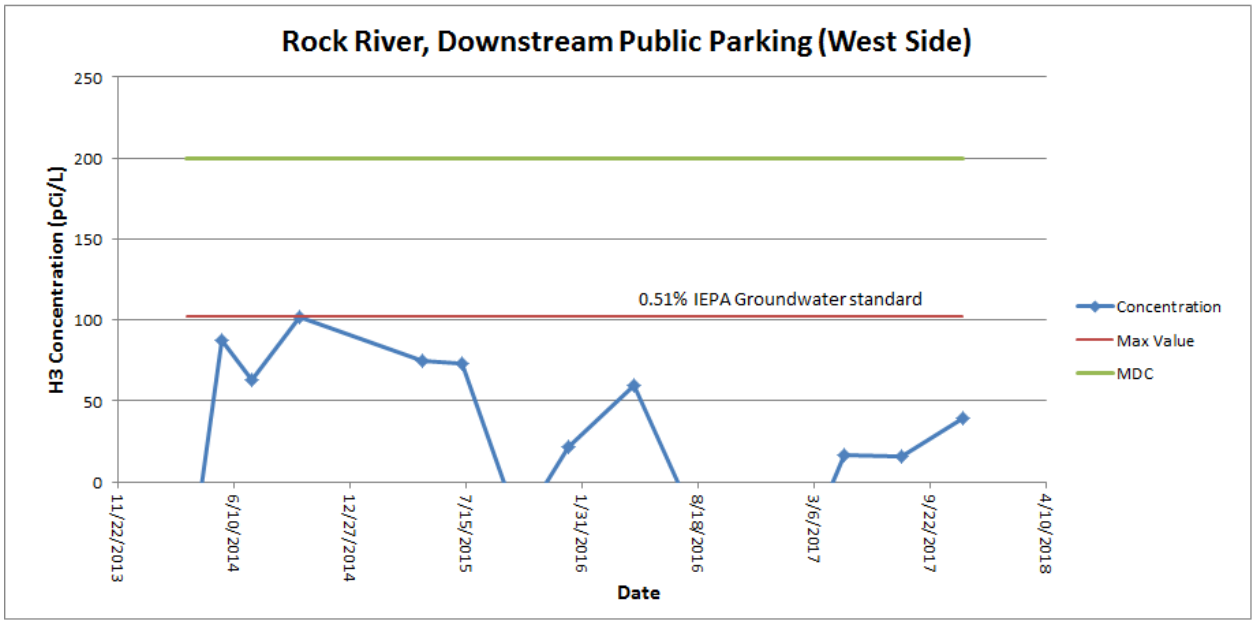
Tables C-2. Trending Graphs for Water from the Byron Area
(Max value compared to IEPA Class I groundwater standard of 20,000 pCi/L)

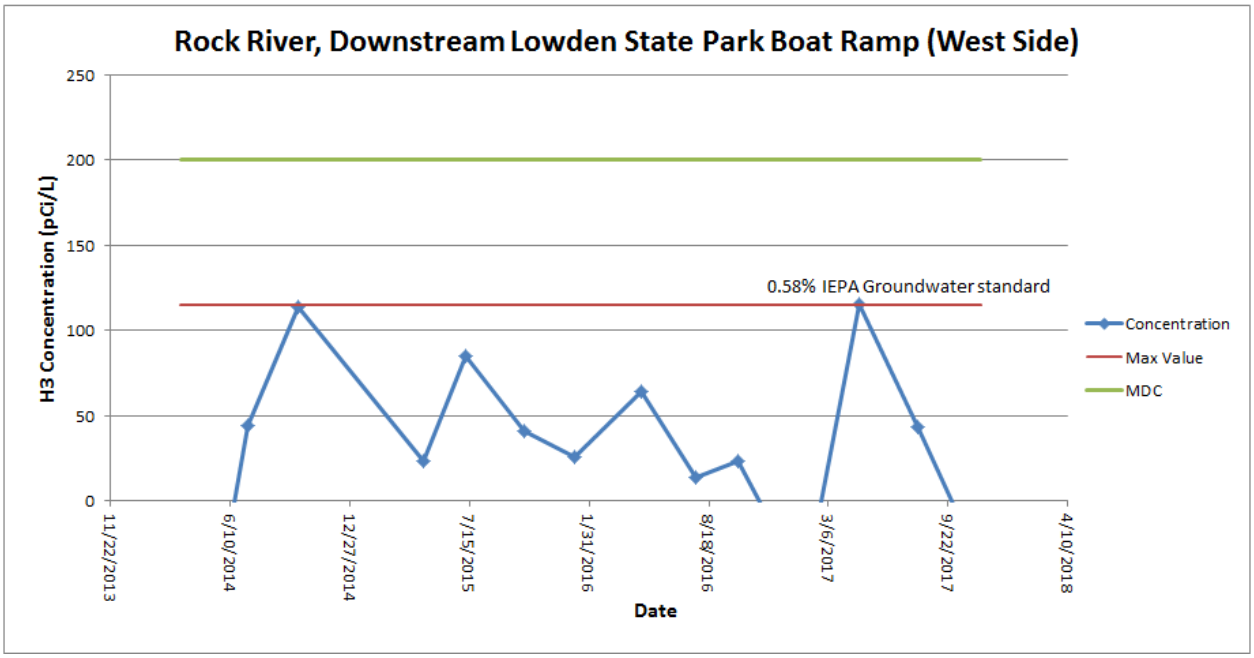





Pool of the Rock River, Oregon, IL
60000
50000
40000
30000
20000
10000
0
H3 Concentration (pCi/L)
247% IEPA Groundwater Standard
Concentration
Max Value
MDC
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date


Rock River at Byron Public Boat Ramp
250
200
150
100
50
0
H3 Concentration (pCi/L)
0.44% IEPA Groundwater standard
Concentration
Max Value
MDC
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date


Rock River, Downstream Public Parking (West Side)
H3 Concentration (pCi/L)
250
200
150
100
50
0
0.51% IEPA Groundwater standard
11/22/2013
6/10/2014
12/27/2014
7/15/2015
1/31/2016
8/18/2016
3/6/2017
9/22/2017
4/10/2018
Date
Concentration
Max Value
MDC


Rock River, Downstream Lowden State Park Boat Ramp (West Side)
H3 Concentration (pCi/L)
250
200
150
100
50
0
0.58% IEPA Groundwater standard
11/22/2013
6/10/2014
12/27/2014
7/15/2015
1/31/2016
8/18/2016
3/6/2017
9/22/2017
4/10/2018
Date
Concentration
Max Value
MDC

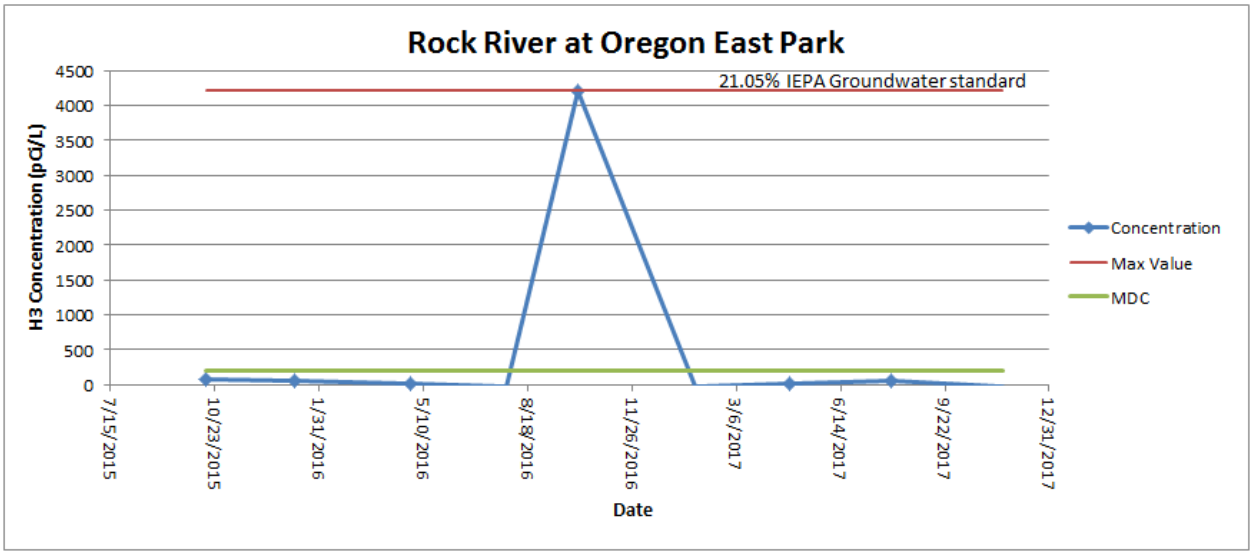

Rock River at Oregon East Park
21.05% IEPA Groundwater standard
H3 Concentration (pCi/L)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
7/15/2015
10/23/2015
1/31/2016
5/10/2016
8/18/2016
11/26/2016
3/6/2017
6/14/2017
9/22/2017
12/31/2017
Date
Concentration
Max Value
MDC

Table C-3. Sample Results for Beta Screening of Water from the Byron Area
Results are in picocuries per liter (pCi/L)

Location	Beta	
Date	Result	MDC
Lowden State Park Boat Ramp		
1/26/2017	5.1	4.3
4/26/2017	<MDC	4.3
8/2/2017	4.5	4.3
11/16/2017	<MDC	4.3
Oregon Park East		
1/26/2017	5.1	4.3
4/26/2017	<MDC	4.3
8/2/2017	5.5	4.3
11/16/2017	4.5	4.3
Pool of the Rock River, Oregon		
1/26/2017	5.0	4.3
4/26/2017	<MDC	4.3
11/16/2017	<MDC	4.3
Public Parking W. of Rock River		
1/26/2017	5.1	4.3
4/26/2017	<MDC	4.3
8/2/2017	4.8	4.3
11/16/2017	<MDC	4.3
Rock River Byron Boat Ramp		
1/26/2017	<MDC	4.3
4/26/2017	<MDC	4.3
8/2/2017	5.6	4.3
11/16/2017	<MDC	4.3
Rock River, UpS of the Byron Cooling Water Discharge		
1/26/2017	<MDC	4.3
4/26/2017	<MDC	4.3
8/2/2017	<MDC	4.3
11/16/2017	<MDC	4.3
Rock River, DnS of Woodland Creek		
1/26/2017	4.6	4.3
4/26/2017	<MDC	4.3
8/2/2017	5.6	4.3
11/16/2017	<MDC	4.3

Table C-4. Gamma Spectroscopy Sample Results for Other Radionuclides in Water from the Byron Area
Results are in picocuries per liter (pCi/L)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Lowden State Park Boat Ramp																								
1/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
4/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
8/2/2017	<MDC	129	<MDC	380	<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
11/16/2017	<MDC	129	<MDC	380	<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
Oregon Park East																								
1/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
4/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
8/2/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
11/16/2017	<MDC	129	<MDC	380	<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
Pool of the Rock River, Oregon																								
1/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
4/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
11/16/2017	<MDC	129	<MDC	380	<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
Public Parking W. of Rock River																								
1/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
4/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
8/2/2017	<MDC	129	<MDC	380	<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
11/16/2017	<MDC	129	<MDC	380	<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
Rock River Byron Boat Ramp																								
1/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
4/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
8/2/2017	<MDC	129	<MDC	380	<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
11/16/2017	<MDC	129	<MDC	380	<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
Rock River, UpS of the Byron Cooling Water Discharge																								
1/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
4/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
8/2/2017	<MDC	129	<MDC	380	<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
11/16/2017	<MDC	129	<MDC	380	<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
Rock River, DnS of Woodland Creek																								
1/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
4/26/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
8/2/2017	<MDC	129			<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5
11/16/2017	<MDC	129	<MDC	380	<MDC	5.4	<MDC	4.6	<MDC	4.3	<MDC	3.8	<MDC	15.4	<MDC	120	<MDC	3.9	<MDC	8.7	<MDC	9.9	<MDC	10.5

Table C-5. Total Strontium Results in Water Samples Collected in the Byron Area
Results in picocuries per liter (pCi/L)

Location	Date	Nuclide	Result	MDC
Public Parking W. of Rock River	4/26/2017	Strontium	<MDC	1.4
Lowden State Park Boat Ramp	4/26/2017	Strontium	<MDC	1.4

Table C-6. Soil Sample Results for Byron Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Forest preserve on River Road																						
6/8/2017	<MDC	0.56			<MDC	0.03	<MDC	0.03	<MDC	0.02	0.12	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08
8/2/2017	<MDC	0.56	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.12	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08
Lot SE of intersection of W Pond & N Main (Leaf River)																						
6/8/2017	<MDC	0.56			<MDC	0.03	<MDC	0.03	<MDC	0.02	0.12	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08
8/2/2017	<MDC	0.56	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.08	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08
Lowden State Park																						
6/8/2017	<MDC	0.56			<MDC	0.03	<MDC	0.03	<MDC	0.02	0.08	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08
8/2/2017	<MDC	0.56	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.12	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08
Southwest of Rockford																						
6/8/2017	<MDC	0.56			<MDC	0.03	<MDC	0.03	<MDC	0.02	0.27	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08
8/2/2017	<MDC	0.56	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.25	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08

Table C-7. Sediment Sample Results for Byron Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Oregon Park East																				
4/26/2017	<MDC	0.89	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.09
8/2/2017	<MDC	0.89	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.09
Rock River, UpS of the Byron Cooling Water Discharge																				
4/26/2017	<MDC	0.89	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.10	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.09

Table C-8. Vegetation Sample Results for Byron Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Forest preserve on River Road																								
6/8/2017	<MDC	3.8			<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	3.8	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3
8/2/2017	<MDC	3.8	<MDC	3.7	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	3.8	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3
Lot SE of intersection of W Pond & N Main (Leaf River)																								
6/8/2017	<MDC	3.8			<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	3.8	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3
8/2/2017	<MDC	3.8	<MDC	3.7	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	3.8	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3
Lowden State Park																								
6/8/2017	<MDC	3.8			<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	3.8	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3
8/2/2017	<MDC	3.8	<MDC	3.7	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	3.8	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3
Southwest of Rockford																								
6/8/2017	<MDC	3.8			<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	3.8	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3
8/2/2017	<MDC	3.8	<MDC	3.7	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	3.8	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3

Table C-9. Fish Sample Results for Byron Area
Results are in picocuries per kilogram (pCi/kg)

Location	Ba-140		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Rock River Fish (Bottom Feeder)																						
6/8/2017	<MDC	2.30	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.09	<MDC	5.80	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.06
Rock River Fish (Top Feeder)																						
6/8/2017	<MDC	2.30	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.09	<MDC	5.80	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.06

Table C-10. Gamma Detection Network Results for Byron

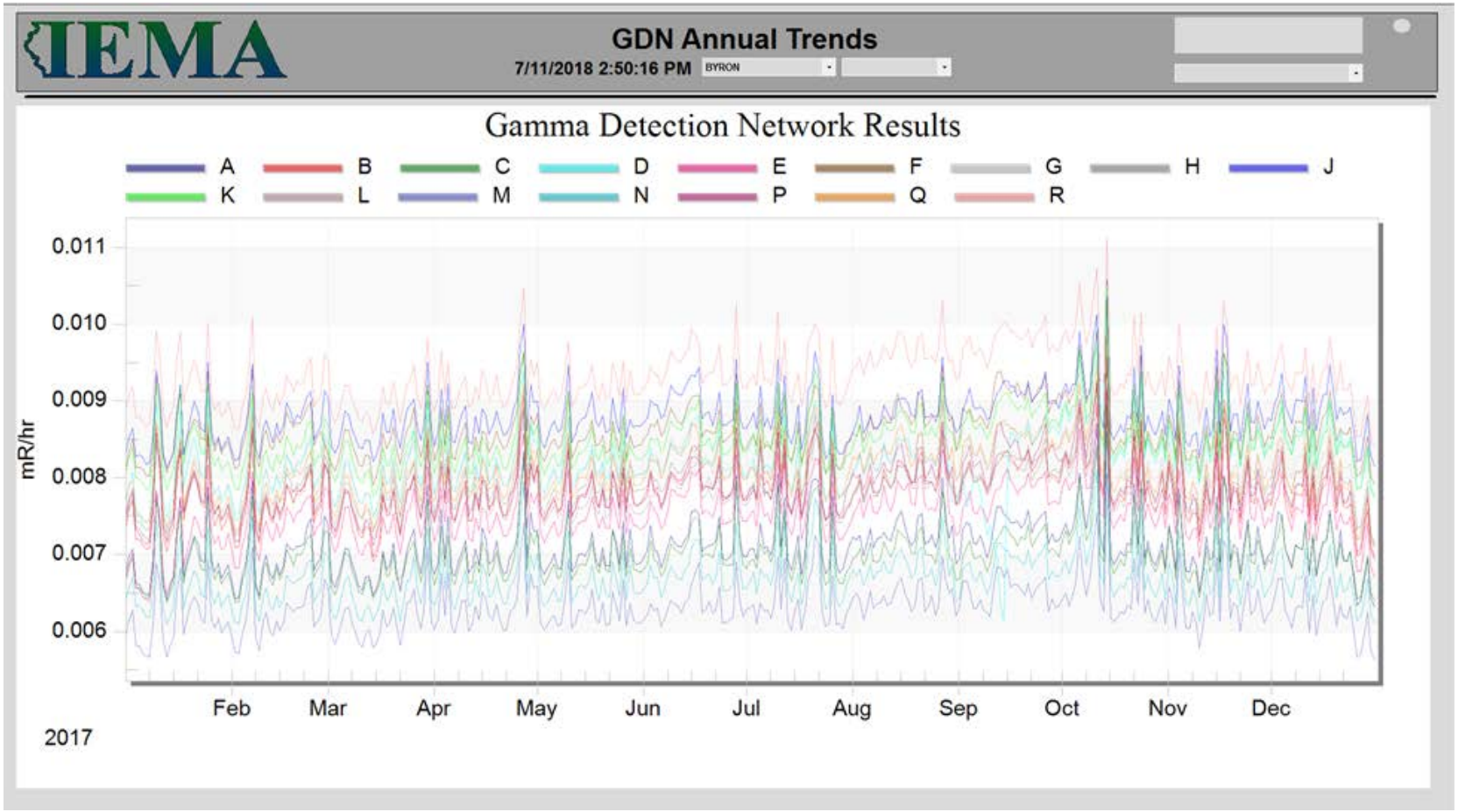


Table C-11. Summary of Ambient Gamma Results for Byron Area

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
BY001	8.03	8.12	8.12	6.66	30.93
BY003	6.66	5.93	6.75	6.39	25.73
BY004	6.75	6.94	8.40	6.84	28.93
BY005	6.75	7.76	6.94	5.11	26.55
BY006	8.40	7.12	7.21	5.84	28.56
BY007	6.30	7.48	6.30	6.94	27.01
BY008	7.85	8.58	8.58	6.94	31.94
BY011	7.85	6.66	7.12	7.57	29.20
BY013	9.31	9.95	11.32	7.67	38.23
BY014	7.21	7.21	7.03	4.93	26.37
BY015	10.86	11.13	10.49	7.67	40.15
BY018	6.11	7.12	7.12	5.66	26.01
BY020	9.49	10.68	11.86	9.40	41.43
BY022	9.76	10.31		7.85	37.23
BY023	8.21	9.58	9.86	7.21	34.86
BY026	7.57	8.76	9.58	6.94	32.85
BY027	8.85	10.68	11.68		41.61
BY029	8.76	9.22	8.76	8.49	35.22
BY030	8.94	9.95	9.13	9.31	37.32
BY033	9.31	10.59	8.94	9.58	38.42
BY034	6.66	6.75	8.76	6.48	28.65
BY035	6.94	7.03	7.39	6.48	27.83
BY037	6.30	7.12	7.12	6.75	27.28
BY040	10.31	10.22	9.95	8.94	39.42
BY041	9.03	7.94	9.13	7.76	33.85
BY044	7.03	6.66	8.12	6.30	28.11
BY045	7.39	9.03	8.67	6.94	32.03
BY049	7.57	7.21	7.03	5.48	27.28
BY050	9.22	8.40	10.22	7.12	34.95
BY051	7.03	8.67	8.03	5.93	29.66
BY052	9.22	9.40	10.13	6.94	35.68
BY053	9.49	8.94	9.40	8.85	36.68
BY055	9.13	10.95	10.77	8.21	39.06
BY056	8.03	8.85	10.40	8.58	35.86
BY057	8.40	9.40	9.40	9.86	37.05
BY058	8.94	9.58	9.22	7.67	35.41
BY059	8.40	8.85	9.67	9.58	36.50
BY060	9.31	9.49	9.67	9.22	37.69
BY061	9.86	10.95	11.32	9.86	41.98
BY062	9.95	8.67	9.22	8.03	35.86
BY063	9.58	9.95	11.41	8.58	39.51
BY064	10.13	10.77	10.86	9.22	40.97
BY065		7.67	9.86	6.39	31.88
BY066	7.21	10.04	8.67	6.02	31.94

Table C-11. Summary of Ambient Gamma Results for Byron Area (continued)

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
BY067	8.76	9.03	8.03	7.39	33.22
BY068	9.03	8.03	9.22	8.85	35.13
BY069	8.76	8.40	8.94	9.13	35.22
BY070	9.03	7.57	10.49	7.21	34.31
BY071	6.75	7.85	7.12	5.48	27.19
BY072	10.31	10.77	10.04	9.31	40.42
BY073	9.40	8.85	10.13	6.11	34.49
BY074	9.13	9.67	10.77	9.86	39.42
BY075	8.40	7.94	8.94	8.94	34.22
BY076	8.12	7.85	6.66	6.11	28.74
BY077	8.58	7.30	8.49	8.12	32.49
BY078	8.03	9.03	8.30	7.39	32.76
BY079	6.02	7.21	7.48	5.93	26.65
BY080	7.85	7.67	6.48	4.84	26.83
BY-RSA	7.94	8.85	8.30	6.11	31.21
BY-RSB	9.86	8.76	9.67	6.75	35.04
BY-RSC	6.66	8.21	8.40	5.75	29.02
BY-RSD	8.58	8.30	9.22	7.30	33.40
BY-RSE	8.03	7.12	7.94	6.57	29.66
BY-RSF		10.40	10.04	9.58	40.03
BY-RSG	7.48	10.49	9.13	7.03	34.13
BY-RSH	7.03	9.22	8.12	8.03	32.39
BY-RSJ	8.30	9.31	8.85	7.94	34.40
BY-RSK	8.58	10.22	9.95	8.03	36.77
BY-RSL	6.94	8.12	8.30	6.02	29.38
BY-RSM	5.02	5.75	5.84	4.38	20.99
BY-RSN	5.66	5.93	5.11	5.66	22.36
BY-RSP	8.40		7.85	6.94	30.90
BY-RSQ	7.30	9.31	9.58	8.49	34.68
BY-RSR	11.68	10.49	11.13	7.94	41.25

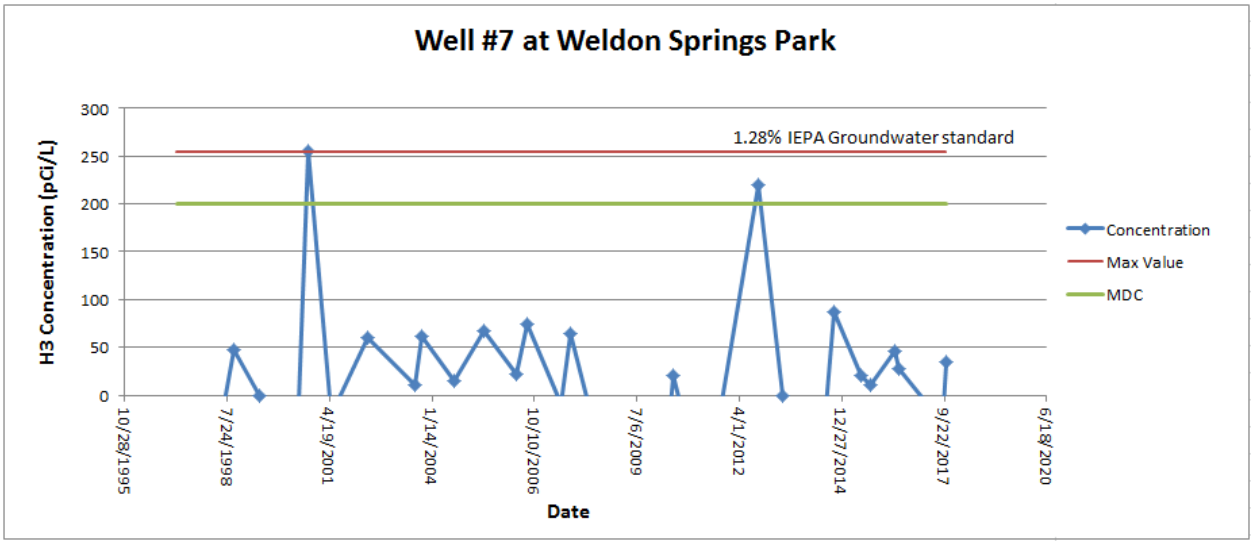
Blanks in the table indicate that dosimeters were missing at the end of the quarter.
Annual Exposure column based on averages of all available data.
Quarter length is estimated to be 91.25 days.

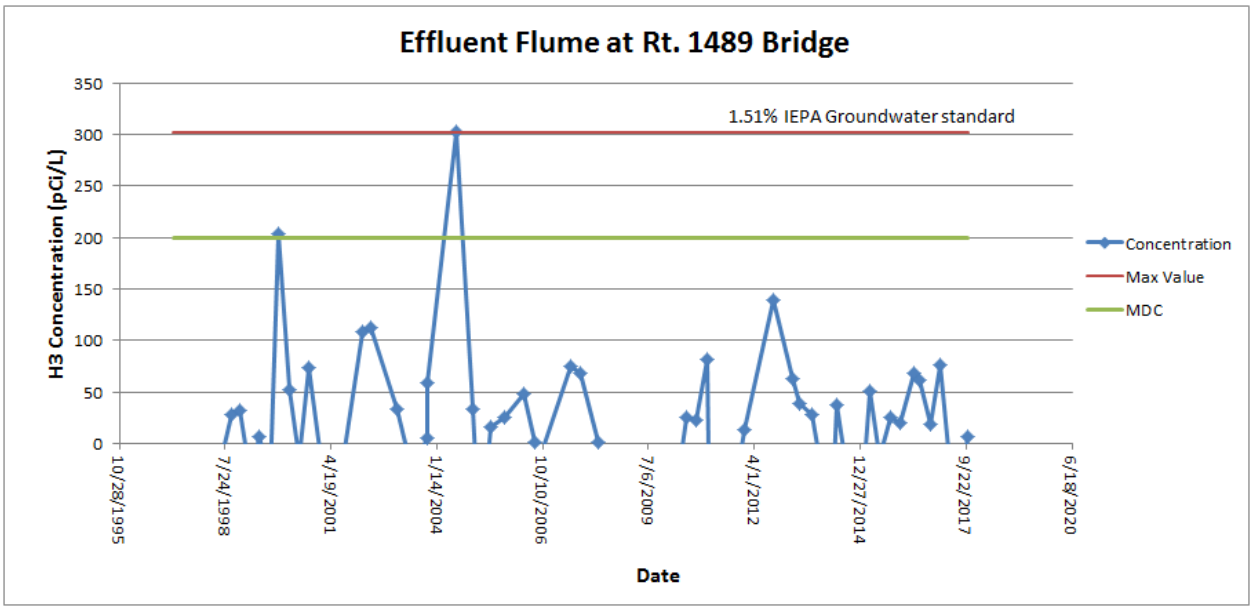
Appendix D
Clinton Sample Results

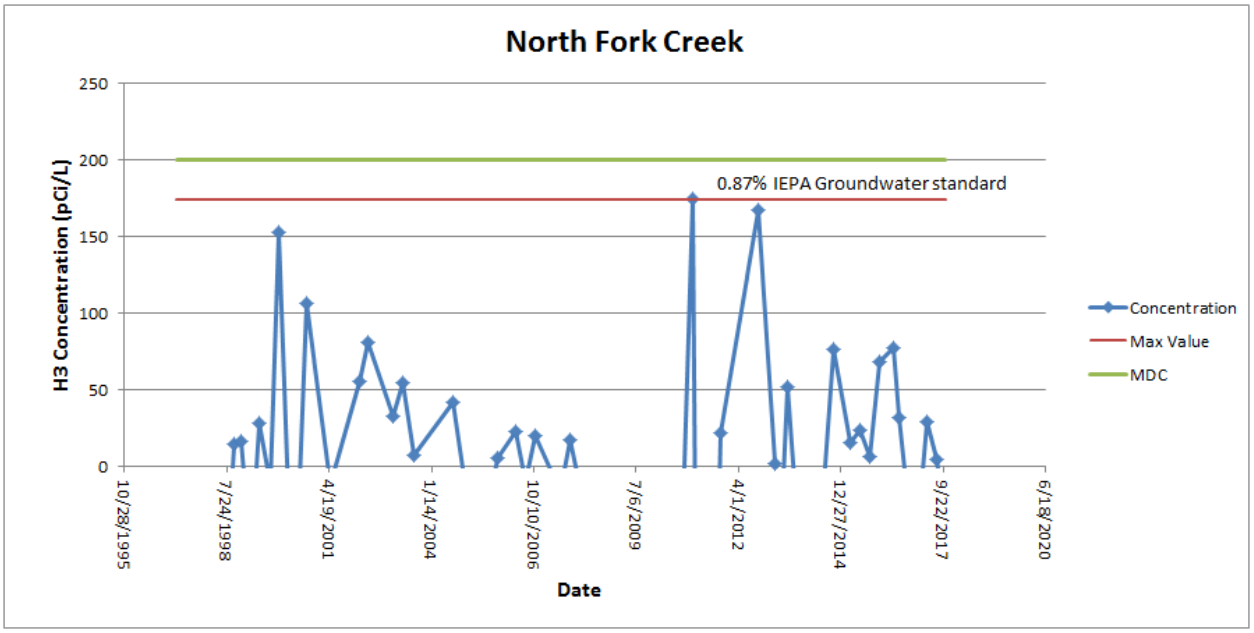
Table D-1. Tritium in Water Sample Results for Clinton Area

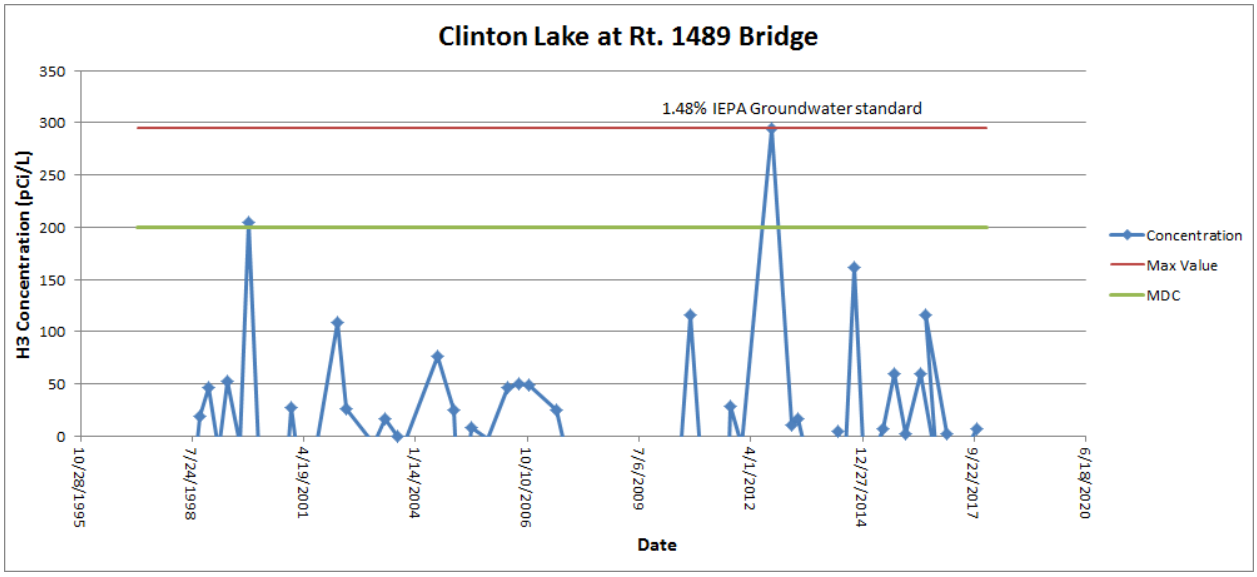
Location	H-3	
Date	Result	MDC
Bridge over Lake at Route 1489		
1/23/2017	<MDC	200
4/11/2017	<MDC	200
7/31/2017	<MDC	200
10/11/2017	<MDC	200
Bridge over Lake at Route 48		
1/23/2017	<MDC	200
4/11/2017	<MDC	200
7/31/2017	<MDC	200
10/11/2017	<MDC	200
Effluent Flume at Bridge Route 1489		
1/23/2017	<MDC	200
4/11/2017	<MDC	400
7/19/2017	<MDC	200
10/11/2017	<MDC	400
Mascutin Recreation Area (Restaurant)		
4/11/2017	<MDC	200
7/31/2017	<MDC	200
10/11/2017	<MDC	200
North Branch at Route 54 Bridge		
1/23/2017	<MDC	200
4/11/2017	<MDC	200
7/31/2017	<MDC	200
10/11/2017	<MDC	200
North Fork Creek		
1/23/2017	<MDC	200
4/11/2017	<MDC	200
7/19/2017	<MDC	200
10/11/2017	<MDC	200
Parnell Boat Ramp		
1/23/2017	<MDC	200
4/11/2017	<MDC	200
7/31/2017	<MDC	200
10/11/2017	<MDC	200
Salt Creek DnS from Spillway		
1/23/2017	<MDC	200
4/11/2017	<MDC	200
7/31/2017	<MDC	200
10/11/2017	<MDC	200
Well #7 at Weldon Springs Park		
4/11/2017	<MDC	200
7/31/2017	<MDC	200
10/11/2017	<MDC	200

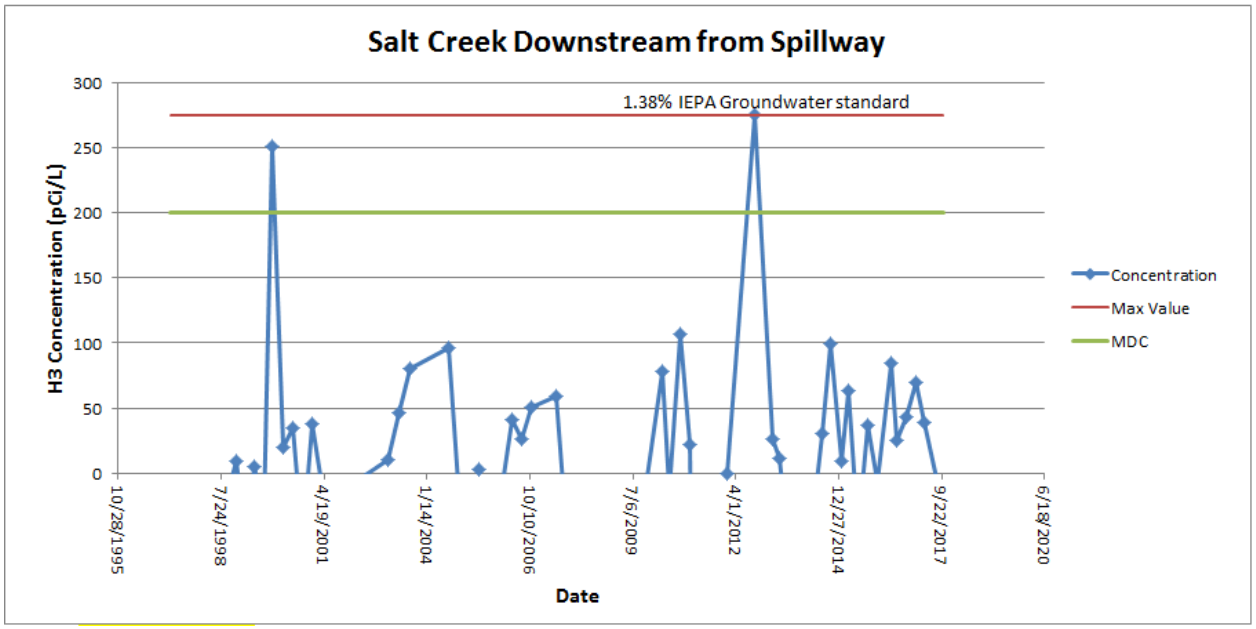
Tables D-2. Trending Graphs for Water from the Clinton Area
(Max value compared to IEPA Class I groundwater standard of 20,000 pCi/L)

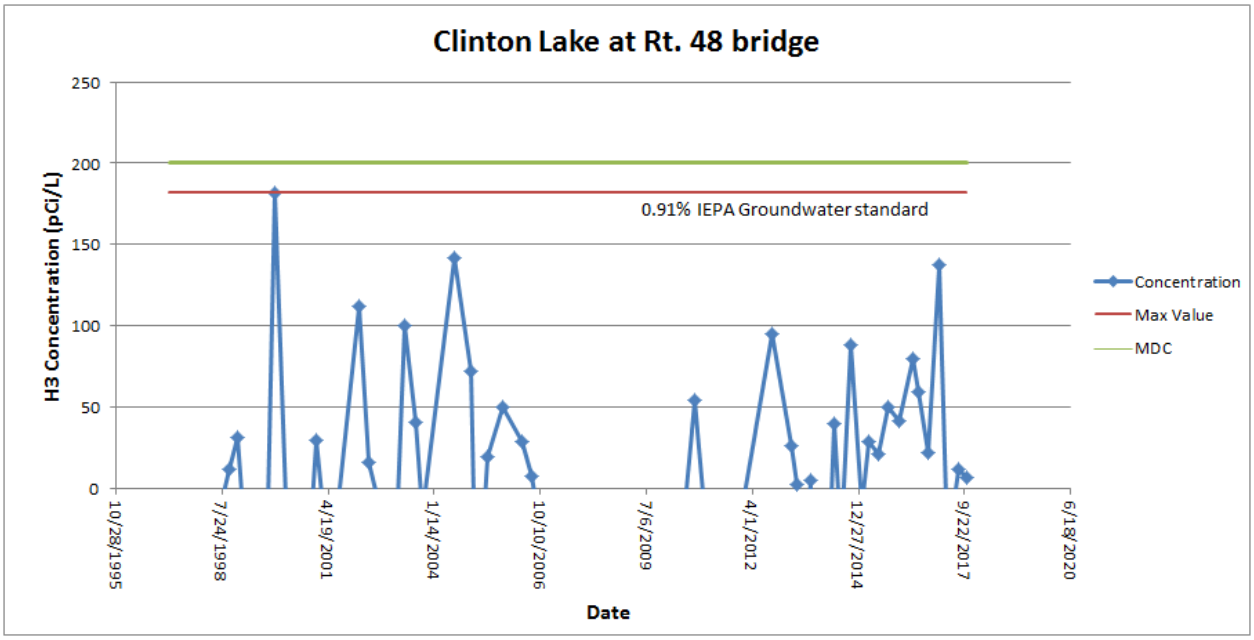


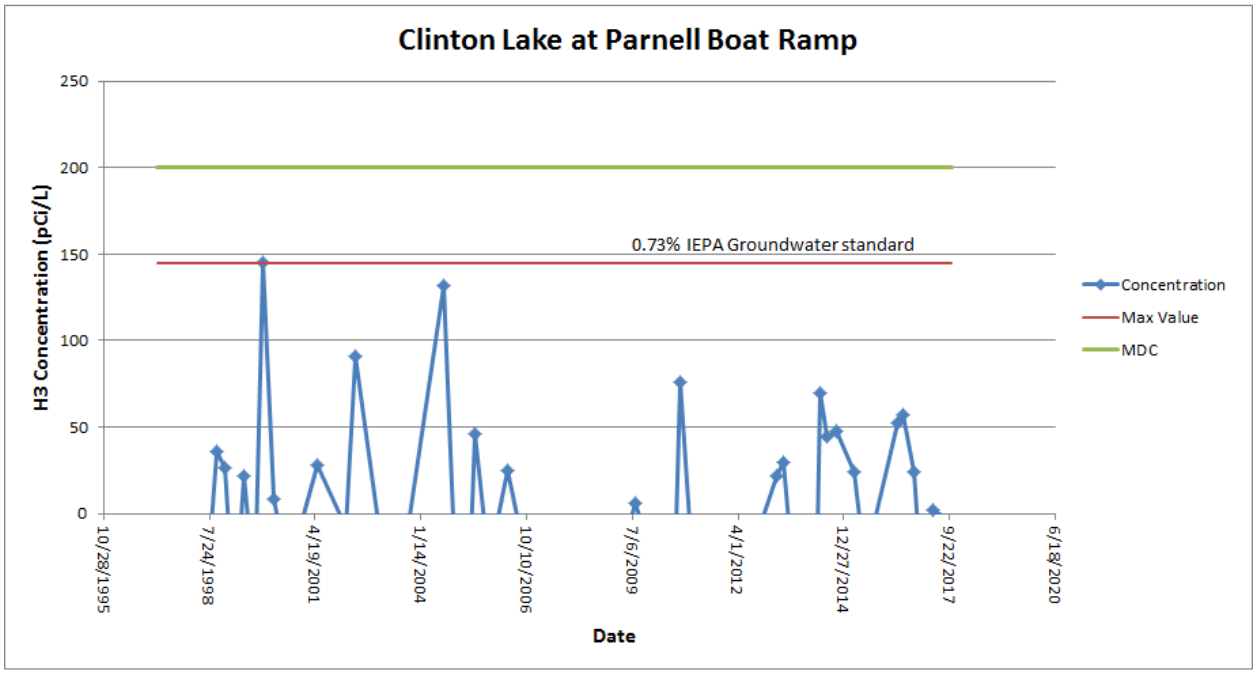


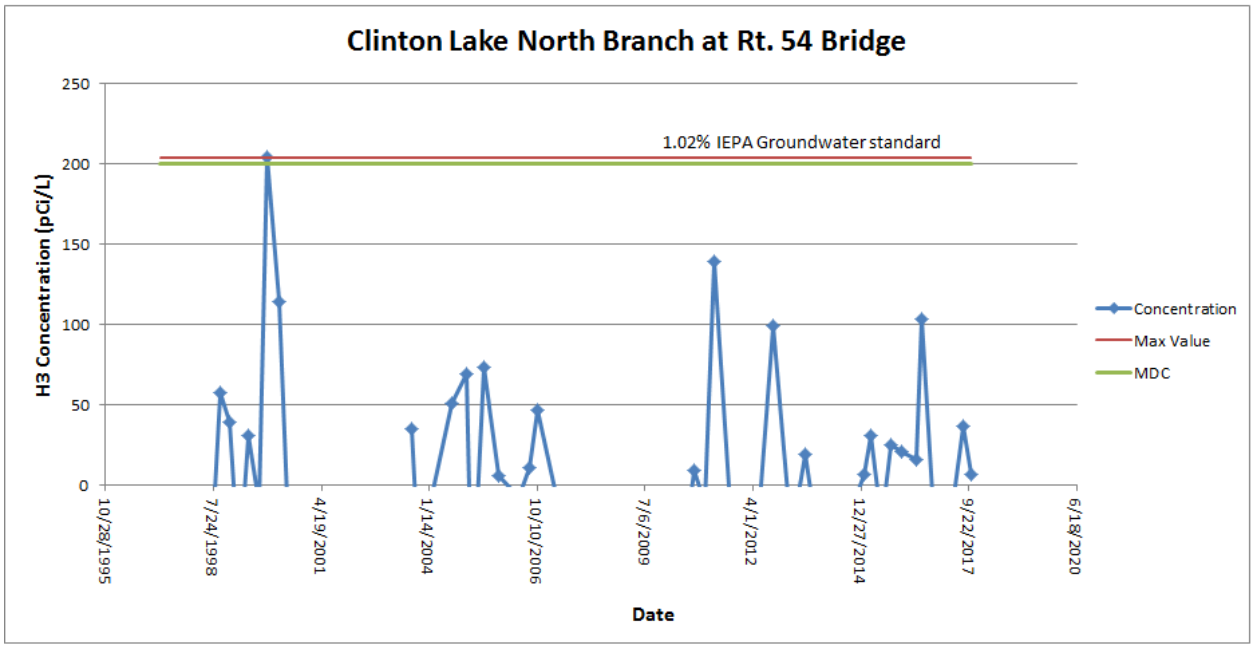

North Fork Creek
H3 Concentration (pCi/L)
250
200
150
100
50
0
0.87% IEPA Groundwater standard
10/28/1995
7/24/1998
4/19/2001
1/14/2004
10/10/2006
7/6/2009
4/1/2012
12/27/2014
9/22/2017
6/18/2020
Date
Concentration
Max Value
MDC


Clinton Lake at Rt. 1489 Bridge
H3 Concentration (pCi/L)
350
300
250
200
150
100
50
0
1.48% IEPA Groundwater standard
10/28/1995
7/24/1998
4/19/2001
1/14/2004
10/10/2006
7/6/2009
4/1/2012
12/27/2014
9/22/2017
6/18/2020
Date
Concentration
Max Value
MDC


Salt Creek Downstream from Spillway
1.38% IEPA Groundwater standard
H3 Concentration (pCi/L)
300
250
200
150
100
50
0
10/28/1995
7/24/1998
4/19/2001
1/14/2004
10/10/2006
7/6/2009
4/1/2012
12/27/2014
9/22/2017
6/18/2020
Date
Concentration
Max Value
MDC


Clinton Lake at Rt. 48 bridge
0.91% IEPA Groundwater standard
H3 Concentration (pCi/L)
250
200
150
100
50
0
10/28/1995
7/24/1998
4/19/2001
1/14/2004
10/10/2006
7/6/2009
4/1/2012
12/27/2014
9/22/2017
6/18/2020
Date
Concentration
Max Value
MDC


Clinton Lake at Parnell Boat Ramp
H3 Concentration (pCi/L)
250
200
150
100
50
0
0.73% IEPA Groundwater standard
10/28/1995
7/24/1998
4/19/2001
1/14/2004
10/10/2006
7/6/2009
4/1/2012
12/27/2014
9/22/2017
6/18/2020
Date
Concentration
Max Value
MDC


Clinton Lake North Branch at Rt. 54 Bridge
H3 Concentration (pCi/L)
250
200
150
100
50
0
1.02% IEPA Groundwater standard
10/28/1995
7/24/1998
4/19/2001
1/14/2004
10/10/2006
7/6/2009
4/1/2012
12/27/2014
9/22/2017
6/18/2020
Date
Concentration
Max Value
MDC

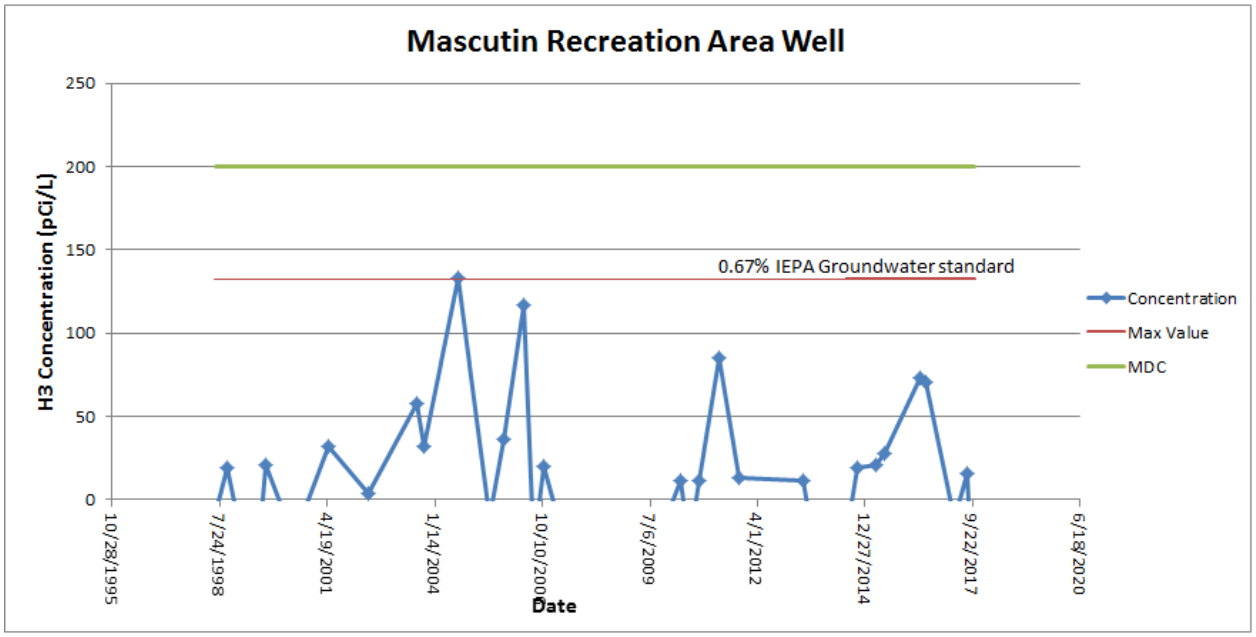

Mascutin Recreation Area Well
H3 Concentration (pCi/L)
250
200
150
100
50
0
0.67% IEPA Groundwater standard
Concentration
Max Value
MDC
10/28/1995
7/24/1998
4/19/2001
1/14/2004
10/10/2006
7/6/2009
4/1/2012
12/27/2014
9/22/2017
6/18/2020
Date

Table D-3. Sample Results for Beta Screening of Water from the Clinton Area
Results are in picocuries per liter (pCi/L)

Location	Beta	
Date	Result	MDC
Bridge over Lake at Route 1489		
1/23/2017	<MDC	4.3
4/11/2017	<MDC	4.3
7/31/2017	<MDC	4.3
10/11/2017	<MDC	4.3
Bridge over Lake at Route 48		
1/23/2017	<MDC	4.3
4/11/2017	<MDC	4.3
7/31/2017	<MDC	4.3
10/11/2017	<MDC	4.3
Effluent Flume at Bridge Route 1489		
1/23/2017	<MDC	4.3
4/11/2017	<MDC	8.7
7/19/2017	<MDC	4.3
10/11/2017	<MDC	8.7
Mascutin Recreation Area (Restaurant)		
4/11/2017	<MDC	4.3
7/31/2017	<MDC	4.3
10/11/2017	<MDC	4.3
North Branch at Route 54 Bridge		
1/23/2017	<MDC	4.3
4/11/2017	<MDC	4.3
7/31/2017	<MDC	4.3
10/11/2017	<MDC	4.3
North Fork Creek		
1/23/2017	<MDC	4.3
4/11/2017	<MDC	4.3
7/19/2017	<MDC	4.3
10/11/2017	5.4	4.3
Parnell Boat Ramp		
1/23/2017	<MDC	4.3
4/11/2017	<MDC	4.3
7/31/2017	<MDC	4.3
10/11/2017	<MDC	4.3
Salt Creek DnS from Spillway		
1/23/2017	<MDC	4.3
4/11/2017	<MDC	4.3
7/31/2017	<MDC	4.3
10/11/2017	<MDC	4.3
Well #7 at Weldon Springs Park		
4/11/2017	<MDC	4.3
7/31/2017	<MDC	4.3
10/11/2017	<MDC	4.3

Table D-4. Gamma Spectroscopy Sample Results for Other Radionuclides in Water from the Clinton Area
Results are in picocuries per liter (pCi/L)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Bridge over Lake at Route 1489																								
1/23/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
4/11/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
7/31/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
10/11/2017	<MDC	111	<MDC	400	<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
Bridge over Lake at Route 48																								
1/23/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
4/11/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
7/31/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
10/11/2017	<MDC	111	<MDC	400	<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
Effluent Flume at Bridge Route 1489																								
1/23/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
4/11/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
7/19/2017	<MDC	111	<MDC	400	<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
10/11/2017	<MDC	111	<MDC	400	<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
Mascutin Recreation Area (Restaurant)																								
4/11/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
7/31/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
10/11/2017	<MDC	111	<MDC	400	<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
North Branch at Route 54 Bridge																								
1/23/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
4/11/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
7/31/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
10/11/2017	<MDC	111	<MDC	400	<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
North Fork Creek																								
1/23/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
4/11/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
7/19/2017	<MDC	111	<MDC	400	<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
10/11/2017	<MDC	111	<MDC	400	<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
Parnell Boat Ramp																								
1/23/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
4/11/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
7/31/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
10/11/2017	<MDC	111	<MDC	400	<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
Salt Creek DnS from Spillway																								
1/23/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
4/11/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
7/31/2017	<MDC	111	<MDC	400	<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
10/11/2017	<MDC	111	<MDC	400	<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
Well #7 at Weldon Springs Park																								
4/11/2017	<MDC	111			<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
7/31/2017	<MDC	111	<MDC	400	<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5
10/11/2017	<MDC	111	<MDC	400	<MDC	4.8	<MDC	4.6	<MDC	4.6	<MDC	3.9	<MDC	15.2	<MDC	114	<MDC	3.9	<MDC	8.3	<MDC	10.2	<MDC	9.5

Table D-5. Total Strontium Results for Water Samples Collected in the Clinton Area
Results are in picocuries per liter (pCi/L)

Location	Date	Nuclide	Result	MDC
Bridge over Lake at Route 48	1/23/2017	Strontium	<MDC	1.2
Effluent Flume at Bridge Route 1489	1/23/2017	Strontium	<MDC	1.2

Table D-6. Soil Sample Results for Clinton Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Mascoutin Recreation Area																						
4/11/2017	<MDC	1.39			<MDC	0.04	<MDC	0.04	<MDC	0.03	<MDC	0.04	<MDC	0.14	<MDC	0.04	<MDC	0.10	<MDC	0.09	<MDC	0.12
7/31/2017	<MDC	1.39			<MDC	0.04	<MDC	0.04	<MDC	0.03	0.05	0.04	<MDC	0.14	<MDC	0.04	<MDC	0.10	<MDC	0.09	<MDC	0.12
North Branch at Route 54 Bridge																						
4/11/2017	<MDC	1.39			<MDC	0.04	<MDC	0.04	<MDC	0.03	0.10	0.04	<MDC	0.14	<MDC	0.04	<MDC	0.10	<MDC	0.09	<MDC	0.12
7/31/2017	<MDC	1.39			<MDC	0.04	<MDC	0.04	<MDC	0.03	<MDC	0.04	<MDC	0.14	<MDC	0.04	<MDC	0.10	<MDC	0.09	<MDC	0.12
North Fork Creek																						
4/11/2017	<MDC	1.39			<MDC	0.04	<MDC	0.04	<MDC	0.03	0.07	0.04	<MDC	0.14	<MDC	0.04	<MDC	0.10	<MDC	0.09	<MDC	0.12
7/19/2017	<MDC	1.39	<MDC	0.16	<MDC	0.04	<MDC	0.04	<MDC	0.03	<MDC	0.04	<MDC	0.14	<MDC	0.04	<MDC	0.10	<MDC	0.09	<MDC	0.12
Weldon Springs Entrance																						
4/11/2017	<MDC	1.39			<MDC	0.04	<MDC	0.04	<MDC	0.03	0.06	0.04	<MDC	0.14	<MDC	0.04	<MDC	0.10	<MDC	0.09	<MDC	0.12
7/19/2017	<MDC	1.39			<MDC	0.04	<MDC	0.04	<MDC	0.03	<MDC	0.04	<MDC	0.14	<MDC	0.04	<MDC	0.10	<MDC	0.09	<MDC	0.12

Table D-7. Sediment Sample Results for Clinton Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Effluent Flume at Bridge Route 1489																						
4/11/2017	<MDC	1.4			<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3
7/19/2017	<MDC	1.4			<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3
North Fork Creek																						
4/11/2017	<MDC	1.4			<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3
8/30/2017	<MDC	1.4	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3
Parnell Boat Ramp																						
4/11/2017	<MDC	1.4			<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3
8/30/2017	<MDC	1.4	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	0.1	<MDC	0.2	<MDC	0.3	<MDC	0.3

Table D-8. Vegetation Sample Results for Clinton Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Mascoutin Recreation Area																								
4/11/2017	<MDC	3.9			<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	6.2	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
7/31/2017	<MDC	3.9	<MDC	3.5	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	6.2	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
North Branch at Route 54 Bridge																								
4/11/2017	<MDC	3.9			<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	6.2	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
7/31/2017	<MDC	3.9	<MDC	3.5	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	6.2	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
North Fork Creek																								
4/11/2017	<MDC	3.9			<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	6.2	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
7/19/2017	<MDC	3.9	<MDC	3.5	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	6.2	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
Weldon Springs Entrance																								
4/11/2017	<MDC	3.9			<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	6.2	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
7/19/2017	<MDC	3.9	<MDC	3.5	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	6.2	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2

Table D-9. Gamma Detection Network Results for Clinton

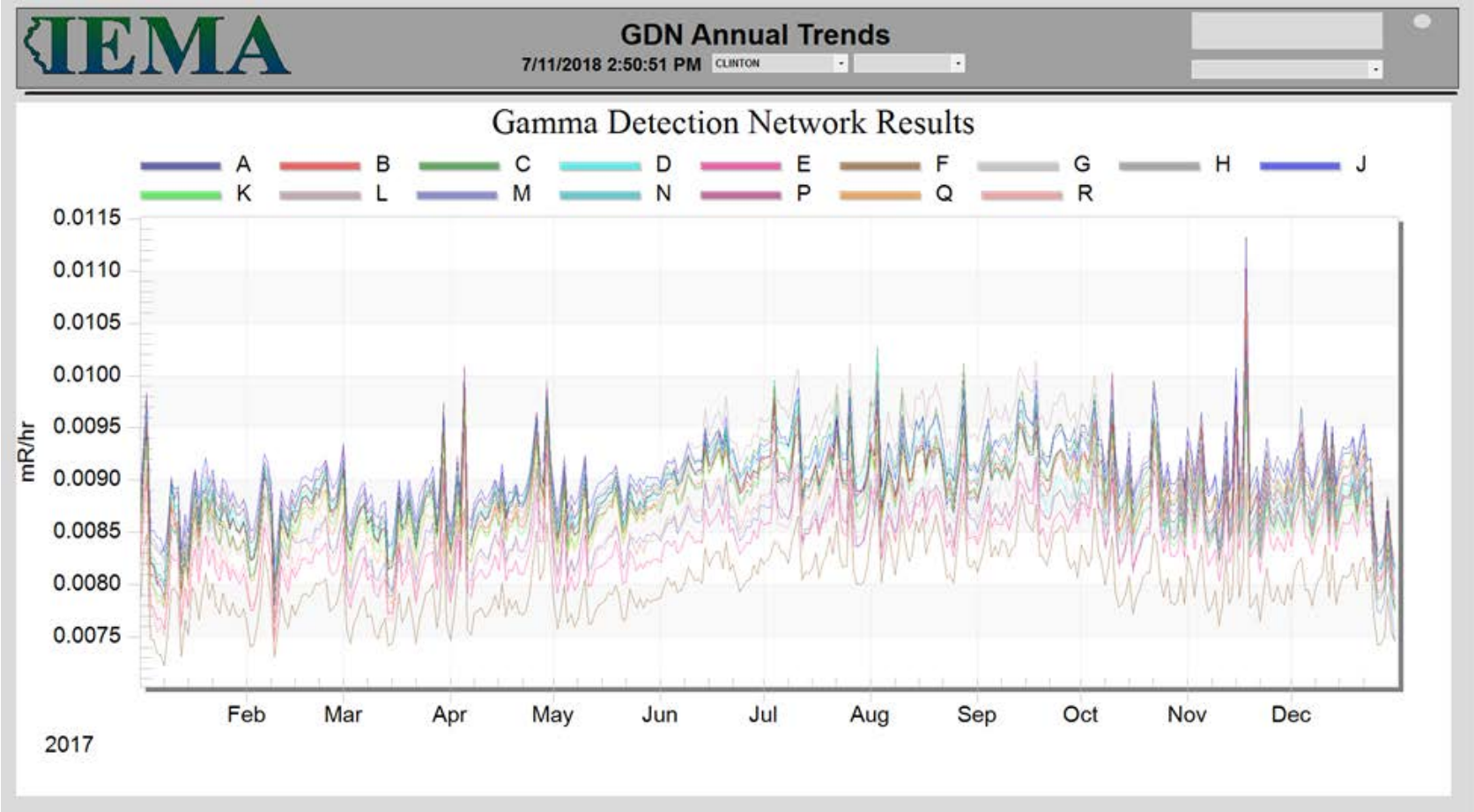


Table D-10. Summary of Ambient Gamma Results for Clinton Area

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
CP001	8.58		10.40	11.13	40.15
CP003	6.75	8.21	10.59	10.13	35.68
CP006	6.84	5.38	7.48	8.21	27.92
CP009	8.30	8.67	9.58	8.40	34.95
CP011	10.04	7.12	10.04	11.22	38.42
CP013	6.66	5.57	6.48		24.94
CP016	11.13	9.13	11.32	11.32	42.89
CP018	9.86	9.86	10.31	11.13	41.15
CP019	10.77	9.40	11.50	11.68	43.34
CP022	10.59	9.31	12.59	10.68	43.16
CP025	10.77	8.21	12.50	11.22	42.71
CP027	8.30	5.75	9.58	9.49	33.12
CP028	9.22	8.30	10.59	10.68	38.78
CP031	9.49	9.31	9.13	10.13	38.05
CP032		7.85	10.22	10.13	37.60
CP033		5.29	8.67	8.40	29.81
CP034	7.76	8.76	10.40	9.95	36.87
CP035	8.58	7.48	9.40	9.31	34.77
CP036	8.49		12.50	11.50	43.31
CP037	9.95	10.13	11.95	11.59	43.62
CP038			10.77	9.76	41.06
CP039	9.49	6.75	13.69	12.05	41.98
CP040	9.22	8.12	10.22	10.13	37.69
CP041	10.13	7.94	11.22	10.49	39.79
CP042	10.13	8.40	10.59	10.22	39.33
CP043	7.94	9.31	10.68	10.31	38.23
CP044	9.40	9.58	12.05	11.95	42.98
CP045	8.40	8.40	11.32	9.95	38.05
CP046	11.04	9.95	11.13	9.86	41.98
CP047	10.40	8.30	11.86	10.59	41.15
CP048	9.67	7.76	12.05	10.86	40.33
CP049	9.49		11.22	10.31	41.37
CP050	10.49	8.30	11.32	10.95	41.06
CP051	10.77	9.40	8.76	11.41	40.33

Table D-10. Summary of Ambient Gamma Results for Clinton Area (continued)

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
CP-RSA	8.40	9.40	10.04	11.50	39.33
CP-RSB	11.59	7.67	11.22	10.77	41.25
CP-RSC	8.58	9.40	10.68	9.95	38.60
CP-RSD	8.76	9.49	9.13	10.22	37.60
CP-RSE	9.40	7.85	9.67	9.49	36.41
CP-RSF	7.39	6.02	10.68		32.12
CP-RSG	8.03	7.57	9.03	10.40	35.04
CP-RSH	9.86	8.30	12.14	11.41	41.70
CP-RSJ		9.86	11.59	10.04	41.98
CP-RSK	8.49	8.85	9.58	10.59	37.50
CP-RSL	9.67	8.49	12.78	10.49	41.43
CP-RSM	7.94	6.21	8.40	10.86	33.40
CP-RSN	9.40	9.03	11.04	10.40	39.88
CP-RSP	8.58	8.21	10.40	11.32	38.51
CP-RSQ	8.76	7.48	10.22	9.95	36.41
CP-RSR	7.21	8.76	10.13	10.40	36.50

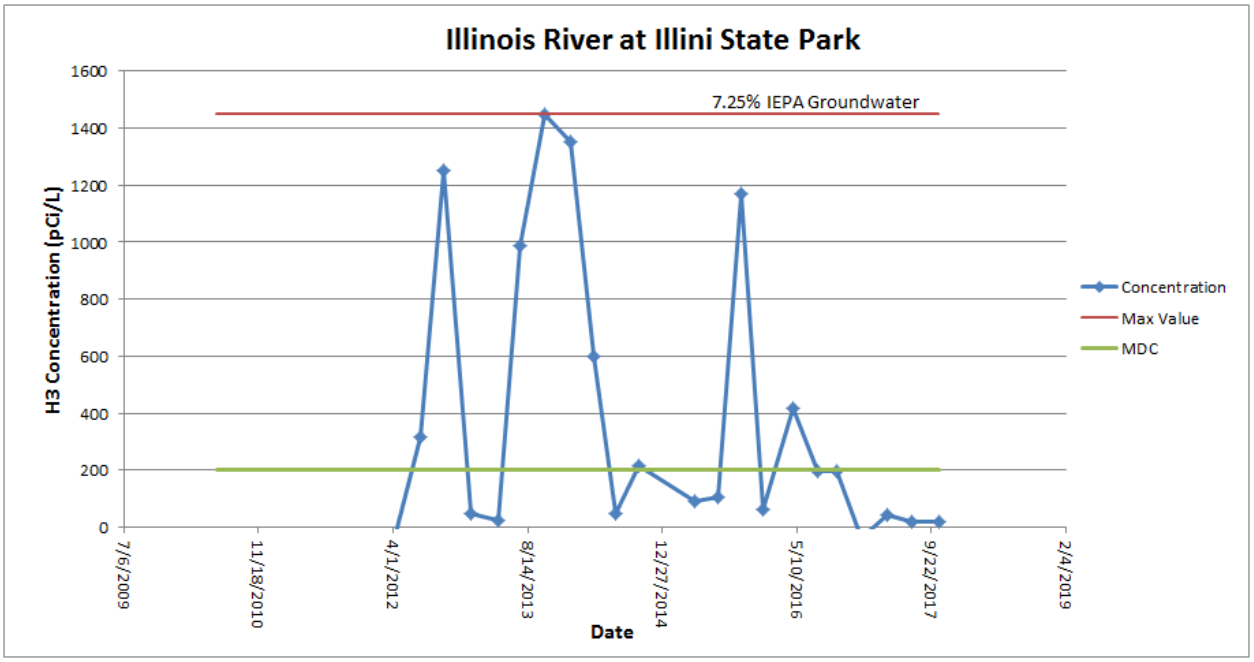
Blanks in the table indicate that dosimeters were missing at the end of the quarter.
Annual Exposure column based on averages of all available data.
Quarter length is estimated to be 91.25 days.

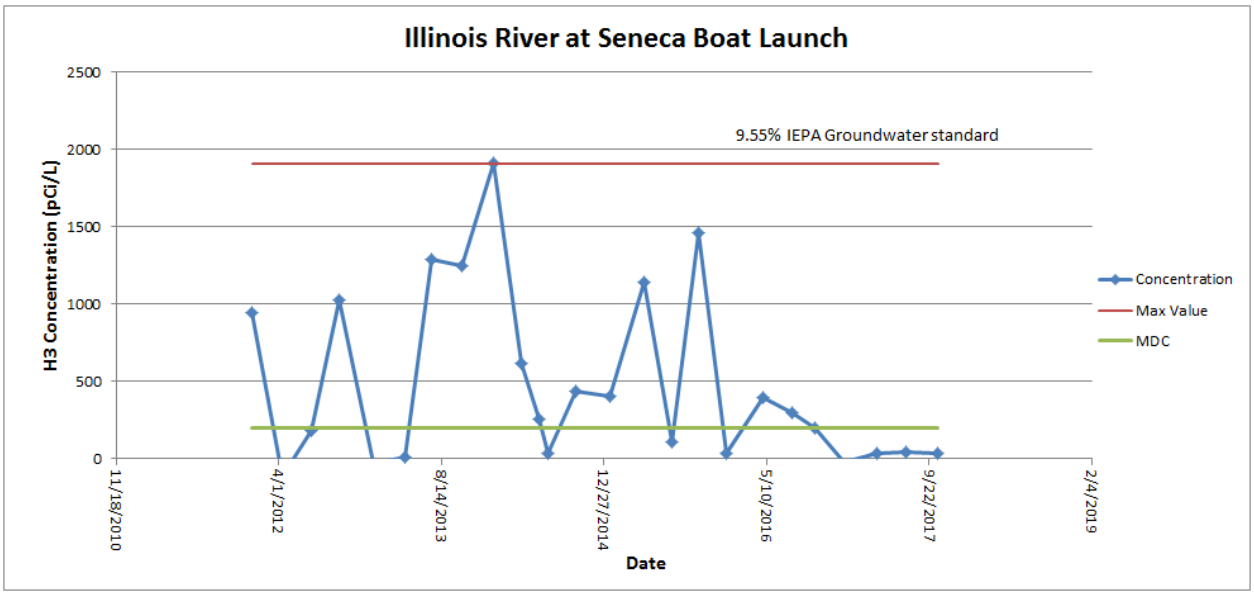
Appendix E
LaSalle Sample Results

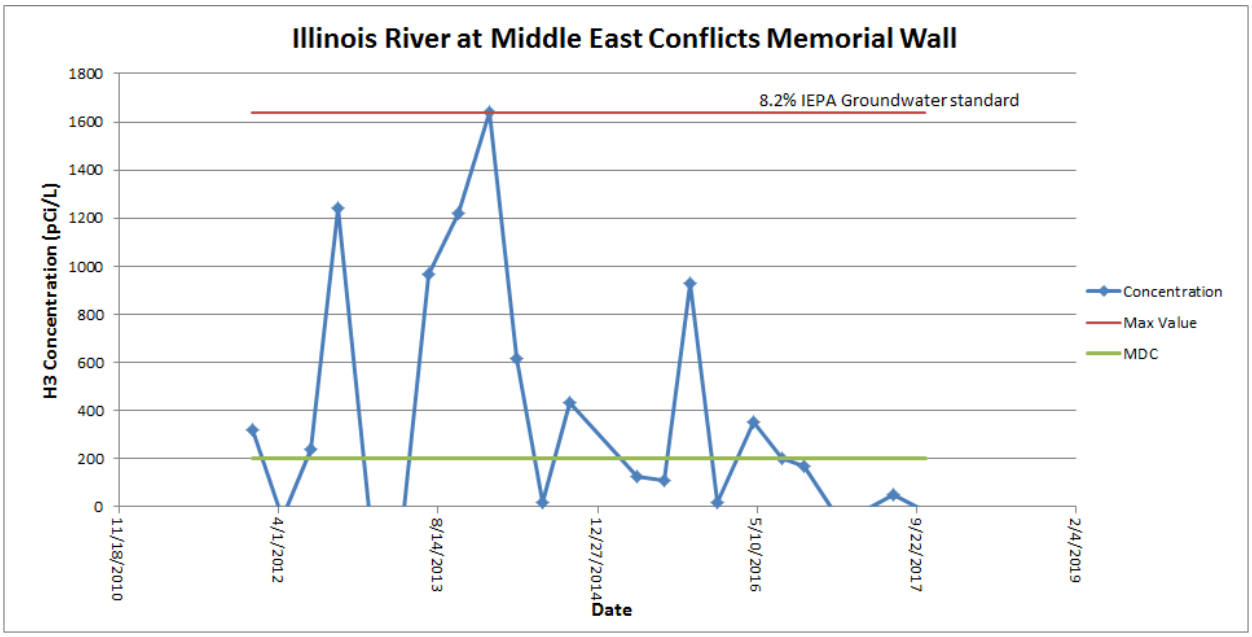
Table E-1. Tritium in Water Sample Results for LaSalle Area
Results are in picocuries per liter (pCi/L)

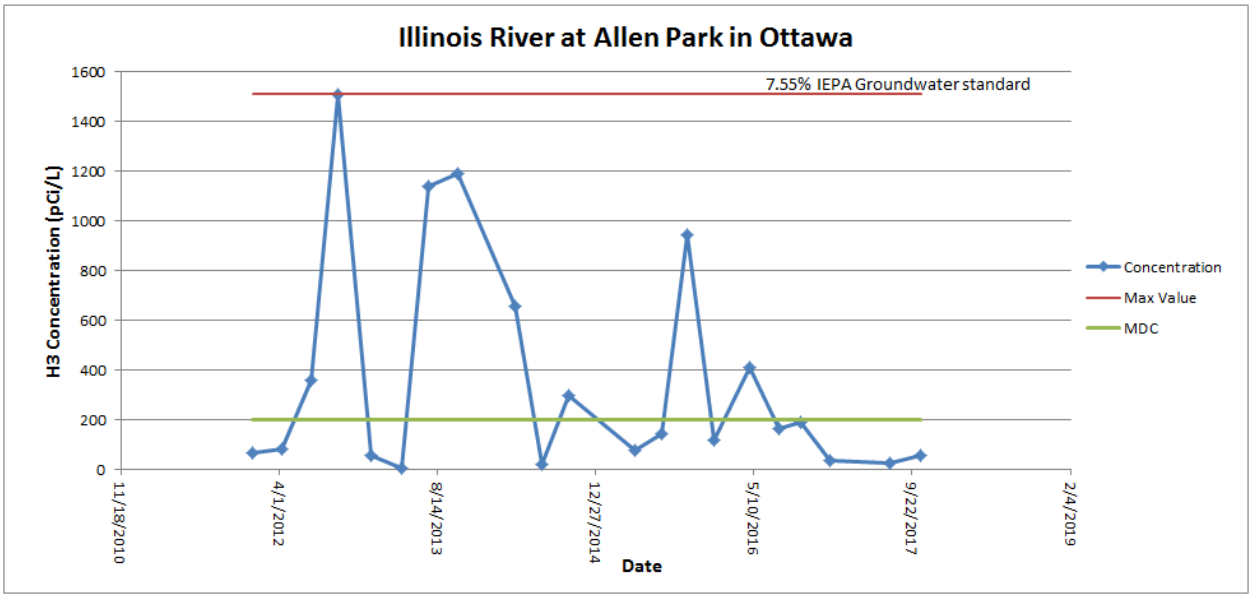
Location	H-3	
Date	Result	MDC
Allen Park, South Ottawa		
1/4/2017	<MDC	200
7/12/2017	<MDC	200
10/19/2017	<MDC	200
Hog Run Creek near LS-49		
1/4/2017	<MDC	200
4/12/2017	<MDC	200
7/12/2017	<MDC	200
10/19/2017	<MDC	200
Illinois River at Illini State Park		
1/4/2017	<MDC	200
4/12/2017	<MDC	200
7/12/2017	<MDC	200
10/19/2017	<MDC	200
Middle East Conflicts Wall Memorial, Marseilles		
1/4/2017	<MDC	200
4/12/2017	<MDC	200
7/12/2017	<MDC	200
10/19/2017	<MDC	200
Seneca, Illinois Boat Launch		
1/4/2017	<MDC	200
4/12/2017	<MDC	200
7/12/2017	<MDC	200
10/19/2017	<MDC	200
Starved Rock State Park		
1/4/2017	<MDC	200
4/12/2017	<MDC	200
7/12/2017	<MDC	200
10/19/2017	<MDC	200
Waupecan Creek near LS-5		
1/4/2017	<MDC	200
4/12/2017	<MDC	200
7/12/2017	<MDC	200
10/19/2017	<MDC	200
Wolf Creek near LS-18		
1/4/2017	<MDC	200
4/12/2017	<MDC	200
7/12/2017	<MDC	200
10/19/2017	<MDC	200

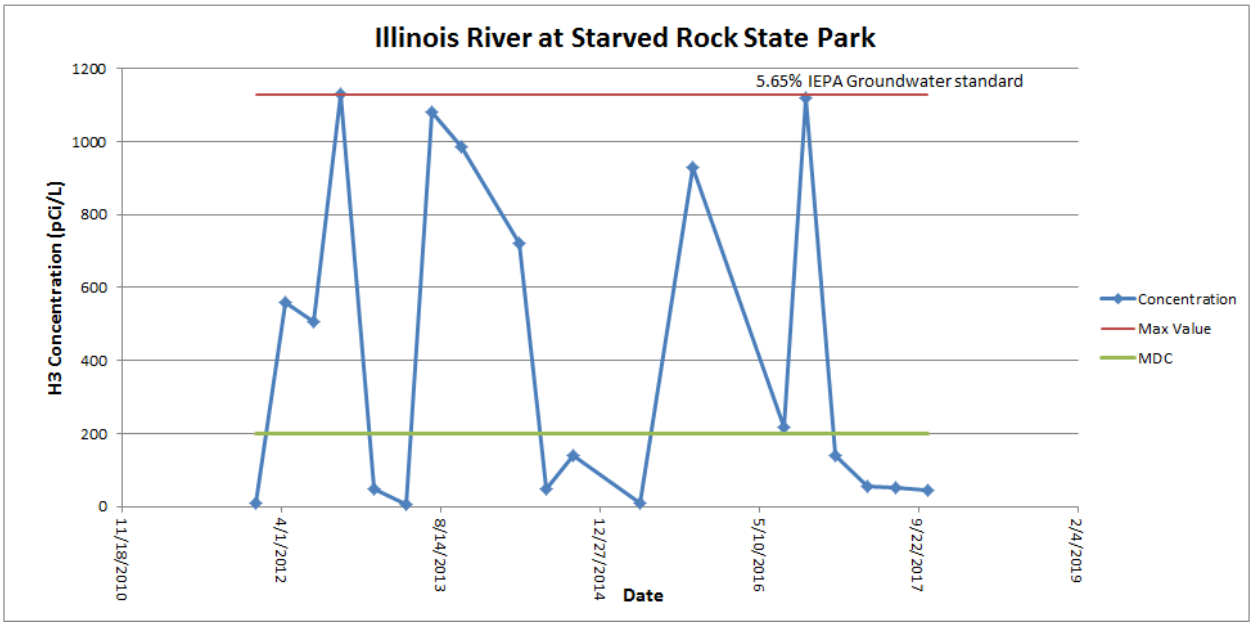
Tables E-2. Trending Graphs for Water from the LaSalle Area
(Max value compared to IEPA Class I groundwater standard of 20,000 pCi/L)

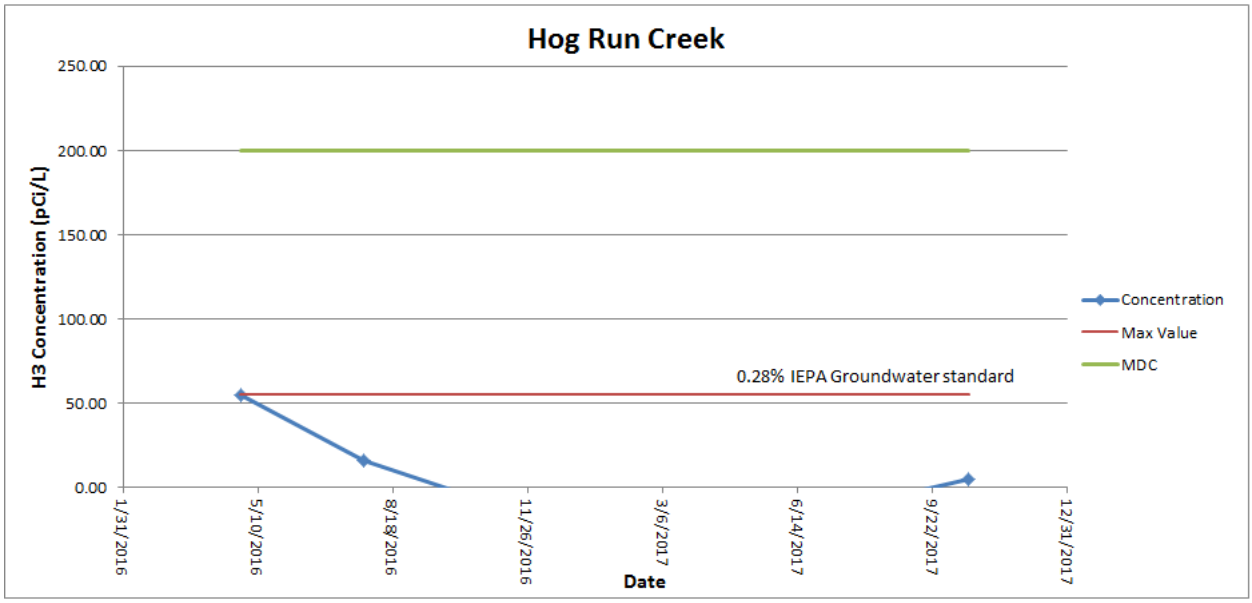


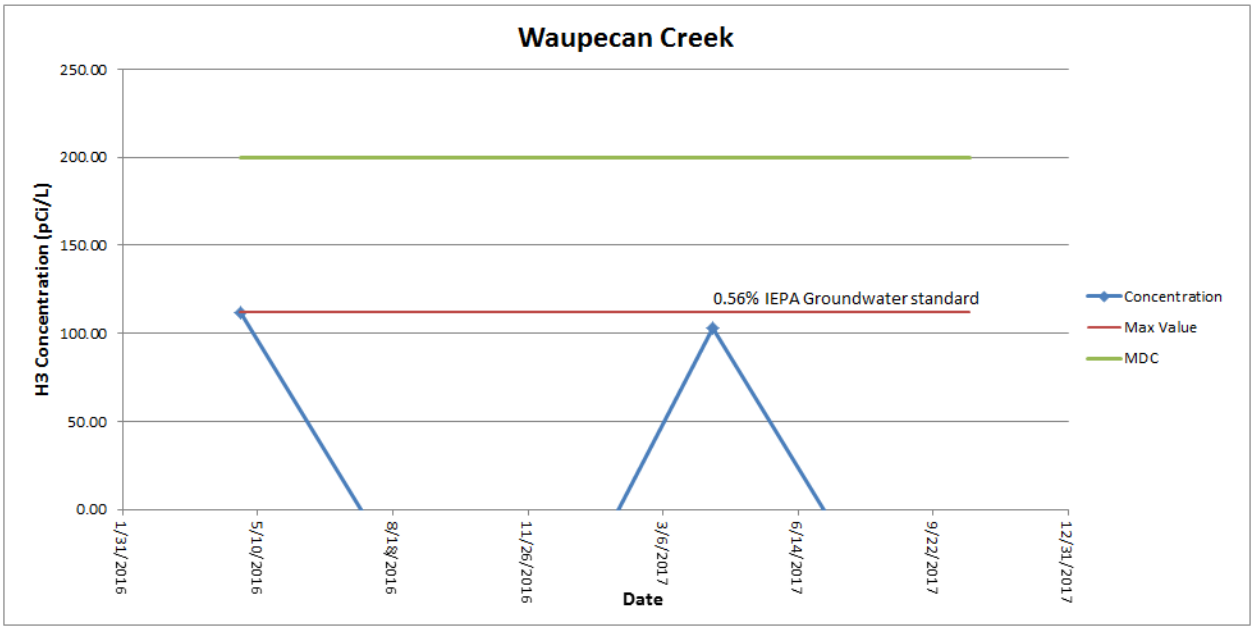



Illinois River at Middle East Conflicts Memorial Wall
8.2% IEPA Groundwater standard
H3 Concentration (pCi/L)
1800
1600
1400
1200
1000
800
600
400
200
0
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC


Illinois River at Allen Park in Ottawa
7.55% IEPA Groundwater standard
H3 Concentration (pCi/L)
1600
1400
1200
1000
800
600
400
200
0
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC


Illinois River at Starved Rock State Park
5.65% IEPA Groundwater standard
H3 Concentration (pCi/L)
1200
1000
800
600
400
200
0
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC


Hog Run Creek
0.28% IEPA Groundwater standard
H3 Concentration (pCi/L)
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2016
5/10/2016
8/18/2016
11/26/2016
3/6/2017
6/14/2017
9/22/2017
12/31/2017
Date
Concentration
Max Value
MDC


Waupecan Creek
250.00
200.00
150.00
100.00
50.00
0.00
H3 Concentration (pCi/L)
0.56% IEPA Groundwater standard
Concentration
Max Value
MDC
1/31/2016
5/10/2016
8/18/2016
11/26/2016
3/6/2017
6/14/2017
9/22/2017
12/31/2017
Date

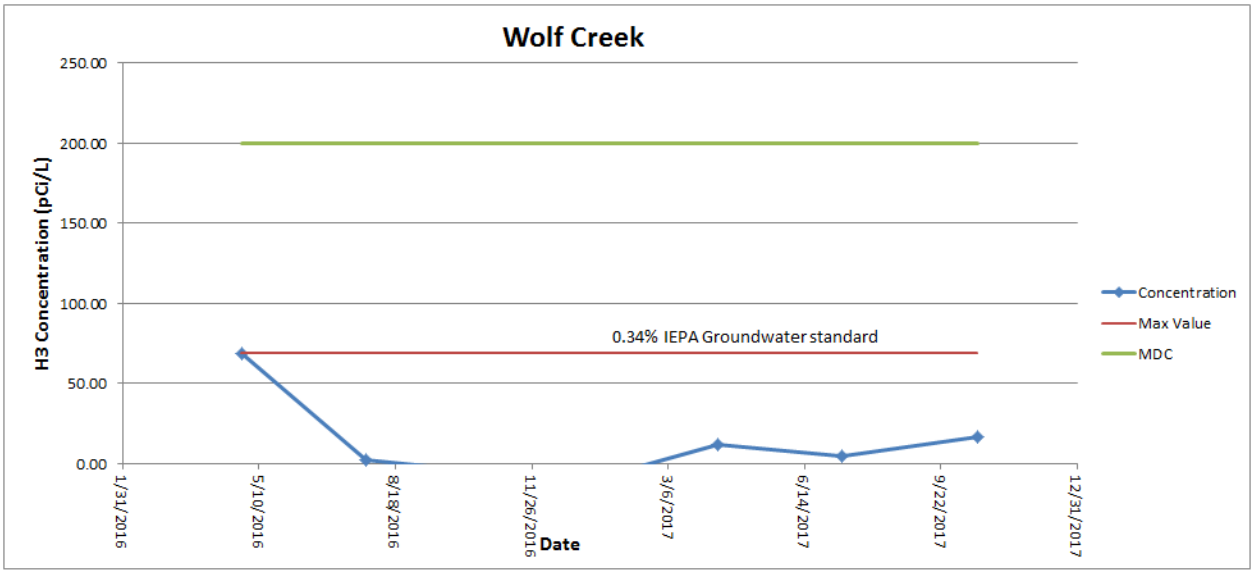

Wolf Creek
250.00
200.00
150.00
100.00
50.00
0.00
H3 Concentration (pCi/L)
0.34% IEPA Groundwater standard
Concentration
Max Value
MDC
1/31/2016
5/10/2016
8/18/2016
11/26/2016
3/6/2017
6/14/2017
9/22/2017
12/31/2017
Date

Table E-3. Sample Results for Beta Screening of Water from the LaSalle Area
Results are in picocuries per liter (pCi/L)

Location	Beta	
Date	Result	MDC
Allen Park, South Ottawa		
1/4/2017	4.5	3.9
7/12/2017	4.9	3.9
10/19/2017	<MDC	3.9
Hog Run Creek near LS-49		
1/4/2017	<MDC	3.9
4/12/2017	<MDC	3.9
10/19/2017	<MDC	3.9
Illinois River at Illini State Park		
1/4/2017	4.3	3.9
4/12/2017	4.4	3.9
7/12/2017	4.5	3.9
10/19/2017	<MDC	3.9
Middle East Conflicts Wall Memorial, Marseilles		
1/4/2017	<MDC	3.9
4/12/2017	5.3	3.9
7/12/2017	<MDC	3.9
10/19/2017	<MDC	3.9
Seneca, Illinois Boat Launch		
1/4/2017	6.1	3.9
4/12/2017	6.0	3.9
7/12/2017	5.0	3.9
10/19/2017	<MDC	3.9
Starved Rock State Park		
1/4/2017	<MDC	3.9
4/12/2017	<MDC	3.9
7/12/2017	<MDC	3.9
10/19/2017	<MDC	3.9
Waupecan Creek near LS-5		
1/4/2017	<MDC	3.9
4/12/2017	<MDC	3.9
7/12/2017	<MDC	3.9
10/19/2017	<MDC	3.9
Wolf Creek near LS-18		
1/4/2017	<MDC	3.9
4/12/2017	<MDC	3.9
7/12/2017	<MDC	3.9
10/19/2017	<MDC	3.9

Table E-4. Gamma Spectroscopy Sample Results for Other Radionuclides in Water from the LaSalle Area
Results are in picocuries per liter (pCi/L)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Allen Park, South Ottawa																								
1/4/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
7/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
10/19/2017	<MDC	148	<MDC	360	<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
Hog Run Creek near LS-49																								
1/4/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
4/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
10/19/2017	<MDC	148	<MDC	360	<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
Illinois River at Illini State Park																								
1/4/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
4/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
7/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
10/19/2017	<MDC	148	<MDC	360	<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
Middle East Conflicts Wall Memorial, Marseilles																								
1/4/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
4/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
7/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
10/19/2017	<MDC	148	<MDC	360	<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
Seneca, Illinois Boat Launch																								
1/4/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
4/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
7/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
10/19/2017	<MDC	148	<MDC	360	<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
Starved Rock State Park																								
1/4/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
4/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
7/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
10/19/2017	<MDC	148	<MDC	360	<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
Waupecan Creek near LS-5																								
1/4/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
4/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
7/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
10/19/2017	<MDC	148	<MDC	360	<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
Wolf Creek near LS-18																								
1/4/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
4/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
7/12/2017	<MDC	148			<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6
10/19/2017	<MDC	148	<MDC	360	<MDC	5.1	<MDC	4.3	<MDC	4.2	<MDC	3.7	<MDC	14.2	<MDC	166	<MDC	4.2	<MDC	7.7	<MDC	9.7	<MDC	10.6

Table E-5. Total Strontium Results for Water Samples Collected in the LaSalle Area
Results are in picocuries per liter (pCi/L)

Location	Date	Nuclide	Result	MDC
Illinois River at Illini State Park	4/12/2017	Strontium	<MDC	1.6

Table E-6. Soil Sample Results for LaSalle Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Hog Run Creek near LS-49																				
4/12/2017	<MDC	1.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.08	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.08	<MDC	0.09	<MDC	0.10
Illini State Park																				
4/12/2017	<MDC	1.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.08	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.08	<MDC	0.09	<MDC	0.10
7/12/2017	<MDC	1.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.18	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.08	<MDC	0.09	<MDC	0.10
Lot off of Kinsman Road																				
4/12/2017	<MDC	1.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.22	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.08	<MDC	0.09	<MDC	0.10
Wolf Creek near LS-18																				
4/12/2017	<MDC	1.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.05	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.08	<MDC	0.09	<MDC	0.10
7/12/2017	<MDC	1.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.09	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.08	<MDC	0.09	<MDC	0.10

Table E-7. Sediment Sample Results for LaSalle Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Allen Park, South Ottawa																				
7/12/2017	<MDC	0.70	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.07
Seneca, Illinois Boat Launch																				
4/12/2017	<MDC	0.70	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.07
7/12/2017	<MDC	0.70	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.07

Table E-8. Vegetation Sample Results for LaSalle Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Hog Run Creek near LS-49																								
7/12/2017	<MDC	5.5			<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.6	<MDC	12.2	<MDC	0.2	<MDC	0.4	<MDC	0.4	<MDC	0.4
Illini State Park																								
4/12/2017	<MDC	5.5			<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.6	<MDC	12.2	<MDC	0.2	<MDC	0.4	<MDC	0.4	<MDC	0.4
7/12/2017	<MDC	5.5	<MDC	4.5	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.6	<MDC	12.2	<MDC	0.2	<MDC	0.4	<MDC	0.4	<MDC	0.4
Lot off of Kinsman Road																								
4/12/2017	<MDC	5.5			<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.6	<MDC	12.2	<MDC	0.2	<MDC	0.4	<MDC	0.4	<MDC	0.4
Wolf Creek near LS-18																								
4/12/2017	<MDC	5.5			<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.6	<MDC	12.2	<MDC	0.2	<MDC	0.4	<MDC	0.4	<MDC	0.4
7/12/2017	<MDC	5.5			<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.6	<MDC	12.2	<MDC	0.2	<MDC	0.4	<MDC	0.4	<MDC	0.4

Table E-9. Gamma Detection Network Results for LaSalle

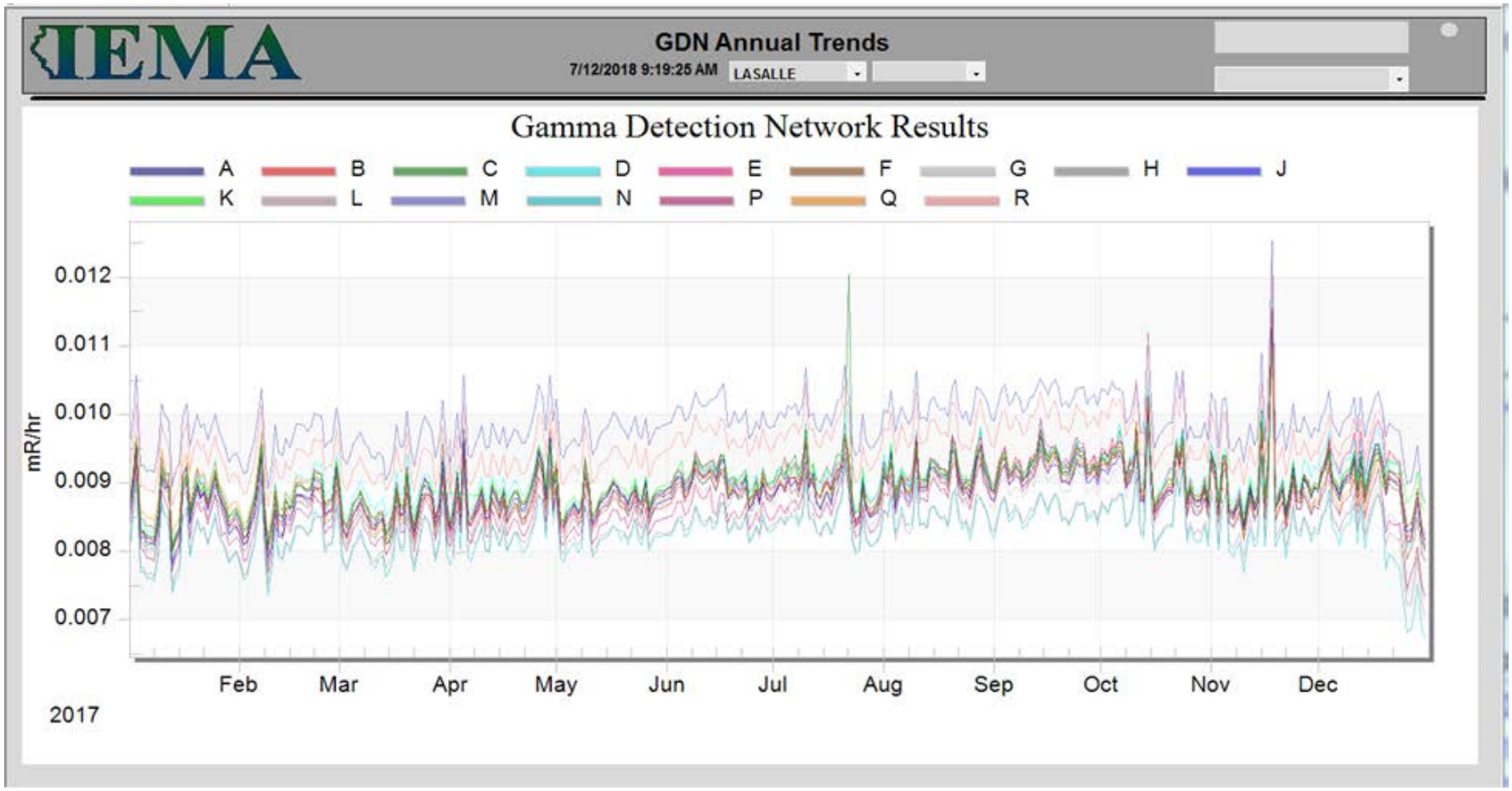


Table E-10. Summary of Ambient Gamma Results for LaSalle Area

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
LS001	8.49	10.40	11.04	10.86	40.79
LS002	9.58	9.95	11.50	10.40	41.43
LS003	9.58	10.49	11.95	9.76	41.79
LS004	11.59	11.59	10.40	11.04	44.62
LS005	10.59	8.85	9.13	8.40	36.96
LS007	10.13	10.95	10.04	11.04	42.16
LS009	7.21	8.21	9.67	9.13	34.22
LS011	8.12	10.04	9.95	8.67	36.77
LS012	8.58	7.30	8.58	9.49	33.95
LS014		8.67	9.76	7.67	34.80
LS015		9.58	9.67	10.95	40.27
LS016	6.66	5.75	8.12	9.40	29.93
LS017	10.95		11.04	11.13	44.17
LS018	10.77	11.41	11.41	10.77	44.35
LS019	9.67	9.31	11.77		41.00
LS021	8.30	9.03	8.67	9.76	35.77
LS023	9.49	10.04	9.58	8.85	37.96
LS024	10.13	10.68	10.40	10.86	42.07
LS025		9.49	11.22	9.58	40.39
LS027	7.57	9.13	7.48	8.12	32.30
LS030	9.58	10.04	10.04	9.49	39.15
LS031	7.85	8.03	8.40		32.36
LS034	7.85	7.12	7.76	7.30	30.02
LS036	12.23		11.50	12.68	48.55
LS037	9.22	8.85	11.04	11.04	40.15
LS038	9.22	10.77	10.59	11.04	41.61
LS039	9.95	8.21	8.30	8.49	34.95
LS040	8.40	9.58	9.31		36.38
LS041	11.13	10.77	11.50	11.95	45.35
LS042	9.22	10.13	10.77	11.50	41.61
LS043	11.04		11.22	10.04	43.07
LS046	11.32	10.31	10.22	9.95	41.79
LS047	9.95		10.68	11.41	42.71
LS048	8.21	8.67	10.40	9.49	36.77
LS049	9.31	10.68	9.67	11.22	40.88
LS050	8.85	10.04	9.49	9.76	38.14
LS051	8.30	12.23	10.77	11.13	42.43
LS052	8.49	9.22	9.22		35.89
LS053	9.40	9.95	9.95	10.13	39.42
LS054		8.21	10.40	10.68	39.06
LS055		10.77	10.86	12.14	45.02
LS056	9.49	8.58	8.58	9.40	36.04
LS057	9.22	9.86	9.67	10.04	38.78

Table E-10. Summary of Ambient Gamma Results for LaSalle Area (continued)

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
LS-RSA	10.13	8.94	10.77	9.22	39.06
LS-RSB	10.22	10.59	10.49	11.59	42.89
LS-RSC	9.13	10.13	10.04	10.49	39.79
LS-RSD	8.85	9.40	9.22	13.78	41.25
LS-RSE	9.40	8.12	7.94	8.03	33.49
LS-RSF		10.77	9.03	9.22	38.69
LS-RSG	8.58	9.13	7.94	9.86	35.50
LS-RSH	8.67	9.49	8.94	10.40	37.50
LS-RSJ	9.67	11.59	9.49	9.58	40.33
LS-RSK	12.59	11.86	11.50	10.31	46.26
LS-RSL	10.49	9.86	10.59	10.13	41.06
LS-RSM	11.04	12.96	12.59	12.32	48.91
LS-RSN	7.94	10.40	9.58	11.32	39.24
LS-RSP	9.58	9.95	11.50	10.95	41.98
LS-RSQ	9.40	9.40	9.49	9.03	37.32
LS-RSR	9.49	12.05	10.13	10.86	42.52

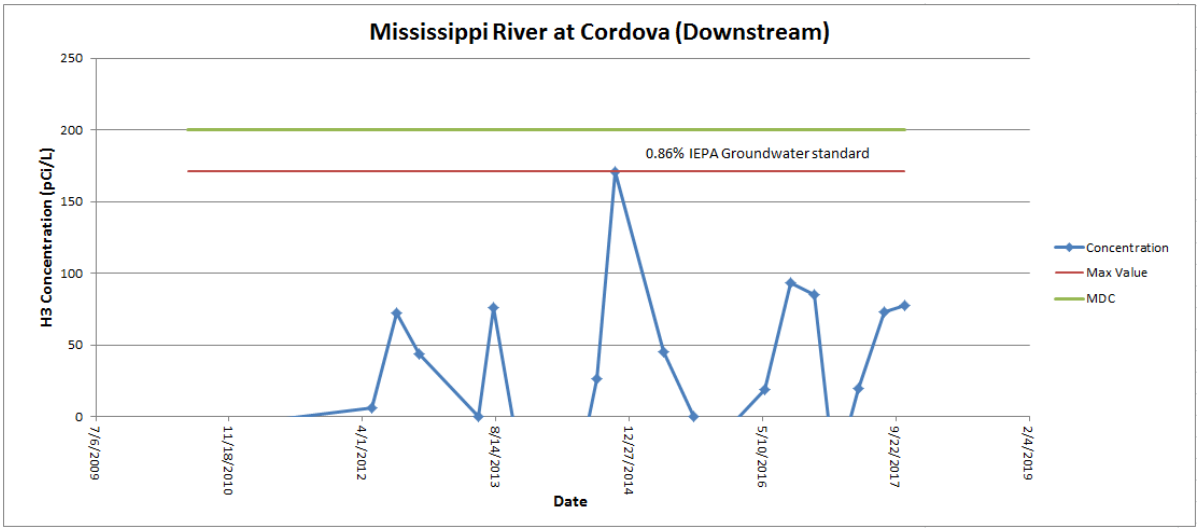
Blanks in the table indicate that dosimeters were missing at the end of the quarter.
Annual Exposure column based on averages of all available data.
Quarter length is estimated to be 91.25 days.

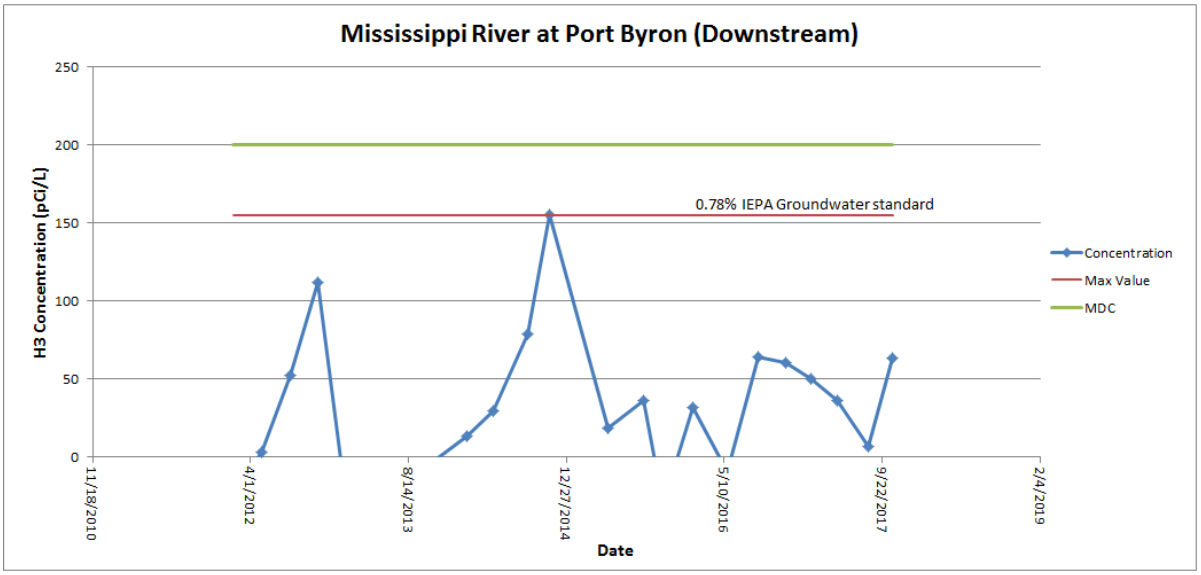
Appendix F
Quad Cities Sample Results

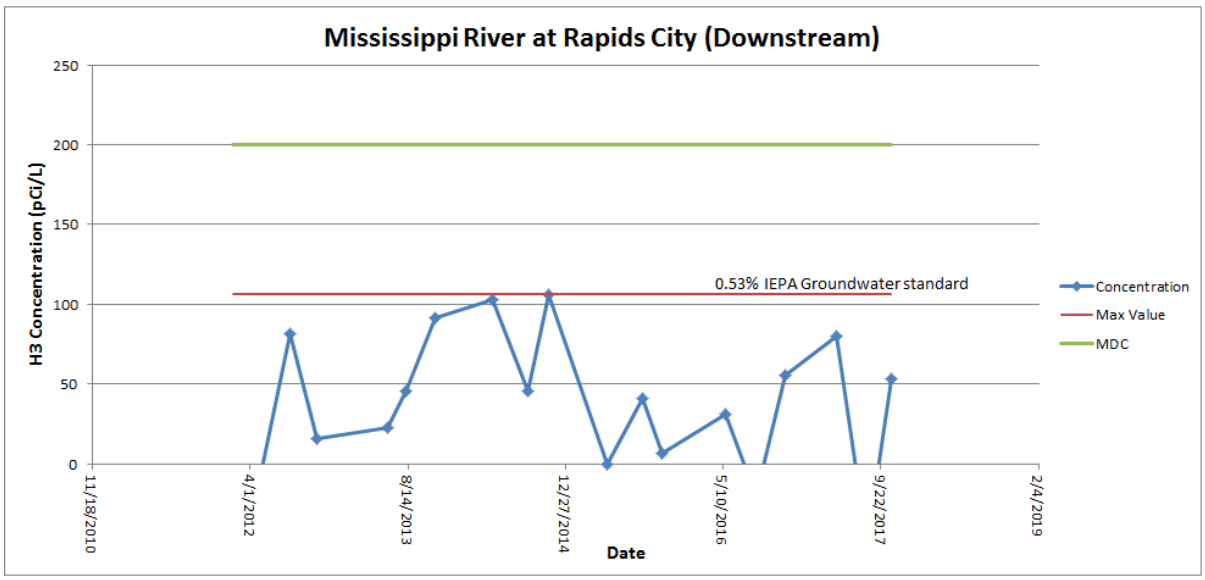
Table F-1. Tritium in Water Sample Results for Quad Cities Area
Results are in picocuries per liter (pCi/L)

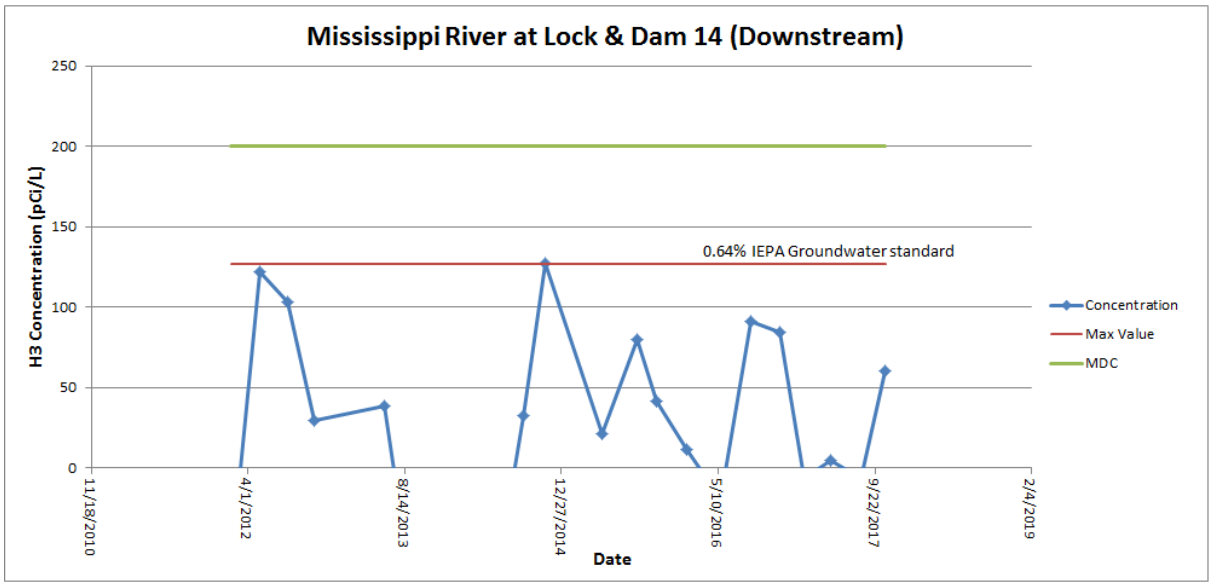
Location	H-3	
Date	Result	MDC
Mississippi River at Albany		
2/7/2017	<MDC	200
5/3/2017	<MDC	200
8/9/2017	<MDC	200
10/25/2017	<MDC	200
Mississippi River at Cordova		
2/7/2017	<MDC	200
5/3/2017	<MDC	200
8/9/2017	<MDC	200
10/25/2017	<MDC	200
Mississippi River at Lock & Dam 14		
2/7/2017	<MDC	200
5/3/2017	<MDC	200
8/9/2017	<MDC	200
10/25/2017	<MDC	200
Mississippi River at Port Byron		
2/7/2017	<MDC	200
5/3/2017	<MDC	200
8/9/2017	<MDC	200
10/25/2017	<MDC	200
Mississippi River at Rapid City		
5/3/2017	<MDC	200
8/9/2017	<MDC	200
10/25/2017	<MDC	200

Tables F-2. Trending Graphs for Water from the Quad Cities Area
(Max value compared to IEPA Class I groundwater standard of 20,000 pCi/L)






Mississippi River at Rapids City (Downstream)
H3 Concentration (pCi/L)
250
200
150
100
50
0
0.53% IEPA Groundwater standard
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC


Mississippi River at Lock & Dam 14 (Downstream)
H3 Concentration (pCi/L)
250
200
150
100
50
0
0.64% IEPA Groundwater standard
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC

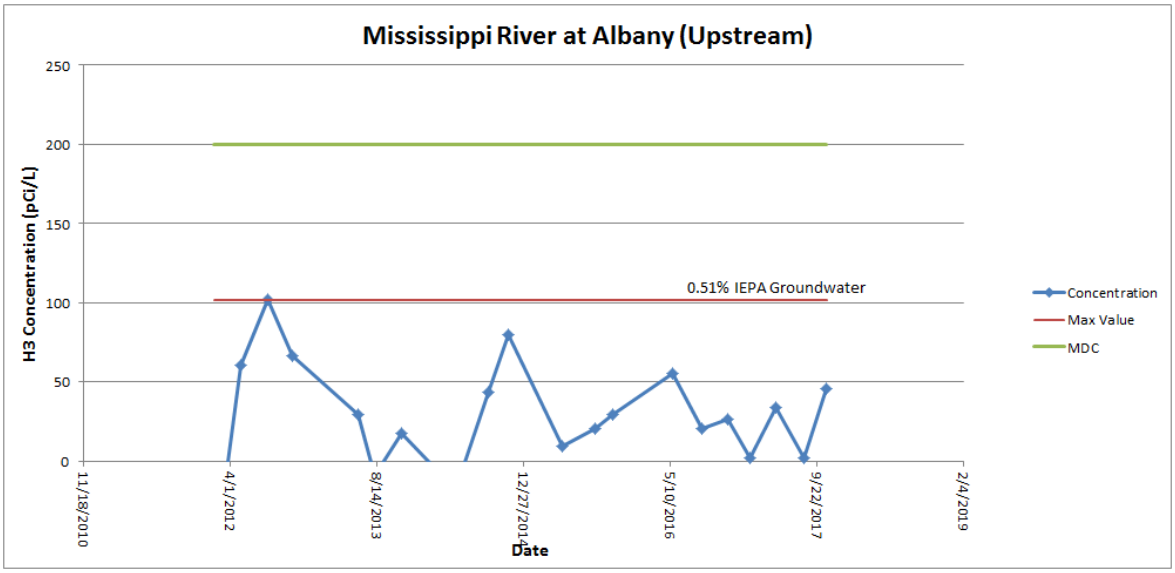

Mississippi River at Albany (Upstream)
H3 Concentration (pCi/L)
250
200
150
100
50
0
0.51% IEPA Groundwater
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC

Table F-3. Sample Results for Beta Screening of Water from the Quad Cities Area
Results are in picocuries per liter (pCi/L)

Location	Beta	
Date	Result	MDC
Mississippi River at Albany		
2/7/2017	<MDC	4.2
5/3/2017	<MDC	4.2
8/9/2017	<MDC	4.2
10/25/2017	<MDC	4.2
Mississippi River at Cordova		
2/7/2017	4.7	4.2
5/3/2017	<MDC	4.2
8/9/2017	<MDC	4.2
10/25/2017	<MDC	4.2
Mississippi River at Lock & Dam 14		
2/7/2017	<MDC	4.2
5/3/2017	<MDC	4.2
8/9/2017	4.2	4.2
10/25/2017	<MDC	4.2
Mississippi River at Port Byron		
2/7/2017	4.1	4.2
5/3/2017	<MDC	4.2
8/9/2017	<MDC	4.2
10/25/2017	<MDC	4.2
Mississippi River at Rapid City		
5/3/2017	<MDC	4.2
8/9/2017	<MDC	4.2
10/25/2017	<MDC	4.2

Table F-4. Gamma Spectroscopy Sample Results for Other Radionuclides in Water from the Quad Cities Area
Results are in picocuries per liter (pCi/L)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Mississippi River at Albany																								
2/7/2017	<MDC	118			<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
5/3/2017	<MDC	118			<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
8/9/2017	<MDC	118	<MDC	390	<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
10/25/2017	<MDC	118	<MDC	390	<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
Mississippi River at Cordova																								
2/7/2017	<MDC	118			<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
5/3/2017	<MDC	118			<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
8/9/2017	<MDC	118	<MDC	390	<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
10/25/2017	<MDC	118	<MDC	390	<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
Mississippi River at Lock & Dam 14																								
2/7/2017	<MDC	118			<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
5/3/2017	<MDC	118			<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
8/9/2017	<MDC	118	<MDC	390	<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
10/25/2017	<MDC	118	<MDC	390	<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
Mississippi River at Port Byron																								
2/7/2017	<MDC	118			<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
5/3/2017	<MDC	118			<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
8/9/2017	<MDC	118	<MDC	390	<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
10/25/2017	<MDC	118	<MDC	390	<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
Mississippi River at Rapid City																								
5/3/2017	<MDC	118			<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
8/9/2017	<MDC	118	<MDC	390	<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6
10/25/2017	<MDC	118	<MDC	390	<MDC	4.8	<MDC	4.2	<MDC	4.3	<MDC	4	<MDC	12.7	<MDC	150	<MDC	3.8	<MDC	7.8	<MDC	9.1	<MDC	9.6

Table F-5. Total Strontium Results for Water Samples Collected in the Quad Cities Area
Results in picocuries per liter (pCi/L)

Location	Date	Nuclide	Result	MDC
Mississippi River at Cordova	5/3/2017	Strontium	<MDC	1.3
Mississippi River at Rapid City	5/3/2017	Strontium	<MDC	1.3

Table F-6. Soil Sample Results for Quad Cities Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Corner of 150th and 266th																						
5/3/2017	<MDC	1.33			<MDC	0.04	<MDC	0.03	<MDC	0.02	0.16	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.10
8/9/2017	<MDC	1.33	<MDC	0.14	<MDC	0.04	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.10
Near RS-C																						
5/3/2017	<MDC	1.33			<MDC	0.04	<MDC	0.03	<MDC	0.02	0.18	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.10
8/9/2017	<MDC	1.33	<MDC	0.14	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.28	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.10

Table F-7. Sediment Sample Results for Quad Cities Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Mississippi River at Rapid City																						
5/3/2017	<MDC	1.25			<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.06	<MDC	0.06	<MDC	0.07
8/9/2017	<MDC	1.25	<MDC	0.12	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.06	<MDC	0.06	<MDC	0.07

Table F-8. Vegetation Sample Results for Quad Cities Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Corner of 150th and 266th																								
5/3/2017	<MDC	8.9			<MDC	0.2	<MDC	0.1	<MDC	0.2	<MDC	0.1	<MDC	0.7	<MDC	13.3	<MDC	0.2	<MDC	0.4	<MDC	0.4	<MDC	0.4
8/9/2017	<MDC	8.9	<MDC	1.2	<MDC	0.2	<MDC	0.1	<MDC	0.2	<MDC	0.1	<MDC	0.7	<MDC	13.3	<MDC	0.2	<MDC	0.4	<MDC	0.4	<MDC	0.4
Near RS-C																								
5/3/2017	<MDC	8.9			<MDC	0.2	<MDC	0.1	<MDC	0.2	<MDC	0.1	<MDC	0.7	<MDC	13.3	<MDC	0.2	<MDC	0.4	<MDC	0.4	<MDC	0.4
8/9/2017	<MDC	8.9	<MDC	1.2	<MDC	0.2	<MDC	0.1	<MDC	0.2	<MDC	0.1	<MDC	0.7	<MDC	13.3	<MDC	0.2	<MDC	0.4	<MDC	0.4	<MDC	0.4

Table F-9. Fish Sample Results for Quad Cities Area
Results are in picocuries per kilogram (pCi/kg)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Mississippi River (bottom feeder)																								
8/1/2017	<MDC	5E+07	<MDC	2330	<MDC	187	<MDC	23.8	<MDC	23.2	<MDC	18.7	<MDC	1690	<MDC	5E+10	<MDC	31	<MDC	2530	<MDC	73	<MDC	440
10/24/2017	<MDC	5E+07	<MDC	2330	<MDC	187	<MDC	23.8	<MDC	23.2	<MDC	18.7	<MDC	1690	<MDC	5E+10	<MDC	31	<MDC	2530	<MDC	73	<MDC	440
Mississippi River (top feeder)																								
8/1/2017	<MDC	5E+07	<MDC	2330	<MDC	187	<MDC	23.8	<MDC	23.2	<MDC	18.7	<MDC	1690	<MDC	5E+10	<MDC	31	<MDC	2530	<MDC	73	<MDC	440
10/24/2017	<MDC	5E+07	<MDC	2330	<MDC	187	<MDC	23.8	<MDC	23.2	<MDC	18.7	<MDC	1690	<MDC	5E+10	<MDC	31	<MDC	2530	<MDC	73	<MDC	440

Table F-10. Gamma Detection Network Results for Quad Cities

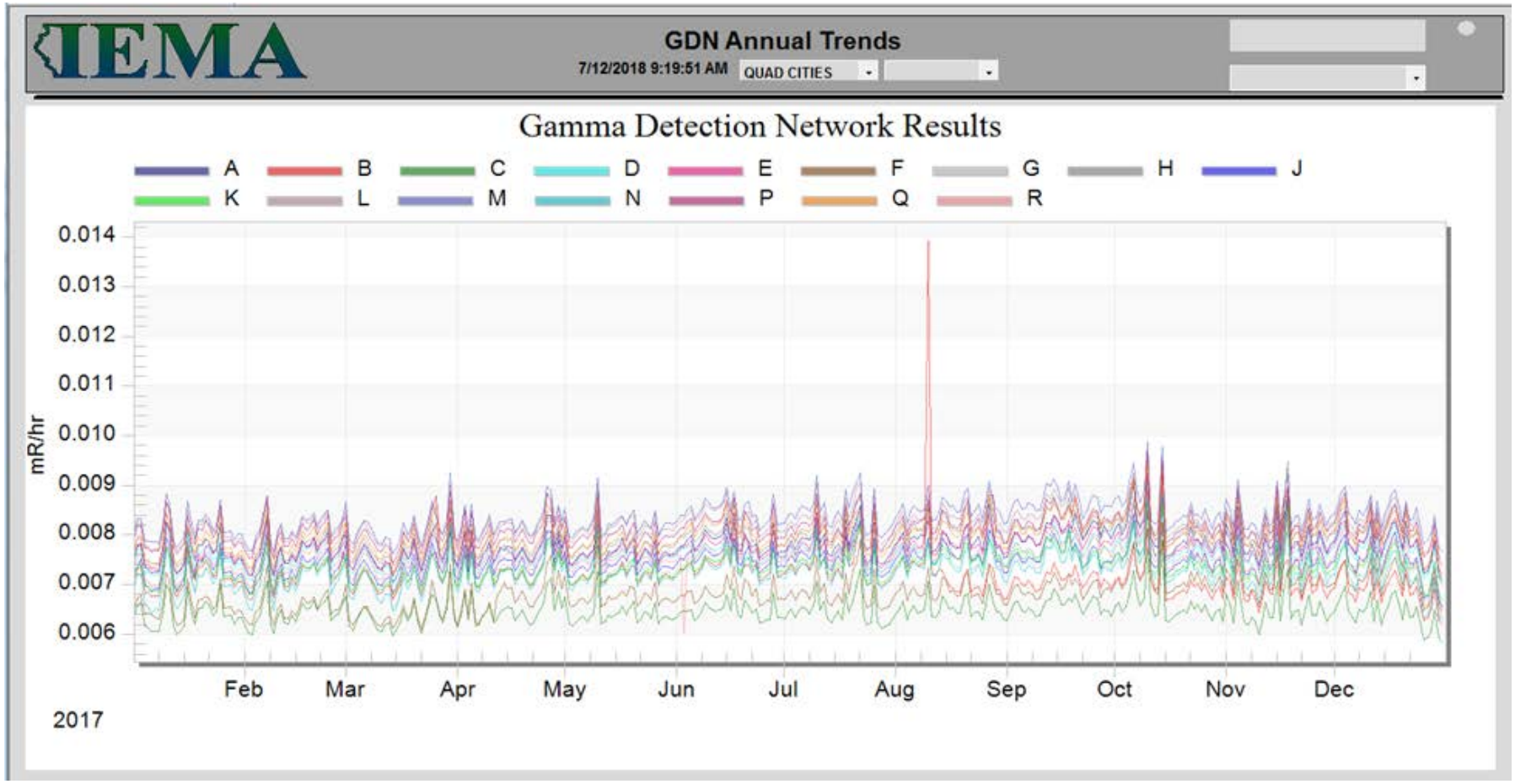


Table F-11. Summary of Ambient Gamma Results for Quad Cities Area

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
QC001	7.94	10.31	9.95	9.95	38.14
QC004	7.12	9.40	7.03	6.66	30.20
QC007	7.03	7.12	7.76	6.30	28.20
QC010	6.21	6.48	7.12	6.11	25.92
QC011			5.57	4.65	20.44
QC012	5.57	6.48	5.38	6.30	23.73
QC014	5.02	5.75	4.93	5.11	20.81
QC016	4.29	5.20	5.38	4.56	19.44
QC018	10.95	10.95	10.77	9.76	42.43
QC025	9.67	9.86	9.22	9.95	38.69
QC026	8.94		9.03	5.93	31.88
QC027	9.49	8.40	8.67	7.12	33.67
QC028	7.48	7.21	8.94	7.57	31.21
QC029	7.48	7.85	9.22	8.67	33.22
QC031	6.94	8.12	6.57	6.57	28.20
QC032	6.02	8.03	6.02	7.21	27.28
QC033		6.21	7.03	6.94	26.89
QC034	4.93	7.76	7.67	6.66	27.01
QC036	9.13	9.13	8.03	8.12	34.40
QC037	5.38	6.48	7.03	6.75	25.64
QC038	7.85	8.21	7.57	6.84	30.48
QC039	5.75	6.94	6.02	5.93	24.64
QC040	8.12	9.95	7.76	8.03	33.85
QC041	5.93	8.12	7.21	6.57	27.83
QC042	8.03	9.76	8.03	8.94	34.77
QC043	7.21		6.94	7.03	28.23
QC044	7.85	8.30	9.95	8.49	34.58
QC045	7.48	7.85	6.94	6.57	28.84
QC046	7.67	9.58	8.76	7.30	33.31
QC049	6.94	7.67	7.21	8.58	30.39
QC050	6.48	6.84	7.30	7.76	28.38
QC051		8.30	8.03	6.66	30.66
QC052	8.49	10.31	10.40	8.30	37.50
QC053	4.65	5.66	6.39	5.20	21.90
QC054	7.57	8.94	6.94	8.67	32.12
QC055	6.57	8.12		7.39	29.44
QC056	6.48	5.93	7.12	4.75	24.27
QC057	5.38	9.22	6.30	7.76	28.65
QC058	6.66	8.85	7.67	7.12	30.30
QC059	6.94	8.40	7.57	6.48	29.38
QC060	7.48	7.48	7.21	6.75	28.93

Table F-11. Summary of Ambient Gamma Results for Quad Cities Area (continued)

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
QC061	7.12	7.57	6.30	8.12	29.11
QC062	10.77	10.49	8.94	9.22	39.42
QC063	6.94	7.94	7.76	7.85	30.48
QC064			7.48	6.66	28.29
QC065	6.21	8.94	8.94	8.30	32.39
QC066	7.85	10.13	10.49	9.76	38.23
QC067	8.21	9.49	9.76	9.40	36.87
QC068	9.95	9.40	7.85	10.04	37.23
QC-RSA	5.66	8.12	9.76	7.39	30.93
QC-RSB	7.94	7.12	8.21	8.85	32.12
QC-RSC	6.21	6.21	6.75	8.21	27.38
QC-RSD	7.03	7.67	7.57	6.94	29.20
QC-RSE	8.21	8.85	8.49	6.39	31.94
QC-RSF	6.75	6.02	5.20	6.84	24.82
QC-RSG	8.03	7.94	8.94	7.85	32.76
QC-RSH	7.57	7.94	8.12	8.12	31.76
QC-RSJ	7.12	8.58	7.76	7.12	30.57
QC-RSK	6.30	7.48	8.21	5.48	27.47
QC-RSL	8.12	9.86	10.31	8.30	36.59
QC-RSM	7.85	8.67	8.58	8.40	33.49
QC-RSN	6.02	7.39	6.02	8.12	27.56
QC-RSP	9.31	8.40	8.49	8.67	34.86
QC-RSQ	7.57	9.13	9.49	8.40	34.58
QC-RSR	7.03	6.75	6.48	7.57	27.83

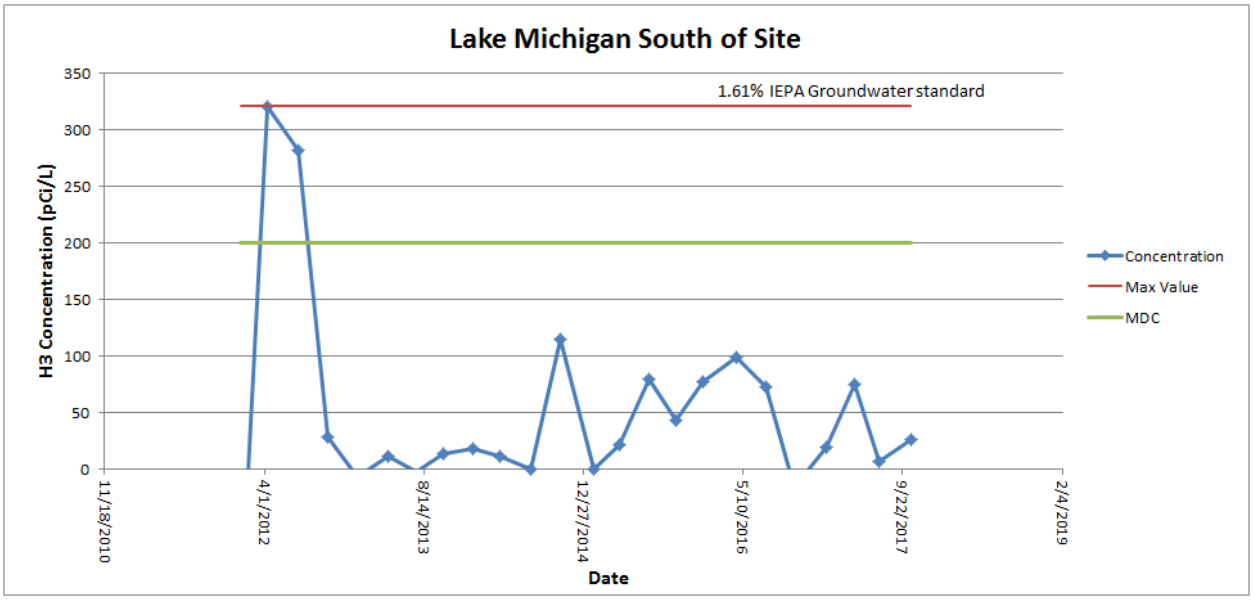
Blanks in the table indicate that dosimeters were missing at the end of the quarter.
Annual Exposure column based on averages of all available data.
Quarter length is estimated to be 91.25 days.

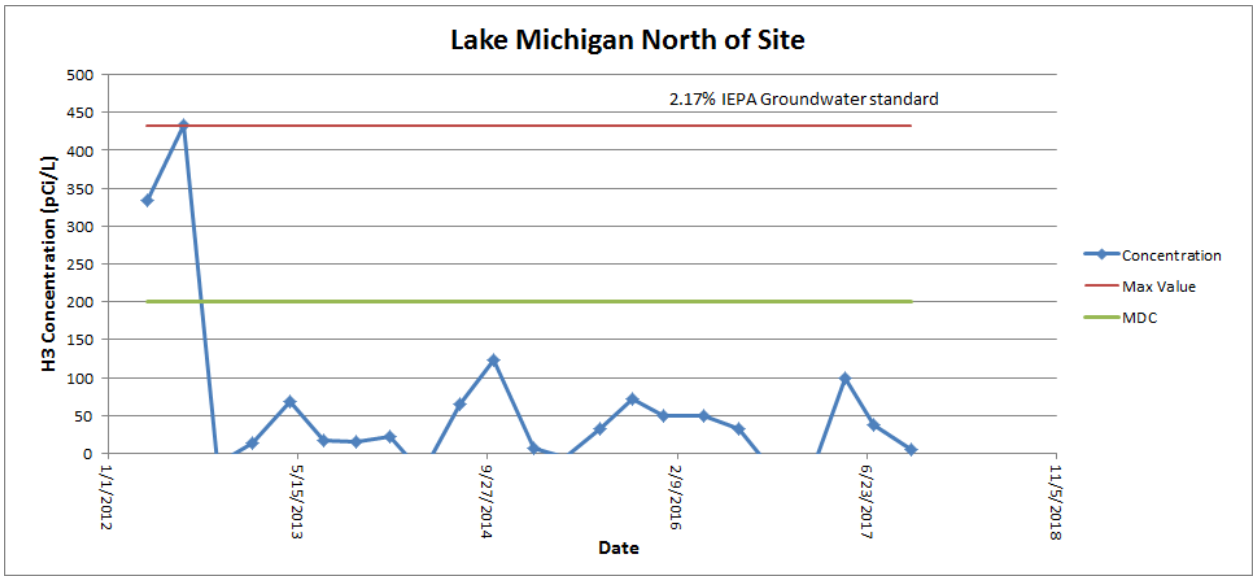
Appendix G
Zion Sample Results

Table G-1. Tritium in Water Sample Results for Zion Area
Results are in picocuries per liter (pCi/L)

Location	H-3	
Date	Result	MDC
Lake Michigan N. of site		
1/24/2017	<MDC	200
4/25/2017	<MDC	200
7/11/2017	<MDC	200
10/17/2017	<MDC	200
Lake Michigan S. of site		
1/24/2017	<MDC	200
4/25/2017	<MDC	200
7/11/2017	<MDC	200
10/17/2017	<MDC	200
Lake Michigan Sector J at State Park		
1/24/2017	<MDC	200
4/25/2017	<MDC	200
7/11/2017	<MDC	200
10/17/2017	<MDC	200

Tables G-2. Trending Graphs for Water from the Zion Area
(Max value compared to IEPA Class I groundwater standard of 20,000 pCi/L)





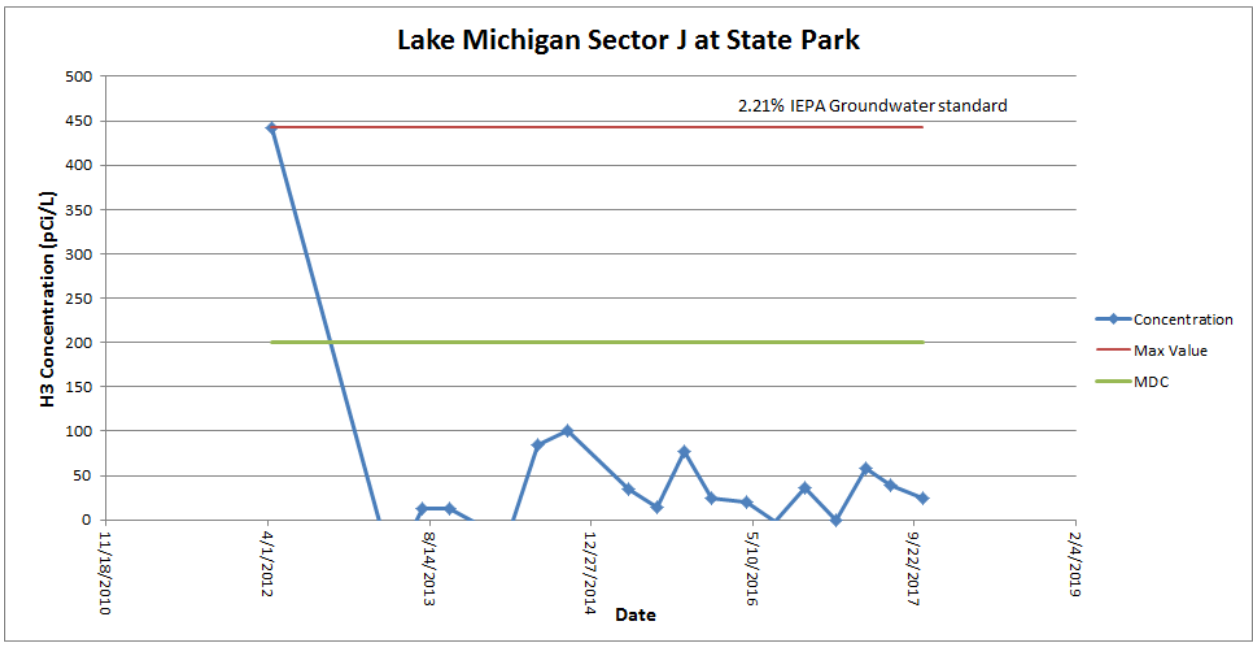

Lake Michigan Sector J at State Park
2.21% IEPA Groundwater standard
H3 Concentration (pCi/L)
500
450
400
350
300
250
200
150
100
50
0
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019
Date
Concentration
Max Value
MDC

Table G-3. Sample Results for Beta Screening of Water from the Zion Area
Results are in picocuries per liter (pCi/L)

Location	Beta	
Date	Result	MDC
Lake Michigan N. of site		
1/24/2017	<MDC	4.2
4/25/2017	<MDC	4.2
7/11/2017	<MDC	4.2
10/17/2017	<MDC	4.2
Lake Michigan S. of site		
1/24/2017	<MDC	4.2
4/25/2017	<MDC	4.2
7/11/2017	<MDC	4.2
10/17/2017	<MDC	4.2
Lake Michigan Sector J at State Park		
1/24/2017	<MDC	4.2
4/25/2017	<MDC	4.2
7/11/2017	5.8	4.2
10/17/2017	<MDC	4.2

Table G-4. Gamma Spectroscopy Sample Results for Other Radionuclides in Water from the Zion Area
Results are in picocuries per liter (pCi/L)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Lake Michigan N. of site																								
1/24/2017	<MDC	73			<MDC	5.1	<MDC	4.3	<MDC	4.4	<MDC	3.6	<MDC	11.7	<MDC	60	<MDC	3.9	<MDC	6.5	<MDC	9.4	<MDC	9.3
4/25/2017	<MDC	73			<MDC	5.1	<MDC	4.3	<MDC	4.4	<MDC	3.6	<MDC	11.7	<MDC	60	<MDC	3.9	<MDC	6.5	<MDC	9.4	<MDC	9.3
7/11/2017	<MDC	73			<MDC	5.1	<MDC	4.3	<MDC	4.4	<MDC	3.6	<MDC	11.7	<MDC	60	<MDC	3.9	<MDC	6.5	<MDC	9.4	<MDC	9.3
10/17/2017	<MDC	73	<MDC	370	<MDC	5.1	<MDC	4.3	<MDC	4.4	<MDC	3.6	<MDC	11.7	<MDC	60	<MDC	3.9	<MDC	6.5	<MDC	9.4	<MDC	9.3
Lake Michigan S. of site																								
1/24/2017	<MDC	73			<MDC	5.1	<MDC	4.3	<MDC	4.4	<MDC	3.6	<MDC	11.7	<MDC	60	<MDC	3.9	<MDC	6.5	<MDC	9.4	<MDC	9.3
4/25/2017	<MDC	73			<MDC	5.1	<MDC	4.3	<MDC	4.4	<MDC	3.6	<MDC	11.7	<MDC	60	<MDC	3.9	<MDC	6.5	<MDC	9.4	<MDC	9.3
7/11/2017	<MDC	73			<MDC	5.1	<MDC	4.3	<MDC	4.4	<MDC	3.6	<MDC	11.7	<MDC	60	<MDC	3.9	<MDC	6.5	<MDC	9.4	<MDC	9.3
10/17/2017	<MDC	73	<MDC	370	<MDC	5.1	<MDC	4.3	<MDC	4.4	<MDC	3.6	<MDC	11.7	<MDC	60	<MDC	3.9	<MDC	6.5	<MDC	9.4	<MDC	9.3
Lake Michigan Sector J at State Park																								
1/24/2017	<MDC	73			<MDC	5.1	<MDC	4.3	<MDC	4.4	<MDC	3.6	<MDC	11.7	<MDC	60	<MDC	3.9	<MDC	6.5	<MDC	9.4	<MDC	9.3
4/25/2017	<MDC	73			<MDC	5.1	<MDC	4.3	<MDC	4.4	<MDC	3.6	<MDC	11.7	<MDC	60	<MDC	3.9	<MDC	6.5	<MDC	9.4	<MDC	9.3
7/11/2017	<MDC	73			<MDC	5.1	<MDC	4.3	<MDC	4.4	<MDC	3.6	<MDC	11.7	<MDC	60	<MDC	3.9	<MDC	6.5	<MDC	9.4	<MDC	9.3
10/17/2017	<MDC	73	<MDC	370	<MDC	5.1	<MDC	4.3	<MDC	4.4	<MDC	3.6	<MDC	11.7	<MDC	60	<MDC	3.9	<MDC	6.5	<MDC	9.4	<MDC	9.3

Table G-5. Soil Sample Results for Zion Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Near Zn-67 across road																				
4/25/2017	<MDC	0.93	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.03	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.05	<MDC	0.07
7/11/2017	<MDC	0.93	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.04	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.05	<MDC	0.07
Samples co-located with ZN-RSJ																				
4/25/2017	<MDC	0.93	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.24	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.05	<MDC	0.07
6/19/2017	<MDC	0.93	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.29	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.05	<MDC	0.07
7/11/2017	<MDC	0.93	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.30	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.05	<MDC	0.07

Table G-6. Sediment Sample Results for Zion Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Lake Michigan N. of site																				
4/25/2017	<MDC	0.73	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.06
7/11/2017	<MDC	0.73	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.06
Lake Michigan S. of site																				
4/25/2017	<MDC	0.73	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.06
Lake Michigan Sector J at State Park																				
4/25/2017	<MDC	0.73	<MDC	0.02	<MDC	0.02	<MDC	0.01	0.04	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.06
7/11/2017	<MDC	0.73	<MDC	0.02	<MDC	0.02	<MDC	0.01	0.24	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.06

Table G-7. Vegetation Sample Results for Zion Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Near Zn-67 across road																						
4/25/2017	<MDC	3.0	<MDC	0.1	<MDC	0.1	<MDC	0.1	0.1	0.1	<MDC	0.3	<MDC	3.3	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
7/11/2017	<MDC	3.0	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	3.3	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
Samples co-located with ZN-RSJ																						
4/25/2017	<MDC	3.0	<MDC	0.1	<MDC	0.1	<MDC	0.1	0.2	0.1	<MDC	0.3	<MDC	3.3	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
6/19/2017	<MDC	3.0	<MDC	0.1	0.4	0.1	<MDC	0.1	0.3	0.1	<MDC	0.3	<MDC	3.3	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2
7/11/2017	<MDC	3.0	<MDC	0.1	<MDC	0.1	<MDC	0.1	0.1	0.1	<MDC	0.3	<MDC	3.3	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2

Table G-8. Alpha /Beta Screening Results for Air Samples in the Zion Area
Results are in femtocuries per cubic meter (fCi/m^3)

Location	Alpha		Beta	
Date	Result	MDC	Result	MDC
Air station co-located with ZN-RSF				
1/3/2017	<MDC	2.6	29.7	7.8
1/10/2017	2.8	2.6	29.8	7.8
1/17/2017	3.0	2.6	34.0	7.8
1/24/2017	<MDC	2.6	25.2	7.8
1/31/2017	<MDC	2.6	21.3	7.8
2/6/2017	<MDC	2.6	23.5	7.8
2/14/2017	<MDC	5.3	55.6	15.7
2/21/2017	4.2	2.6	25.5	7.8
2/28/2017	<MDC	2.6	20.9	7.8
3/7/2017	<MDC	2.6	20.6	7.8
3/14/2017	<MDC	2.6	17.7	7.8
3/21/2017	<MDC	2.6	22.9	7.8
3/28/2017	<MDC	2.6	16.2	7.8
4/4/2017	<MDC	2.6	17.2	7.8
4/11/2017	<MDC	2.6	16.5	7.8
4/17/2017	<MDC	2.6	18.6	7.8
4/25/2017	<MDC	2.6	14.0	7.8
5/2/2017	<MDC	2.6	11.6	7.8
5/9/2017	<MDC	2.6	21.3	7.8
5/15/2017	<MDC	2.6	18.9	7.8
5/23/2017	<MDC	2.6	18.6	7.8
5/30/2017	<MDC	2.6	14.9	7.8
6/6/2017	2.7	2.6	20.9	7.8
6/13/2017	3.1	2.6	19.3	7.8
6/19/2017	<MDC	2.6	15.0	7.8
6/27/2017	<MDC	2.6	11.8	7.8
7/11/2017	3.3	2.6	19.9	7.8
7/18/2017	<MDC	2.6	17.2	7.8
7/25/2017	<MDC	2.6	16.8	7.8
8/1/2017	<MDC	2.6	23.0	7.8
8/8/2017	3.6	2.6	28.9	7.8
8/15/2017	3.2	2.6	24.0	7.8
8/22/2017	3.7	2.6	30.6	7.8
8/29/2017	2.8	2.6	23.2	7.8
9/5/2017	2.8	2.6	25.6	7.8
9/11/2017	<MDC	2.6	15.6	7.8
9/18/2017	2.7	2.6	38.4	7.8
9/25/2017	3.6	2.6	41.2	7.8
10/10/2017	<MDC	2.6	31.3	7.8
10/17/2017	<MDC	2.6	24.2	7.8
10/24/2017	2.7	2.6	28.7	7.8
10/31/2017	<MDC	2.6	13.3	7.8
11/7/2017	<MDC	2.6	25.5	7.8
11/14/2017	3.4	2.6	35.1	7.8
11/20/2017	4.4	2.6	28.9	7.8
11/27/2017	4.7	2.6	32.1	7.8
12/5/2017	3.7	2.6	31.2	7.8
12/12/2017	4.8	2.6	24.1	7.8
12/19/2017	5.4	2.6	31.4	7.8

Location	Alpha		Beta	
Date	Result	MDC	Result	MDC
Air station co-located with ZN-RSJ				
1/3/2017	7.4	2.6	71.5	7.8
1/10/2017				
1/17/2017				
1/24/2017				
1/31/2017				
2/6/2017	<MDC	2.6	24.4	7.8
2/14/2017	<MDC	2.6	28.5	7.8
2/21/2017	3.6	2.6	28.4	7.8
2/28/2017	<MDC	2.6	21.3	7.8
3/7/2017	<MDC	2.6	21.9	7.8
3/14/2017				
3/21/2017	2.7	2.6	21.1	7.8
3/28/2017	<MDC	2.6	17.0	7.8
4/4/2017	<MDC	2.6	15.3	7.8
4/11/2017	<MDC	2.6	18.2	7.8
4/17/2017	<MDC	2.6	18.3	7.8
4/25/2017	<MDC	2.6	15.6	7.8
5/2/2017	<MDC	2.6	12.0	7.8
5/9/2017	<MDC	2.6	22.0	7.8
5/15/2017	3.1	2.6	19.8	7.8
5/23/2017	<MDC	2.6	18.6	7.8
5/30/2017	<MDC	2.6	19.5	7.8
6/6/2017	<MDC	2.6	22.8	7.8
6/13/2017	3.4	2.6	24.1	7.8
6/19/2017	<MDC	2.6	16.1	7.8
6/27/2017	<MDC	2.6	11.2	7.8
7/11/2017	2.7	2.6	20.8	7.8
7/18/2017	<MDC	2.6	13.1	7.8
7/25/2017	2.8	2.6	19.6	7.8
8/1/2017	3.1	2.6	32.9	7.8
8/8/2017	<MDC	2.6	26.4	7.8
8/15/2017	4.3	2.6	26.8	7.8
8/22/2017				
8/29/2017	<MDC	2.6	24.2	7.8
9/5/2017	3.4	2.6	30.0	7.8
9/11/2017	<MDC	2.6	17.0	7.8
9/18/2017	3.1	2.6	37.6	7.8
9/25/2017	<MDC	2.6	37.8	7.8
10/10/2017	<MDC	2.6	32.7	7.8
10/17/2017	<MDC	2.6	25.4	7.8
10/24/2017	<MDC	2.6	31.7	7.8
10/31/2017	<MDC	2.6	12.0	7.8
11/7/2017	3.9	2.6	24.9	7.8
11/14/2017	3.8	2.6	41.2	7.8
11/20/2017	5.1	2.6	33.3	7.8
11/27/2017	4.4	2.6	33.8	7.8
12/5/2017	<MDC	2.6	28.1	7.8
12/12/2017	4.2	2.6	29.2	7.8
12/19/2017	4.7	2.6	34.4	7.8

Location	Alpha		Beta	
Date	Result	MDC	Result	MDC
Air station co-located with ZN-RSA				
1/3/2017	<MDC	2.6	31.9	7.8
1/10/2017	2.8	2.6	28.9	7.8
1/17/2017	2.9	2.6	39.9	7.8
1/24/2017	<MDC	2.6	29.2	7.8
1/31/2017	<MDC	2.6	24.3	7.8
2/6/2017	<MDC	2.6	21.9	7.8
2/14/2017	<MDC	2.6	28.1	7.8
2/21/2017	3.8	2.6	29.2	7.8
2/28/2017	3.0	2.6	21.8	7.8
3/7/2017	2.8	2.6	21.2	7.8
3/14/2017	2.8	2.6	16.1	7.8
3/21/2017	2.8	2.6	25.4	7.8
3/28/2017	<MDC	2.6	18.0	7.8
4/4/2017	<MDC	2.6	16.4	7.8
4/11/2017	<MDC	2.6	18.9	7.8
4/17/2017	<MDC	2.6	17.6	7.8
4/25/2017	<MDC	2.6	17.5	7.8
5/2/2017	<MDC	2.6	11.9	7.8
5/9/2017	<MDC	2.6	18.6	7.8
5/15/2017	3.9	2.6	18.8	7.8
5/23/2017	<MDC	2.6	17.4	7.8
5/30/2017	<MDC	2.6	17.9	7.8
6/6/2017	<MDC	2.6	20.8	7.8
6/13/2017	2.8	2.6	23.1	7.8
6/19/2017	2.7	2.6	20.0	7.8
6/27/2017	<MDC	2.6	13.5	7.8
7/11/2017	3.0	2.6	22.1	7.8
7/18/2017	<MDC	2.6	16.4	7.8
7/25/2017	3.4	2.6	17.3	7.8
8/1/2017	2.8	2.6	25.3	7.8
8/8/2017	2.8	2.6	27.6	7.8
8/15/2017	3.3	2.6	29.1	7.8
8/22/2017	3.2	2.6	34.9	7.8
8/29/2017	<MDC	2.6	26.9	7.8
9/5/2017	3.0	2.6	29.0	7.8
9/11/2017	<MDC	2.6	16.0	7.8
9/18/2017	3.8	2.6	43.0	7.8
9/25/2017	<MDC	2.6	42.2	7.8
10/10/2017	<MDC	2.6	30.5	7.8
10/17/2017	<MDC	2.6	26.4	7.8
10/24/2017	<MDC	2.6	30.3	7.8
10/31/2017	<MDC	2.6	16.3	7.8
11/7/2017	2.8	2.6	22.6	7.8
11/14/2017	3.4	2.6	35.4	7.8
11/20/2017	5.6	2.6	35.1	7.8
11/27/2017	4.6	2.6	32.4	7.8
12/5/2017	4.1	2.6	34.1	7.8
12/12/2017	4.5	2.6	28.9	7.8
12/19/2017	5.0	2.6	32.8	7.8

Blanks in the table are from samples not collected due to difficulty maintaining consistent power to the air sampling unit or equipment malfunction.

Table G-9. Gamma Detection Network Results for Zion

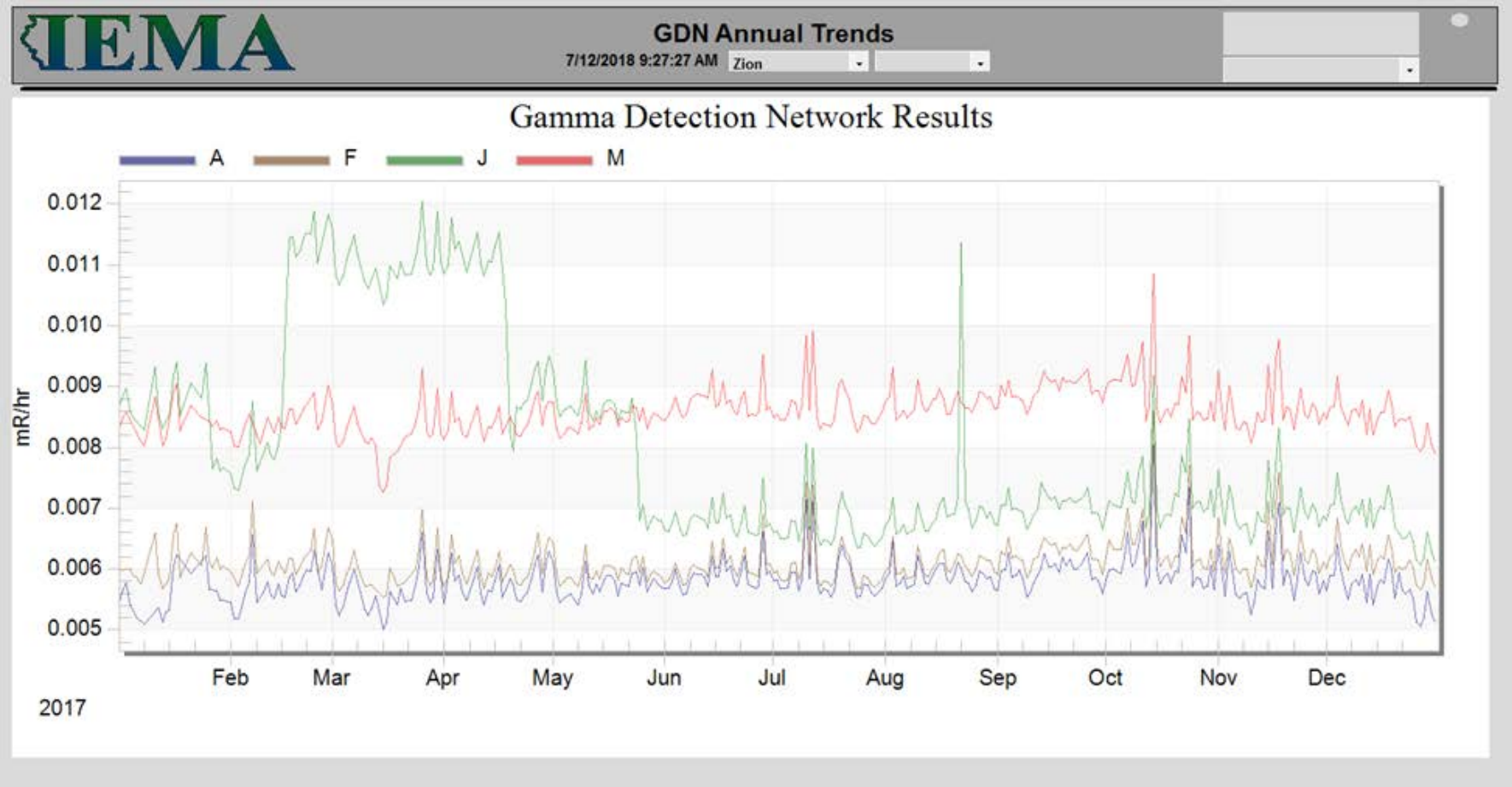


Table G-10. Summary of Ambient Gamma Results for Zion Area

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
ZN039	5.57	7.03	6.84	6.39	25.82
ZN040	4.75	8.40	5.57	5.20	23.91
ZN045	3.56	7.12	4.56	4.38	19.62
ZN065	5.66	7.12	5.93	7.76	26.46
ZN066	8.30	10.49	7.85	7.03	33.67
ZN067	3.38	5.75	4.84	4.56	18.52
ZN068	6.57	9.13	6.02	6.75	28.47
ZN069	5.20	8.30	5.84	6.39	25.73
ZN070	4.47	6.94	5.38	5.38	22.17
ZN071	7.67	9.49	8.85	8.12	34.13
ZN072	4.56	6.94	6.48	5.48	23.45
ZN073	5.93		5.75	5.75	23.24
ZN074		7.30	5.93	6.21	25.92
ZN075	8.12	10.31	7.85	8.94	35.22
ZN076	7.76	8.58	8.76	7.12	32.21
ZN077	8.49	10.49	8.03	9.13	36.14
ZN078	6.75	9.03	7.85	7.67	31.30
ZN079	6.66	8.30	7.30	8.67	30.93
ZN080	6.39	9.31	7.57	7.76	31.03
ZN081	6.94	9.22	10.40	8.40	34.95
ZN082	4.93	7.67	5.93	4.75	23.27
ZN084	4.20	7.48	5.29	5.75	22.72
ZN-RSJ	10.22	9.03	4.75	7.03	31.03
ZN-RSF	4.65	7.57	4.47	4.29	20.99

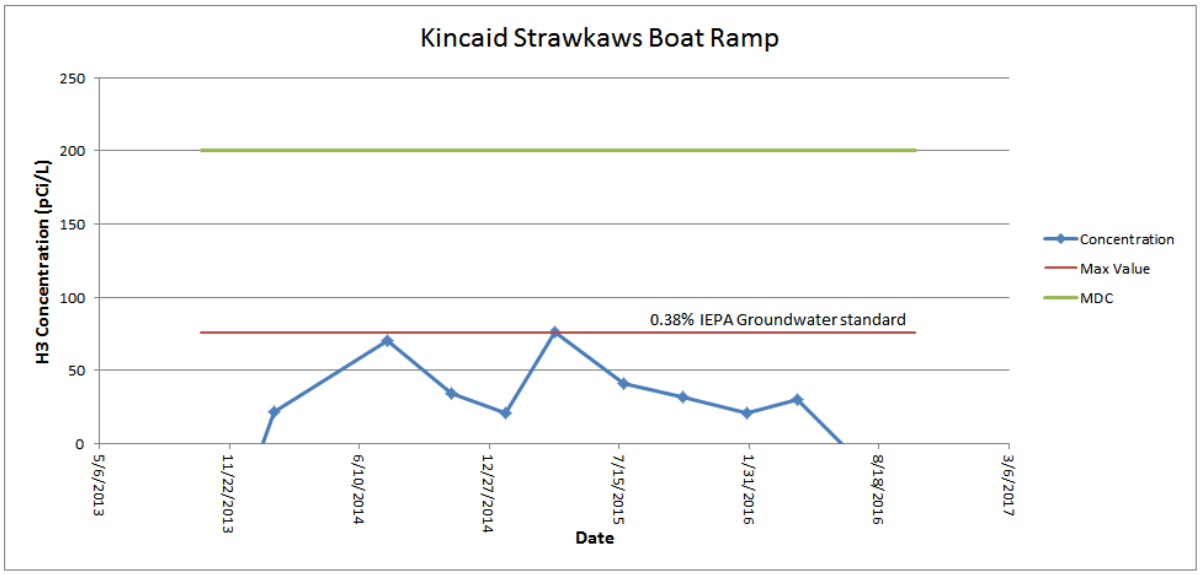
Blanks in the table indicate that dosimeters were missing at the end of the quarter.
Annual Exposure column based on averages of all available data.
Quarter length is estimated to be 91.25 days.

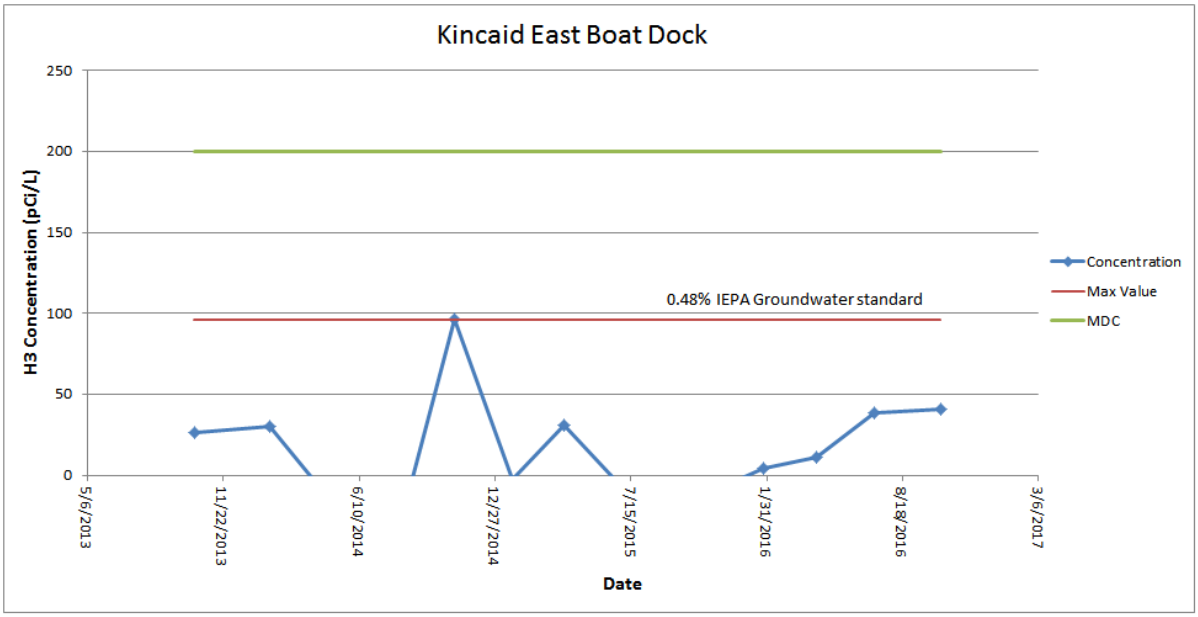
Appendix H
Background Reference Site Results

Table H-1. Tritium in Water Sample Results for Background Reference Area
Results are in picocuries per liter (pCi/L)

Location	H-3	
Date	Result	MDC
East Boat Ramp		
1/11/2017	<MDC	200
4/19/2017	<MDC	200
7/18/2017	<MDC	200
10/18/2017	<MDC	200
Strawkaws Boat Ramp		
1/11/2017	<MDC	200
4/19/2017	<MDC	200
7/18/2017	<MDC	200
10/18/2017	<MDC	200
West Boat Ramp		
1/11/2017	<MDC	200
4/19/2017	<MDC	200
7/18/2017	<MDC	200
10/18/2017	<MDC	200

Tables H-2. Trending Graphs for Water from the Background Reference Area
(Max value compared to IEPA Class I groundwater standard of 20,000 pCi/L)





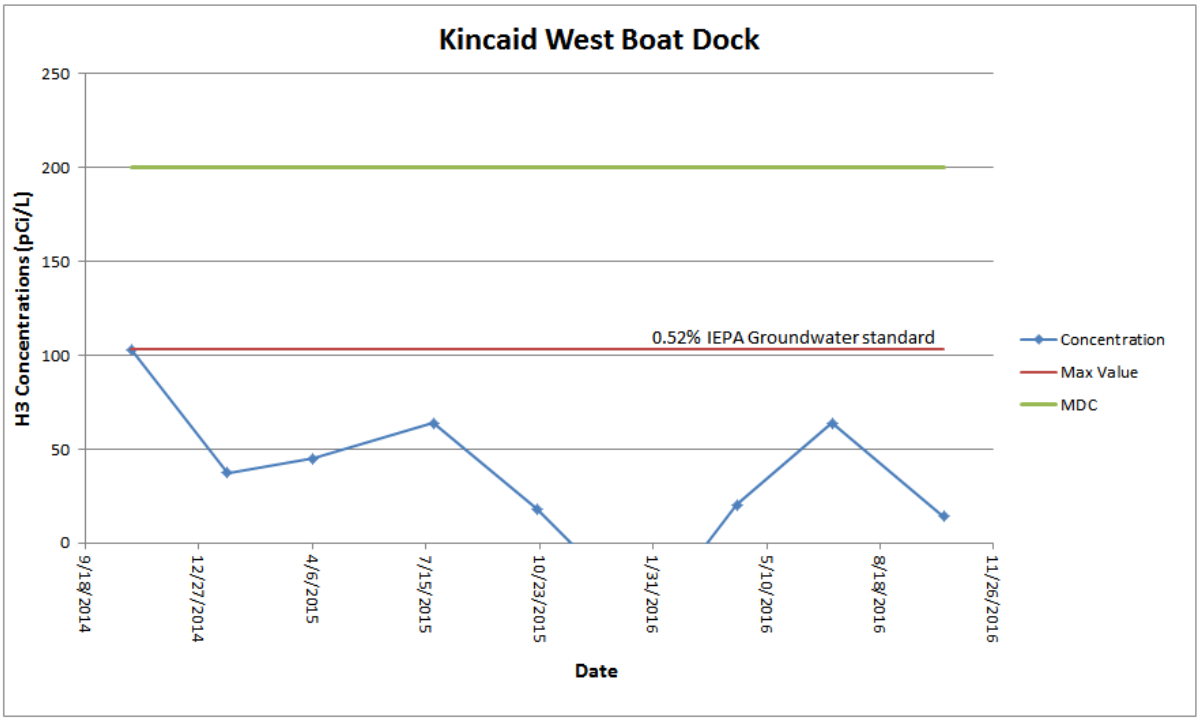


Table H-3. Sample Results for Beta Screening of Water from the Background Reference Area
Results are in picocuries per liter (pCi/L)

Location	Beta	
Date	Result	MDC
East Boat Ramp		
1/11/2017	<MDC	4.3
4/19/2017	<MDC	4.3
7/18/2017	<MDC	4.3
10/18/2017	<MDC	4.3
Strawkaws Boat Ramp		
1/11/2017	<MDC	4.3
4/19/2017	<MDC	4.3
7/18/2017	<MDC	4.3
10/18/2017	<MDC	4.3
West Boat Ramp		
1/11/2017	<MDC	4.3
4/19/2017	4.6	4.3
7/18/2017	<MDC	4.3
10/18/2017	<MDC	4.3

Table H-4. Gamma Spectroscopy Sample Results for Other Radionuclides in Water from the Background Reference Area
Results are in picocuries per liter (pCi/L)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
East Boat Ramp																								
1/11/2017	<MDC	116	<MDC	29.3	<MDC	5.2	<MDC	4.1	<MDC	4	<MDC	3.8	<MDC	13.5	<MDC	126	<MDC	4.1	<MDC	7.9	<MDC	8.1	<MDC	10.2
4/19/2017	<MDC	116	<MDC	29.3	<MDC	5.2	<MDC	4.1	<MDC	4	<MDC	3.8	<MDC	13.5	<MDC	126	<MDC	4.1	<MDC	7.9	<MDC	8.1	<MDC	10.2
7/18/2017	<MDC	116	<MDC	29.3	<MDC	5.2	<MDC	4.1	<MDC	4	<MDC	3.8	<MDC	13.5	<MDC	126	<MDC	4.1	<MDC	7.9	<MDC	8.1	<MDC	10.2
10/18/2017	<MDC	116	<MDC	29.3	<MDC	5.2	<MDC	4.1	<MDC	4	<MDC	3.8	<MDC	13.5	<MDC	126	<MDC	4.1	<MDC	7.9	<MDC	8.1	<MDC	10.2
Strawkaws Boat Ramp																								
1/11/2017	<MDC	116	<MDC	29.3	<MDC	5.2	<MDC	4.1	<MDC	4	<MDC	3.8	<MDC	13.5	<MDC	126	<MDC	4.1	<MDC	7.9	<MDC	8.1	<MDC	10.2
4/19/2017	<MDC	116	<MDC	29.3	<MDC	5.2	<MDC	4.1	<MDC	4	<MDC	3.8	<MDC	13.5	<MDC	126	<MDC	4.1	<MDC	7.9	<MDC	8.1	<MDC	10.2
7/18/2017	<MDC	116	<MDC	29.3	<MDC	5.2	<MDC	4.1	<MDC	4	<MDC	3.8	<MDC	13.5	<MDC	126	<MDC	4.1	<MDC	7.9	<MDC	8.1	<MDC	10.2
10/18/2017	<MDC	116	<MDC	29.3	<MDC	5.2	<MDC	4.1	<MDC	4	<MDC	3.8	<MDC	13.5	<MDC	126	<MDC	4.1	<MDC	7.9	<MDC	8.1	<MDC	10.2
West Boat Ramp																								
1/11/2017	<MDC	116	<MDC	29.3	<MDC	5.2	<MDC	4.1	<MDC	4	<MDC	3.8	<MDC	13.5	<MDC	126	<MDC	4.1	<MDC	7.9	<MDC	8.1	<MDC	10.2
4/19/2017	<MDC	116	<MDC	29.3	<MDC	5.2	<MDC	4.1	<MDC	4	<MDC	3.8	<MDC	13.5	<MDC	126	<MDC	4.1	<MDC	7.9	<MDC	8.1	<MDC	10.2
7/18/2017	<MDC	116	<MDC	29.3	<MDC	5.2	<MDC	4.1	<MDC	4	<MDC	3.8	<MDC	13.5	<MDC	126	<MDC	4.1	<MDC	7.9	<MDC	8.1	<MDC	10.2
10/18/2017	<MDC	116	<MDC	29.3	<MDC	5.2	<MDC	4.1	<MDC	4	<MDC	3.8	<MDC	13.5	<MDC	126	<MDC	4.1	<MDC	7.9	<MDC	8.1	<MDC	10.2

Table H-5. Soil Sample Results for Background Reference Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
East Boat Ramp																								
4/19/2017	<MDC	0.55	<MDC	0.07	<MDC	0.01	<MDC	0.01	0.05	0.01	0.11	0.01	<MDC	0.04	<MDC	0.93	<MDC	0.01	<MDC	0.03	<MDC	0.02	0.03	0.03
7/18/2017	<MDC	0.55	<MDC	0.07	<MDC	0.01	<MDC	0.01	0.04	0.01	0.11	0.01	<MDC	0.04	<MDC	0.93	<MDC	0.01	<MDC	0.03	<MDC	0.02	<MDC	0.03
Strawkaws Boat Ramp																								
4/19/2017	<MDC	0.55	<MDC	0.07	<MDC	0.01	<MDC	0.01	0.05	0.01	0.07	0.01	<MDC	0.04	<MDC	0.93	0.02	0.01	<MDC	0.03	<MDC	0.02	<MDC	0.03
7/18/2017	<MDC	0.55	<MDC	0.07	<MDC	0.01	<MDC	0.01	0.04	0.01	0.06	0.01	<MDC	0.04	<MDC	0.93	0.01	0.01	<MDC	0.03	<MDC	0.02	<MDC	0.03
West Boat Ramp																								
4/19/2017	<MDC	0.55	<MDC	0.07	<MDC	0.01	<MDC	0.01	<MDC	0.01	0.12	0.01	<MDC	0.04	<MDC	0.93	0.02	0.01	<MDC	0.03	<MDC	0.02	0.04	0.03
7/18/2017	<MDC	0.55	<MDC	0.07	<MDC	0.01	<MDC	0.01	<MDC	0.01	0.02	0.01	<MDC	0.04	<MDC	0.93	<MDC	0.01	<MDC	0.03	<MDC	0.02	<MDC	0.03

Table H-6. Fish Sample Results for Background Reference Area
Results are in picocuries per kilogram (pCi/kg)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Sangchris Lake (Bottom Feeder)																								
10/18/2017	<MDC	540	<MDC	87	<MDC	23.5	<MDC	20.8	<MDC	17.9	<MDC	17.4	<MDC	63	<MDC	580	<MDC	19.3	<MDC	37	<MDC	44	<MDC	44
Sangchris Lake (Top Feeder)																								
10/18/2017	<MDC	540	<MDC	87	<MDC	23.5	<MDC	20.8	<MDC	17.9	<MDC	17.4	<MDC	63	<MDC	580	<MDC	19.3	<MDC	37	<MDC	44	<MDC	44

Table H-7. Vegetation Sample Results for Background Reference Area
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
East Boat Ramp																								
4/19/2017	<MDC	6.1	<MDC	0.7	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.6	<MDC	7.8	<MDC	0.2	<MDC	0.4	<MDC	0.3	<MDC	0.4
7/18/2017	<MDC	6.1	<MDC	0.7	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.6	<MDC	7.8	<MDC	0.2	<MDC	0.4	<MDC	0.3	<MDC	0.4
Strawkaws Boat Ramp																								
4/19/2017	<MDC	6.1	<MDC	0.7	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.6	<MDC	7.8	<MDC	0.2	<MDC	0.4	<MDC	0.3	<MDC	0.4
7/18/2017	<MDC	6.1	<MDC	0.7	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.6	<MDC	7.8	<MDC	0.2	<MDC	0.4	<MDC	0.3	<MDC	0.4
West Boat Ramp																								
4/19/2017	<MDC	6.1	<MDC	0.7	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.6	<MDC	7.8	<MDC	0.2	<MDC	0.4	<MDC	0.3	<MDC	0.4
7/18/2017	<MDC	6.1	<MDC	0.7	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.6	<MDC	7.8	<MDC	0.2	<MDC	0.4	<MDC	0.3	<MDC	0.4

Table H-8. Alpha / Beta Screening Results for Air Samples in the Springfield Area
Results are in picocuries per liter (pCi/L)

Location	Alpha		Beta	
Date	Result	MDC	Result	MDC
Knotts Street Air Sampler				
1/3/2017	4.08	1.41	30.9	3.76
1/10/2017	2.77	1.41	38.55	3.76
1/17/2017	3.38	1.41	36.49	3.76
1/30/2017	2.2	1.41	29.55	3.76
2/6/2017	0	1.41	17.1	3.76
2/14/2017	0	1.41	25.71	3.76
2/21/2017	3.91	1.41	28.71	3.76
2/27/2017	3.41	1.41	31.25	3.76
3/6/2017	3.1	1.41	25.73	3.76
3/13/2017	1.79	1.41	18.85	3.76
3/20/2017	2.63	1.41	14.1	3.76
3/27/2017	2.78	1.41	24.75	3.76
4/3/2017	0	1.41	17.08	3.76
4/10/2017	1.76	1.41	28.23	3.76
4/17/2017	0	1.41	24.05	3.76
4/24/2017	0	1.41	19.61	3.76
5/1/2017	0	1.41	15.72	3.76
5/8/2017	0	1.41	21.7	3.76
5/15/2017	0	1.41	28.85	3.76
5/22/2017	1.88	1.41	18	3.76
5/30/2017	2.61	1.41	21.56	3.76
6/6/2017	2.51	1.41	29.91	3.76
6/12/2017	2.61	1.41	25.62	3.76
6/19/2017	1.77	1.41	16.3	3.76
6/26/2017	2.25	1.41	14.76	3.76

Location	Alpha		Beta	
Date	Result	MDC	Result	MDC
Knotts Street Air Sampler				
7/5/2017	3.65	1.41	27.34	3.76
7/10/2017	3.18	1.41	26.5	3.76
7/17/2017	3.84	1.41	24.21	3.76
7/24/2017	4.59	1.41	30.24	3.76
7/31/2017	2.95	1.41	21.04	3.76
8/7/2017	2.47	1.41	28.88	3.76
8/14/2017	1.86	1.41	26.73	3.76
8/21/2017	4.45	1.41	38.58	3.76
8/28/2017	2.54	1.41	24.44	3.76
9/11/2017	1.98	1.41	24.04	3.76
9/18/2017	2.38	1.41	37.2	3.76
9/25/2017	2.9	1.41	38.54	3.76
10/2/2017	2.14	1.41	32.21	3.76
10/10/2017	0	1.41	24.42	3.76
10/17/2017	1.56	1.41	26.08	3.76
10/24/2017	2.27	1.41	31.14	3.76
10/31/2017	3.12	1.41	15.46	3.76
11/7/2017	4.86	1.41	40.86	3.76
11/13/2017	4.34	1.41	34.76	3.76
11/27/2017	2.81	1.41	37.74	3.76
12/4/2017	4.9	1.41	31.94	3.76
12/11/2017	4.15	1.41	29.92	3.76
12/19/2017	3.9	1.41	28.34	3.76
12/27/2017	5.53	1.41	35.84	3.76

Table H-9. Summary of Ambient Gamma Results for Background Reference Area

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
KC-01	9.22	10.59	10.13	11.32	41.25
KC-02	7.67	10.86	11.68	10.49	40.70
KC-03	9.40		9.49	8.58	36.62
KC-04	8.58	9.95	10.13	8.40	37.05
KC-05	9.40	9.03	9.03	8.76	36.23
KC-06	7.76		10.22	9.31	36.38
KC-07	7.94	8.03	10.59	10.31	36.87
KC-08	7.21	8.67	8.94	8.21	33.03
KC-09	8.76	8.67	10.49	11.32	39.24
KC-10	8.49		10.04	10.13	38.20
KC-11		10.49	12.41	9.49	43.19
KC-12	9.95	8.49	9.76	11.41	39.60
KC-13	8.67	9.86	9.03	11.32	38.87
KC-14	9.58	10.13	12.05	10.59	42.34
KC-15	9.22	9.95	10.95	8.94	39.06

Blanks in the table indicate that dosimeters were missing at the end of the quarter.
Annual Exposure column based on averages of all available data.
Quarter length is estimated to be 91.25 days.

Appendix I
Gamma Analysis Library

Ba-140
Ce-144*
Co-58
Co-60
Cs-134
Cs-137
Fe-59
I-131
Mn-54
Nb-95
Zn-65
Zr-95

* Ce-144 was added to the gamma spectroscopy library in July 2017

Appendix J
Radionuclide Abbreviations in this Report

Ba-140	Barium-140
Ce-144	Cerium-144
Co-58	Cobalt-58
Co-60	Cobalt-60
Cs-134	Cesium-134
Cs-137	Cesium-137
Fe-59	Iron-59
I-131	Iodine-131
Mn-54	Manganese-54
Nb-95	Niobium-95
Zn-65	Zinc-65
Zr-95	Zirconium-95

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