



State of Illinois
Illinois Emergency Management Agency

2019 Radiological Environmental Monitoring Report for Illinois Nuclear Power Stations



IEMA

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Table of Contents

<u>Section Title</u>	<u>Page Number</u>
Executive Summary.....	4
Introduction.....	5
IEMA Radiological Environmental Monitoring Program.....	5
Sampling and Monitoring Activities.....	6
Water Sampling.....	6
Soil Sampling.....	7
Vegetation Sampling.....	7
Sediment Sampling.....	7
Fish Sampling.....	7
Air Sampling.....	7
Direct Radiation Monitoring.....	7
Gaseous Effluent Monitoring System.....	8
Gamma Detection Network.....	9
General Sampling and Monitoring Information.....	10
Laboratory Analysis.....	10
Tritium Analysis (Water).....	10
Total Strontium Analysis (Water).....	11
Gross Beta Analysis (Water).....	11
Gamma Analysis (Water, Soil, Sediment, Vegetation, and Fish).....	11
Gross Alpha/Beta Analysis (Air).....	11
Ambient Gamma Analysis.....	12
Limits of Detection.....	12
Background Reference Areas.....	12
Results at a Glance.....	12
Braidwood Nuclear Power Station.....	14
Bryon Nuclear Power Station.....	35
Clinton Nuclear Power Station.....	53
Dresden Nuclear Power Station.....	74
LaSalle Nuclear Power Station.....	93
Quad Cities Nuclear Power Station.....	112
Zion Nuclear Power Station.....	128
Background Sampling Locations.....	142
Appendix A: Radionuclide Abbreviations in this Report.....	156

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 (NPS) and the Zion NPS which ceased operation in 1998 and completed the decommissioning process in 2019.

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 NPSs. 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 2019, 628 environmental samples were collected and analyzed for radioactivity. The samples collected by IEMA included water, sediment, soil, air, vegetation and fish. In addition, 1564 environmental dosimeters (Optically Stimulated Luminescence Dosimeters, or OSLs) were strategically deployed around the NPS sites to measure direct radiation. Environmental dosimetry results provide a baseline of ambient gamma radiation levels within a 10-mile radius of each NPS and other background reference locations across the state.

In 2019, all test results for samples collected as part of IEMA's environmental monitoring program for NPSs were below federal and state safety standards and guidelines.

Introduction

With 11 operating reactors at six NPSs, 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. NPSs 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 each operating NPS. IEMA also maintains a radiological environmental monitoring program at Zion NPS, which ceased operation in 1998 and completed the decommissioning process in 2019. Control “background” sample locations are chosen in areas where the samples are not influenced by station operations. Background samples are collected and analyzed quarterly, and the results are compared to the sample results collected for each NPS. Background environmental samples are taken from Sangchris Lake State Park near Kincaid, Illinois and air monitoring samples are collected in Springfield, Marion, and West Chicago, Illinois. Background location information and sample results can be found on pages 142-155.

In addition to “traditional” radiological environmental monitoring, IEMA has a Remote Monitoring System (RMS) around each NPS. IEMA’s RMS is an advanced, integrated computer-based system that continually monitors selected station 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).

IEMA has developed software that continually monitors and analyzes data collected through the RMS. 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 2019 through December 2019 for the six operating NPSs in Illinois, the now decommissioned NPS at Zion, the background sampling locations in Kincaid, Marion, Springfield, and West Chicago.

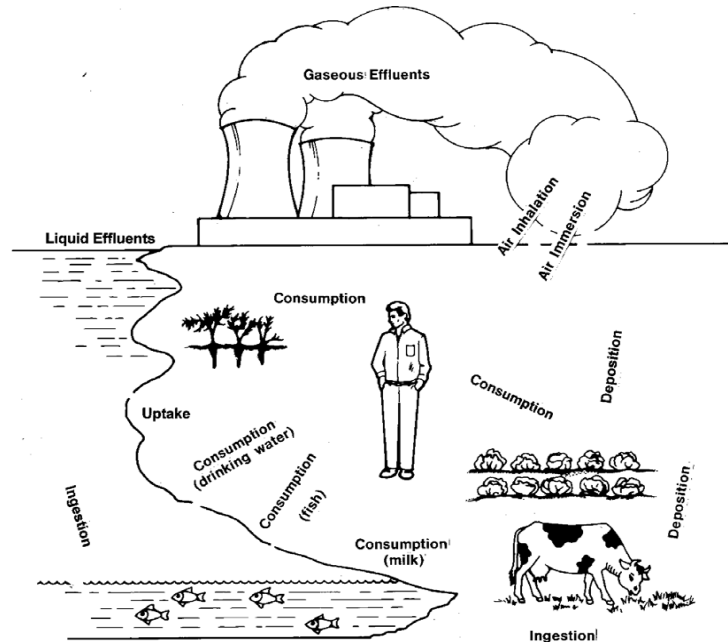
IEMA Radiological Environmental Monitoring Program

The IEMA Radiological Environmental Monitoring Program for Illinois NPSs is designed to evaluate the environs of all Illinois NPSs by monitoring the movement, or lack of movement, of radionuclides, and subsequently determine any potential for public exposure. Critical pathways for potential radiation exposure to the public include direct radiation, airborne, waterborne, aquatic, and ingestion. Figure 1 depicts the different exposure pathways through which people may be exposed to radiation or may ingest radioactive material. IEMA has strategically identified sampling locations that provide early indication of any potential public health and safety issues regarding Illinois NPS operation. Data from the program is also used to establish a baseline data set that can be used to perform exposure assessments in the event of a significant release from a NPS.

IEMA collects samples from designated sampling locations on a routine basis. These samples are then analyzed 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. Additionally, IEMA deploys an array of radiological environmental dosimeters around each NPS to measure direct radiation from all sources. In 2019, 628 samples were collected and analyzed, and 1564 radiological environmental dosimeters were deployed. A description of IEMA Radiological Environmental Monitoring Program for Illinois NPS's sample collection and analysis follows. Maps containing sample collection and monitoring locations, as well as tables containing sample and monitoring results are included within the site-specific information provided in this report.

Figure 1. Radiation Exposure Pathways to Humans



Sampling and Monitoring Activities

Water Sampling

NPSs require large volumes of water to operate, 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). Potentially impacted bodies of water include the Kankakee, Illinois, Rock, and Mississippi rivers, as well as Heideke and Clinton Lakes. Samples are collected and analyzed from each these bodies of water on a quarterly basis.

Station operations can also impact groundwater. Therefore, samples are collected and analyzed quarterly from potentially impacted wells at or around NPSs.

Water samples are collected to ensure that there are no adverse radiological impacts to local water supplies. The Public Water Supply (PWS) limits for radionuclides are based upon the U.S. Environmental Protection Agency (US EPA) and Illinois Environmental Protection Agency's (IEPA)

drinking water standards; IEMA's purpose for sampling private wells and public water supplies is solely to screen for the presence of radionuclides in drinking water.

Soil Sampling

Soil samples are collected during the second and third quarters of the year and analyzed for radionuclides that may have been released into the atmosphere and deposited on the ground downwind from the NPS. Soil is sampled at a depth of six inches to monitor the migration of radionuclides away from the soil surface and at one inch to monitor for deposition of radionuclides on the soil surface.

Vegetation Sampling

Vegetation samples are collected during the second and third quarters of the year and analyzed for radionuclides that may have been released into the atmosphere and deposited on plant tissue or on the ground and subsequently taken up by the plant via the root system.

Sediment Sampling

Sediment samples are collected during the second and third quarters of the year and analyzed for radionuclides that may have been released from a NPS into a surrounding river or lake. Radionuclides released into surrounding rivers or lakes would be expected to accumulate in sediments downstream of a NPS.

Fish Sampling

Fish are excellent bio-accumulators of radionuclides. Fish samples are collected from rivers and lakes near NPS discharge points during the second and third quarter of the year. Edible portions of the fish are then harvested and submitted for analysis. Both "top-feeders" and "bottom feeders" are collected from each sampling location and are analyzed separately.

Air Sampling

Due to decommissioning activities at the Zion NPS, which permanently ceased operation in February 1998, IEMA maintained a network of air monitoring stations around the Zion site. Air samples were collected continuously, with the air filters being changed and analyzed weekly.

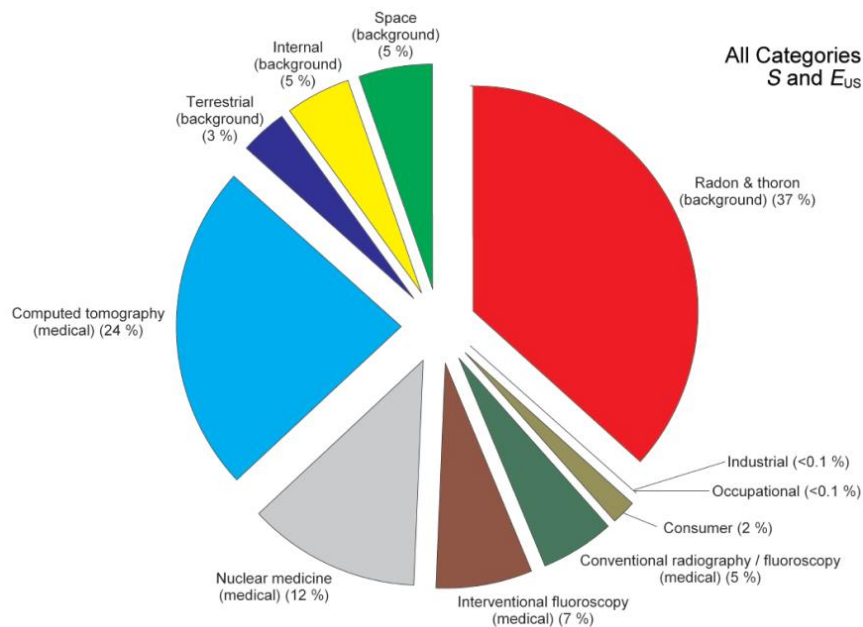
Direct Radiation Monitoring

IEMA maintains a network of 406 environmental dosimeters around the six operating NPSs and the now defunct Zion NPS. Unlike the environmental samples described previously, dosimeters do not provide information about what radionuclides are found in the environment. Instead, the dosimeters are used to monitor for small changes in ambient background levels of gamma radiation around each NPS during normal operations, as well as to determine the extent and magnitude of radiation dose to the public following a significant release of radioactive materials into the environment or from exposure to large quantities of stored material on-site.

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 station and are exchanged and analyzed quarterly by IEMA.

In addition to the quarterly results, the approximate exposure per year an individual would receive at that location has been calculated. Those numbers can be compared to the average radiation dose to an individual of 620 millirem per year from various sources (according to the 2009 National Council on Radiation Protection's Report 160, Figure 2.). Approximately 8% (49.6 mrem/year) of that dose is from terrestrial and cosmic radiation (background radiation).

Figure 2. Sources of Radiation Exposure to Man

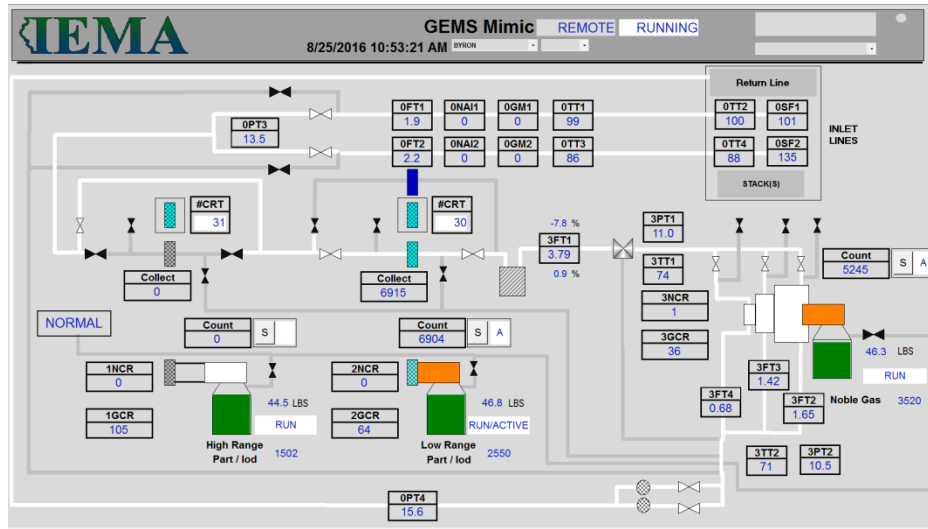


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Gaseous Effluent Monitoring System (GEMS)

IEMA continuously monitors gaseous effluents from all operating NPSs with GEMS. The GEMS provides automatic, online, continuous sampling of each NPS effluent stack. The GEMS is capable of measurement and identification of particulates, noble gases and iodines over a wide range of concentrations, from background levels to releases under emergency conditions. The GEMS can be controlled remotely during NPS emergencies to provide flexibility in sampling (Figure 3).

Figure 3. Computer Display of GEMS Data



Gamma Detection Network (GDN)

In addition to placing dosimeters around the NPSs, IEMA manages a GDN. The GDN consists of a network of detectors placed radially around each of the NPSs 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 station. This system is capable of detecting gamma radiation in the range of background levels up to 10 roentgens (R) per hour.

Figure 5 is an analytical display for the Clinton NPS with meteorological, GDN, and GEMS radiation information. During an incident at one of the stations, 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 NPS

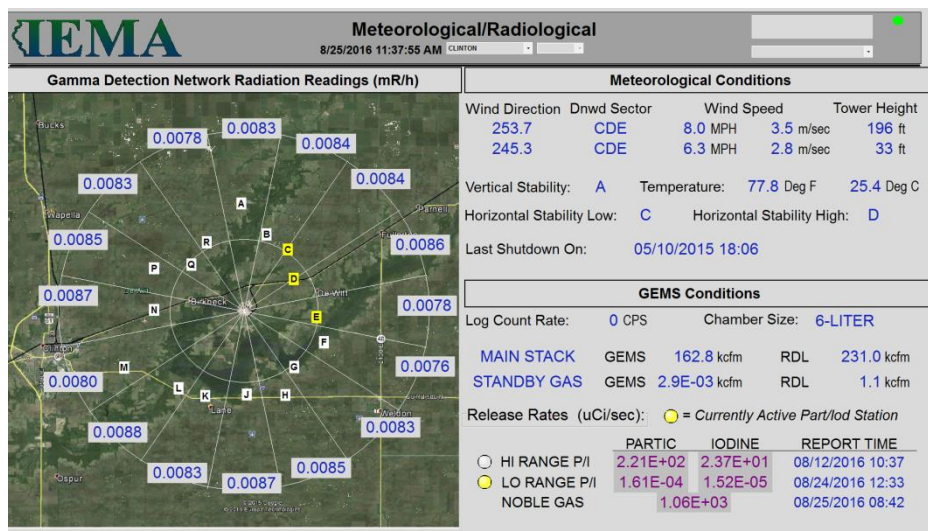


Figure 6. Typical IEMA GDN Field Installation



General Sampling and Monitoring Information

Every effort is made to collect all scheduled environmental samples; however, occasionally samples are unobtainable due to weather conditions, water levels, or obstructed access.

Laboratory Analysis

Soil, sediment, vegetation, water, and air samples are analyzed by the IEMA Radiochemistry Laboratory located in Springfield, Illinois. The laboratory participates in semi-annual proficiency testing programs through Environmental Resource Associates, an accredited proficiency testing provider, and the Department of Energy (DOE) Radiological and Environmental Science Laboratory's Mixed Analyte Performance Evaluation Program (MAPEP). OSs are analyzed by IEMA staff using a Landauer - In Light System Auto Reader.

Tritium Analysis (Water)

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

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 US EPA and IEPA. IEPA's purpose for sampling private wells and public water supplies is solely to screen for the presence of radionuclides in drinking water.

Tritium emits a low energy beta particle. This beta energy is too low to be detected by ordinary analytical methodologies for evaluating gross beta activity. Therefore, to measure the concentration of tritium, water samples are analyzed using liquid scintillation counting; a technique that is capable of measuring radioactive emissions at very low energies and very low concentrations.

Total Strontium Analysis (Water)

Strontium results are compared to historical data, data collected from the background reference location, and to the U.S. Environmental Protection Agency's (US EPA) drinking water standard (National Primary Drinking Water Regulations: Maximum Contaminant Levels and Maximum Residual Disinfectant Levels, 2000), as well as the Illinois Environmental Protection Agency's (IEPA) groundwater standard (Groundwater Quality Standards for Class I: Potable Resource Groundwater, 2013) which both set a limit for strontium-90 at 8 pCi/L.

Strontium is easily masked by other radionuclides, including those which are naturally occurring. Therefore, samples being analyzed for total strontium undergo preliminary chemical separation so that the strontium may be isolated for analysis. Sample analysis for total strontium is performed using a low-background gas proportional counter.

Gross Beta Analysis (Water)

Water samples are analyzed for radioactivity through gross beta analysis using a gas proportional counter. Since many radionuclides associated with nuclear power production emit beta particles, analysis of water samples for gross beta activity provides a good method of screening for the presence of radioactive materials.

Gamma Analysis (Water, Soil, Sediment, Vegetation, and Fish)

Water, soil, sediment, vegetation, and fish samples are analyzed to determine the concentration of individual radionuclides using a high-purity germanium detector in a process called gamma spectroscopy. Gamma spectroscopy results for all sample types are included within the NPS specific information provided in this report.

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

Gross Alpha/ Gross Beta Analysis (Air)

Air particulate filters are analyzed for airborne radioactivity through gross alpha and beta analysis using a gas proportional counter. Since many radionuclides associated with nuclear power production emit either alpha or beta particles, analysis of air particulate samples for gross alpha/beta activity provides a good method of screening for the presence of radioactive materials.

Ambient Gamma Analysis

OSLs are analyzed by IEMA staff using a Landauer In Light System Auto Reader. Results are expressed as the average milliroentgen (mR) per quarter and are also calculated to the approximate mR per year that would have been accrued by an individual at that location for an entire year. Results for environmental dosimeters analyzed during 2019 are included in the site-specific sections of this report.

Limits of Detection

All analytical methods have limitations: amounts that are 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.

Background Reference Areas

For comparison, samples are collected and analyzed from background reference areas located in Springfield, Marion, and Kincaid, and West Chicago. Background location information and sample results can be found on pages 142-155.

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 NPSs. The U.S. Environmental Protection Agency (US EPA) sets drinking water standards for several types of radioactive contaminants; the standard 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, Dresden and LaSalle stations. The elevated levels found near these stations are likely attributable to the liquid effluent releases from the Braidwood station or the radioactive effluents released from the Dresden sewage treatment plant and storm sewer system as unmonitored liquid releases. Tritium is a normal part of the effluent stream of NPSs, and its presence in nearby surface water sources is expected. The concentrations detected were well below the US EPA limit for tritium in drinking water.

Detectable levels of tritium were also found in groundwater 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 groundwater and a pond outside the boundaries of the station. As a result, IEMA continues to analyze split groundwater samples collected by Exelon from two locations on site. Sample MW-4 is taken near the turbine building and sample DS-2 taken from F-ditch. 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.

Cesium-137 in concentrations greater than the established MDC was seen near all NPSs; however, the concentrations seen were consistent with soil concentrations historically found from atmospheric nuclear weapons testing. Zirconium-95 in concentrations greater than the established MDC was seen during the second quarter sampling in a soil sample collected from the Forest Preserve on River Road near the Byron station and from a sediment sample collected from the Waupecan Creek near the LaSalle station. Results from the second quarter sediment sampling of the Waupecan Creek near the LaSalle station also indicated the presence of Niobium-95 in a concentration greater than the established MDC. Results from samples collected at those locations during the third quarter were below the established MDC for all radionuclides. All other gamma spectroscopy radionuclides of interest were below their established MDCs.

A total strontium concentration above the established MDC was found at the Mississippi River at Rapid City sampling location near the Quad City station during the second quarter sampling. The result from the sample collected at that location in the third quarter was below the established MDC. These slightly elevated concentrations of total strontium are likely attributable to the liquid effluent releases from the NPSs.

Gross beta analysis indicated that many sampling locations had slightly elevated levels of beta contamination. These slightly elevated levels of gross beta are likely attributable to the liquid effluent releases from the NPSs.

Ambient gamma results were comparable to historical and background levels for all NPSs.

<p>In 2019, all results for samples collected as part of IEMA's radiological environmental monitoring program for NPSs were below federal and state safety standards and guidelines.</p>
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Braidwood Nuclear Power Station

The Braidwood NPS, consisting of two 3,587 Megawatt (MW) pressurized water reactors (PWR), is owned and operated by Exelon Corporation and 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 with release limits governed by the station's license with the NRC and the station's IEPA National Pollutant Discharge Elimination System permit. In 2019, there were 83 liquid effluent batch releases from 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 groundwater and in a pond outside the boundaries of the station. As a result, IEMA continues to analyze split water samples collected by Exelon from two locations on site. One sample is collected from a groundwater well (MW-4) located near the turbine building and the other is a surface water sample collected from F-ditch (DS-2). 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 US EPA and IEPA.

Maps of the monitoring and sampling locations for the Braidwood NPS provided in this section (Figures 7-10) provide an overview of all sampling and monitoring locations in the vicinity of the

Braidwood NPS (yellow star in the center). The second yellow star near the top of Figure 9 represents the Dresden NPS.

Significant Events or Changes for 2019

Elevated tritium concentrations were found during Exelon's routine analysis of surface water collected from the Braidwood Cooling Lake. On March 7, IEMA collected ten surface water samples to verify that the concentrations within the cooling lake and surrounding bodies of water were not impacted. Nine samples were collected from the cooling lake, and one from the Kankakee River. Sample results for the samples taken on March 7 indicate that the results are consistent with past cooling lake and river samples.

Braidwood Sampling and Monitoring Results

Water Sampling Results

No detectable levels of tritium were found in surface water samples taken near the Braidwood and Dresden stations. Detectable levels of tritium were found in groundwater samples collected from a well at the Braidwood station. Elevated levels of tritium are known to exist in this well and are due to the 2005 groundwater tritium leak. All tritium levels were well below the Drinking Water Standards established by the US EPA and IEPA.

Results from total strontium analysis indicated no concentrations above the established MDCs.

Results from gross beta analysis indicated that the established MDC was met at some sampling locations and are likely attributable to the routine liquid effluent releases from the Braidwood station.

Gamma spectroscopy results for water samples indicated no concentrations above the established MDCs.

Soil Sampling Results

Gamma spectroscopy results for soil samples indicated no concentrations of reactor-produced radionuclides above background. Cesium-137 in concentrations greater than the established MDC was seen but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing.

Sediment Sampling Results

Gamma spectroscopy results for sediment samples indicated no concentrations of reactor-produced radionuclides above background. Cesium-137 at a concentration greater than the established MDC was seen but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing.

Vegetation Sampling Results

Gamma spectroscopy results for vegetation samples indicated no concentrations above the established MDC.

Fish Sampling Results

Gamma spectroscopy results for fish samples indicated no concentrations above the established MDC.

Direct Radiation Monitoring Results

The ambient gamma monitoring results were comparable to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois.

Figure 8. OSL and GDN Monitoring Locations- Braidwood (continued)

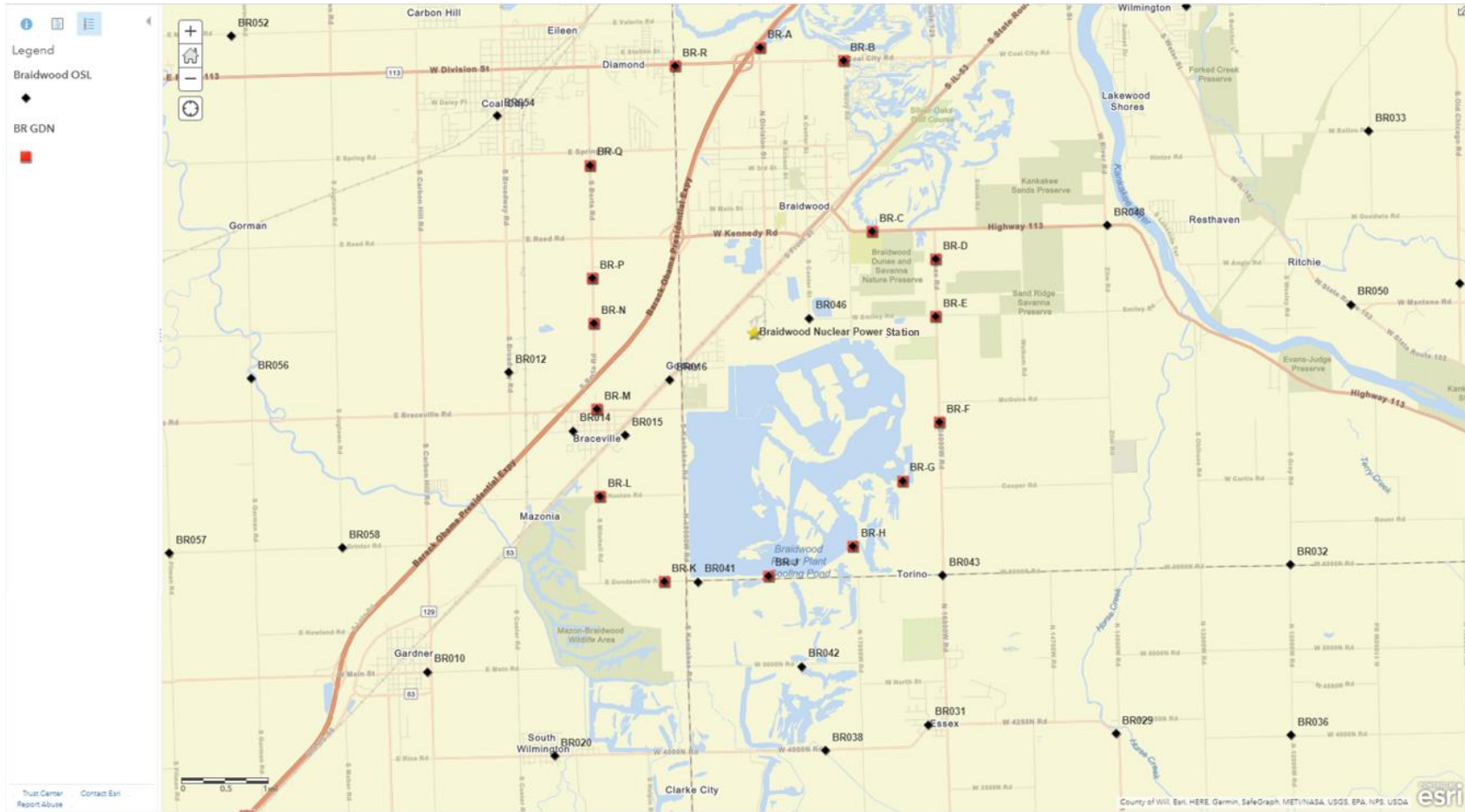


Figure 9. Environmental Sampling Locations – Braidwood

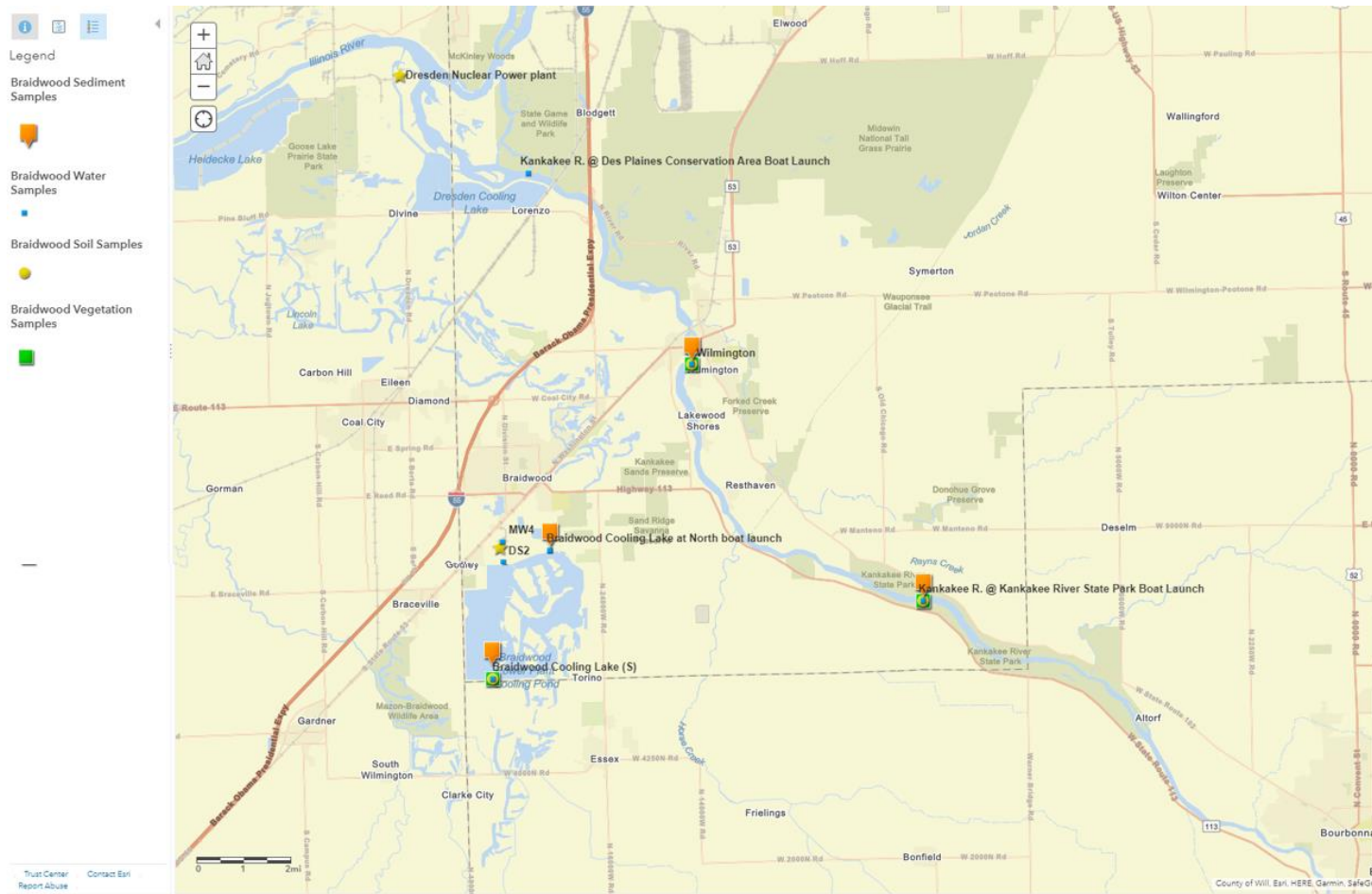
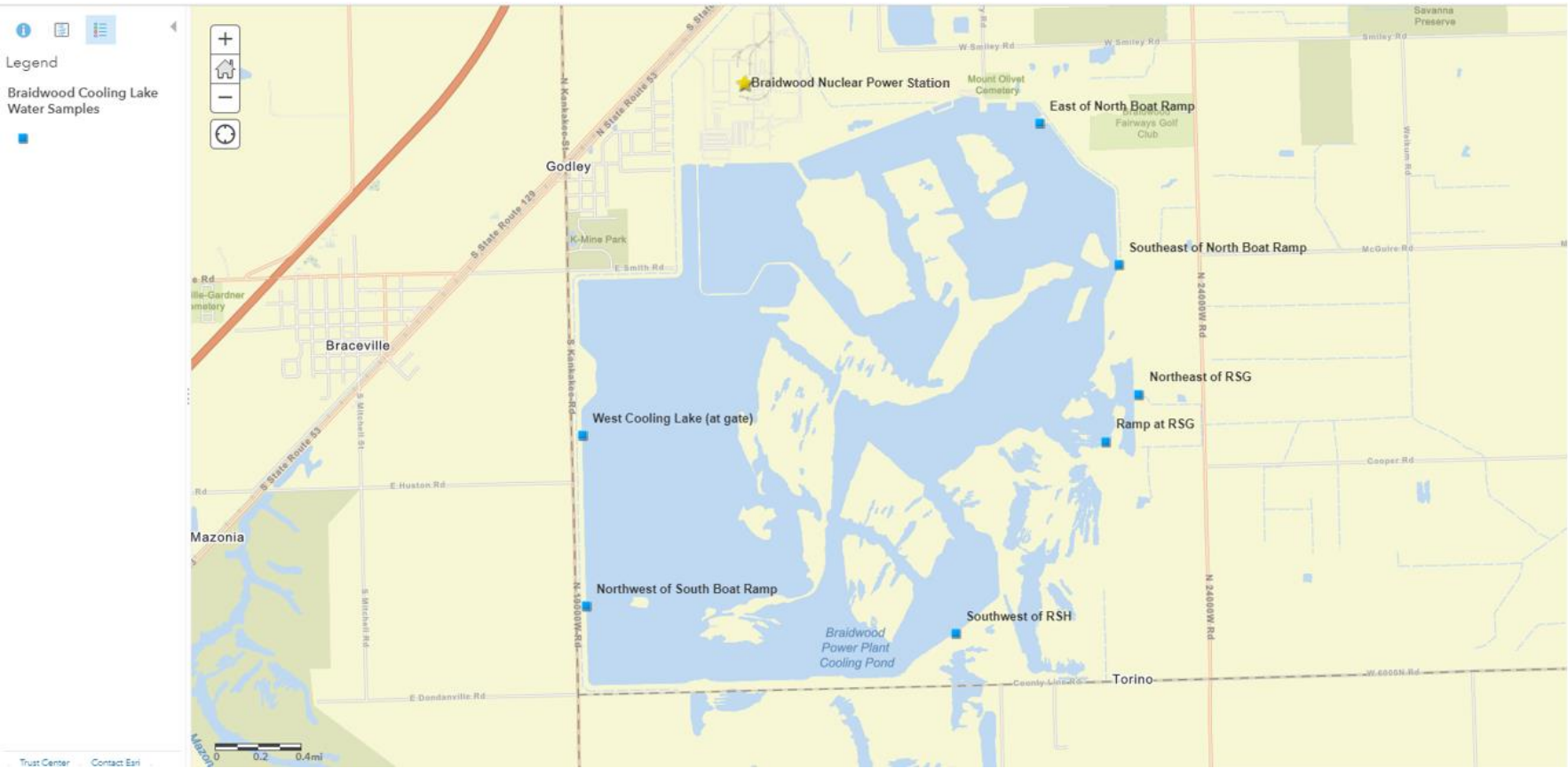


Figure 10. Environmental Sampling Locations – Braidwood Cooling Lake



Braidwood Sample Result Tables and Graphs

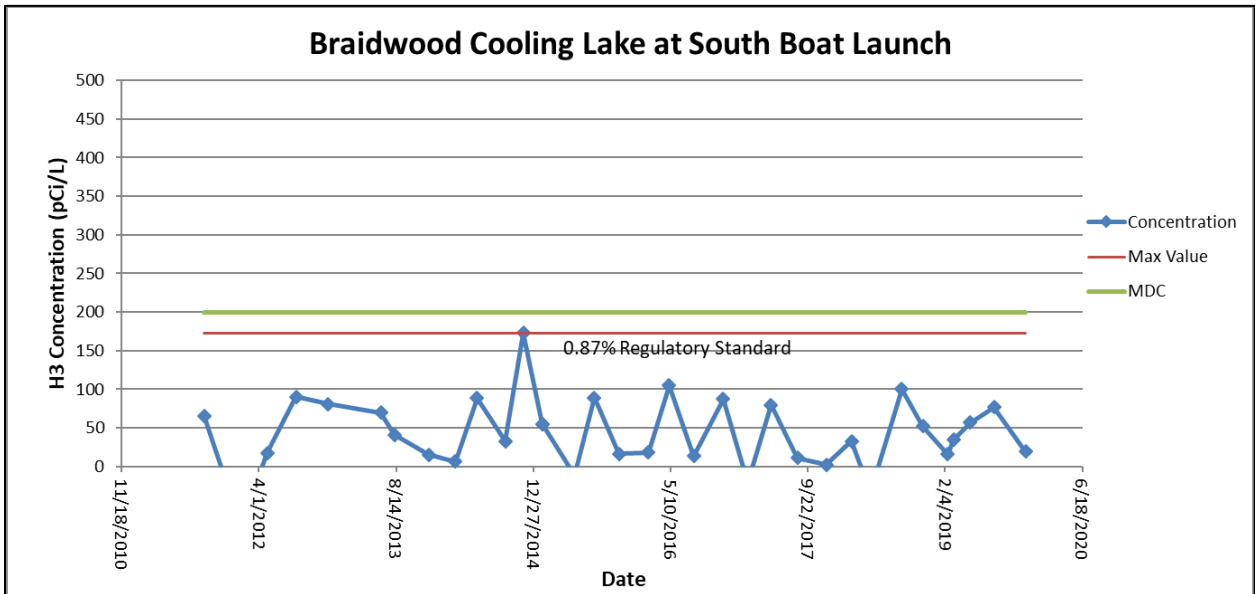
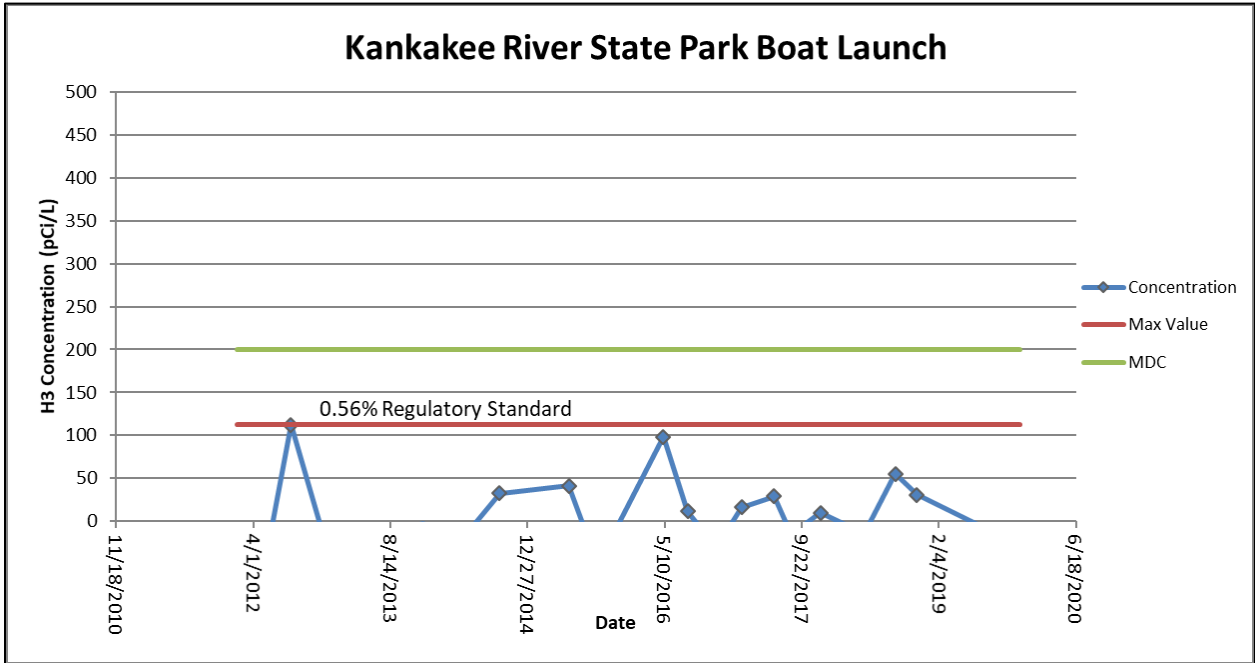
Tritium (H-3) in Water Results - Braidwood Results are in picocuries per liter (pCi/L)

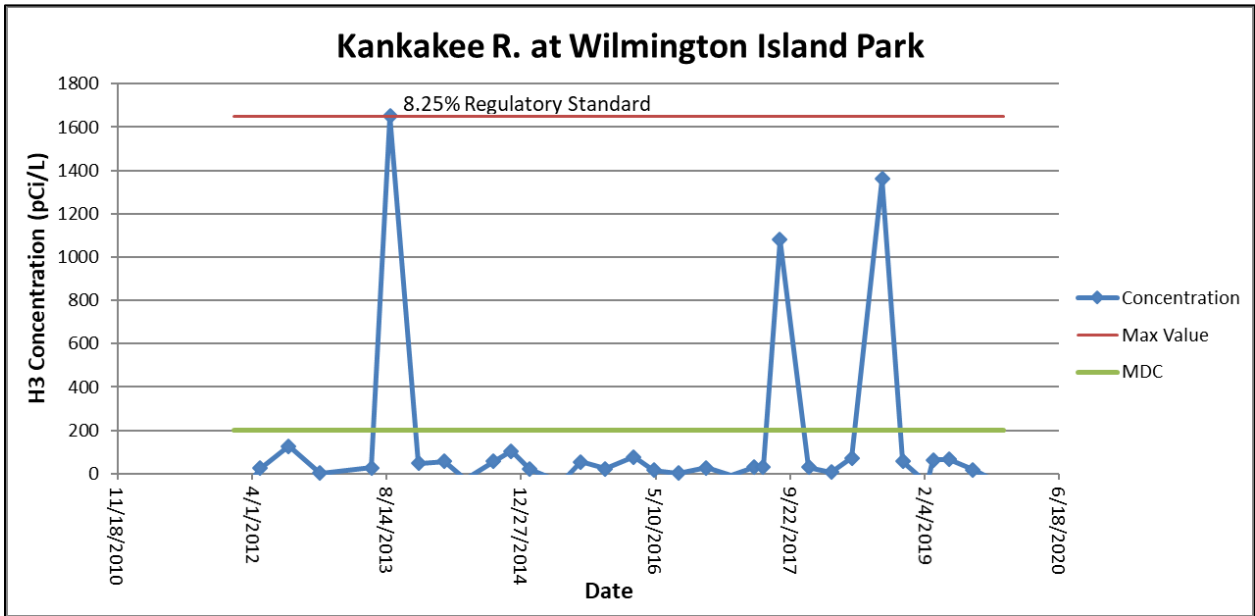
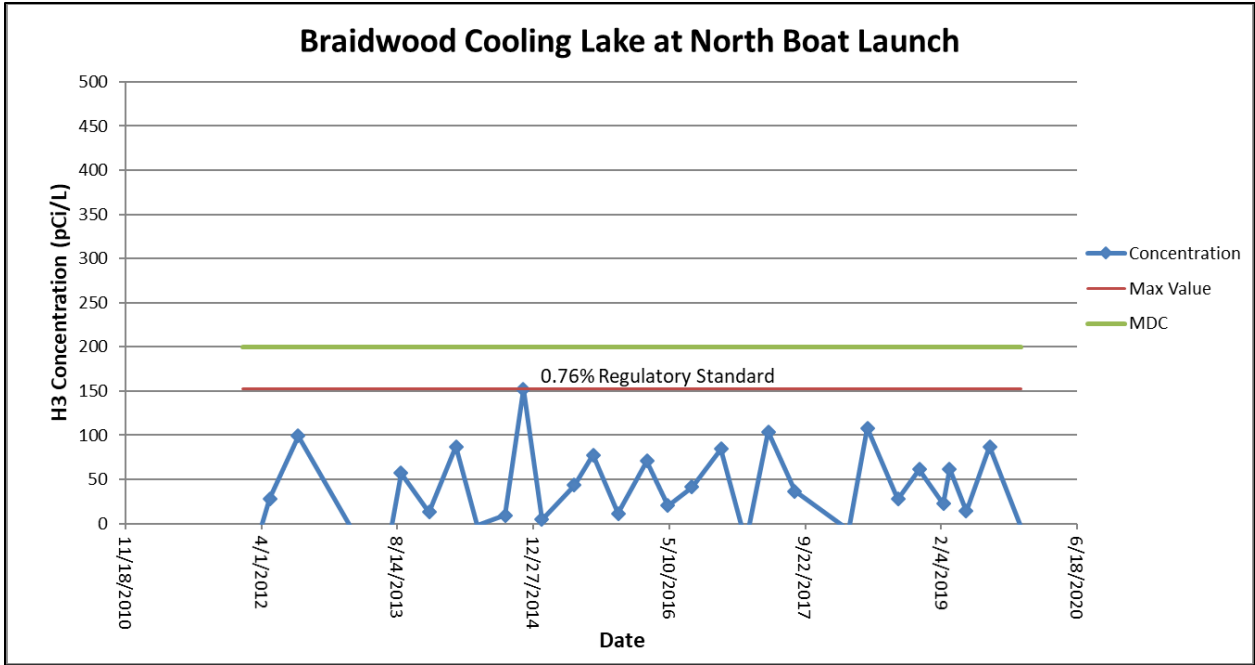
Location Date	H-3	
	Result	MDC
Braidwood Cooling Lake (N)		
2/13/2019	<MDC	200
3/7/2019	<MDC	200
5/7/2019	<MDC	200
8/1/2019	<MDC	200
11/25/2019	<MDC	200
Braidwood Cooling Lake (S)		
2/14/2019	<MDC	200
3/7/2019	<MDC	200
5/7/2019	<MDC	200
8/1/2019	<MDC	200
11/25/2019	<MDC	200
DS-2		
3/5/2019	<MDC	200
6/11/2019	<MDC	200
9/30/2019	<MDC	200
10/13/2019	<MDC	200
Kankakee R. at Des Plaines Conservation Area Boat Launch		
5/7/2019	<MDC	200
8/1/2019	<MDC	200
Kankakee R. at Kankakee R. State Park Boat Launch		
8/1/2019	<MDC	200
11/25/2019	<MDC	200
Kankakee R. at Wilmington Island Park		
2/13/2019	<MDC	200
3/7/2019	<MDC	200
5/7/2019	<MDC	200
8/1/2019	<MDC	200
11/25/2019	<MDC	200
MW-4		
3/7/2019	685	200
9/24/2019	368	200
10/10/2019	399	200

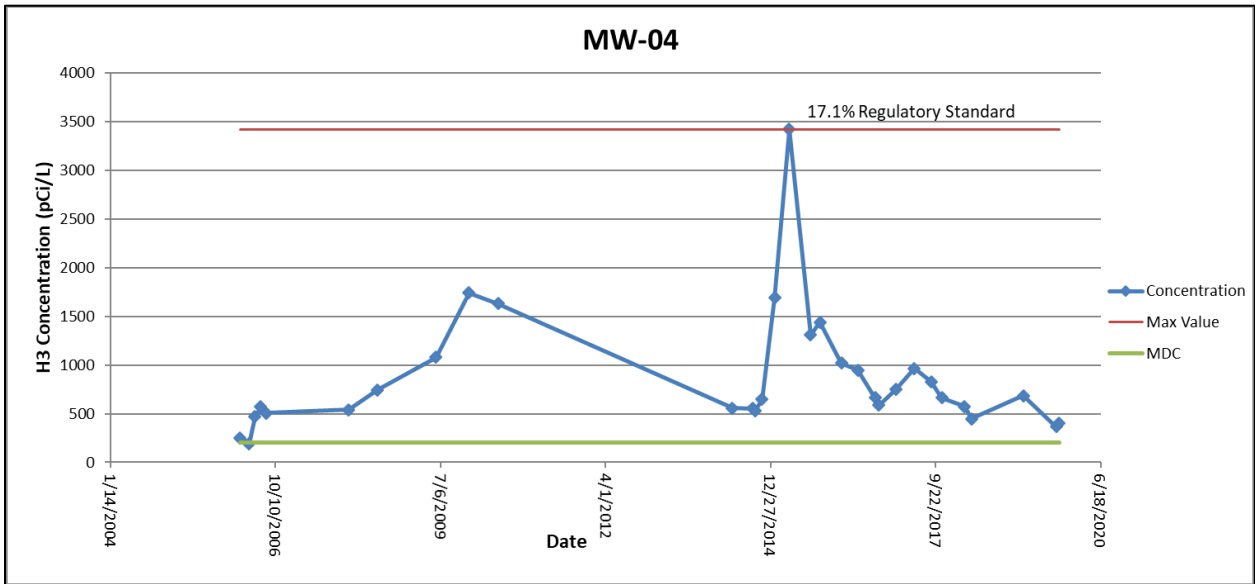
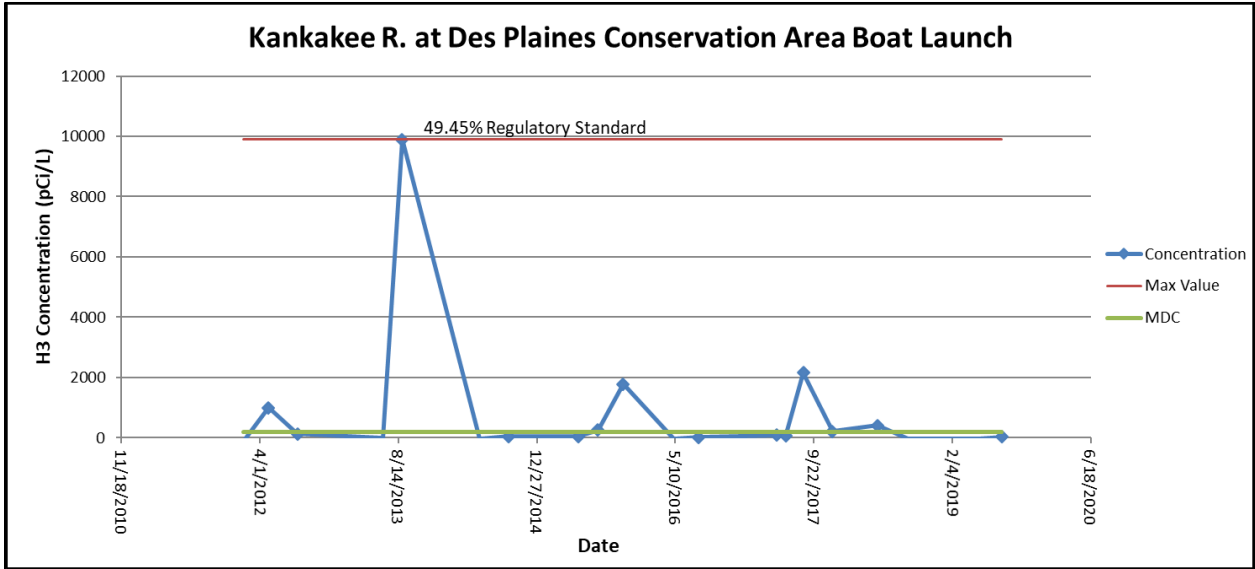
Tritium (H-3) in Water Results - Braidwood Cooling Lake
 Results are in picocuries per liter (pCi/L)

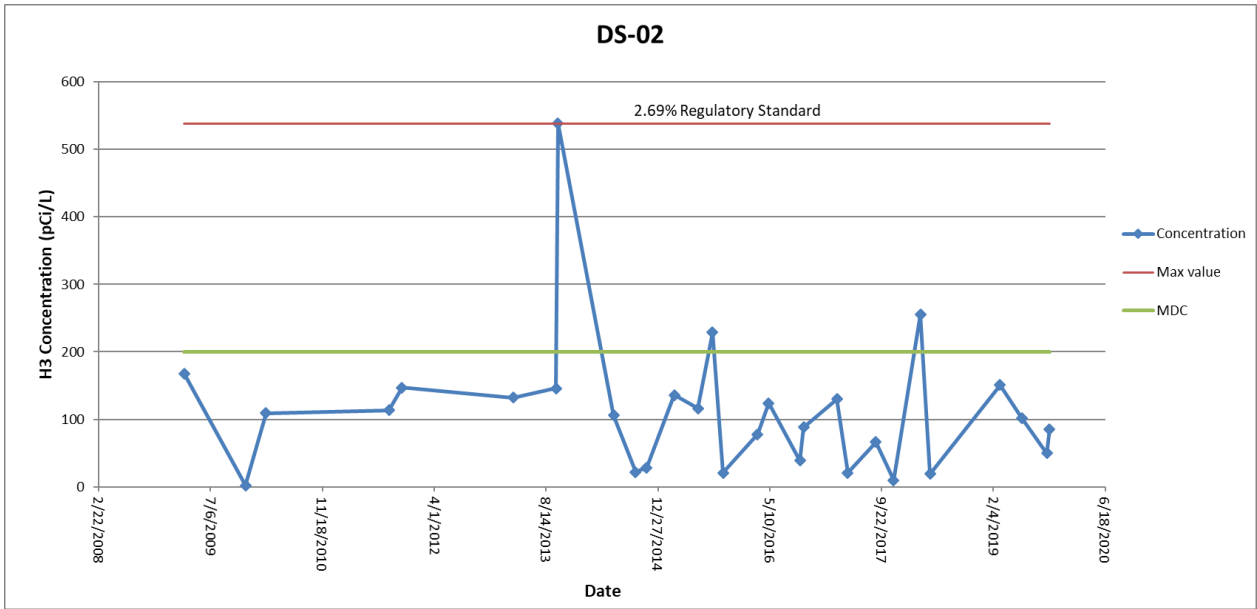
Location	H-3	
Date	Result	MDC
East of North Boat Ramp		
3/7/2019	<MDC	200
North East of RSG		
3/7/2019	<MDC	200
North West of South Boat Ramp		
3/7/2019	<MDC	200
Ramp at RSG		
3/7/2019	<MDC	200
South East of North Boat Ramp		
3/7/2019	<MDC	200
South West of RSH		
3/7/2019	<MDC	200
West Cooling Lake (at gate)		
3/7/2019	<MDC	200

Trending Graphs for Tritium (H-3) in Water - Braidwood
 (Max value compared to IEPA and US EPA regulatory standard of 20,000 pCi/L)









Total Strontium Results in Water - Braidwood
Results are in picocuries per liter (pCi/L)

Location	Strontium	
Date	Result	MDC
Braidwood Cooling Lake (S)		
5/7/2019	<MDC	0.4
Kankakee R. at Des Plaines Conservation Area Boat Launch		
5/7/2019	<MDC	0.4

Results for Gross Beta Screening of Water - Braidwood Area
Results are in picocuries per liter (pCi/L)

Location	Beta	
Date	Result	MDC
Braidwood Cooling Lake (N)		
2/13/2019	7.3	3.7
5/7/2019	6.8	3.7
8/1/2019	4.9	3.7
11/25/2019	5.2	3.7
Braidwood Cooling Lake (S)		
2/14/2019	5.8	3.7
5/7/2019	6.1	3.7
8/1/2019	5.2	3.7
11/25/2019	5.1	3.7
Kankakee R. at Des Plaines Conserv. Area		
5/7/2019	<MDC	3.7
8/1/2019	<MDC	3.7
Kankakee R. at Kankakee R. State Park Boat Launch		
8/1/2019	3.8	3.7
11/25/2019	<MDC	3.7
Kankakee R. at Wilmington Island Park		
2/13/2019	<MDC	3.7
5/7/2019	<MDC	3.7
8/1/2019	<MDC	3.7
11/25/2019	<MDC	3.7

Gamma Spectroscopy Results for Other Radionuclides in Water - Braidwood
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)																								
2/13/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
5/7/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
8/1/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
11/25/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
Braidwood Cooling Lake (S)																								
2/14/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
5/7/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
8/1/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
11/25/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
Kankakee R. at Des Plaines Conservation Area Boat Launch																								
5/7/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
8/1/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
Kankakee R. at Kankakee R. State Park Boat Launch																								
8/1/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
11/25/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
Kankakee R. at Wilmington Island Park																								
2/13/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
5/7/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
8/1/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5
11/25/2019	<MDC	20.7	<MDC	360.0	<MDC	3.6	<MDC	4.0	<MDC	4.2	<MDC	4.0	<MDC	8.1	<MDC	8.9	<MDC	3.6	<MDC	4.2	<MDC	7.7	<MDC	6.5

Gamma Spectroscopy Results for Radionuclides in Soil (Migration) - Braidwood
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
Braidwood Cooling Lake (S)																						
5/7/2019	<MDC	1.80	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.03	<MDC	0.14	<MDC	0.04	<MDC	0.09	<MDC	0.08	<MDC	0.11
8/1/2019	<MDC	1.80	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.03	<MDC	0.14	<MDC	0.04	<MDC	0.09	<MDC	0.08	<MDC	0.11
Kankakee R. at Kankakee R. State Park Boat Launch																						
8/1/2019	<MDC	1.80	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.07	0.03	<MDC	0.14	<MDC	0.04	<MDC	0.09	<MDC	0.08	<MDC	0.11
Kankakee R. at Wilmington Island Park																						
8/1/2019	<MDC	1.80	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.16	0.03	<MDC	0.14	<MDC	0.04	<MDC	0.09	<MDC	0.08	<MDC	0.11

Gamma Spectroscopy Results for Radionuclides in Soil (Deposition) - Braidwood
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
Braidwood Cooling Lake (S)																						
5/7/2019	<MDC	1.52	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.06	<MDC	0.03	<MDC	0.12	<MDC	0.03	<MDC	0.09	<MDC	0.12	<MDC	0.13
8/1/2019	<MDC	1.52	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.06	<MDC	0.03	<MDC	0.12	<MDC	0.03	<MDC	0.09	<MDC	0.12	0.27	0.13
Kankakee R. at Kankakee R. State Park Boat Launch																						
8/1/2019	<MDC	1.52	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.06	0.05	0.03	<MDC	0.12	<MDC	0.03	<MDC	0.09	<MDC	0.12	<MDC	0.13
Kankakee R. at Wilmington Island Park																						
8/1/2019	<MDC	1.52	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.06	0.13	0.03	<MDC	0.12	<MDC	0.03	<MDC	0.09	<MDC	0.12	<MDC	0.13

Gamma Spectroscopy Results for Radionuclides in Sediment- Braidwood
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)																								
5/7/2019	<MDC	0.94	<MDC	0.14	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.11	<MDC	0.02	<MDC	0.06	<MDC	0.06	<MDC	0.08		
8/1/2019	<MDC	0.94	<MDC	0.14	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.11	<MDC	0.02	<MDC	0.06	<MDC	0.06	<MDC	0.08		
Kankakee R. at Kankakee R. State Park Boat Launch																								
8/1/2019	<MDC	0.94	<MDC	0.14	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.11	<MDC	0.02	<MDC	0.06	<MDC	0.06	<MDC	0.08		
Kankakee R. at Wilmington Island Park																								
8/1/2019	<MDC	0.94	<MDC	0.14	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.04	0.02	<MDC	0.11	<MDC	0.02	<MDC	0.06	<MDC	0.06	<MDC	0.08		

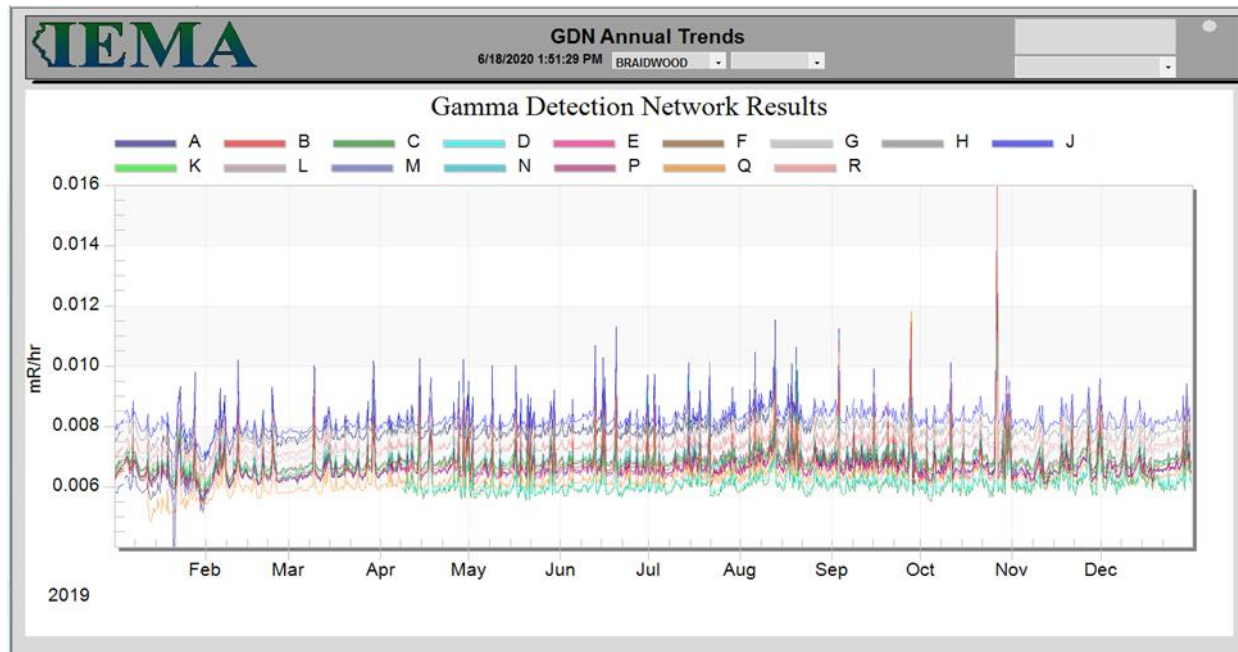
Gamma Spectroscopy Results for Radionuclides in Vegetation - Braidwood
Results are in picocuries per gram (pCi/g)

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
Braidwood Cooling Lake (S)																									
5/7/2019	<MDC	1.9	<MDC	3.3	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	1.8	<MDC	0.1	<MDC	0.1	<MDC	0.2	<MDC	0.2	
8/1/2019	<MDC	1.9	<MDC	3.3	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	1.8	<MDC	0.1	<MDC	0.1	<MDC	0.2	<MDC	0.2	
Kankakee R. at Kankakee R. State Park Boat Launch																									
8/1/2019	<MDC	1.9	<MDC	3.3	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	1.8	<MDC	0.1	<MDC	0.1	<MDC	0.2	<MDC	0.2	
Kankakee R. at Wilmington Island Park																									
8/1/2019	<MDC	1.9	<MDC	3.3	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	1.8	<MDC	0.1	<MDC	0.1	<MDC	0.2	<MDC	0.2	

Gamma Spectroscopy Results for Radionuclides in Fish - Braidwood
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
Kankakee R. (Bottom Feeder)																								
8/14/2019	<MDC	6800	<MDC	2970	<MDC	78	<MDC	54	<MDC	58	<MDC	51	<MDC	242	<MDC	15700	<MDC	56	<MDC	184	<MDC	125	<MDC	173
Kankakee R. (Top Feeder)																								
8/14/2019	<MDC	6800	<MDC	2970	<MDC	78	<MDC	54	<MDC	58	<MDC	51	<MDC	242	<MDC	15700	<MDC	56	<MDC	184	<MDC	125	<MDC	173

Braidwood Gamma Detection Network Results- Braidwood
Results are in milliroentgen per hour (mR/hr)



Summary of Ambient Gamma Results - Braidwood

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
BR001	10.9	10.8	10.1	11.8	43.5
BR005	7.5	8.9	8.7	10.6	35.6
BR008	10.4	9.6	14.8	10.1	44.9
BR010	8.4	8.4	6.4	9.7	32.9
BR012	7.3	6.7	6.3	7.9	28.2
BR014	5.9	4.4	7.0	7.3	24.6
BR015	6.6	5.0	4.0	8.2	23.8
BR016	6.6	6.5	7.2	7.4	27.7
BR020	6.5	6.1	9.0	8.6	30.3
BR025	6.7	6.8	9.7	10.9	34.0
BR027	6.4	5.6	5.7	6.9	24.6
BR029	6.4	6.7	7.5	9.7	30.3
BR031	5.4	5.7	4.3	8.0	23.4
BR032	7.3	4.8	5.9	7.5	25.6
BR033	6.8	7.5	6.8	8.8	29.9
BR034	9.5	8.9	10.8	8.7	37.8
BR035	10.4	8.8	13.0	11.4	43.6
BR036	5.2	4.5	5.3	6.7	21.7
BR037	5.7	6.8	9.1	8.2	29.7
BR038	6.8	7.4	7.8	9.2	31.2
BR039	8.7	8.7	10.3	11.0	38.6
BR040	9.3		10.3	12.7	43.1
BR041	6.8	7.6	6.1	9.2	29.7
BR042	9.1	9.6	10.1	11.8	40.6
BR043	5.8	5.6	5.1	6.6	23.2
BR046	5.7	4.9	8.8	6.5	25.9

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
BR048	6.2	4.9	4.7	7.1	22.9
BR049	6.4	6.3	5.8	6.3	24.8
BR050	7.6	7.1	9.5	7.8	32.0
BR051	5.2	4.4	4.0	7.6	21.2
BR052	7.0	6.1	4.7	7.9	25.7
BR053	9.3	8.9	10.1	10.1	38.4
BR054	6.8	5.5	5.9	8.8	26.9
BR056	7.0	6.8	9.5	8.9	32.2
BR057	10.8	10.0	9.9	12.1	42.9
BR058	8.5	9.9	9.6	12.2	40.1
BR-RSA	5.8	5.6	4.2	4.9	20.5
BR-RSB	5.8	8.4	6.9	7.5	28.7
BR-RSC	5.5	5.3	6.0	8.5	25.3
BR-RSD	6.8	5.8	5.3	7.2	25.1
BR-RSE	6.4	5.7	6.6	8.0	26.7
BR-RSF	4.8	6.0	4.5	8.4	23.8
BR-RSG	6.8	6.5	8.2		28.7
BR-RSH	6.9	8.0	7.4		29.8
BR-RSJ	9.6	9.3	9.1		37.4
BR-RSK	6.0	5.8	6.0	8.3	26.2
BR-RSL	6.4	5.6	7.3	7.2	26.4
BR-RSM	5.5	4.8	4.8	5.7	20.8
BR-RSN	5.9	4.9	6.6	7.6	25.0
BR-RSP	6.3	4.7	6.5	6.7	24.2
BR-RSQ	6.0	4.1	5.7	7.6	23.4
BR-RSR	7.2	8.5	7.9		31.5

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.

Byron Nuclear Power Station

The Byron NPS, 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 and the station's IEPA National Pollutant Discharge Elimination System permit. In 2019, there were 71 liquid effluent batch releases from the Byron station.

Figures 11 through 13 provide an overview of all sampling and monitoring locations in the vicinity of the Byron NPS (yellow star).

Significant Events or Changes for 2019

The Pine Rock Nature Preserve soil and vegetation sampling location was added to provide a sampling location to the southeast of the Byron station.

Sampling and Monitoring Results

Water Sampling Results

Water sample analysis for tritium, total strontium, and gamma spectroscopy indicated no concentrations above the established MDCs.

Results from gross beta analysis indicated that the established MDC was met at some sampling locations. The slightly elevated gross beta results can likely be attributed to the routine liquid effluent releases from the Byron station.

Soil Sampling Results

Gamma spectroscopy results for soil samples indicated the presence of Cesium-137 above the established MDC for all soil samples collected. Although above MDC, the concentrations present were consistent with concentrations historically found from atmospheric nuclear weapons testing. The May 22, 2019 deposition soil sample collected from the Forest Preserve on River Road location indicated the presence of Zirconium-95 in a concentration slightly above the established MDC. Results from the sample collected from that location in the following quarter were once again below MDC.

Sediment Sampling Results

Gamma spectroscopy results for sediment samples indicated no concentrations above the established MDC.

Vegetation Sampling Results

Gamma spectroscopy results for vegetation samples indicated no concentrations above the established MDC.

Fish Sampling Results

Gamma spectroscopy results for fish samples indicated no concentrations above the established MDC.

Direct Radiation Monitoring Results

The ambient gamma monitoring results were comparable to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois

Byron Maps of Monitoring and Sampling Locations

Figure II. OSL and GDN Monitoring Locations- Byron

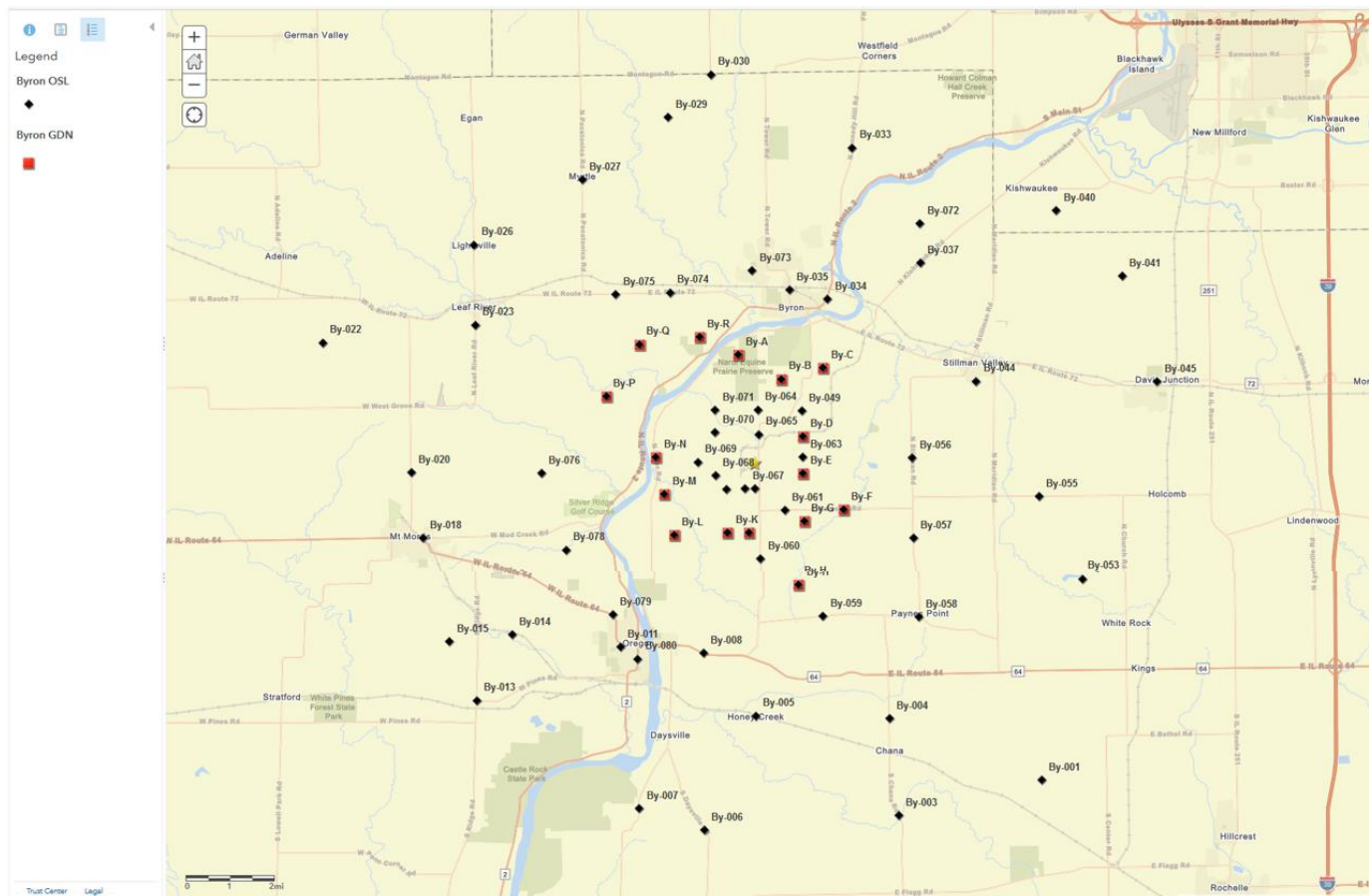


Figure 12. OSL and GDN Monitoring Locations- Byron (continued)

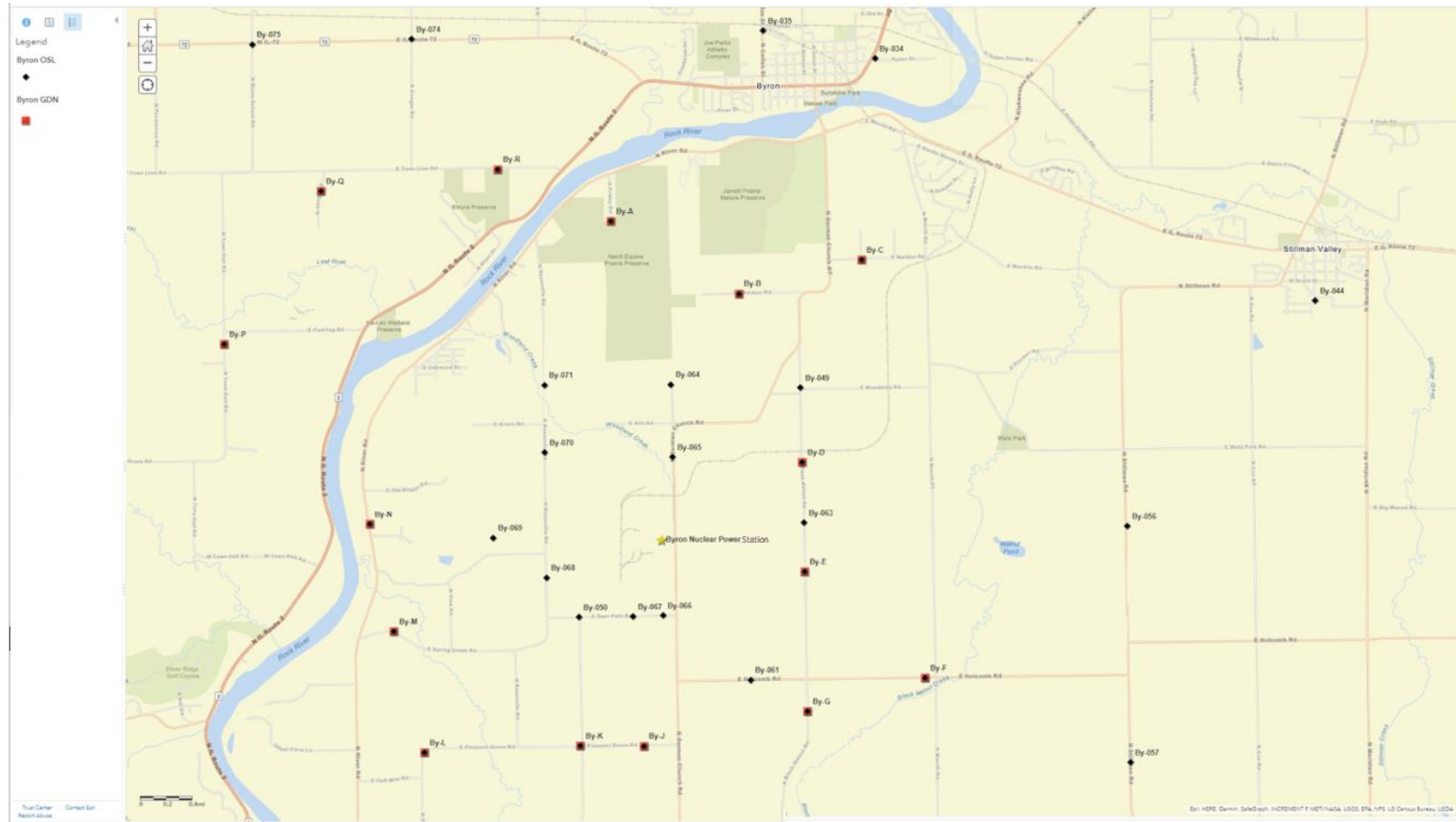
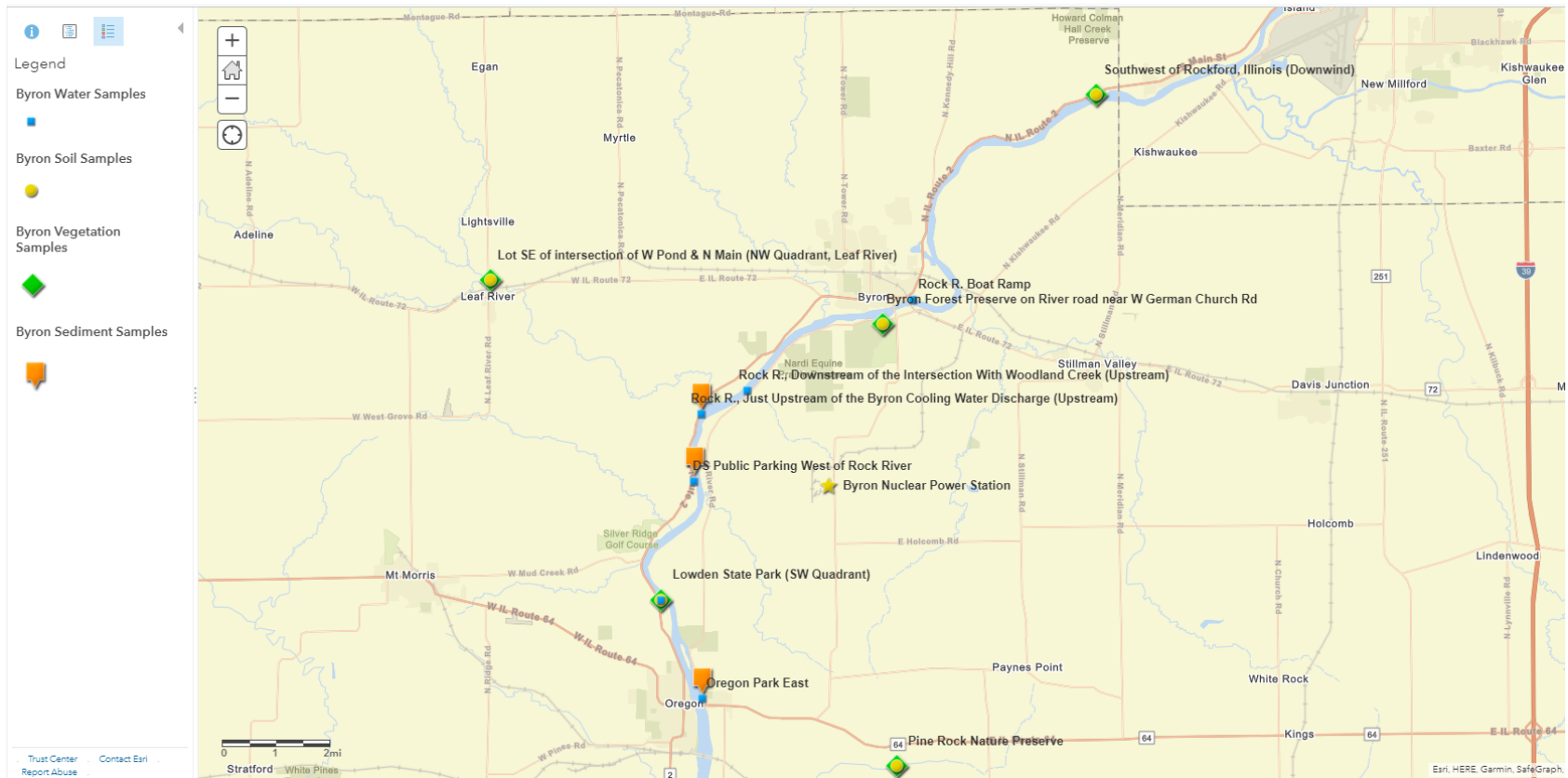


Figure 13. Environmental Sampling Locations- Byron

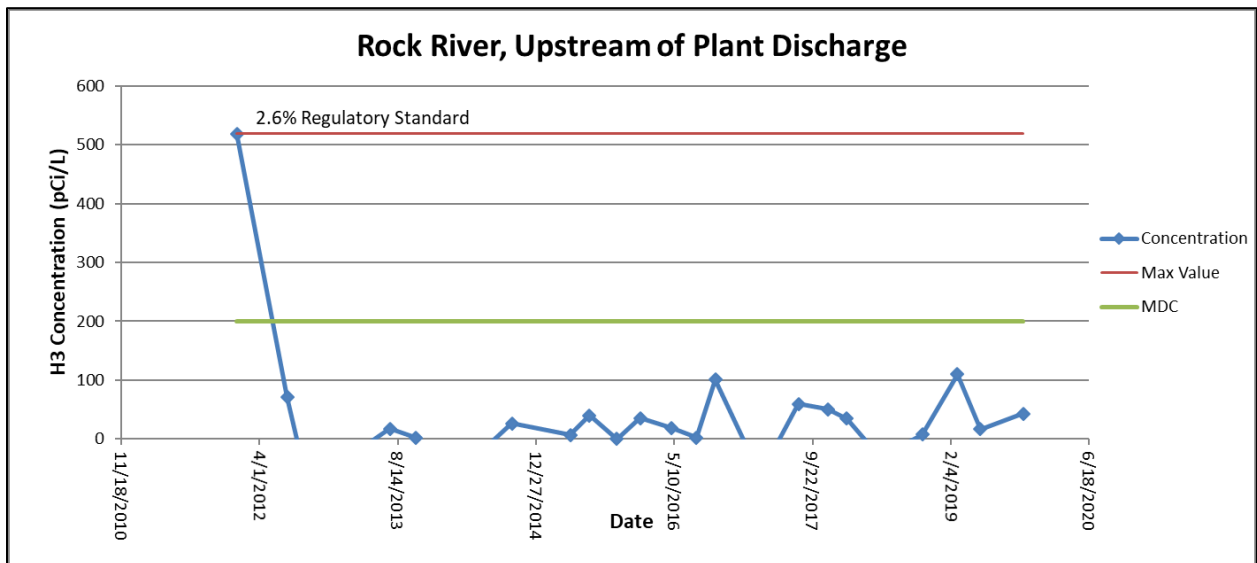
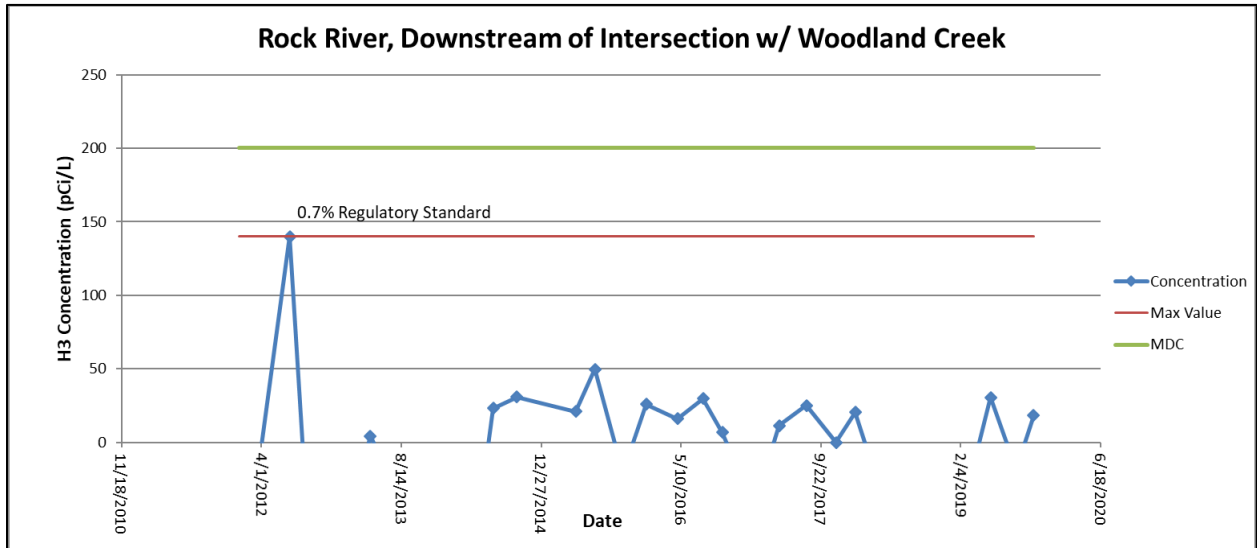


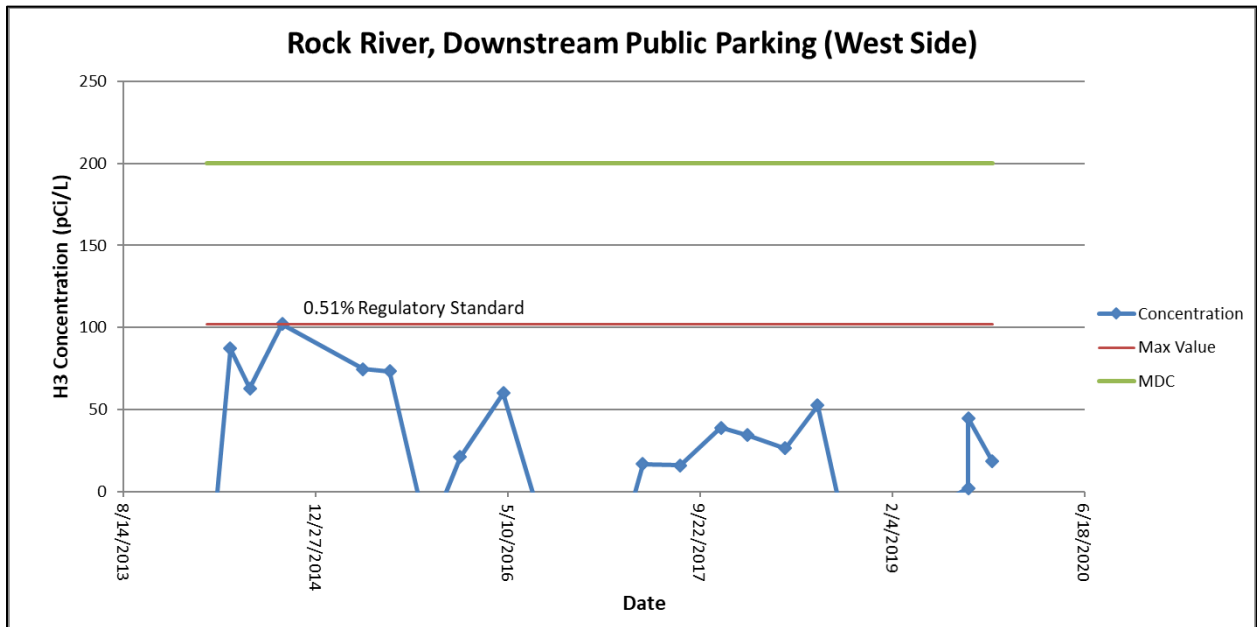
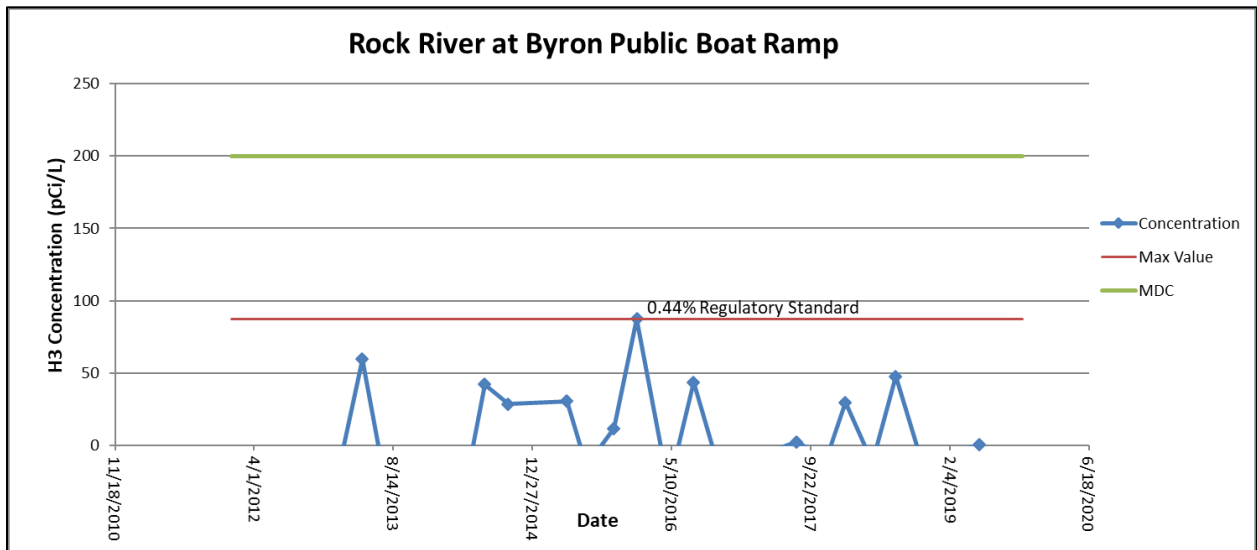
Byron Sample Result Tables and Graphs

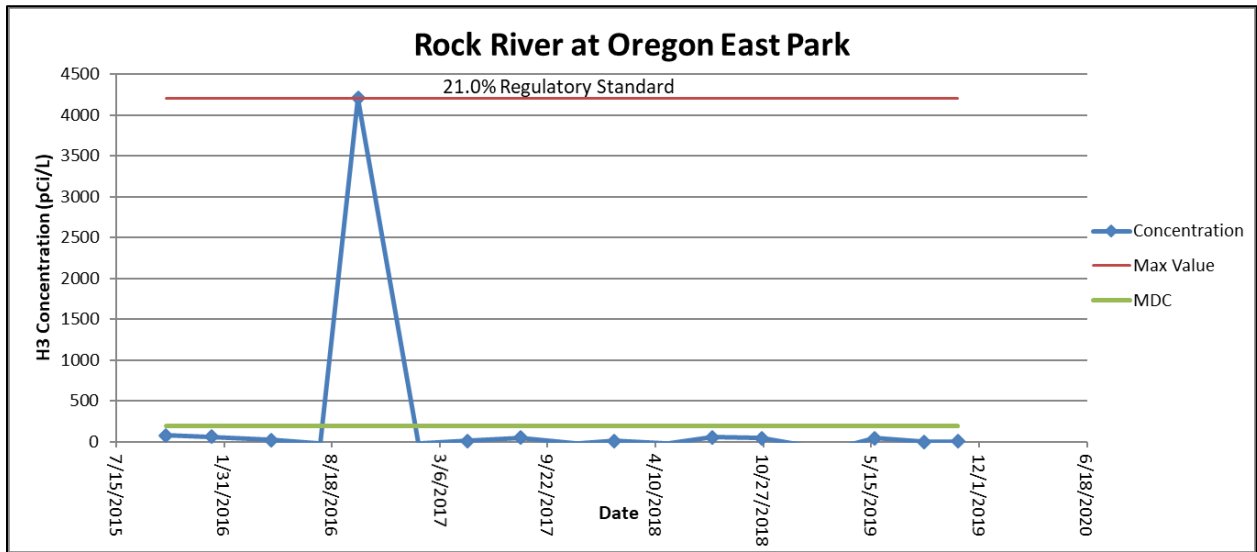
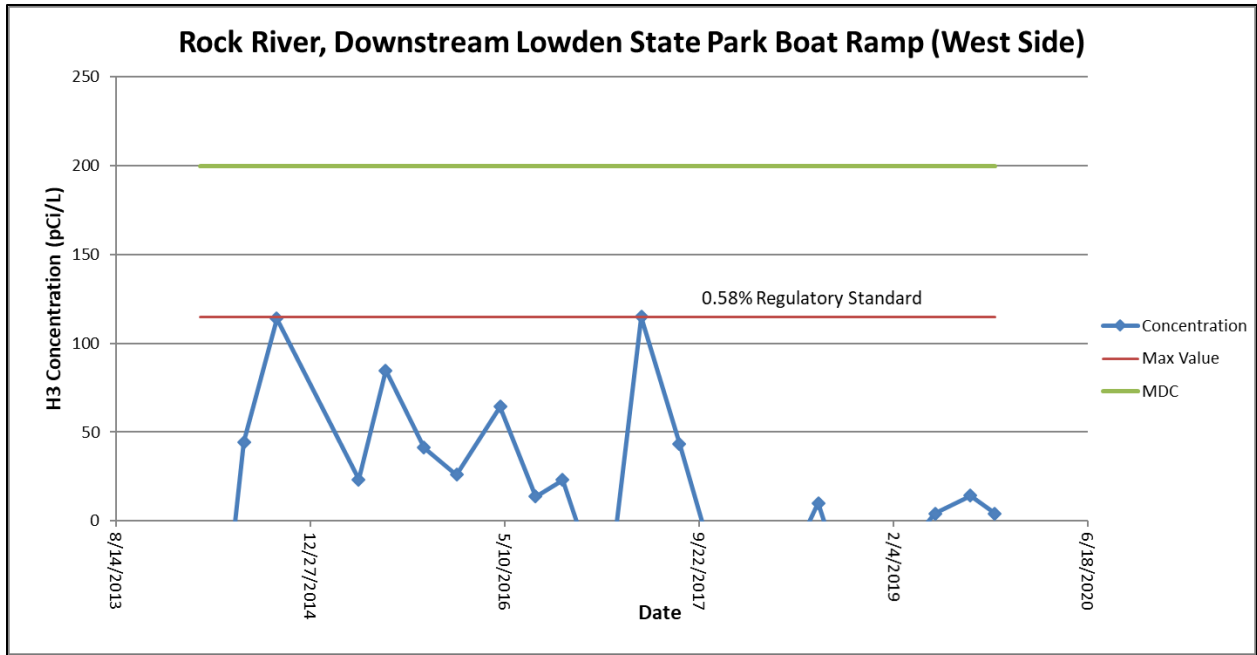
Tritium (H-3) in Water Results - Byron
Results are in picocuries per liter (pCi/L)

Location Date	H-3	
	Result	MDC
Lowden State Park Boat Ramp		
5/22/2019	<MDC	200
8/21/2019	<MDC	200
10/23/2019	<MDC	200
Oregon Park East		
2/27/2019	<MDC	200
5/22/2019	<MDC	200
8/21/2019	<MDC	200
10/23/2019	<MDC	200
Public Parking W. of Rock R.		
2/27/2019	<MDC	200
5/22/2019	<MDC	200
8/21/2019	<MDC	200
10/23/2019	<MDC	200
Rock R. UpS of the Byron Cooling Water Discharge		
2/28/2019	<MDC	200
5/22/2019	<MDC	200
8/21/2019	<MDC	200
10/23/2019	<MDC	200
Rock R. Byron Boat Ramp		
5/22/2019	<MDC	200
8/21/2019	<MDC	200
10/23/2019	<MDC	200
Rock R. DnS of Woodland Creek		
2/27/2019	<MDC	200
5/22/2019	<MDC	200
8/21/2019	<MDC	200
10/23/2019	<MDC	200

Trending Graphs for Tritium (H-3) in Water - Byron
 (Max value compared to IEPA and US EPA regulatory standard of 20,000 pCi/L)







Total Strontium in Water Results - Byron
 Results in picocuries per liter (pCi/L)

Location	Strontium	
Date	Result	MDC
Public Parking W. of Rock R.		
5/22/2019	<MDC	0.5
Lowden State Park Boat Ramp		
5/22/2019	<MDC	0.5

Sample Results for Beta Screening of Water - Byron
Results are in picocuries per liter (pCi/L)

Location	Beta	
Date	Result	MDC
Lowden State Park Boat Ramp		
5/22/2019	<MDC	3.8
8/21/2019	4.2	3.8
10/23/2019	<MDC	3.8
Oregon Park East		
2/27/2019	4.2	3.8
5/22/2019	<MDC	3.8
8/21/2019	4.0	3.8
10/23/2019	<MDC	3.8
Public Parking W. of Rock R.		
2/27/2019	<MDC	3.8
5/22/2019	<MDC	3.8
8/21/2019	4.8	3.8
10/23/2019	4.1	3.8
Rock R. Byron Boat Ramp		
5/22/2019	<MDC	3.8
8/21/2019	4.9	3.8
10/23/2019	7.1	3.8
Rock R. DnS of Woodland Creek		
2/27/2019	<MDC	3.8
5/22/2019	<MDC	3.8
8/21/2019	<MDC	3.8
10/23/2019	7.4	3.8
Rock R. UpS of the Byron Discharge		
2/28/2019	<MDC	3.8
5/22/2019	<MDC	3.8
8/21/2019	<MDC	3.8
10/23/2019	<MDC	3.8

Gamma Spectroscopy Results for Other Radionuclides in Water - Byron
 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																								
5/22/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
8/21/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
10/23/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
Oregon Park East																								
2/27/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
5/22/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
8/21/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
10/23/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
Public Parking W. of Rock R.																								
2/27/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
5/22/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
8/21/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
10/23/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
Rock R. Byron Boat Ramp																								
5/22/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
8/21/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
10/23/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
Rock R. DnS of Woodland Creek																								
2/27/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
5/22/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
8/21/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
10/23/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
Rock R. UpS of the Byron Cooling Water Discharge																								
2/28/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
5/22/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
8/21/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3
10/23/2019	<MDC	17.1	<MDC	360	<MDC	3.5	<MDC	3.9	<MDC	3.9	<MDC	3.8	<MDC	7.8	<MDC	6.9	<MDC	3.6	<MDC	3.9	<MDC	7.8	<MDC	6.3

Gamma Spectroscopy Results for Radionuclides in Soil (Migration) - Byron
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 Rd.																						
5/22/2019	<MDC	1.11	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.12	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.10
8/21/2019	<MDC	1.11	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.10	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.10
Lot SE of Pond & Main (Leaf River)																						
5/22/2019	<MDC	1.11	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.06	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.10
8/21/2019	<MDC	1.11	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.09	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.10
Lowden State Park																						
5/22/2019	<MDC	1.11	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.11	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.10
8/21/2019	<MDC	1.11	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.03	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.10
Pine Rock Nature Preserve																						
5/22/2019	<MDC	1.11	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.10	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.10
Southwest of Rockford																						
5/22/2019	<MDC	1.11	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.15	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.10
8/21/2019	<MDC	1.11	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.20	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.10

Gamma Spectroscopy Results for Radionuclides in Soil (Deposition) - Byron
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
Forest preserve on River Rd.																						
5/22/2019	<MDC	1.08	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.11	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	0.12	0.10
8/21/2019	<MDC	1.08	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.10	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.10
Lot SE of Pond & Main (Leaf River)																						
5/22/2019	<MDC	1.08	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.05	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.10
8/21/2019	<MDC	1.08	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.08	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.10
Lowden State Park																						
5/22/2019	<MDC	1.08	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.12	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.10
8/21/2019	<MDC	1.08	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.05	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.10
Pine Rock Nature Preserve																						
5/22/2019	<MDC	1.08	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.09	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.10
Southwest of Rockford																						
5/22/2019	<MDC	1.08	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.11	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.10
8/21/2019	<MDC	1.08	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.18	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.10

Gamma Spectroscopy Results for Radionuclides in Sediment - Byron
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
Oregon Park East																						
5/22/2019	<MDC	0.60	<MDC	0.09	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.04	<MDC	0.05
8/21/2019	<MDC	0.60	<MDC	0.09	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.04	<MDC	0.05
Public Parking W. of Rock R.																						
8/21/2019	<MDC	0.60	<MDC	0.09	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.04	<MDC	0.05

Gamma Spectroscopy Results for Radionuclides in Vegetation - Byron
Results are in picocuries per gram (pCi/g)

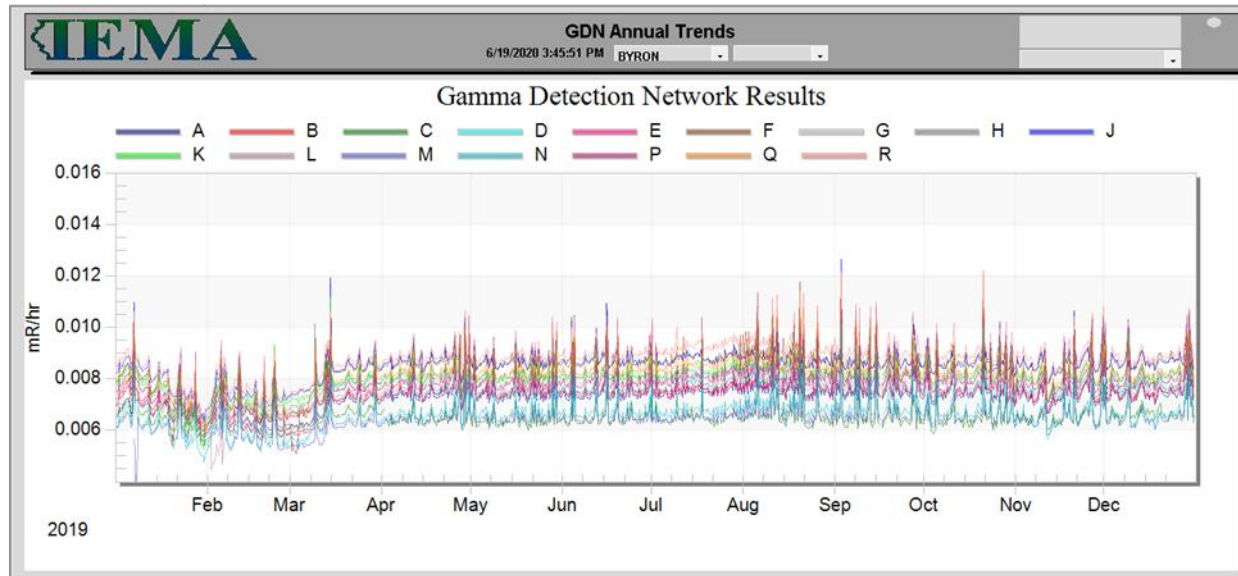
Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95			
	Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	
Forest preserve on River Rd.																										
5/22/2019	<MDC	6.1	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.0	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3	<MDC	0.3
8/21/2019	<MDC	6.1	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.0	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3	<MDC	0.3
Lot SE of Pond & Main (Leaf River)																										
5/22/2019	<MDC	6.1	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.0	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3	<MDC	0.3
8/21/2019	<MDC	6.1	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.0	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3	<MDC	0.3
Lowden State Park																										
5/22/2019	<MDC	6.1	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.0	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3	<MDC	0.3
8/21/2019	<MDC	6.1	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.0	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3	<MDC	0.3
Pine Rock Nature Preserve																										
5/22/2019	<MDC	6.1	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.0	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3	<MDC	0.3
8/21/2019	<MDC	6.1	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.0	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3	<MDC	0.3
Southwest of Rockford																										
5/22/2019	<MDC	6.1	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.0	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3	<MDC	0.3
8/21/2019	<MDC	6.1	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.0	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3	<MDC	0.3

Gamma Spectroscopy Results for Radionuclides in Fish - Byron
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	
Rock R. (Bottom Feeder)																										
4/25/2019	<MDC	1100	<MDC	1810	<MDC	27.1	<MDC	19.9	<MDC	20.4	<MDC	16.6	<MDC	78	<MDC	1770	<MDC	20.5	<MDC	49	<MDC	45	<MDC	51	<MDC	51
Rock R. (Top Feeder)																										
4/25/2019	<MDC	1100	<MDC	1810	<MDC	27.1	<MDC	19.9	<MDC	20.4	<MDC	16.6	<MDC	78	<MDC	1770	<MDC	20.5	<MDC	49	<MDC	45	<MDC	51	<MDC	51

No fish collected in the third quarter due to flood conditions on the Rock River.

Gamma Detection Network Results - Byron
Results are in milliroentgen per hour (mR/hr)



Summary of Ambient Gamma Results - Byron

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
BY001	9.5	6.9	5.0	7.8	29.2
BY003	7.1	5.7	4.7	4.5	22.0
BY004	8.5	6.5	5.7	6.5	27.1
BY005	7.8	6.6	7.6	6.6	28.5
BY006	8.3	7.2	6.3	4.4	26.2
BY007	9.0	7.0	7.6	4.6	28.3
BY008	8.7	6.8	6.8	6.0	28.3
BY011	8.4	7.8	5.7	6.7	28.7
BY013	9.9	9.7	9.2	10.0	38.8
BY014	6.2	6.3	5.5	6.8	24.8
BY015	9.8	10.9	7.8	8.1	36.6
BY018	6.8	6.3	7.9	2.4	23.5
BY020	8.5	9.8	10.1	6.5	34.9
BY022	9.3	8.6	6.7	6.3	30.9
BY023	8.6	9.9	7.6	7.4	33.4
BY026	8.9	8.6	6.1	8.1	31.7
BY027	11.1		8.9	9.6	39.5
BY029	10.6	8.4	12.4	8.8	40.2
BY030	9.9	9.5	6.4	7.6	33.4
BY033	11.9	7.8	9.4	8.9	38.0
BY034	11.1	6.3	8.1	6.3	31.8
BY035	8.7	6.4	4.8	5.4	25.3
BY037	8.4	6.3	5.6	5.6	25.9
BY040	9.9	9.6	9.6	9.1	38.2
BY041	7.1	5.8	7.6	5.8	26.3
BY044	6.7	4.7	9.9	7.7	29.1
BY045	7.2	6.4	4.5		24.1
BY049	8.5	6.8	6.9	7.6	29.8
BY050	11.1	7.6	11.5	9.7	39.9
BY053	11.3	7.6	10.7	7.0	36.5
BY055	10.4	8.5	9.1	8.7	36.7
BY056	7.8	8.8	7.1	6.7	30.4
BY057	11.6	9.3	7.4	7.1	35.4
BY058	9.9	9.9	9.1	8.0	36.9
BY059	11.9	8.6	8.7	7.7	36.8

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
BY060	11.0	6.9	7.9	7.7	33.6
BY061	15.0	9.7		5.0	39.5
BY063	11.0	8.0	12.3	6.0	37.4
BY064	10.7	10.4	9.3	9.5	39.9
BY065	11.1	9.0	8.9	6.0	35.1
BY066	9.8	10.3	6.4	7.0	33.5
BY067	9.8	6.5	10.5	7.5	34.2
BY068	8.7	7.2	8.7	5.4	30.0
BY069	9.0	7.8	8.0	5.2	30.0
BY070		9.1	8.7	4.5	29.8
BY071	7.8	7.1	5.3	5.4	25.6
BY072	9.0	8.7	8.9	9.8	36.4
BY073	11.1	8.6	9.6	7.9	37.2
BY074	11.1	9.9	10.9	7.9	39.8
BY075		8.9	7.9	5.9	30.3
BY076	9.3	6.5	4.6	4.7	25.1
BY078	8.5	8.4	8.0	9.3	34.2
BY079	7.0	4.7	5.0	4.8	21.6
BY080	7.8	7.0	5.8	5.5	26.1
BY-RSA	7.1	7.0	5.7	3.0	22.8
BY-RSB	9.9	9.4	7.4	4.4	31.1
BY-RSC	7.0	4.3	7.6	4.9	23.8
BY-RSD	10.6	9.9	9.0	8.6	38.2
BY-RSE	11.1	7.8	8.0	6.4	33.4
BY-RSF	12.9	9.8	9.4	9.3	41.4
BY-RSG	8.4	8.0	7.3	7.6	31.4
BY-RSH	9.2	8.2	6.9	6.4	30.7
BY-RSJ	11.2	7.6	8.5	6.2	33.5
BY-RSK	9.1	7.8	8.0	5.4	30.4
BY-RSL	10.0	9.0	7.9	7.5	34.5
BY-RSM	4.9	6.9	4.0	4.7	20.6
BY-RSN	7.9	5.5	5.9	2.3	21.7
BY-RSP	9.9	9.1	10.3	7.7	37.0
BY-RSQ	11.2	8.7	8.1	6.3	34.3
BY-RSR	11.4	12.0	12.0	9.5	44.9

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.

Clinton Nuclear Power Station

The Clinton NPS, consisting of one approximately 1,140 Megawatt boiling water reactor (BWR), is owned and operated by the Exelon Corporation and 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 permitted to be 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 and the station's IEPA National Pollutant Discharge Elimination System permit. No liquid effluents were discharged in 2019.

The outflow from Clinton Lake falls into Salt Creek, a tributary of the Sangamon River.

Figures 14 through 16 provide an overview of all sampling and monitoring locations in the vicinity of the Clinton NPS (yellow star).

Significant Events or Changes for 2019

No significant events or changes in 2019.

Sampling and Monitoring Results

Water Sampling Results

Water sample analysis for tritium, total strontium, gross beta, and gamma spectroscopy indicated no concentrations above the established MDCs.

Soil Sampling Results

Gamma spectroscopy results for soil samples indicated no concentrations of reactor-produced radionuclides above background. Cesium-137 in concentrations greater than the established MDC was seen but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing.

Sediment Sampling Results

Gamma spectroscopy results for sediment samples indicated no concentrations of reactor-produced radionuclides above background. Cesium-137 in concentrations greater than the established MDC was seen but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing.

Vegetation Sampling Results

Gamma spectroscopy results for vegetation samples indicated no concentrations above the established MDC.

Fish Sampling Results

Gamma spectroscopy results for fish samples indicated no concentrations above the established MDC.

Direct Radiation Monitoring Results

The ambient gamma monitoring results were comparable to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois.

Clinton Maps of Monitoring and Sampling Locations

Figure 14. OSL and GDN Monitoring Locations- Clinton

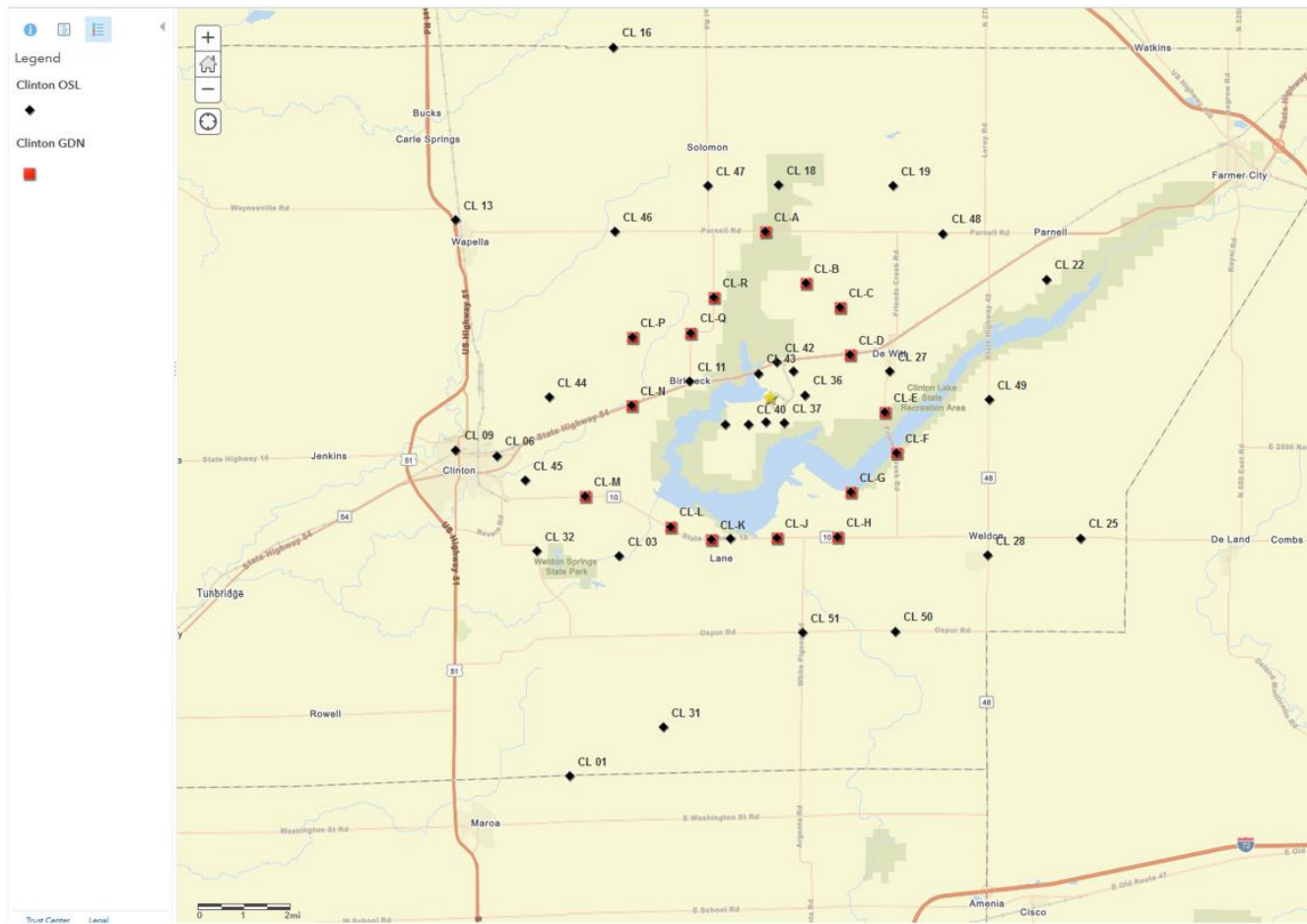
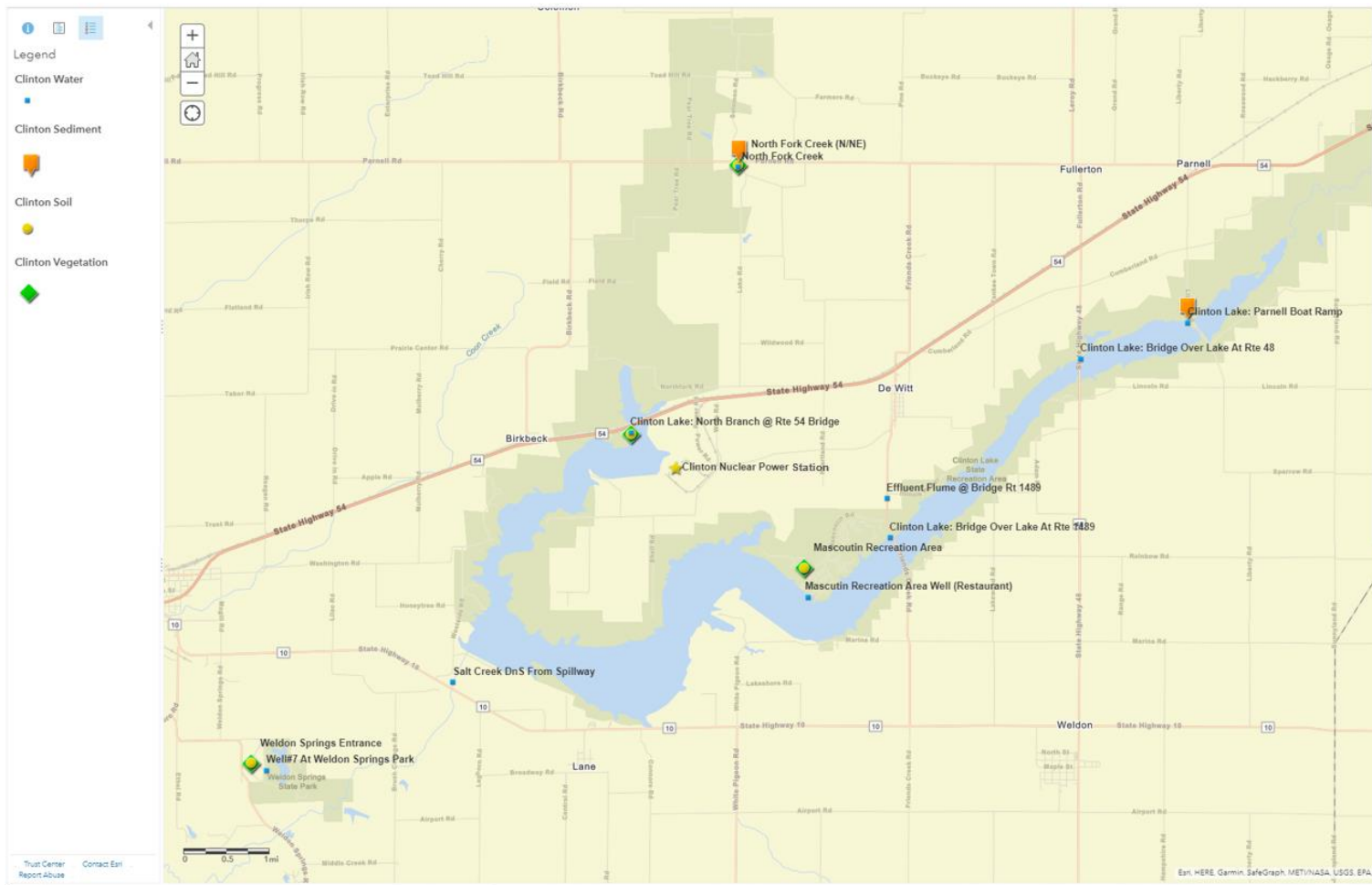


Figure 16. Environmental Sampling Locations - Clinton



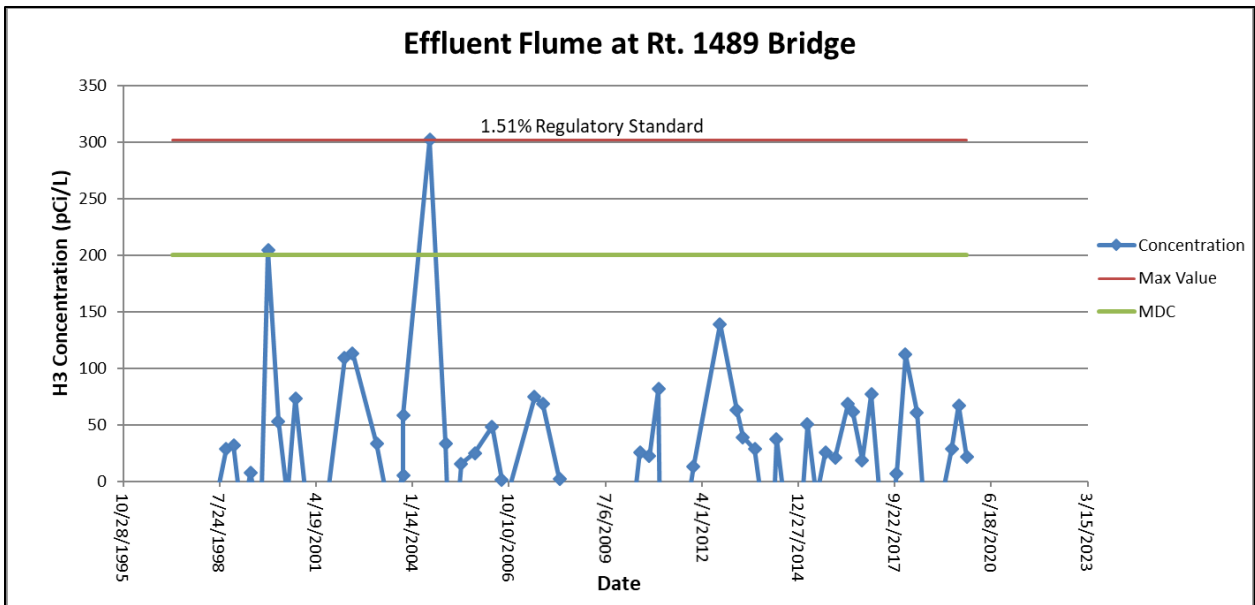
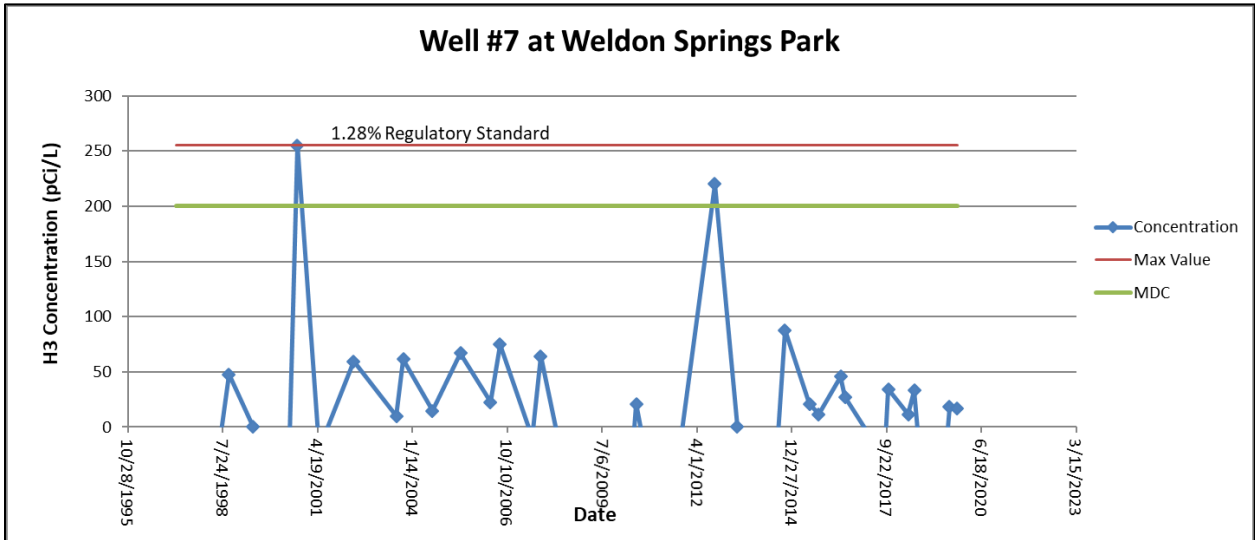
Clinton Sample Result Tables and Graphs

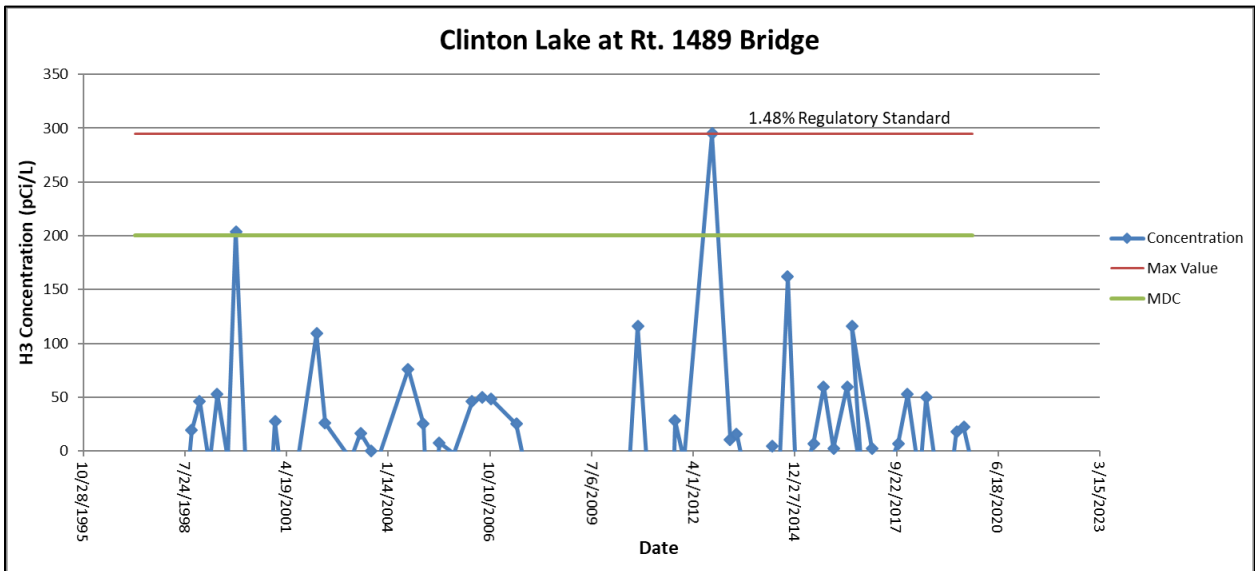
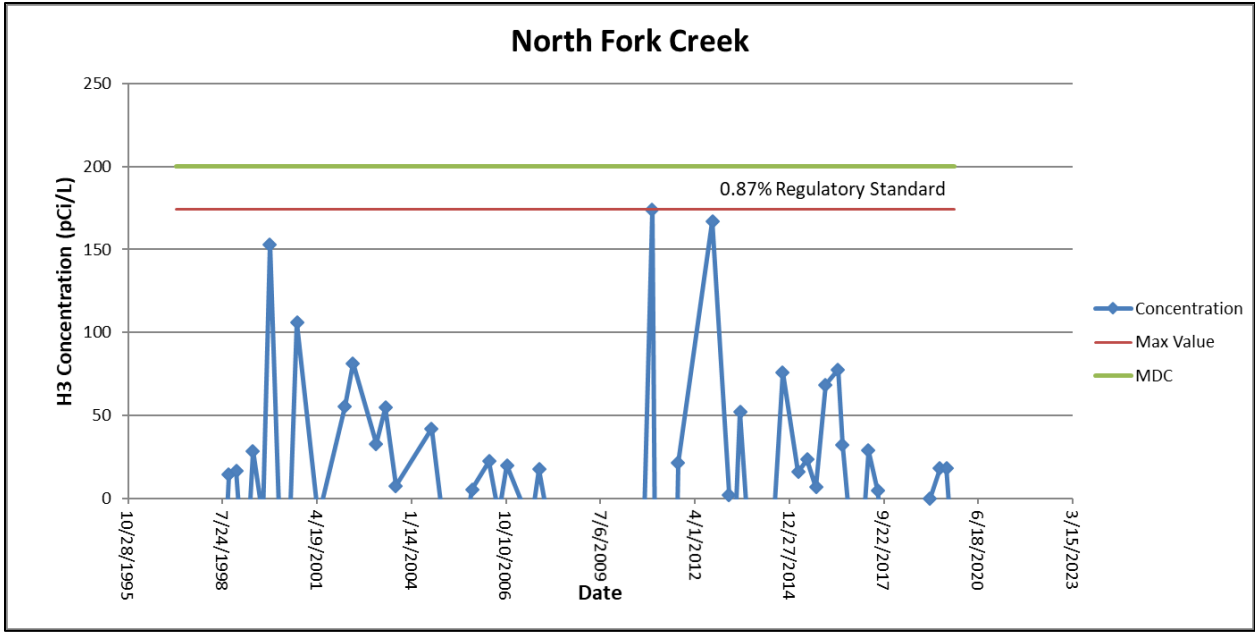
Tritium (H-3) in Water Results– Clinton
Results are in picocuries per liter (pCi/L)

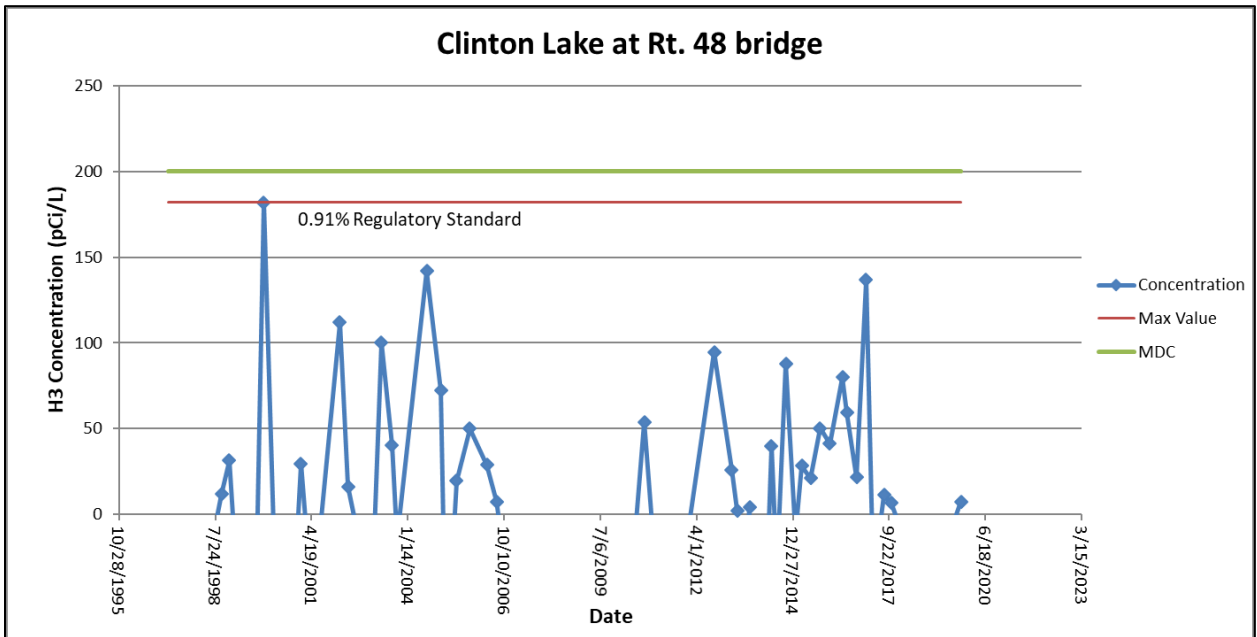
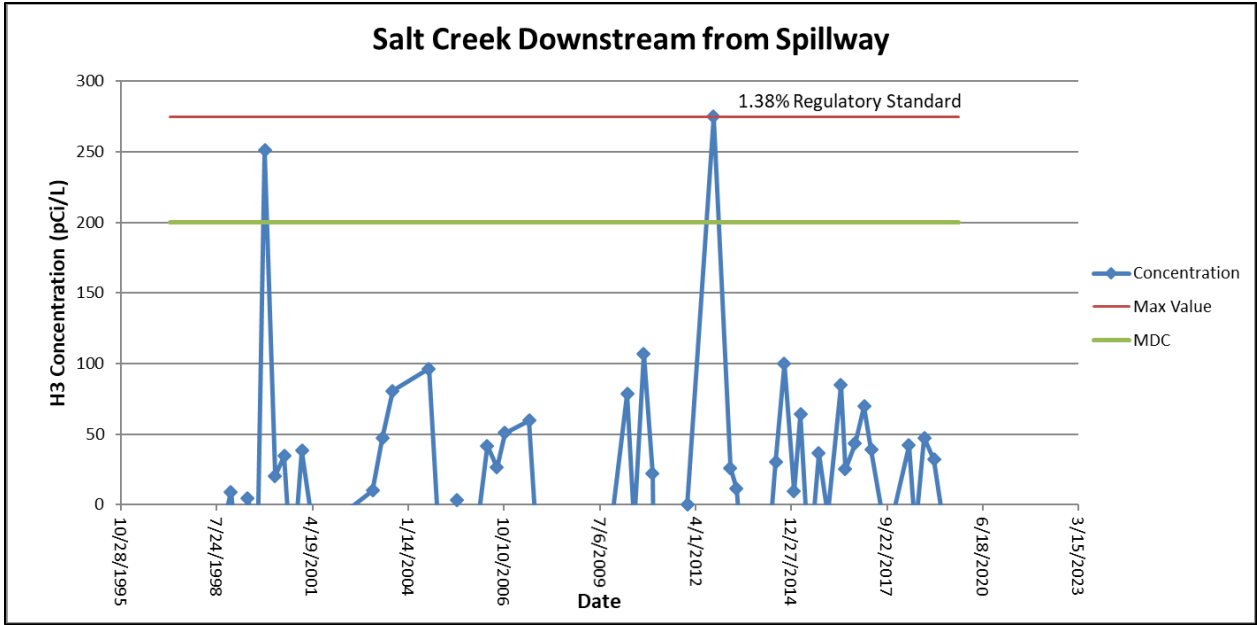
Location	H-3	
Date	Result	MDC
Bridge over Lake at Rt 1489		
1/23/2019	<MDC	200
5/6/2019	<MDC	200
7/17/2019	<MDC	200
10/8/2019	<MDC	200
Bridge over Lake at Rt 48		
5/6/2019	<MDC	200
7/17/2019	<MDC	200
10/8/2019	<MDC	200
Effluent Flume at Bridge Rt 1489		
1/23/2019	<MDC	200
5/6/2019	<MDC	200
7/17/2019	<MDC	200
10/8/2019	<MDC	200
Mascutin Recreation Area (restaurant)		
5/6/2019	<MDC	200
7/17/2019	<MDC	200
10/8/2019	<MDC	200
North Branch at Rt 54 Bridge		
1/23/2019	<MDC	200
5/6/2019	<MDC	200
10/8/2019	<MDC	200

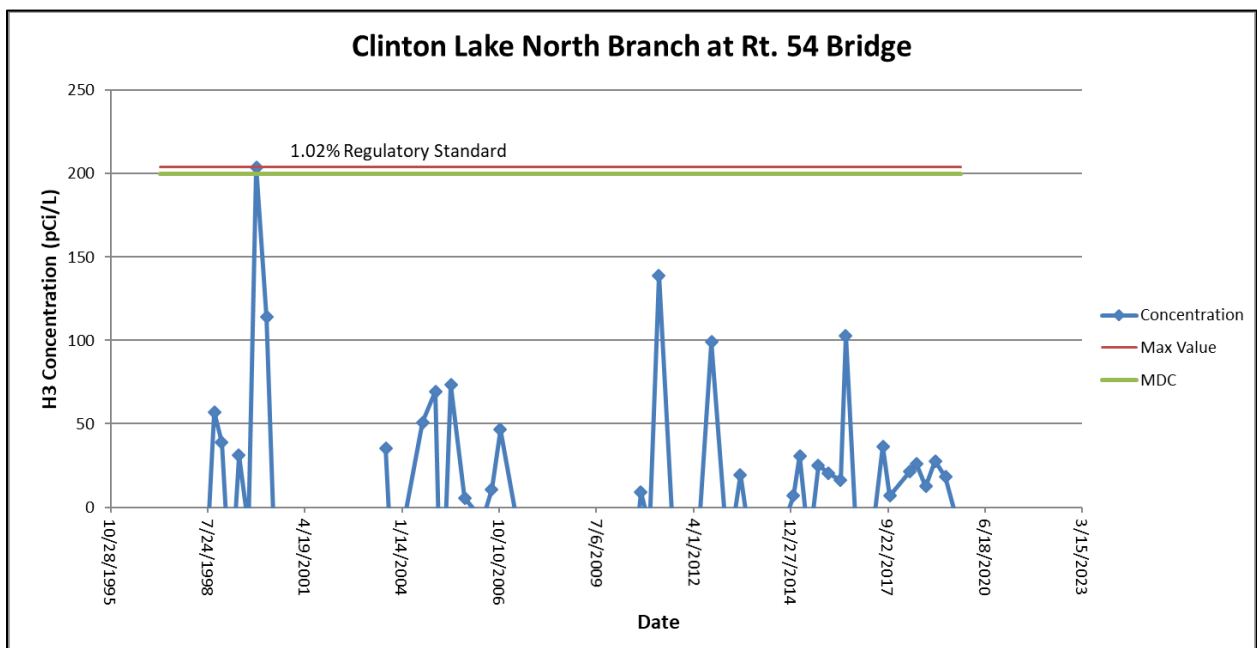
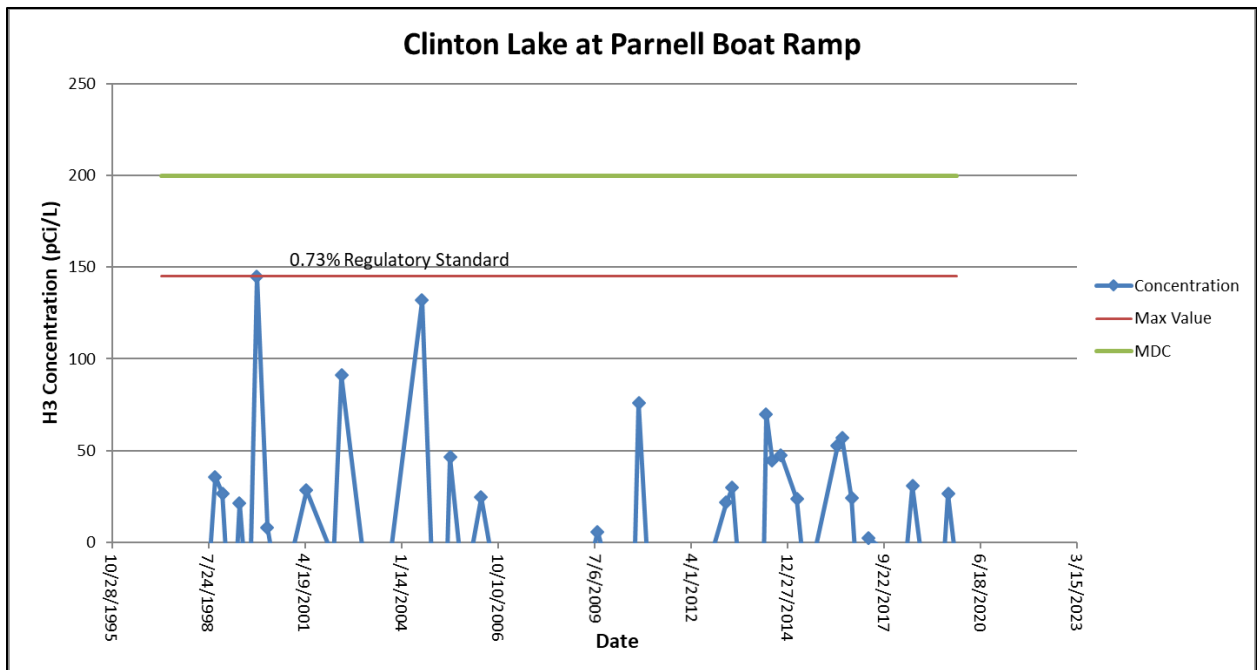
Location	H-3	
Date	Result	MDC
North Fork Creek		
1/23/2019	<MDC	200
5/6/2019	<MDC	200
7/17/2019	<MDC	200
10/8/2019	<MDC	200
Parnell Boat Ramp		
1/23/2019	<MDC	200
5/6/2019	<MDC	200
7/17/2019	<MDC	200
10/8/2019	<MDC	200
Salt Creek DnS from Spillway		
1/23/2019	<MDC	200
5/6/2019	<MDC	200
7/17/2019	<MDC	200
10/8/2019	<MDC	200
Well #7 at Weldon Springs Park		
5/6/2019	<MDC	200
7/17/2019	<MDC	200
10/8/2019	<MDC	200

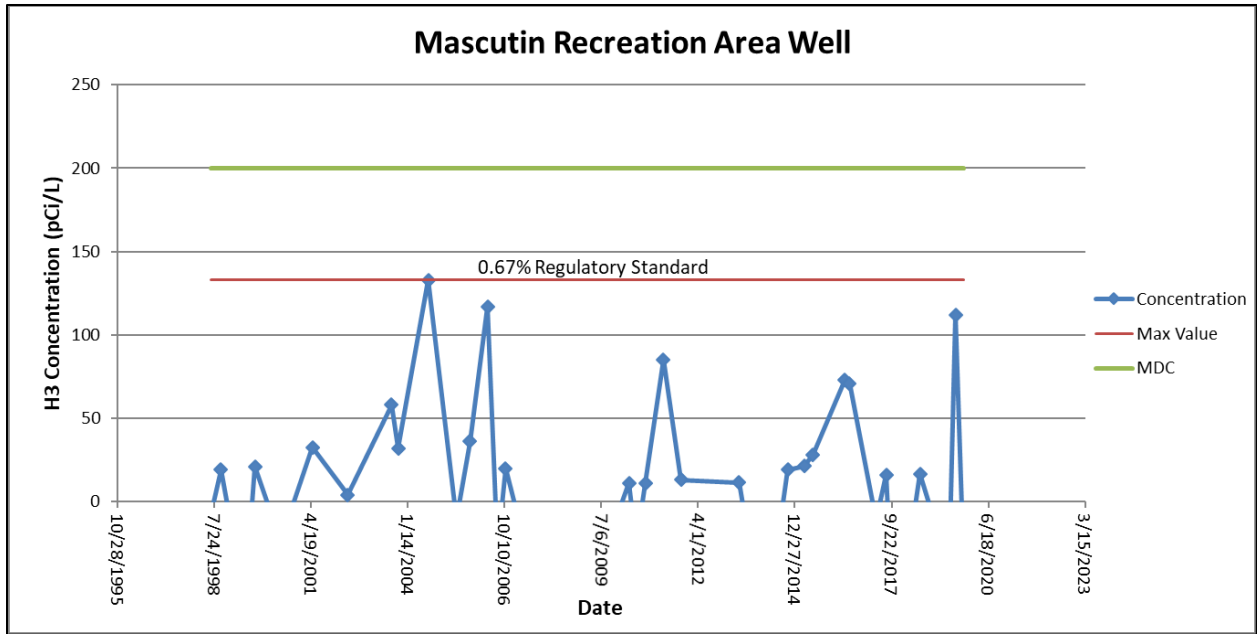
Trending Graphs for Tritium (H-3) in Water - Clinton
 (Max value compared to IEPA and US EPA regulatory standard of 20,000 pCi/L)











Total Strontium in Water Results - Clinton
Results are in picocuries per liter (pCi/L)

Location	Strontium		
	Date	Result	MDC
Effluent Flume at Bridge Rt 1489			
	1/23/2019	<MDC	0.5
Bridge over lake at Rt 48			
	5/6/2019	<MDC	0.5
	10/8/2019	<MDC	0.5

Beta Screening of Water Results - Clinton
Results are in picocuries per liter (pCi/L)

Location	Beta	
Date	Result	MDC
Bridge over Lake at Rt 1489		
1/23/2019	<MDC	3.7
5/6/2019	<MDC	3.7
7/17/2019	<MDC	3.7
10/8/2019	<MDC	3.7
Bridge over Lake at Rt 48		
5/6/2019	<MDC	3.7
7/17/2019	<MDC	3.7
10/8/2019	<MDC	3.7
Effluent Flume at Bridge Rt 1489		
1/23/2019	<MDC	3.7
5/6/2019	<MDC	3.7
7/17/2019	<MDC	3.7
10/8/2019	<MDC	3.7
Mascutin Recreation Area (restaurant)		
5/6/2019	<MDC	3.7
7/17/2019	<MDC	3.7
10/8/2019	<MDC	3.7
North Branch at Rt 54 Bridge		
1/23/2019	<MDC	3.7
5/6/2019	<MDC	3.7
10/8/2019	<MDC	3.7

Location	Beta	
Date	Result	MDC
North Fork Creek		
1/23/2019	<MDC	3.7
5/6/2019	<MDC	3.7
7/17/2019	<MDC	3.7
10/8/2019	<MDC	3.7
Parnell Boat Ramp		
1/23/2019	<MDC	3.7
5/6/2019	<MDC	3.7
7/17/2019	<MDC	3.7
10/8/2019	<MDC	3.7
Salt Creek DnS from Spillway		
1/23/2019	<MDC	3.7
5/6/2019	<MDC	3.7
7/17/2019	<MDC	3.7
10/8/2019	<MDC	3.7
Well #7 at Weldon Springs Park		
5/6/2019	<MDC	3.7
7/17/2019	<MDC	3.7
10/8/2019	<MDC	3.7

Gamma Spectroscopy Results for Other Radionuclides in Water - Clinton
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 Rt 1489																								
1/23/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
5/6/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
7/17/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
10/8/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
Bridge over Lake at Rt 48																								
5/6/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
7/17/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
10/8/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
Effluent Flume at Bridge Rt 1489																								
1/23/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
5/6/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
7/17/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
10/8/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
Mascutin Recreation Area (restaurant)																								
5/6/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
7/17/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
10/8/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
North Branch at Rt 54 Bridge																								
1/23/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
5/6/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
10/8/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5

Gamma Spectroscopy Results for Other Radionuclides in Water - Clinton
Results are in picocuries per liter (pCi/L) – Continued

Location Date	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
North Fork Creek																								
1/23/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
5/6/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
7/17/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
10/8/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
Parnell Boat Ramp																								
1/23/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
5/6/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
7/17/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
10/8/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
Salt Creek DnS from Spillway																								
1/23/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
5/6/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
7/17/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
10/8/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
Well #7 at Weldon Springs Park																								
5/6/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
7/17/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5
10/8/2019	<MDC	51	<MDC	1300	<MDC	13.8	<MDC	16.2	<MDC	14.8	<MDC	14	<MDC	26.7	<MDC	16.4	<MDC	14.3	<MDC	12.8	<MDC	29.5	<MDC	22.5

Gamma Spectroscopy Results for Radionuclides in Soil (Deposition) - Clinton
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																							
5/6/2019	<MDC	1.45	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.10	
7/17/2019	<MDC	1.45	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.10	
North Branch at Rt 54 Bridge																							
6/26/2019	<MDC	1.45	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.04	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.10	
7/17/2019	<MDC	1.45	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.10	
North Fork Creek																							
5/6/2019	<MDC	1.45	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.07	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.10	
7/17/2019	<MDC	1.45	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.10	
Weldon Springs Entrance																							
5/6/2019	<MDC	1.45	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.06	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.10	
7/17/2019	<MDC	1.45	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.10	

Gamma Spectroscopy Results for Radionuclides in Soil (Migration) - Clinton
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																							
5/6/2019	<MDC	1.46	<MDC	0.19	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.05	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.09	
7/17/2019	<MDC	1.46	<MDC	0.19	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.05	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.09	
North Branch at Rt 54 Bridge																							
6/26/2019	<MDC	1.46	<MDC	0.19	<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	0.09	
7/17/2019	<MDC	1.46	<MDC	0.19	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.04	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.09	
North Fork Creek																							
5/6/2019	<MDC	1.46	<MDC	0.19	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.04	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.09	
7/17/2019	<MDC	1.46	<MDC	0.19	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.03	0.03	<MDC	0.11	<MDC	0.03	<MDC	0.08	<MDC	0.07	<MDC	0.09	
Weldon Springs Entrance																							
5/6/2019	<MDC	1.46	<MDC	0.19	<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	0.09	
7/17/2019	<MDC	1.46	<MDC	0.19	<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	0.09	

Gamma Spectroscopy Results for Radionuclides in Sediment - Clinton
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	
North Fork Creek																								
5/6/2019	<MDC	0.62	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.04	0.03	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.09		
7/17/2019	<MDC	0.62	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.05	0.03	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.09		
Parnell Boat Ramp																								
5/6/2019	<MDC	0.62	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.09		
7/17/2019	<MDC	0.62	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.06	<MDC	0.09		

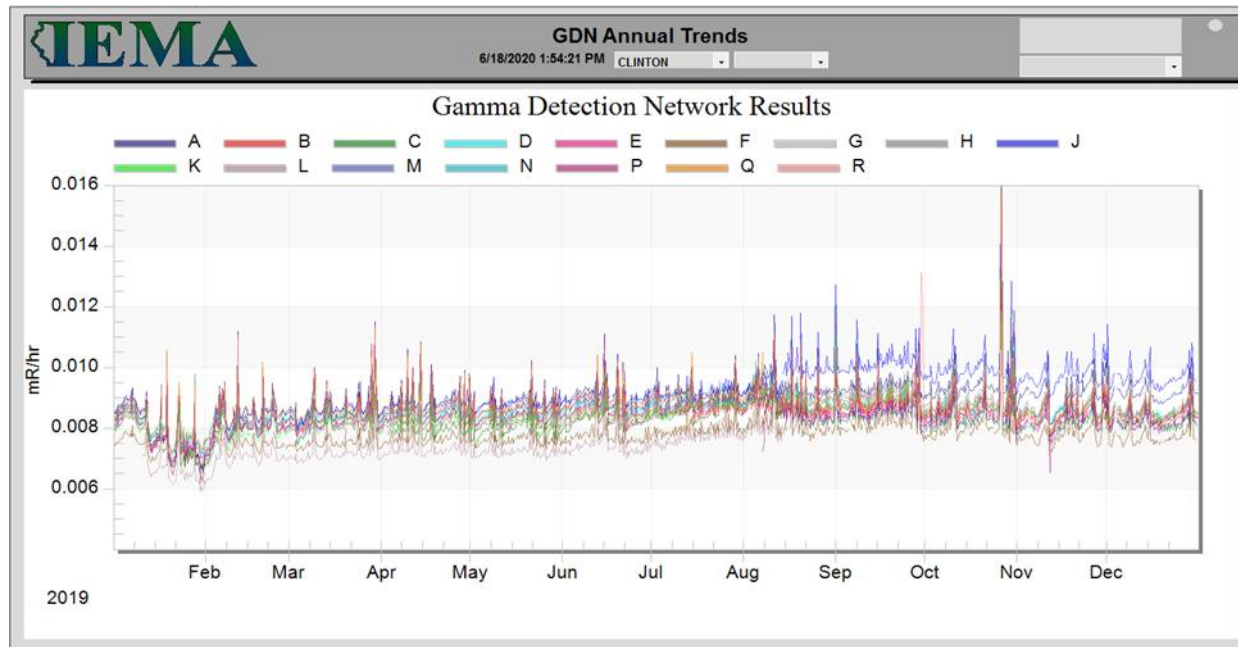
Gamma Spectroscopy Results for Radionuclides in Vegetation- Clinton
Results are in picocuries per gram (pCi/g)

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																										
5/6/2019	<MDC	2.7	<MDC	4.8	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	3.0	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2
7/17/2019	<MDC	2.7	<MDC	4.8	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	3.0	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2
North Branch at Rt 54 Bridge																										
6/26/2019	<MDC	2.7	<MDC	4.8	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	3.0	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2
7/17/2019	<MDC	2.7	<MDC	4.8	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	3.0	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2
North Fork Creek																										
5/6/2019	<MDC	2.7	<MDC	4.8	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	3.0	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2
7/17/2019	<MDC	2.7	<MDC	4.8	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	3.0	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2
Weldon Springs Entrance																										
5/6/2019	<MDC	2.7	<MDC	4.8	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	3.0	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2
7/17/2019	<MDC	2.7	<MDC	4.8	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	3.0	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2

Gamma Spectroscopy Results for Radionuclides in Fish- Clinton
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	
Clinton Lake (Bottom Feeder)																										
9/25/2019	<MDC	820	<MDC	940	<MDC	24.5	<MDC	19.5	<MDC	18.1	<MDC	16.5	<MDC	68	<MDC	1020	<MDC	20.3	<MDC	43	<MDC	45	<MDC	46		
Clinton Lake (Top Feeder)																										
9/25/2019	<MDC	820	<MDC	940	<MDC	24.5	<MDC	19.5	<MDC	18.1	<MDC	16.5	<MDC	68	<MDC	1020	<MDC	20.3	<MDC	43	<MDC	45	<MDC	46		

Gamma Detection Network Results – Clinton
Results are in milliroentgen per hour (mR/hr)



Summary of Ambient Gamma Results - Clinton

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
CL001	10.5	11.3	11.2	10.3	43.3
CL003	8.1	10.9	9.0	10.3	38.3
CL006		6.6	9.3	8.4	32.3
CL009	8.2	8.0	6.8	7.0	30.0
CL011	9.9	6.7	10.6	12.4	39.6
CL013	6.8	5.9	6.4	7.4	26.6
CL016	10.4	9.9	11.4	10.1	41.8
CL018	10.3	10.5	10.5	10.3	41.6
CL019	9.3	9.1	11.7	11.9	42.0
CL022	9.9	12.1	11.7	12.0	45.8
CL025	8.7	10.4	13.5	11.5	44.1
CL027	7.0	7.6	8.3	8.2	31.1
CL028	9.3		9.2	10.2	38.3
CL031	9.5	8.8	12.7	10.3	41.2
CL032	8.9	8.9	10.7	9.9	38.3
CL033	7.9	8.9	8.9	9.1	34.9
CL036	9.9	12.9	10.9	9.7	43.3
CL037	9.1	12.4	11.1	11.2	43.9
CL038	6.8	9.7	11.7	7.5	35.6
CL039	10.3		11.8	11.6	44.8
CL040	8.9	8.1	12.0	8.7	37.6
CL041	11.0	6.4	13.9	12.4	43.7
CL042	8.7	9.7	10.8	12.6	41.8
CL043	8.8	7.7	10.0	11.2	37.7

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
CL044	9.2	9.6	10.0	12.1	41.0
CL045	10.4	9.1	11.0	8.5	39.0
CL046	9.8	11.6	11.4	13.7	46.5
CL047	8.9	9.6	10.2	11.8	40.5
CL048	9.1	11.4	12.8	12.1	45.4
CL049	8.2	11.0	9.8	11.2	40.2
CL050		11.3	10.2	12.5	45.4
CL051	9.2	9.9	12.6	12.3	44.0
CL-RSA	10.5	9.9	13.0	11.4	44.9
CL-RSB	8.9	8.6	13.7	10.6	41.7
CL-RSC	10.3	12.0	14.1	9.8	46.2
CL-RSD	8.9	11.0	9.0	9.7	38.7
CL-RSE	9.1	11.9	11.0	11.5	43.4
CL-RSF	7.2	5.8	7.0	5.9	25.9
CL-RSG	9.2	8.1	11.0	9.0	37.4
CL-RSH	9.5	10.3	10.4	10.3	40.5
CL-RSJ	10.0	8.9	10.8	8.9	38.6
CL-RSK	8.2	9.2	8.9	10.0	36.2
CL-RSL	9.9	10.5	13.4	10.3	44.1
CL-RSM	8.5	11.0	11.0	12.0	42.6
CL-RSN	8.9	12.0	11.4	10.8	43.1
CL-RSP	9.5	10.5	9.4	9.8	39.2
CL-RSQ	8.5	7.5	10.2	8.8	35.0
CL-RSR	9.2	9.7	11.5	8.9	39.2

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
CL044	9.2	9.6	10.0	12.1	41.0
CL045	10.4	9.1	11.0	8.5	39.0
CL046	9.8	11.6	11.4	13.7	46.5
CL047	8.9	9.6	10.2	11.8	40.5
CL048	9.1	11.4	12.8	12.1	45.4
CL049	8.2	11.0	9.8	11.2	40.2
CL050		11.3	10.2	12.5	45.4
CL051	9.2	9.9	12.6	12.3	44.0
CL-RSA	10.5	9.9	13.0	11.4	44.9
CL-RSB	8.9	8.6	13.7	10.6	41.7
CL-RSC	10.3	12.0	14.1	9.8	46.2
CL-RSD	8.9	11.0	9.0	9.7	38.7
CL-RSE	9.1	11.9	11.0	11.5	43.4
CL-RSF	7.2	5.8	7.0	5.9	25.9
CL-RSG	9.2	8.1	11.0	9.0	37.4
CL-RSH	9.5	10.3	10.4	10.3	40.5
CL-RSJ	10.0	8.9	10.8	8.9	38.6
CL-RSK	8.2	9.2	8.9	10.0	36.2
CL-RSL	9.9	10.5	13.4	10.3	44.1
CL-RSM	8.5	11.0	11.0	12.0	42.6
CL-RSN	8.9	12.0	11.4	10.8	43.1
CL-RSP	9.5	10.5	9.4	9.8	39.2
CL-RSQ	8.5	7.5	10.2	8.8	35.0
CL-RSR	9.2	9.7	11.5	8.9	39.2

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.

Dresden Nuclear Power Station

The Dresden NPS, consisting of one retired reactor and two operating 867 Megawatt BWRs, is owned and operated by the Exelon Corporation and located in Grundy County, Illinois. Dresden unit 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 permitted to be released to the Rock River in accordance to release limits governed by the station's license with the NRC and the station's IEPA National Pollutant Discharge Elimination System permit. Although there were no liquid batch releases of radioactive effluents discharged during this reporting period, there were some radioactive effluents released from the Dresden storm sewer system and groundwater remediation activities.

A surface water sample taken from the Illinois River at the Dresden Lock and Dam was found to contain detectable levels of tritium due to liquid effluent releases from the Braidwood station or from the Dresden sewage treatment plant and storm sewer system releases.

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

Figures 17 through 19 provide an overview of all sampling and monitoring locations in the vicinity of the Dresden NPS (yellow star in the middle of the map). The second yellow star near the bottom of Figure 17 is the Braidwood NPS

Significant Events or Changes for 2019

No significant events or changes in 2019.

Sampling and Monitoring Results

Water Sampling Results

A detectable level of tritium was found in one surface water sample taken from the Illinois River at the Dresden Lock and Dam. The elevated level is likely attributable to the liquid effluent releases from the Braidwood Station or the radioactive effluents released from the Dresden sewage treatment plant and storm sewer system as unmonitored liquid releases. All tritium levels were well below the Drinking Water Standards established by the US EPA and IEPA.

Results from total strontium analysis indicated no concentrations above the established MDCs.

Results from gross beta analysis indicated that the established MDC was met at some surface water sampling locations and can likely be attributed to the routine liquid effluent releases from the Braidwood station and the radioactive effluents released from the Dresden sewage treatment plant and storm sewer system as unmonitored liquid releases. Gross beta results for groundwater samples collected from a well located at the Dresden Lock and Dam were also above the established MDC. However, due to the presence of dissolved naturally occurring radionuclides; it is not unusual to see elevated gross beta results in groundwater samples.

Gamma spectroscopy results for water samples indicated no concentrations above the established MDCs.

Soil Sampling Results

Gamma spectroscopy results for soil samples indicated no concentrations of reactor-produced radionuclides above background. Cesium-137 in concentrations greater than the established MDC was seen but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing.

Sediment Sampling Results

Gamma spectroscopy results for sediment samples indicated no concentrations of reactor-produced radionuclides above background. Cesium-137 in concentrations greater than the established MDC was seen but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing.

Vegetation Sampling Results

Gamma spectroscopy results for vegetation samples indicated no concentrations above the established MDC.

Fish Sampling Results

Gamma spectroscopy results for fish samples indicated no concentrations above the established MDC.

Direct Radiation Monitoring Results

The ambient gamma monitoring results were comparable to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois.

Dresden Maps of Monitoring and Sampling Locations

Figure 17. OSL and GDN Monitoring Locations - Dresden

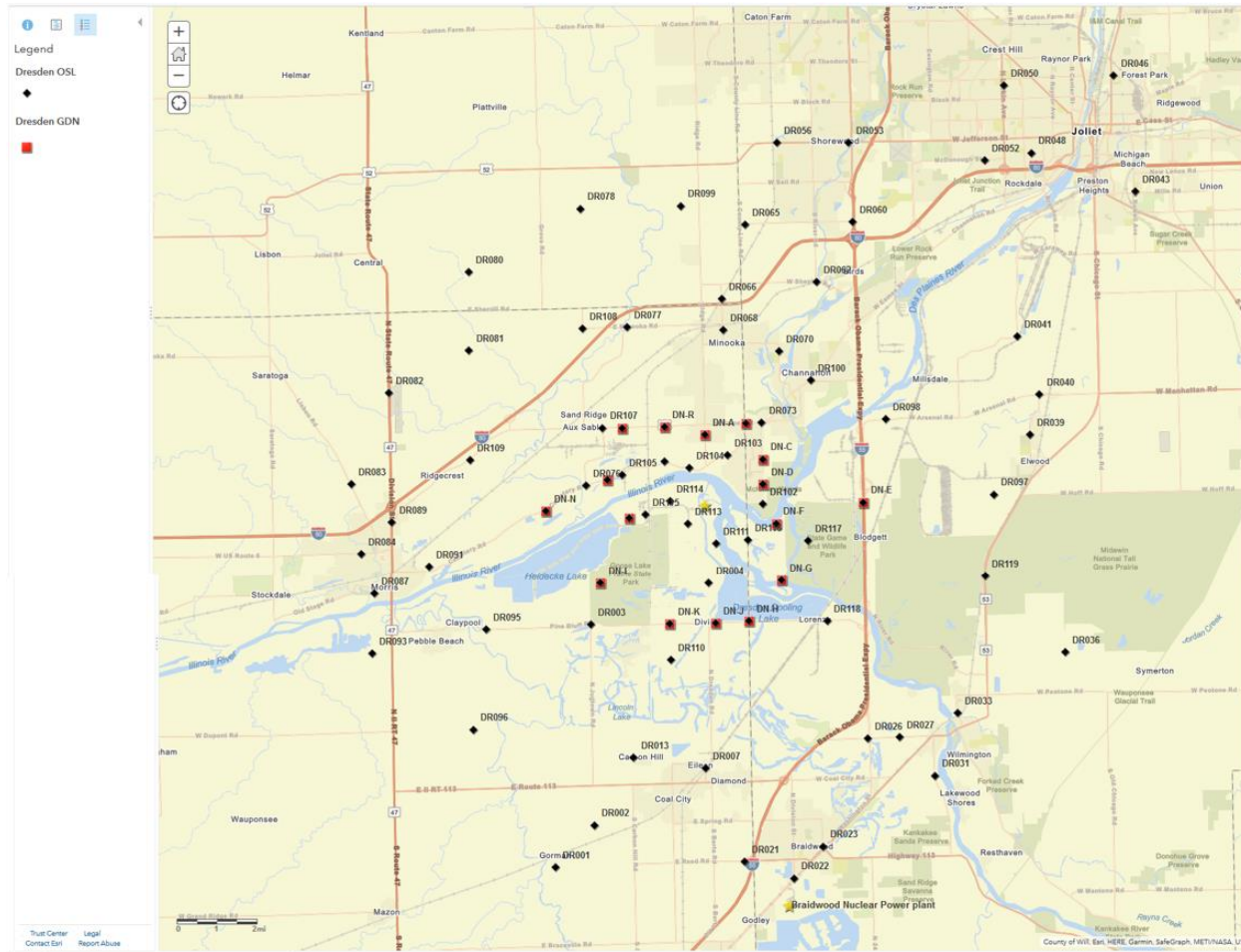


Figure 18. OSL and GDN Monitoring Locations - Dresden (continued)

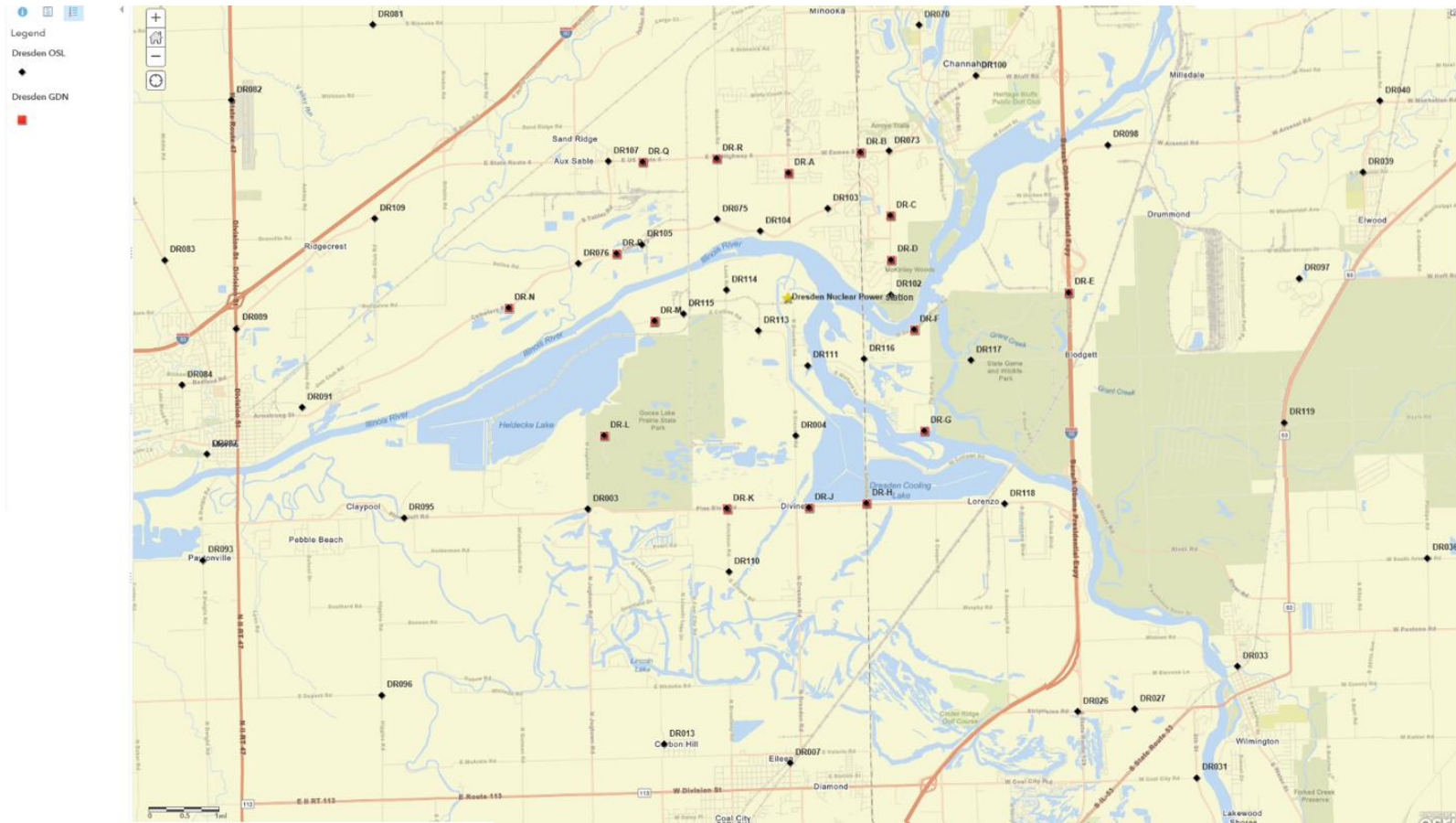
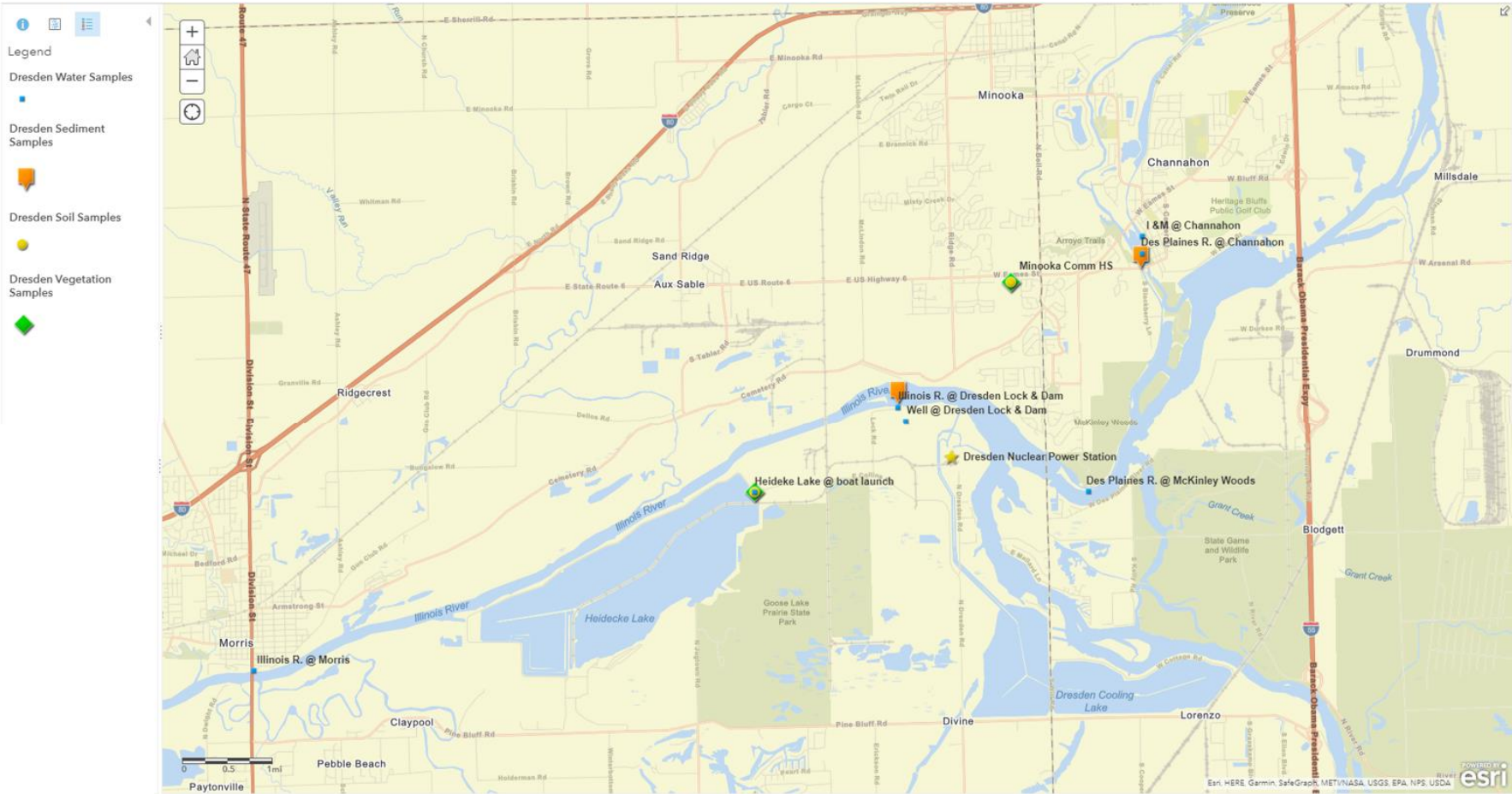


Figure 19. Environmental Sampling Locations - Dresden

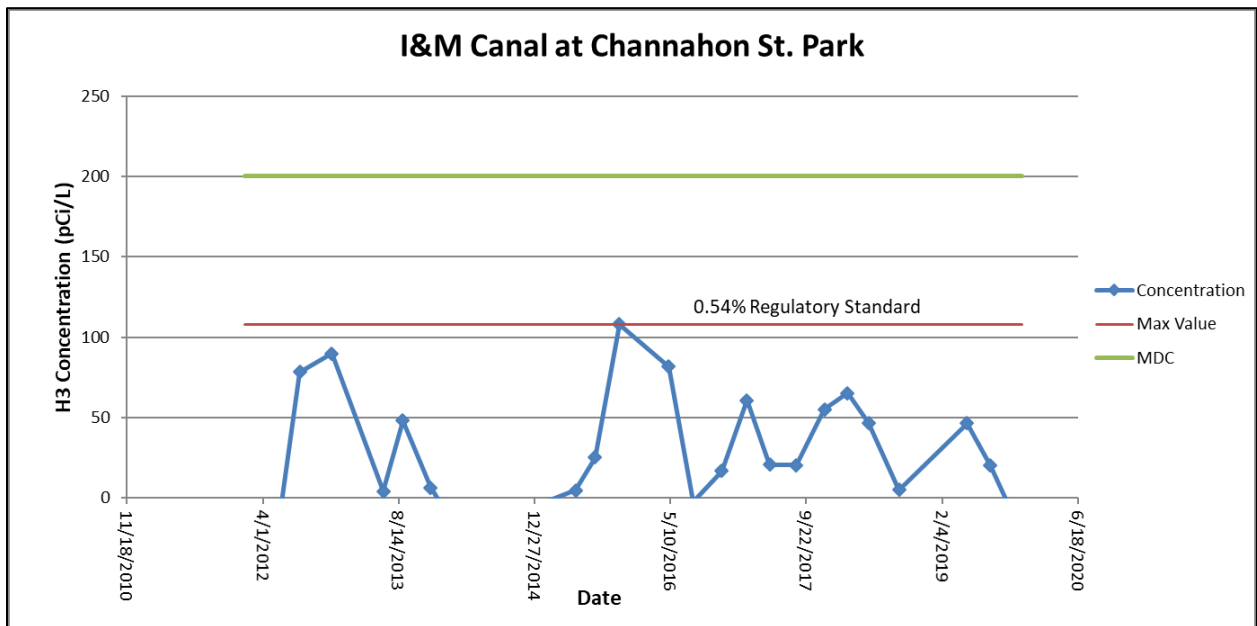
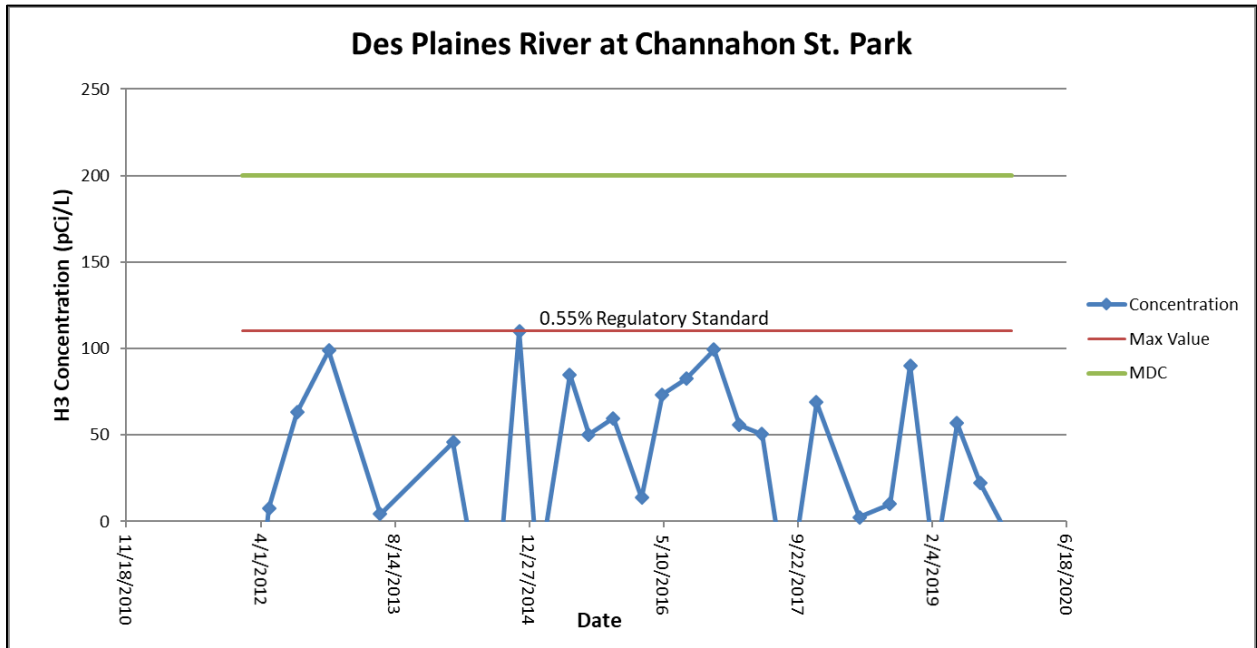


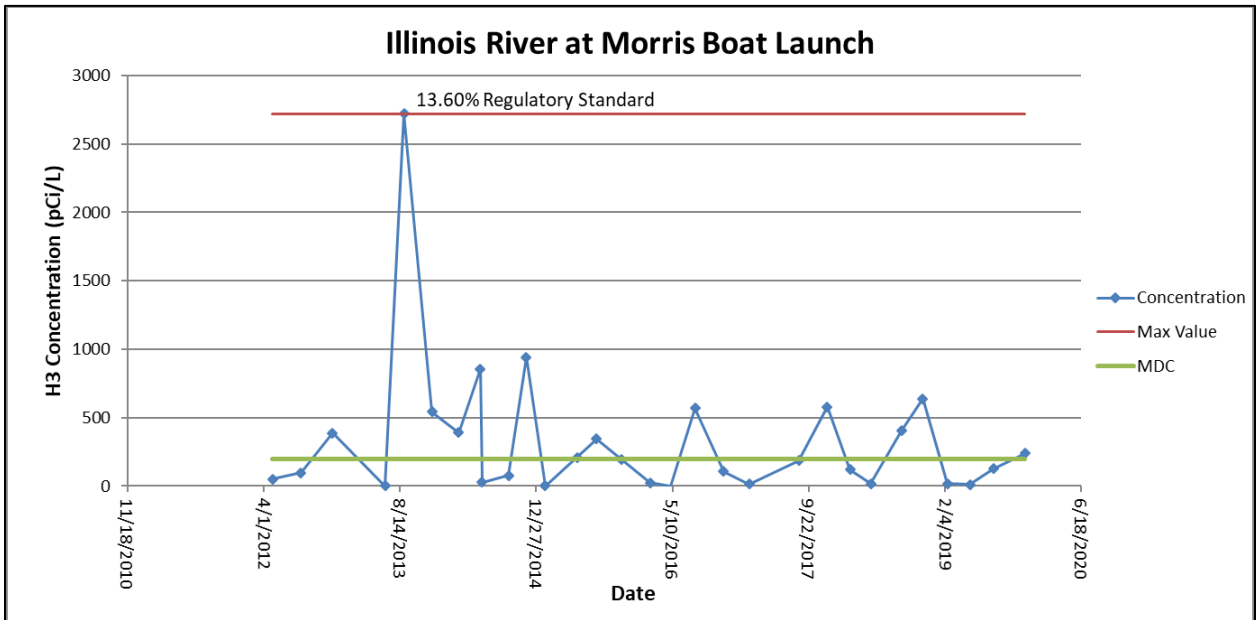
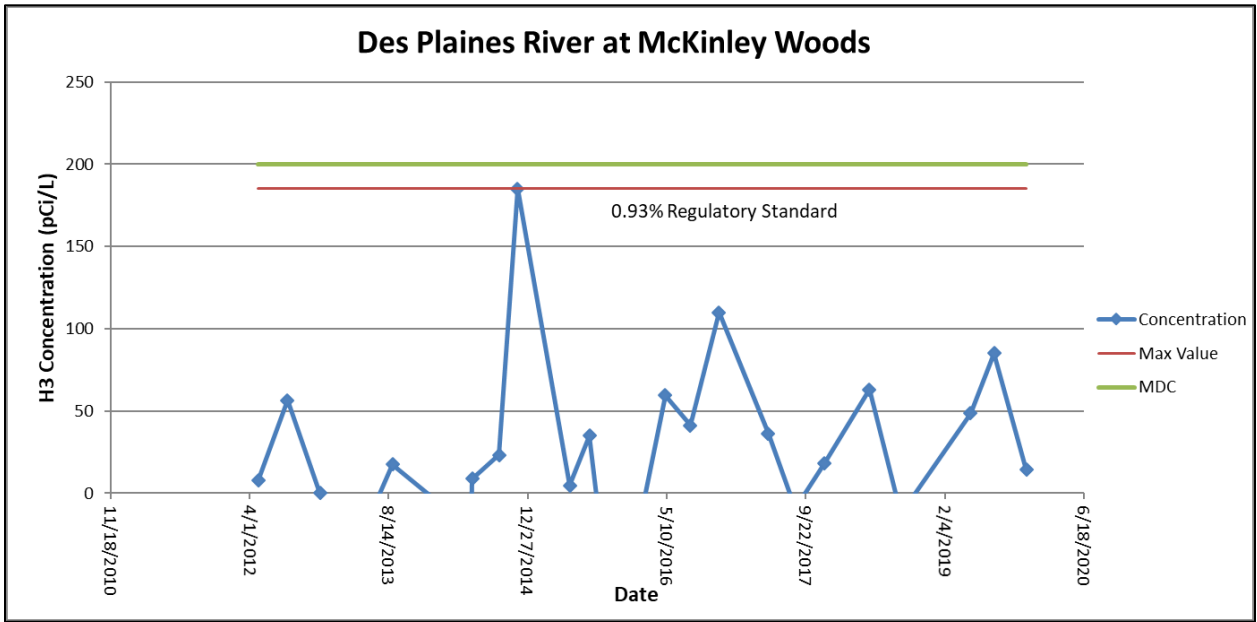
Dresden Sample Result Tables and Graphs

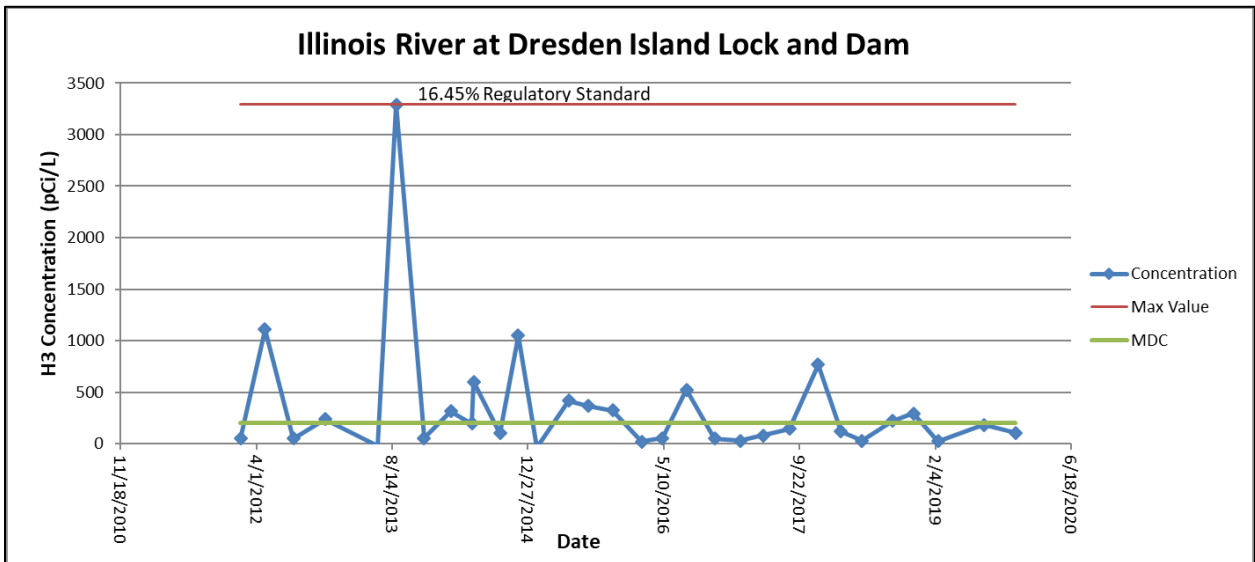
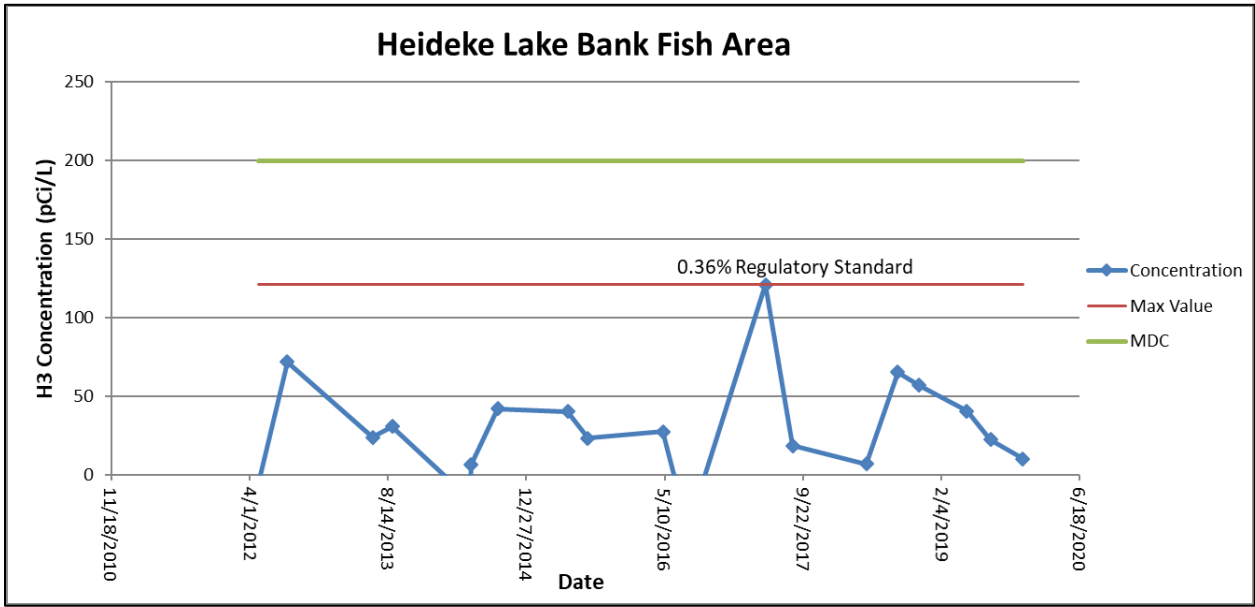
Tritium (H-3) in Water - Dresden
Results are in picocuries per liter (pCi/L)

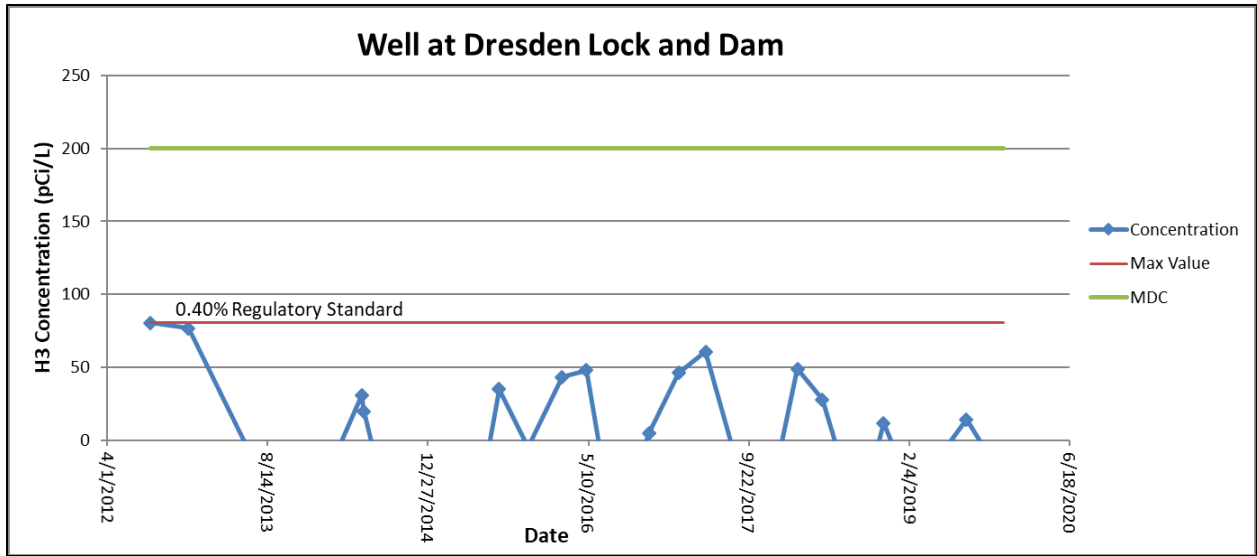
Location	H-3	
Date	Result	MDC
Des Plaines R. @ Channahon		
2/13/2019	<MDC	200
5/22/2019	<MDC	200
8/21/2019	<MDC	200
10/23/2019	<MDC	200
Des Plaines R. @ McKinley Woods		
5/7/2019	<MDC	200
8/1/2019	<MDC	200
11/25/2019	<MDC	200
Heideke Lake		
5/7/2019	<MDC	200
8/1/2019	<MDC	200
11/25/2019	<MDC	200
I & M Canal @ Channahon		
5/7/2019	<MDC	200
8/1/2019	<MDC	200
11/25/2019	<MDC	200
Illinois R. @ Dresden Lock & Dam		
2/13/2019	<MDC	200
8/1/2019	<MDC	200
11/25/2019	239	200
Illinois R. @ Morris		
2/13/2019	<MDC	200
5/7/2019	<MDC	200
8/1/2019	<MDC	200
11/25/2019	<MDC	200
Well @ Dresden Lock & Dam		
2/13/2019	<MDC	200
8/1/2019	<MDC	200
11/25/2019	<MDC	200

Trending Graphs for Tritium (H-3) in Water - Dresden Area
 (Max value compared to IEPA and US EPA regulatory standard of 20,000 pCi/L)









Total Strontium in Water Results - Dresden Area
Results are in picocuries per liter (pCi/L)

Location	Strontium	
Date	Result	MDC
Illinois R. @ Morris		
5/7/2019	<MDC	0.4

Results for Beta Screening of Water - Dresden
Results are in picocuries per liter (pCi/L)

Location	Beta	
	Date	Result
Des Plaines R. at Channahon		
2/13/2019	6.7	3.8
5/7/2019	<MDC	3.8
8/1/2019	8.0	3.8
11/25/2019	5.9	3.8
Des Plaines R. at McKinley Woods		
5/7/2019	4.4	3.8
8/1/2019	5.5	3.8
11/25/2019	7.5	3.8
Heideke Lake		
5/7/2019	<MDC	3.8
8/1/2019	<MDC	3.8
11/25/2019	4.7	3.8
I & M Canal at Channahon		
5/7/2019	<MDC	3.8
8/1/2019	<MDC	3.8
11/25/2019	5.2	3.8
Illinois R. at Dresden Lock & Dam		
2/13/2019	4.1	3.8
8/1/2019	5.8	3.8
11/25/2019	6.5	3.8
Illinois R. at Morris		
2/13/2019	4.4	3.8
5/7/2019	4.4	3.8
8/1/2019	4.5	3.8
11/25/2019	4.8	3.8
Well at Dresden Lock & Dam		
2/13/2019	13.8	3.8
8/1/2019	16.1	3.8
11/25/2019	15.6	3.8

Gamma Spectroscopy Results for Other Radionuclides in Water - Dresden
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 R. @ Channahon																								
2/13/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
5/7/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
8/1/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
11/25/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
Des Plaines R. @ McKinley Woods																								
5/7/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
8/1/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
11/25/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
Heideke Lake																								
5/7/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
8/1/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
11/25/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
I & M Canal @ Channahon																								
5/7/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
8/1/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
11/25/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
Illinois R. @ Dresden Lock & Dam																								
2/13/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
8/1/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
11/25/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
Illinois R. @ Morris																								
2/13/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
5/7/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
8/1/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
11/25/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
Well @ Dresden Lock & Dam																								
2/13/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
8/1/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8
11/25/2019	<MDC	24.2	<MDC	370	<MDC	3.7	<MDC	3.8	<MDC	3.9	<MDC	3.7	<MDC	8.5	<MDC	11.2	<MDC	3.6	<MDC	4.4	<MDC	7.4	<MDC	6.8

Gamma Spectroscopy Results for Radionuclides in Soil (Migration) - Dresden
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
Heideke Lake																						
5/7/2019	<MDC	1.56	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.11	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.09	<MDC	0.07	<MDC	0.11
8/1/2019	<MDC	1.56	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.13	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.09	<MDC	0.07	<MDC	0.11
Minooka Comm HS																						
5/7/2019	<MDC	1.56	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.09	<MDC	0.07	<MDC	0.11
8/1/2019	<MDC	1.56	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.09	<MDC	0.07	<MDC	0.11

Gamma Spectroscopy Results for Radionuclides in Soil (Deposition) - Dresden
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
Heideke Lake																						
5/7/2019	<MDC	1.62	<MDC	0.19	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.08	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.09	<MDC	0.07	<MDC	0.10
8/1/2019	<MDC	1.62	<MDC	0.19	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.08	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.09	<MDC	0.07	<MDC	0.10
Minooka Comm HS																						
5/7/2019	<MDC	1.62	<MDC	0.19	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.09	<MDC	0.07	<MDC	0.10
8/1/2019	<MDC	1.62	<MDC	0.19	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.13	<MDC	0.03	<MDC	0.09	<MDC	0.07	<MDC	0.10

Gamma Spectroscopy Results for Radionuclides in Sediment - Dresden
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
Illinois R. at Dresden Lock & Dam																						
8/1/2019	<MDC	1.11	<MDC	1.57	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.13	0.04	<MDC	0.12	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.10

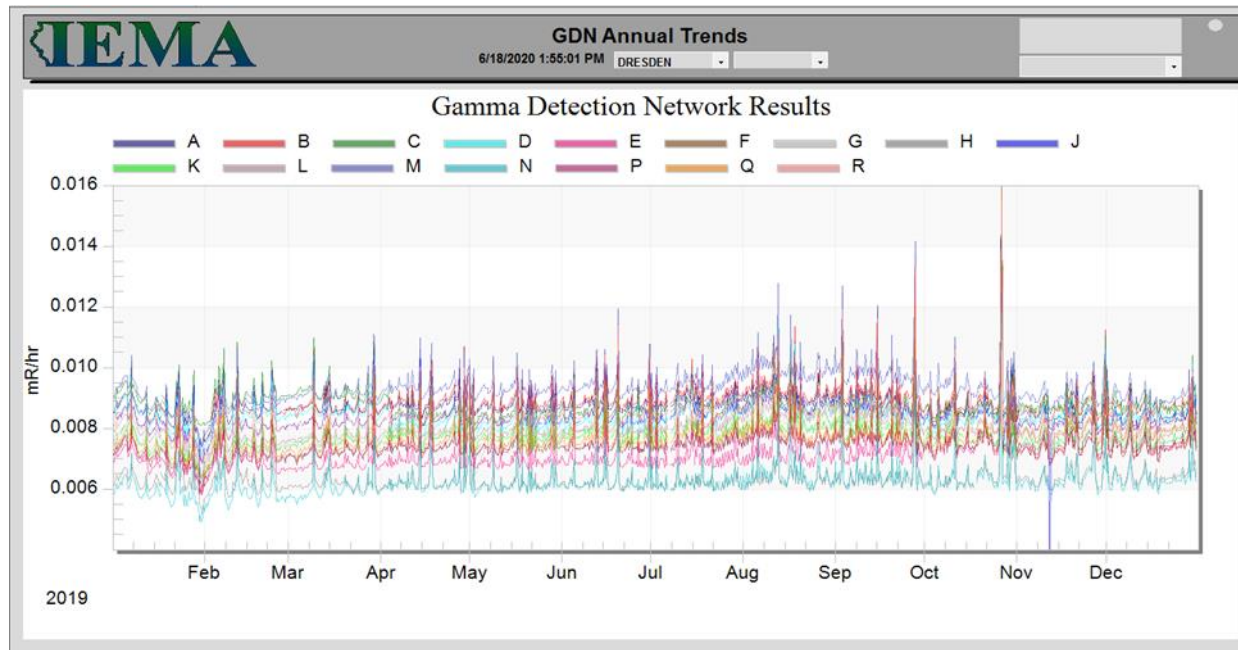
Gamma Spectroscopy Results for Radionuclides in Vegetation - Dresden
Results are in picocuries per gram (pCi/g)

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	
Heideke Lake																								
5/7/2019	<MDC	6.6	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.4	<MDC	14.7	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
8/1/2019	<MDC	6.6	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.4	<MDC	14.7	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
Minooka Comm HS																								
5/7/2019	<MDC	6.6	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.4	<MDC	14.7	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
8/1/2019	<MDC	6.6	<MDC	10.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.4	<MDC	14.7	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3

Gamma Spectroscopy Results for Radionuclides in Fish - Dresden
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	
Kankakee R. (Bottom Feeder)																								
8/14/2019	<MDC	6800	<MDC	2970	<MDC	78	<MDC	54	<MDC	58	<MDC	51	<MDC	242	<MDC	15700	<MDC	56	<MDC	184	<MDC	125	<MDC	173
Kankakee R. (Top Feeder)																								
8/14/2019	<MDC	6800	<MDC	2970	<MDC	78	<MDC	54	<MDC	58	<MDC	51	<MDC	242	<MDC	15700	<MDC	56	<MDC	184	<MDC	125	<MDC	173

Gamma Detection Network Results – Dresden
Results are in milliroentgen per hour (mR/hr)



Summary of Ambient Gamma Results - Dresden

Location	Quarter 1 mR/day	Quarter 2 mR/day	Quarter 3 mR/day	Quarter 4 mR/day	Annual Exposure mR/year
DR001	6.8	5.7	7.5	5.4	25.3
DR002	6.0	7.1	6.4	7.1	26.6
DR003	6.7	6.1	6.3	6.4	25.5
DR004	6.8	6.8	7.1	7.8	28.4
DR007	8.2	7.6	6.7	9.0	31.5
DR013	8.0	7.8	9.3	9.6	34.7
DR021	6.8	7.0	8.8	4.9	27.5
DR022	8.2		6.7	7.0	29.1
DR023	6.7	5.9	6.0	6.5	25.1
DR026	6.4	5.6	6.8	6.9	25.7
DR027	6.2	6.2	8.0	8.8	29.3
DR031	6.3	7.5	6.3	5.7	25.8
DR033	6.5	3.7	4.7	5.2	20.1
DR036	8.5	7.9	12.6	7.6	36.7
DR039	11.3	10.1	11.7	11.1	44.2
DR040	8.9	10.1	11.0	10.4	40.4
DR041	7.0	8.0	6.3	8.5	29.8
DR043	9.4	7.4	9.5	9.4	35.6
DR046	4.7	5.5	4.6	6.3	21.1
DR048	8.3	9.6	11.9	9.7	39.4
DR050	6.7	7.3	6.5	6.2	26.7
DR052	9.8	8.1	9.7	8.1	35.7
DR053	4.8	4.5	6.6	4.6	20.5
DR056	11.0	9.8	11.0		42.3
DR060	8.4	8.0	6.5	8.1	31.0
DR062	9.1	7.4	10.8	7.7	35.0
DR065	11.4	11.0	10.8	10.4	43.6
DR066	5.6	5.3	7.8	5.2	23.9
DR068	8.8	7.3	11.3	6.1	33.5
DR070	9.2	9.0	9.2	8.8	36.3
DR073	10.2	7.2	7.5	7.8	32.8
DR075	9.4	9.4	8.4	9.5	36.7
DR076	5.7	6.5	6.0	8.5	26.7

Location	Quarter 1 mR/day	Quarter 2 mR/day	Quarter 3 mR/day	Quarter 4 mR/day	Annual Exposure mR/year
DR077	7.8	6.8	7.4	7.4	29.3
DR078	9.8	10.8	7.7	13.3	41.5
DR080	10.0	9.0	9.1	9.6	37.8
DR081	10.0	8.4	8.8	8.3	35.5
DR082		8.8	8.2	7.3	32.4
DR083	8.1	7.4	7.4	6.5	29.4
DR084	8.2	7.6	9.3	8.3	33.4
DR087	8.7	8.5	7.9	9.2	34.3
DR089	8.1	8.0	7.8	8.3	32.2
DR091	8.3	6.9	7.9	7.0	30.2
DR093	8.4	6.1	7.9	9.0	31.5
DR095	8.2	8.4	8.1	8.5	33.2
DR096	8.4	9.2	9.9	8.7	36.2
DR097	9.9	9.9	7.5	12.0	39.3
DR098	6.5	9.3	6.3		29.4
DR099	9.8	11.7	12.8	8.6	42.8
DR100	8.9	7.4	8.0	8.0	32.3
DR102	8.9	9.7	15.2	9.1	42.8
DR103	10.9	10.4	12.0	11.0	44.3
DR104	12.4	10.4	11.3	8.9	43.0
DR105	5.7	4.7	6.9	6.3	23.8
DR107	8.3	8.4	7.6	8.4	32.7
DR108	8.9	9.6	8.6	10.4	37.5
DR109	11.9	11.9			47.5
DR110	5.7	4.7	4.5	2.6	17.5
DR111	6.7	5.2	6.2	5.4	23.5
DR113	9.9		10.4	10.0	40.3
DR114	10.7	10.5	9.9	12.6	43.6
DR115	10.8	9.6	9.9	11.3	41.6
DR116	6.9	5.9	7.2	6.4	26.4
DR117	7.9	7.4	9.9	8.1	33.4
DR118	6.2	6.2	5.8	7.8	26.1
DR119	8.3	8.5	9.8	7.9	34.5

Location	Quarter 1 mR/day	Quarter 2 mR/day	Quarter 3 mR/day	Quarter 4 mR/day	Annual Exposure mR/year
DR-RSA	8.5	8.6	6.8	10.0	33.8
DR-RSB	9.8	9.6	8.6	8.1	36.0
DR-RSC	8.6	10.5	9.8	10.0	38.8
DR-RSD	11.8	11.8	13.6	10.6	47.7
DR-RSE	7.5	8.6	7.3	7.7	31.1
DR-RSF	6.3	6.6	6.8	8.5	28.3
DR-RSG	7.3	6.8	8.4	7.1	29.6
DR-RSH	5.2	5.1	7.4	7.2	25.0
DR-RSJ	9.4	8.8		8.7	35.8
DR-RSK	6.8	7.6	7.0	7.5	28.9
DR-RSL	7.5	8.0	9.6	8.1	33.2
DR-RSM	11.4	10.4	10.5	11.0	43.3
DR-RSN	6.0	5.6	6.6	4.5	22.7
DR-RSP	6.3	5.7	7.8	7.4	27.1
DR-RSQ	7.4	6.9	6.7	6.8	27.8
DR-RSR	9.2	10.2	11.1	7.9	38.5

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.

LaSalle Nuclear Power Station

The LaSalle NPS, consisting of two 3,546 Megawatt BWRs, is owned and operated by the Exelon Corporation and 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 the station's IEPA National Pollutant Discharge Elimination System permit, and from there to the Illinois River at a point 3.5 miles north of the station. The discharge point is approximately 20 miles downriver of the Dresden NPS, samples taken downstream of Dresden station are effectively, upstream controls for the LaSalle station. No liquid effluents were discharged in 2019.

Figures 20-22 provide an overview of all sampling and monitoring locations in the vicinity of the LaSalle NPS (yellow star).

Significant Events or Changes for 2019

The Sanbury Railroad Preserve soil and vegetation sampling location was added to provide a sampling location to the southeast of the LaSalle station.

Sampling and Monitoring Results

Water Sampling Results

Detectable levels of tritium were found in several surface water samples taken in August 2019. The elevated levels are likely attributable to the routine liquid effluent releases from the Braidwood station or the radioactive effluents released from the Dresden sewage treatment plant and storm

sewer system as unmonitored liquid releases. All tritium levels were well below the Drinking Water Standards established by the US EPA and IEPA.

Results from gross beta analysis indicated that the established MDC was met at several sampling locations and can likely be attributed to the routine liquid effluent releases from the Braidwood station or the radioactive effluents released from the Dresden sewage treatment plant and storm sewer system as unmonitored liquid releases.

Results from total strontium and gamma spectroscopy analysis indicated no concentrations above the established MDCs.

Soil Sampling Results

Gamma spectroscopy results for soil samples indicated no concentrations of reactor-produced radionuclides above background. Cesium-137 in concentrations greater than the established MDC was seen but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing.

Sediment Sampling Results

Gamma spectroscopy results for second quarter sediment samples indicated concentrations of Niobium-95 and Zirconium-95 slightly above the established MDC. Results from samples collected at these locations in the subsequent quarter were once again below MDC.

Vegetation Sampling Results

Gamma spectroscopy results for vegetation samples indicated no concentrations above the established MDC.

Fish Sampling Results

Gamma spectroscopy results for fish samples indicated no concentrations above the established MDC.

Direct Radiation Monitoring Results

The ambient gamma monitoring results were comparable to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois.

LaSalle Maps of Monitoring and Sampling Locations

Figure 20. OSL and GDN Monitoring Locations – LaSalle

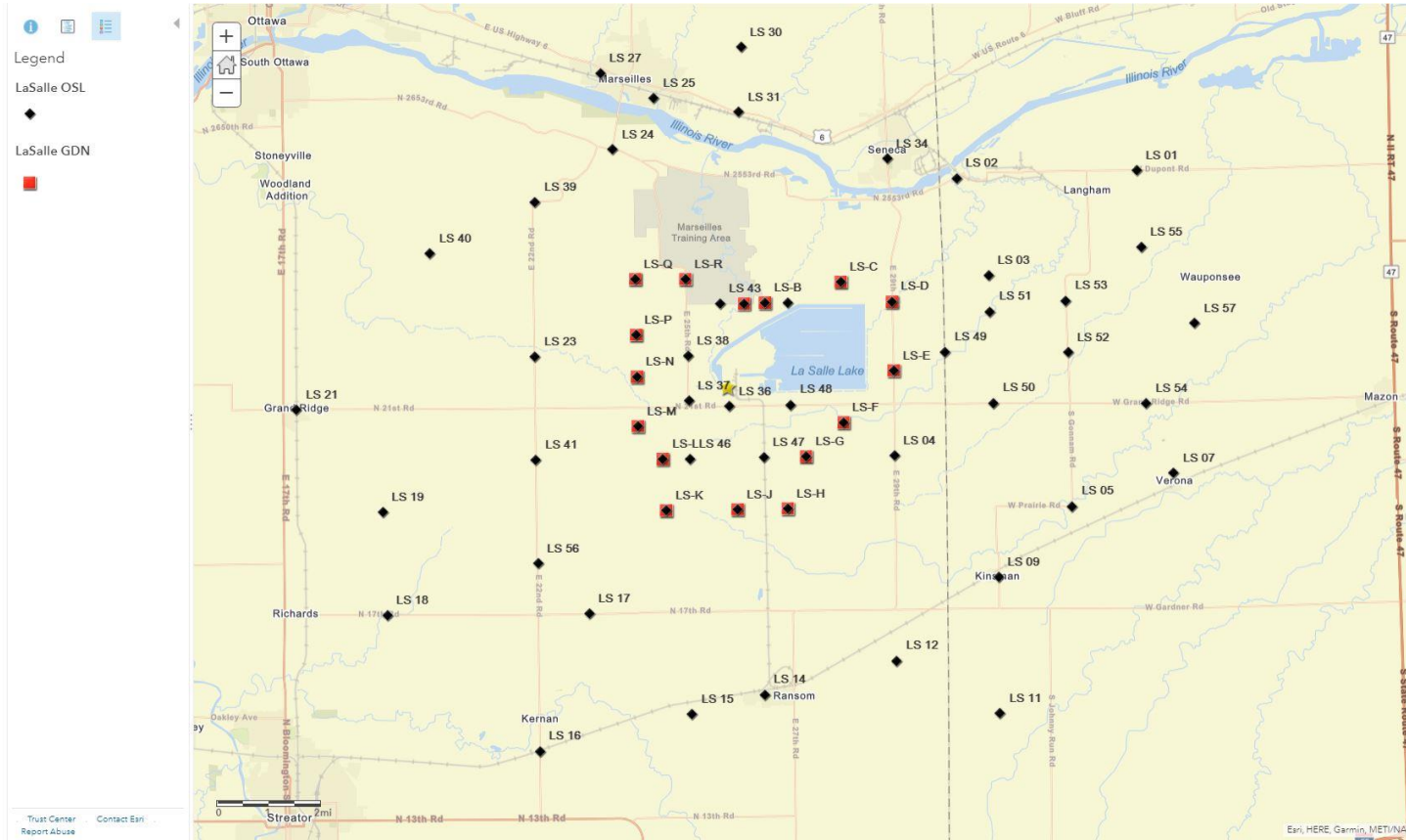


Figure 21. OSL and GDN Monitoring Locations (continued) – LaSalle

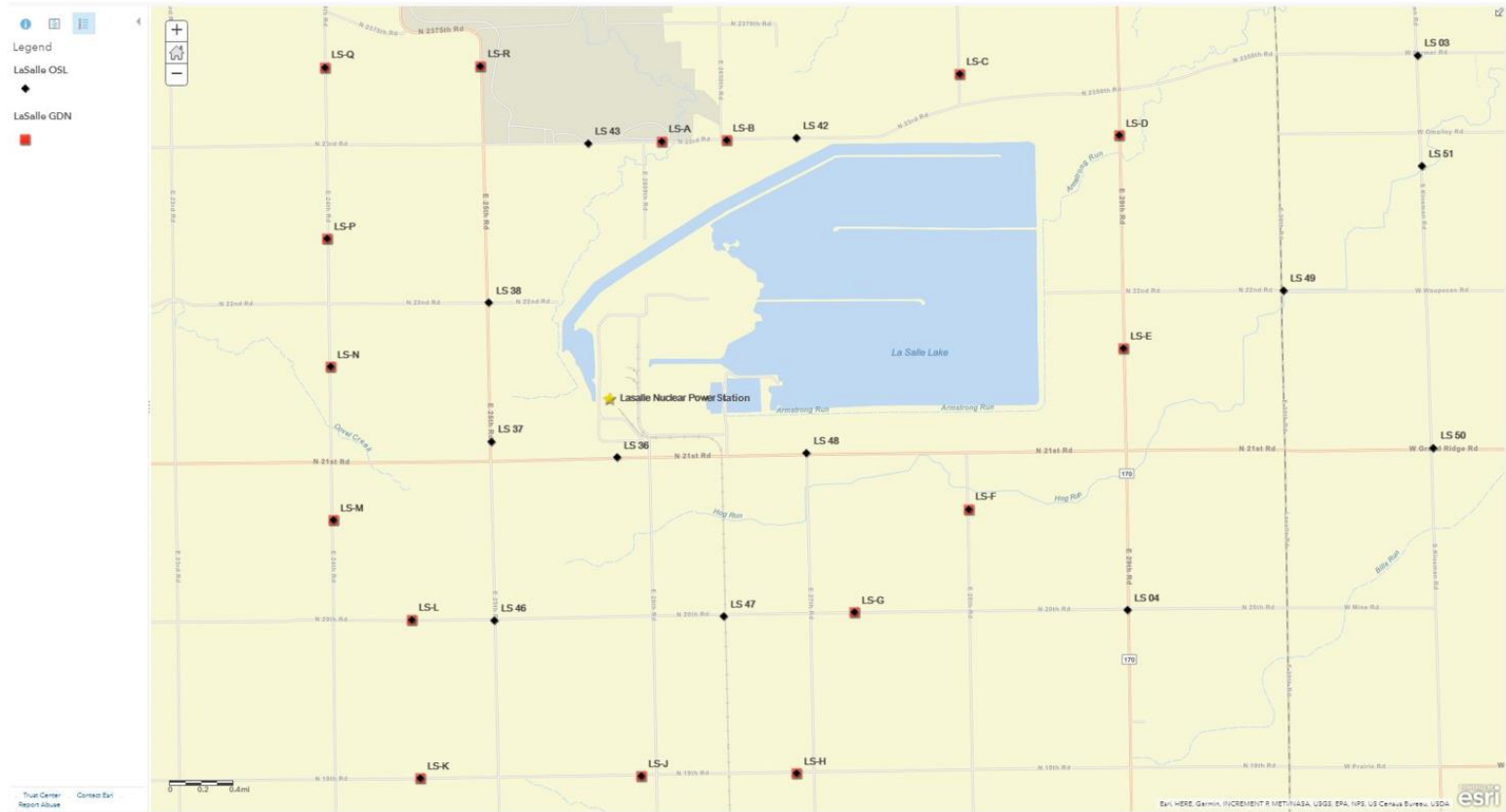
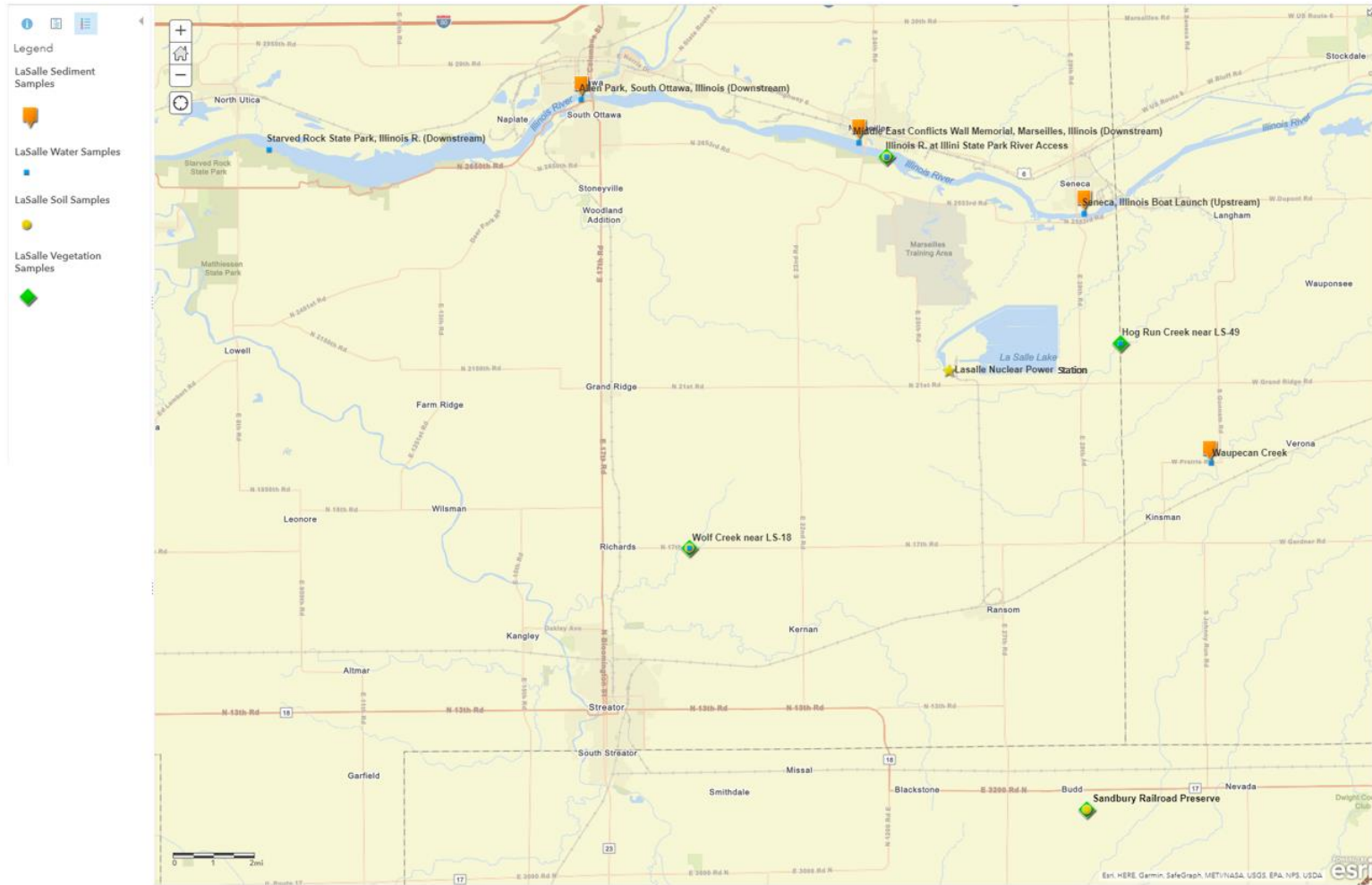


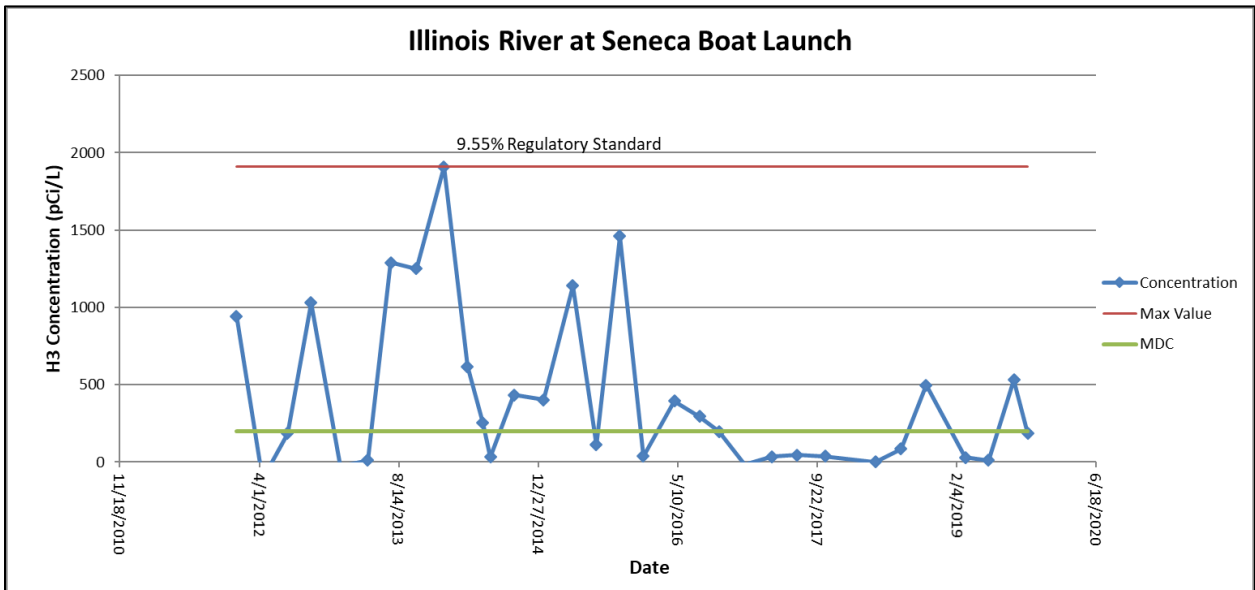
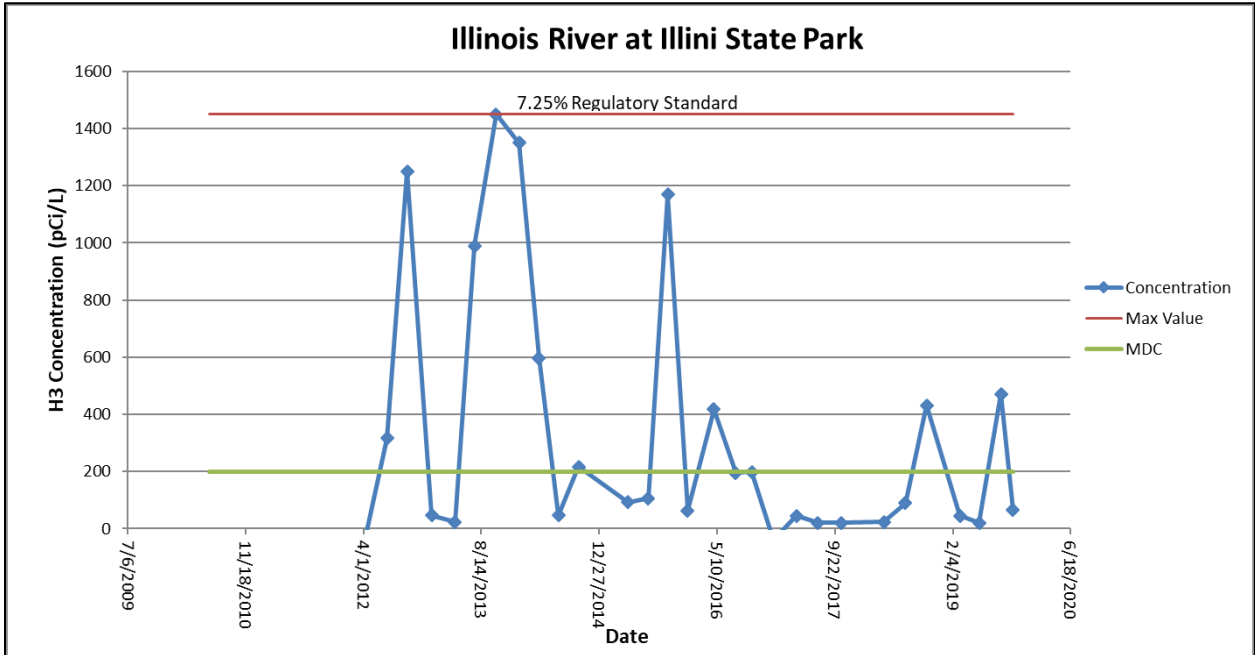
Figure 22. Environmental Sampling Locations - LaSalle

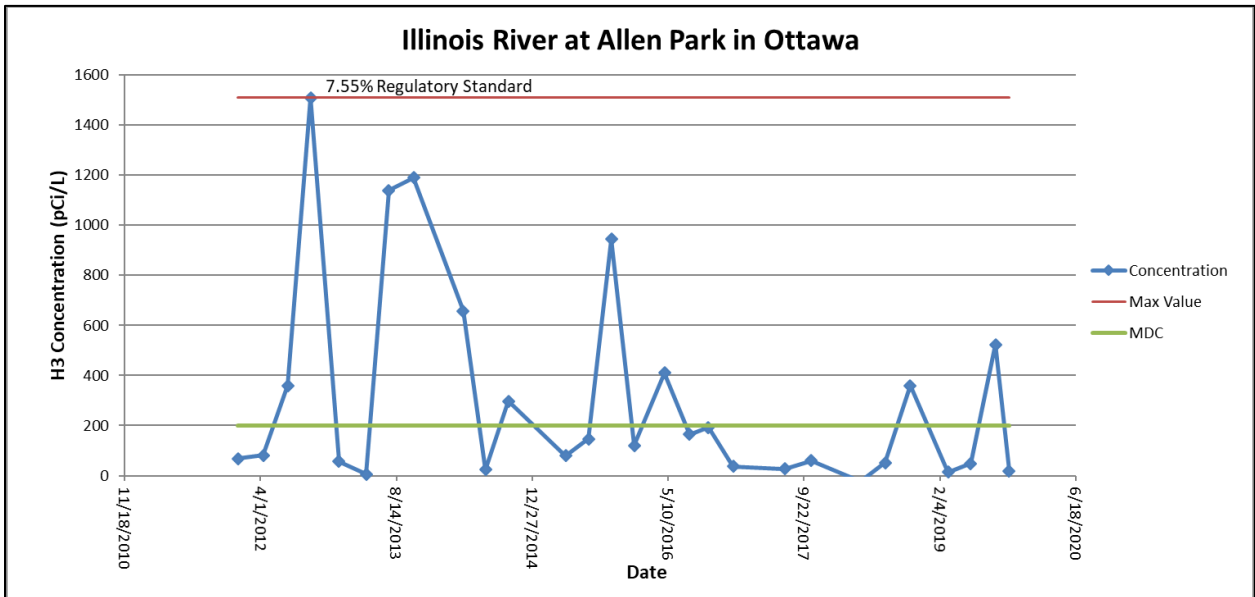
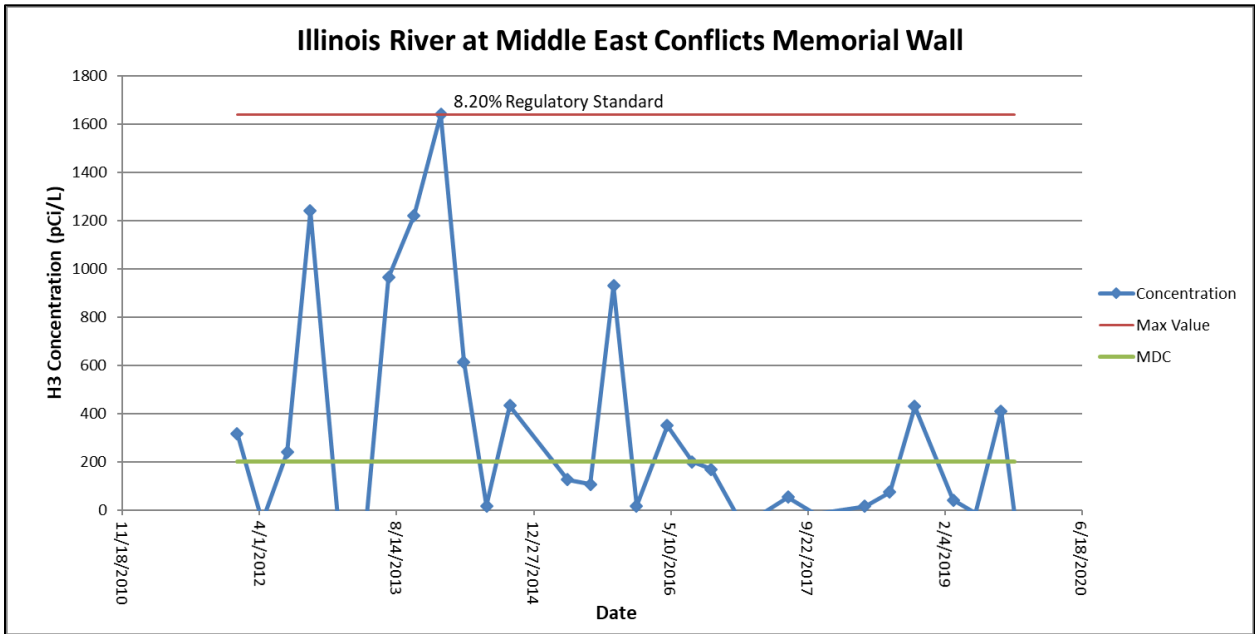


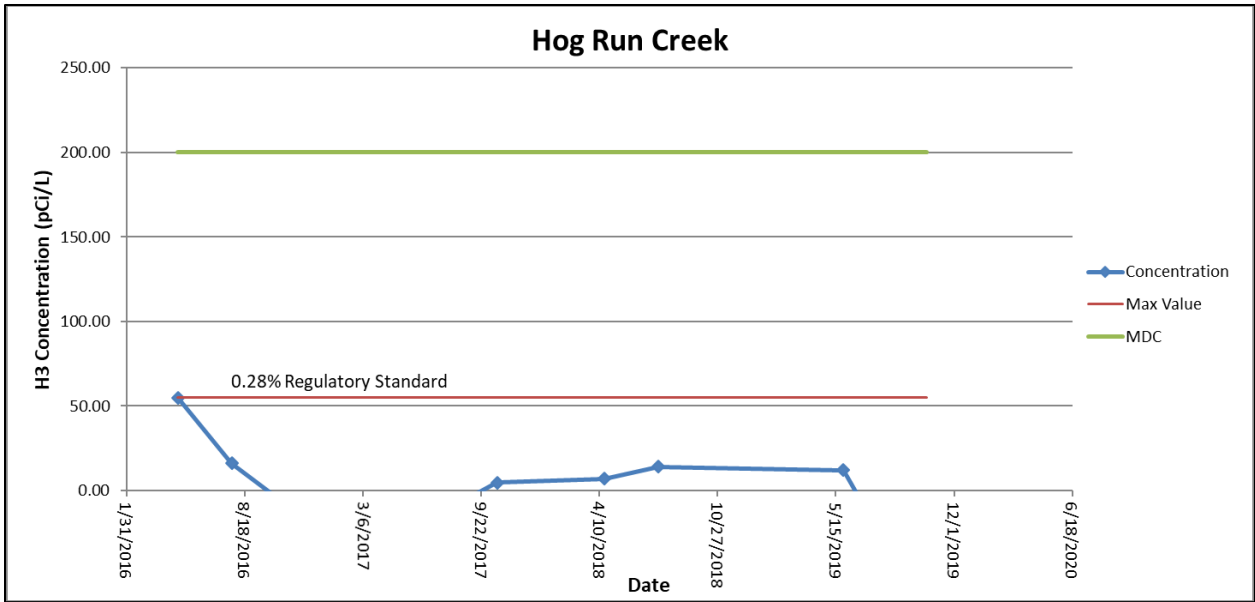
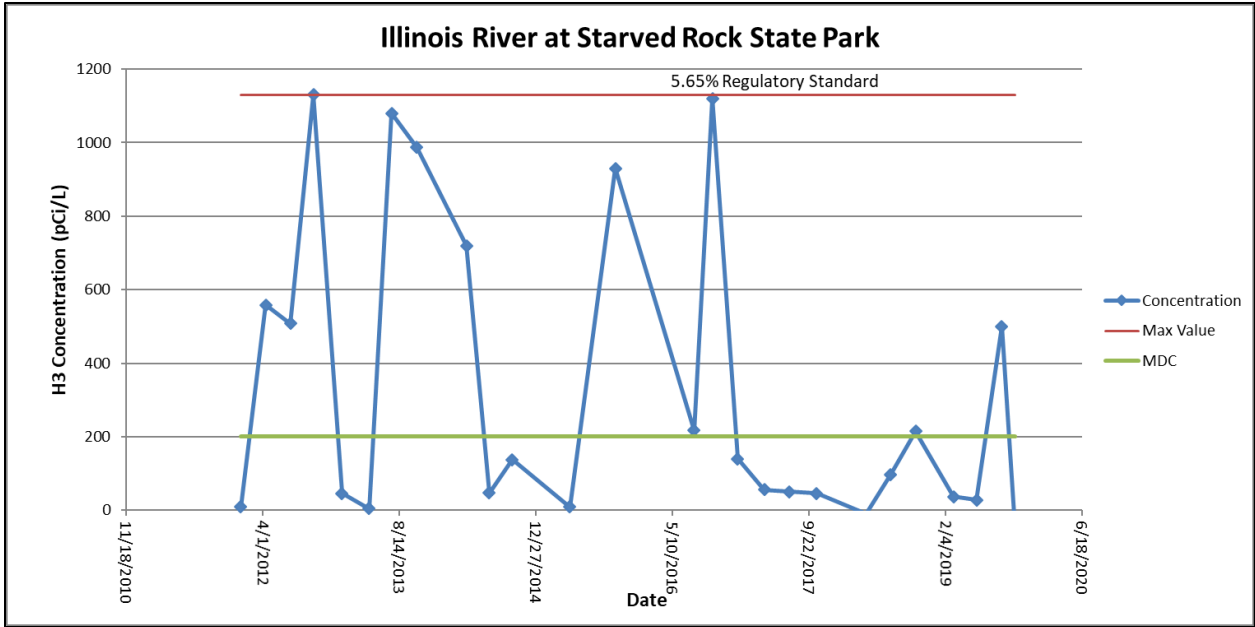
LaSalle Sample Result Tables and Graphs
 Tritium (H-3) in Water Results - LaSalle
 Results are in picocuries per liter (pCi/L)

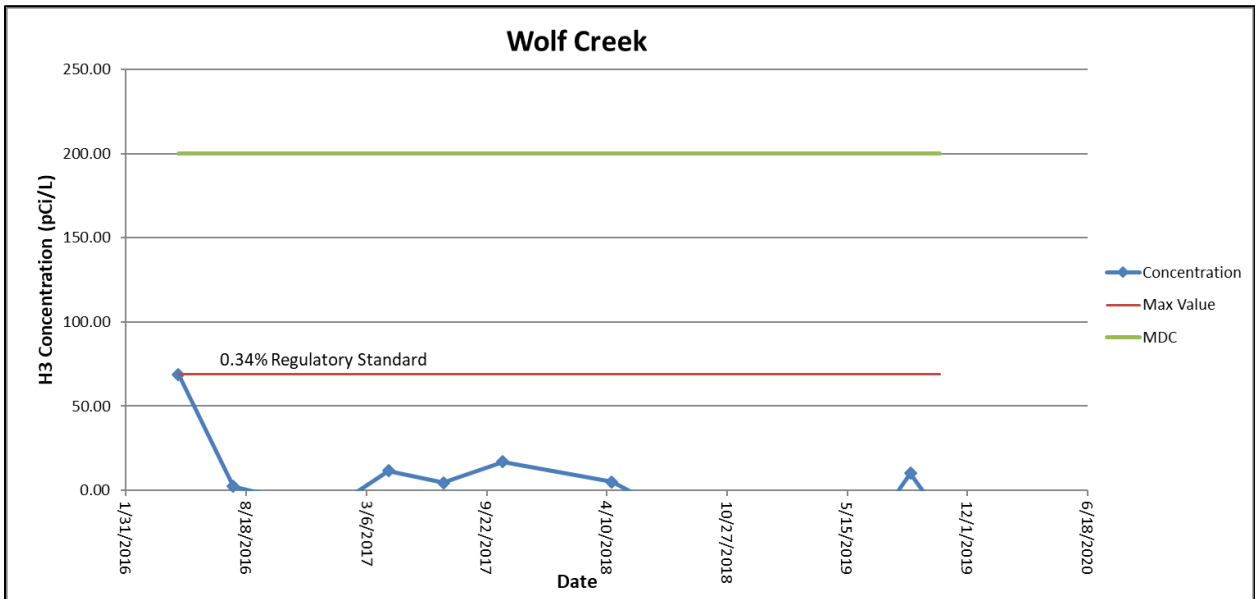
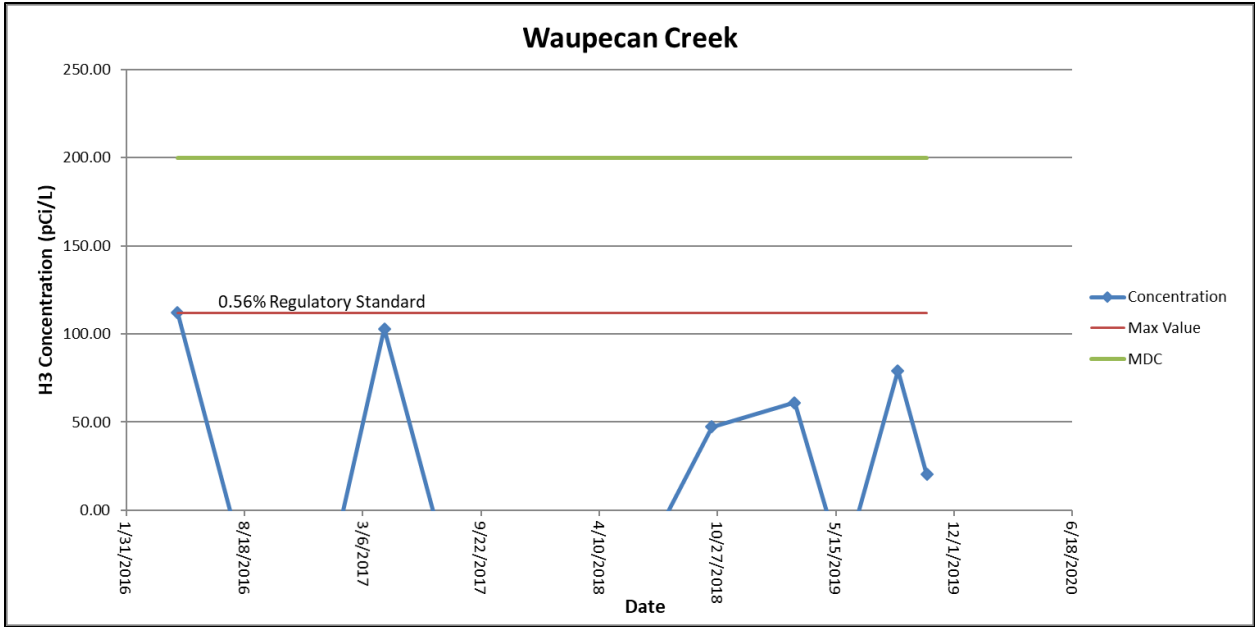
Location	H-3	
Date	Result	MDC
Allen Park, South Ottawa		
3/6/2019	<MDC	200
5/28/2019	<MDC	200
8/28/2019	524	200
10/16/2019	<MDC	200
Hog Run Creek near LS-49		
5/28/2019	<MDC	200
8/28/2019	<MDC	200
10/16/2019	<MDC	200
Illinois R. at Illini State Park		
3/6/2019	<MDC	200
5/28/2019	<MDC	200
8/28/2019	471	200
10/16/2019	<MDC	200
Middle East Conflicts Wall Memorial, Marseilles		
3/6/2019	<MDC	200
5/28/2019	<MDC	200
8/28/2019	410	200
10/16/2019	<MDC	200
Starved Rock State Park		
3/6/2019	<MDC	200
5/28/2019	<MDC	200
8/28/2019	500	200
10/16/2019	<MDC	200
Waupecan Creek near LS-5		
3/6/2019	<MDC	200
5/28/2019	<MDC	200
8/28/2019	<MDC	200
10/16/2019	<MDC	200
Wolf Creek near LS-18		
5/28/2019	<MDC	200
8/28/2019	<MDC	200
10/16/2019	<MDC	200

Trending Graphs for Tritium (H-3) in Water - LaSalle
 (Max value compared to IEPA and US EPA Class regulatory standard of 20,000 pCi/L)









Total Strontium in Water Results - LaSalle
Results are in picocuries per liter (pCi/L)

Location	Strontium	
Date	Result	MDC
Illinois R. at Illini State Park		
5/28/2019	<MDC	0.4

Results for Beta Screening of Water - LaSalle
Results are in picocuries per liter (pCi/L)

Location Date	Beta	
	Result	MDC
Allen Park, South Ottawa		
3/6/2019	4.4	3.8
5/28/2019	<MDC	3.8
8/28/2019	5.1	3.8
10/16/2019	6.6	3.8
Hog Run Creek near LS-49		
5/28/2019	<MDC	3.8
8/28/2019	<MDC	3.8
10/16/2019	<MDC	3.8
Illinois R. at Illini State Park		
3/6/2019	6.4	3.8
5/28/2019	<MDC	3.8
8/28/2019	4.2	3.8
10/16/2019	<MDC	3.8
Middle East Conflicts Wall Memorial, Marseilles		
3/6/2019	5.6	3.8
5/28/2019	<MDC	3.8
8/28/2019	<MDC	3.8
10/16/2019	5.6	3.8
Seneca, Illinois Boat Launch		
3/6/2019	<MDC	3.8
5/28/2019	<MDC	3.8
8/28/2019	4.3	3.8
10/16/2019	6.9	3.8
Starved Rock State Park		
3/6/2019	<MDC	3.8
5/28/2019	<MDC	3.8
8/28/2019	4.7	3.8
10/16/2019	<MDC	3.8
Waupecan Creek near LS-5		
3/6/2019	<MDC	3.8
5/28/2019	<MDC	3.8
8/28/2019	<MDC	3.8
10/16/2019	4.0	3.8
Wolf Creek near LS-18		
5/28/2019	<MDC	3.8
8/28/2019	<MDC	3.8
10/16/2019	<MDC	3.8

Gamma Spectroscopy Results for Other Radionuclides in Water - LaSalle
Results are in picocuries per liter (pCi/L)

Location Date	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
	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																								
3/6/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
5/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
8/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
10/16/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
Hog Run Creek near LS-49																								
5/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
8/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
10/16/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
Illinois R. at Illini State Park																								
3/6/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
5/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
8/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
10/16/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
Middle East Conflicts Wall Memorial, Marseilles																								
3/6/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
5/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
8/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
10/16/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
Seneca, Illinois Boat Launch																								
3/6/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
5/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
8/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
10/16/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9

Gamma Spectroscopy Results for Other Radionuclides in Water - LaSalle (Continued)
Results are in picocuries per liter (pCi/L)

Starved Rock State Park																								
3/6/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
5/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
8/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
10/16/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
Waupecan Creek near LS-5																								
3/6/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
5/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
8/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
10/16/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
Wolf Creek near LS-18																								
5/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
8/28/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9
10/16/2019	<MDC	20.5	<MDC	360	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.8	<MDC	7.7	<MDC	8.4	<MDC	3.7	<MDC	4.3	<MDC	7.9	<MDC	6.9

Gamma Spectroscopy Results for Radionuclides in Soil (Migration) - LaSalle
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
Illini State Park																						
5/28/2019	<MDC	2.38	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.08	0.04	<MDC	0.16	<MDC	0.04	<MDC	0.11	<MDC	0.09	<MDC	0.12
8/28/2019	<MDC	2.38	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.22	0.04	<MDC	0.16	<MDC	0.04	<MDC	0.11	<MDC	0.09	<MDC	0.12
Sanbury Railroad Preserve																						
5/28/2019	<MDC	2.38	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.24	0.04	<MDC	0.16	<MDC	0.04	<MDC	0.11	<MDC	0.09	<MDC	0.12
8/28/2019	<MDC	2.38	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.14	0.04	<MDC	0.16	<MDC	0.04	<MDC	0.11	<MDC	0.09	<MDC	0.12
Wolf Creek near LS-18																						
5/28/2019	<MDC	2.38	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.11	0.04	<MDC	0.16	<MDC	0.04	<MDC	0.11	<MDC	0.09	<MDC	0.12
8/28/2019	<MDC	2.38	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.11	0.04	<MDC	0.16	<MDC	0.04	<MDC	0.11	<MDC	0.09	<MDC	0.12

Gamma Spectroscopy Results for Radionuclides in Soil (Deposition) - LaSalle
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
Illini State Park																						
5/28/2019	<MDC	2.98	<MDC	0.24	<MDC	0.05	<MDC	0.04	<MDC	0.03	0.18	0.05	<MDC	0.16	<MDC	0.04	<MDC	0.13	<MDC	0.09	<MDC	0.14
8/28/2019	<MDC	2.98	<MDC	0.24	<MDC	0.05	<MDC	0.04	<MDC	0.03	0.16	0.05	<MDC	0.16	<MDC	0.04	<MDC	0.13	<MDC	0.09	<MDC	0.14
Sanbury Railroad Preserve																						
5/28/2019	<MDC	2.98	<MDC	0.24	<MDC	0.05	<MDC	0.04	<MDC	0.03	0.14	0.05	<MDC	0.16	<MDC	0.04	<MDC	0.13	<MDC	0.09	<MDC	0.14
8/28/2019	<MDC	2.98	<MDC	0.24	<MDC	0.05	<MDC	0.04	<MDC	0.03	0.12	0.05	<MDC	0.16	<MDC	0.04	<MDC	0.13	<MDC	0.09	<MDC	0.14
Wolf Creek near LS-18																						
5/28/2019	<MDC	2.98	<MDC	0.24	<MDC	0.05	<MDC	0.04	<MDC	0.03	0.10	0.05	<MDC	0.16	<MDC	0.04	<MDC	0.13	<MDC	0.09	<MDC	0.14
8/28/2019	<MDC	2.98	<MDC	0.24	<MDC	0.05	<MDC	0.04	<MDC	0.03	0.09	0.05	<MDC	0.16	<MDC	0.04	<MDC	0.13	<MDC	0.09	<MDC	0.14

Gamma Spectroscopy Results for Radionuclides in Sediment- LaSalle
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
Allen Park, South Ottawa																						
5/28/2019	<MDC	1.78	<MDC	0.15	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.02	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.09	<MDC	0.09
8/28/2019	<MDC	1.78	<MDC	0.15	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.02	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.09	<MDC	0.09
Middle East Conflicts Wall Memorial, Marseilles																						
8/28/2019	<MDC	1.78	<MDC	0.15	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.02	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.09	<MDC	0.09
Seneca, Illinois Boat Launch																						
5/28/2019	<MDC	1.78	<MDC	0.15	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.02	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.09	<MDC	0.09
8/28/2019	<MDC	1.78	<MDC	0.15	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.02	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.09	<MDC	0.09
Waupecan Creek near LS-5																						
5/28/2019	<MDC	1.78	<MDC	0.15	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.02	<MDC	0.10	<MDC	0.03	0.10	0.07	<MDC	0.09	0.10	0.09
8/28/2019	<MDC	1.78	<MDC	0.15	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.02	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.09	<MDC	0.09

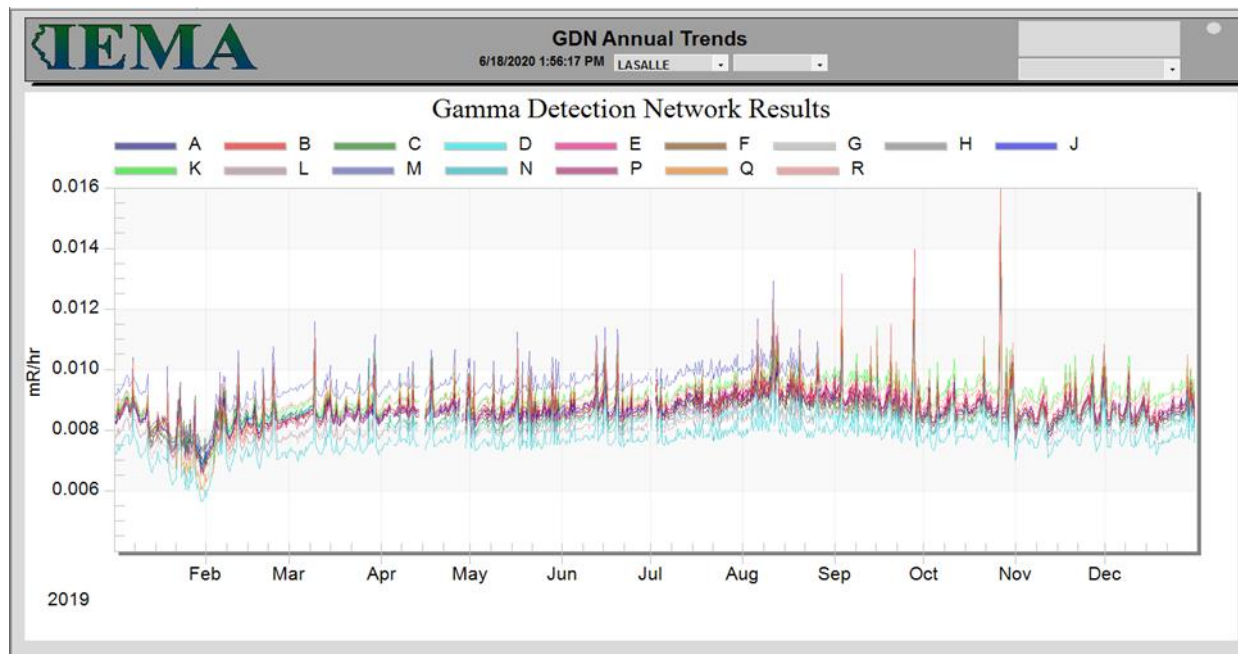
Gamma Spectroscopy Results for Radionuclides in Vegetation - LaSalle
Results are in picocuries per gram (pCi/g)

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																										
5/28/2019	<MDC	11.4	<MDC	20.2	<MDC	0.3	<MDC	0.2	<MDC	0.3	<MDC	0.2	<MDC	0.8	<MDC	18.4	<MDC	0.2	<MDC	0.6	<MDC	0.5	<MDC	0.6	<MDC	0.6
8/28/2019	<MDC	11.4	<MDC	20.2	<MDC	0.3	<MDC	0.2	<MDC	0.3	<MDC	0.2	<MDC	0.8	<MDC	18.4	<MDC	0.2	<MDC	0.6	<MDC	0.5	<MDC	0.6	<MDC	0.6
Illini State Park																										
5/28/2019	<MDC	11.4	<MDC	20.2	<MDC	0.3	<MDC	0.2	<MDC	0.3	<MDC	0.2	<MDC	0.8	<MDC	18.4	<MDC	0.2	<MDC	0.6	<MDC	0.5	<MDC	0.6	<MDC	0.6
8/28/2019	<MDC	11.4	<MDC	20.2	<MDC	0.3	<MDC	0.2	<MDC	0.3	<MDC	0.2	<MDC	0.8	<MDC	18.4	<MDC	0.2	<MDC	0.6	<MDC	0.5	<MDC	0.6	<MDC	0.6
Sanbury Railroad Preserve																										
5/28/2019	<MDC	11.4	<MDC	20.2	<MDC	0.3	<MDC	0.2	<MDC	0.3	<MDC	0.2	<MDC	0.8	<MDC	18.4	<MDC	0.2	<MDC	0.6	<MDC	0.5	<MDC	0.6	<MDC	0.6
8/28/2019	<MDC	11.4	<MDC	20.2	<MDC	0.3	<MDC	0.2	<MDC	0.3	<MDC	0.2	<MDC	0.8	<MDC	18.4	<MDC	0.2	<MDC	0.6	<MDC	0.5	<MDC	0.6	<MDC	0.6
Wolf Creek near LS-18																										
5/28/2019	<MDC	11.4	<MDC	20.2	<MDC	0.3	<MDC	0.2	<MDC	0.3	<MDC	0.2	<MDC	0.8	<MDC	18.4	<MDC	0.2	<MDC	0.6	<MDC	0.5	<MDC	0.6	<MDC	0.6
8/28/2019	<MDC	11.4	<MDC	20.2	<MDC	0.3	<MDC	0.2	<MDC	0.3	<MDC	0.2	<MDC	0.8	<MDC	18.4	<MDC	0.2	<MDC	0.6	<MDC	0.5	<MDC	0.6	<MDC	0.6

Gamma Spectroscopy Results for Radionuclides in Fish - LaSalle
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	
LaSalle Lake (Bottom Feeder)																										
10/17/2019	<MDC	1580	<MDC	1800	<MDC	47	<MDC	35	<MDC	35	<MDC	28	<MDC	125	<MDC	2460	<MDC	35	<MDC	86	<MDC	81	<MDC	91	<MDC	91
LaSalle Lake (Top Feeder)																										
10/17/2019	<MDC	1580	<MDC	1800	<MDC	47	<MDC	35	<MDC	35	<MDC	28	<MDC	125	<MDC	2460	<MDC	35	<MDC	86	<MDC	81	<MDC	91	<MDC	91

Gamma Detection Network Results – LaSalle
Results are in milliroentgen per hour (mR/hr)



Summary of Ambient Gamma Results - LaSalle

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
LS001	13.0	10.5	8.4	9.5	41.4
LS002	8.0	10.9	13.5	9.3	41.7
LS003	12.1	8.7	10.9	10.3	42.0
LS004		11.9	11.7	9.2	43.7
LS005	6.9	7.7	9.1	8.9	32.7
LS007	9.2	8.0	8.7	10.8	36.8
LS009	10.2	7.2	9.5	8.0	34.9
LS011	10.3	9.9	13.2	12.7	46.1
LS012	7.1	8.8	8.3	8.4	32.6
LS014	8.2	9.3	10.0		36.7
LS015	11.8	7.6	11.0	10.2	40.6
LS016	7.6	6.9	9.7	9.9	34.1
LS017	8.6	10.5	8.4	12.5	40.0
LS018	11.0	7.8	10.5	11.0	40.3
LS019	7.2	10.4	14.7	13.0	45.3
LS021	7.8	9.9	10.8	8.9	37.5
LS023	11.2	10.6	14.5	11.4	47.7
LS024	11.0	9.1	12.6	11.9	44.6
LS025	6.5	12.8	10.2	10.5	40.0
LS027	10.1	7.6	11.6	7.5	36.8
LS030	10.0	11.0	9.9	10.4	41.4
LS031	5.8	8.1		9.5	31.3
LS034		6.8	6.2	9.1	29.6
LS036	9.4		12.7		44.2
LS037	10.6	11.3	14.8	12.6	49.3
LS038	6.4	8.5	10.1		33.3
LS039	6.6	7.7	9.0	8.6	31.9
LS040	9.8	9.0	8.3	9.2	36.3
LS041	8.8	11.3	10.9	8.8	39.7
LS042	8.6	8.9	12.1	11.3	40.9

Summary of Ambient Gamma Results – LaSalle (Continued)

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
LS043	9.5	12.4	10.7	10.9	43.5
LS046	9.8	12.0	9.9	12.2	43.9
LS047	12.2	11.3	15.2	11.2	49.9
LS048	9.5	7.7	10.2	8.6	36.0
LS049	10.3	9.4	11.1	11.9	42.7
LS050	8.5	6.8	7.0	10.2	32.5
LS051	11.2	9.2	7.8	11.8	40.0
LS052	10.2	7.9	9.1	9.1	36.4
LS053	9.2	8.1	11.3	10.8	39.5
LS054	6.7	8.7	5.7	9.8	30.9
LS055	9.7	8.6	10.0	13.2	41.5
LS056	9.4	9.5	10.5	9.9	39.3
LS057	8.5	9.4	10.8	12.3	41.0
LS-RSA	11.8	9.5	11.8	9.7	42.7
LS-RSB	6.8	8.2	11.0	10.4	36.3
LS-RSC	13.7	9.7	11.0	9.6	43.9
LS-RSD	7.8	8.5	11.1	11.7	39.2
LS-RSE		7.1	9.9	7.8	33.1
LS-RSF	10.1	6.3	10.8	9.2	36.4
LS-RSG	8.5	7.4	7.1	9.1	32.1
LS-RSH	10.0	9.5	10.3	10.6	40.4
LS-RSJ	8.9	10.5	9.0	13.4	41.9
LS-RSK	8.8	10.9	10.1	12.5	42.3
LS-RSL	10.1	10.3	11.4	10.3	42.1
LS-RSM	13.1	11.7	14.4	12.7	51.9
LS-RSN	9.2	6.8	11.5	10.0	37.5
LS-RSP	10.1	10.0	17.6	13.2	51.0
LS-RSQ	6.8	8.0	8.5	9.6	32.9
LS-RSR	11.0	8.0	12.3	11.1	42.4

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.

Quad Cities Nuclear Power Station

The Quad Cities NPS, consisting of two 2,957 Megawatt BWRs, is owned and operated by the Exelon Corporation and 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 may be released to the adjacent Mississippi River in accordance to release limits governed by the station's license with the NRC and the station's IEPA National Pollutant Discharge Elimination System permit. Although there were no liquid batch releases of radioactive effluents discharged during this reporting period, in April and November 2019 groundwater contaminated in March 2018 by a leaking pipe clamp within a Radwaste Pipe Vault was routed from an extraction well to the Discharge Bay (Quad Cities liquid effluent final release point).

Figures 23-25 provide an overview of all sampling and monitoring locations in the vicinity of the Quad Cities NPS (yellow star).

Significant Events or Changes for 2019

No significant events or changes in 2019.

Sampling and Monitoring Results

Water Sampling Results

Water sample analysis for tritium and gamma spectroscopy indicated no concentrations above the established MDCs.

Results from gross beta analysis indicated that the established MDC was met at some sampling locations. These slightly elevated concentrations may be attributable to the discharge of contaminated groundwater from the 2018 leak in the Radwaste Pipe Vault.

Results from total strontium analysis of the second quarter sample collected from the Mississippi River at Rapids City were slightly above the established MDC. Third quarter total strontium results for that location were below MDC.

Soil Sampling Results

Gamma spectroscopy results for soil samples indicated no concentrations of reactor-produced radionuclides above background. Cesium-137 in concentrations greater than the established MDC was seen but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing.

Sediment Sampling Results

Gamma spectroscopy results for sediment samples indicated no concentrations above the established MDC.

Vegetation Sampling Results

Gamma spectroscopy results for vegetation samples indicated no concentrations above the established MDC.

Fish Sampling Results

Gamma spectroscopy results for fish samples indicated no concentrations above the established MDC.

Direct Radiation Monitoring Results

The ambient gamma monitoring results were comparable to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois.

Maps of Monitoring and Sampling Locations – Quad Cities

Figure 23. OSL and GDN Monitoring Locations - Quad Cities

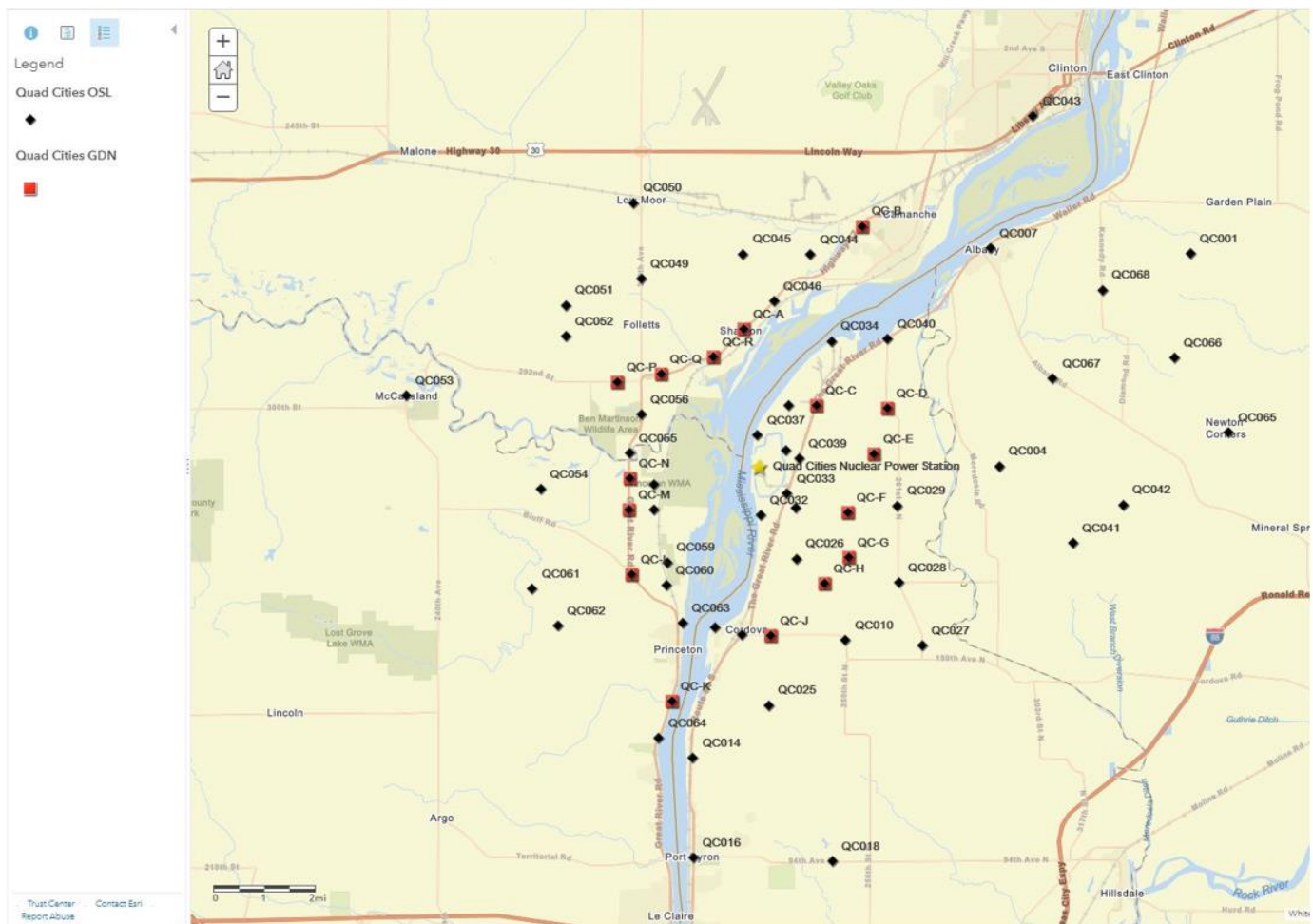
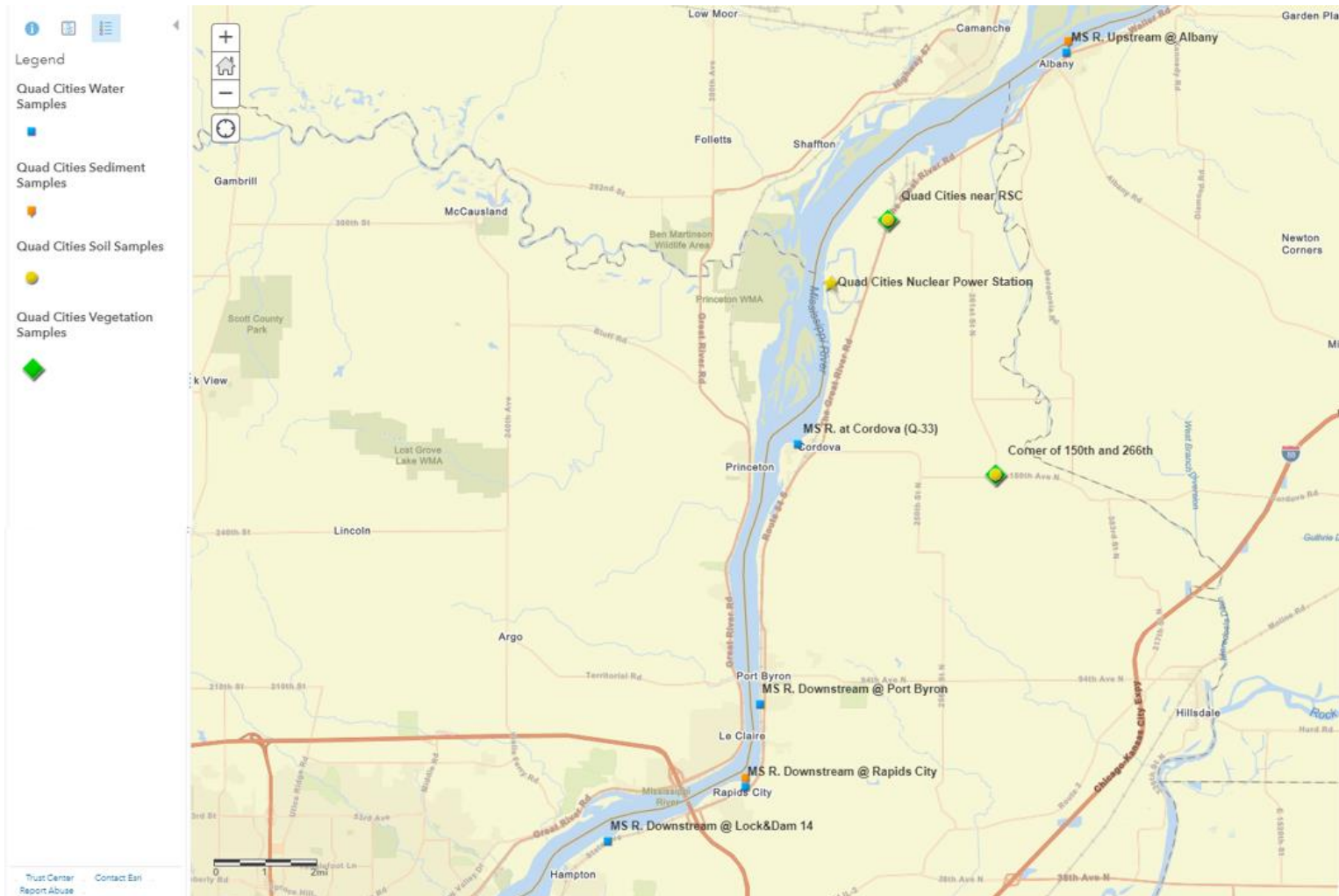


Figure 24. OSL and GDN Monitoring Locations (continued) - Quad Cities



Figure 25. Environmental Sampling Locations – Quad Cities

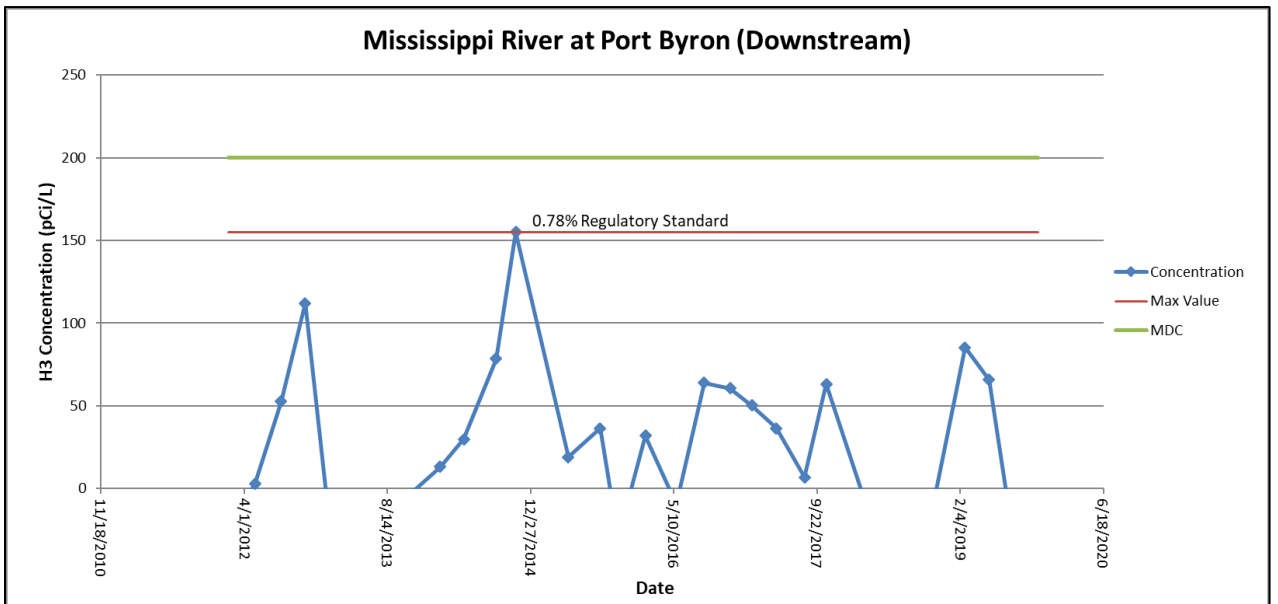
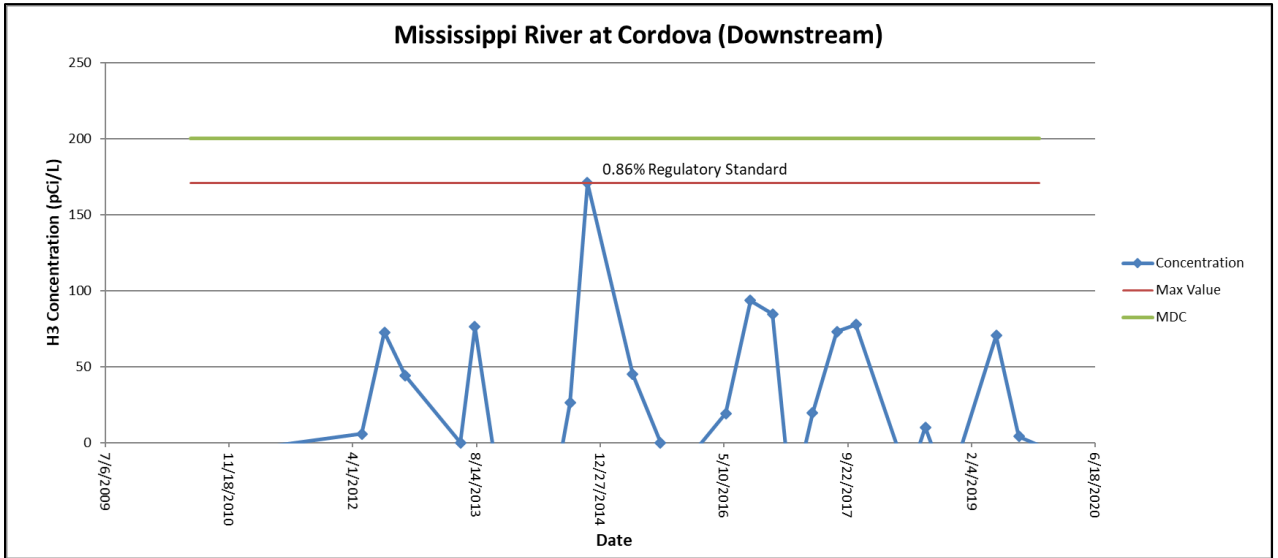


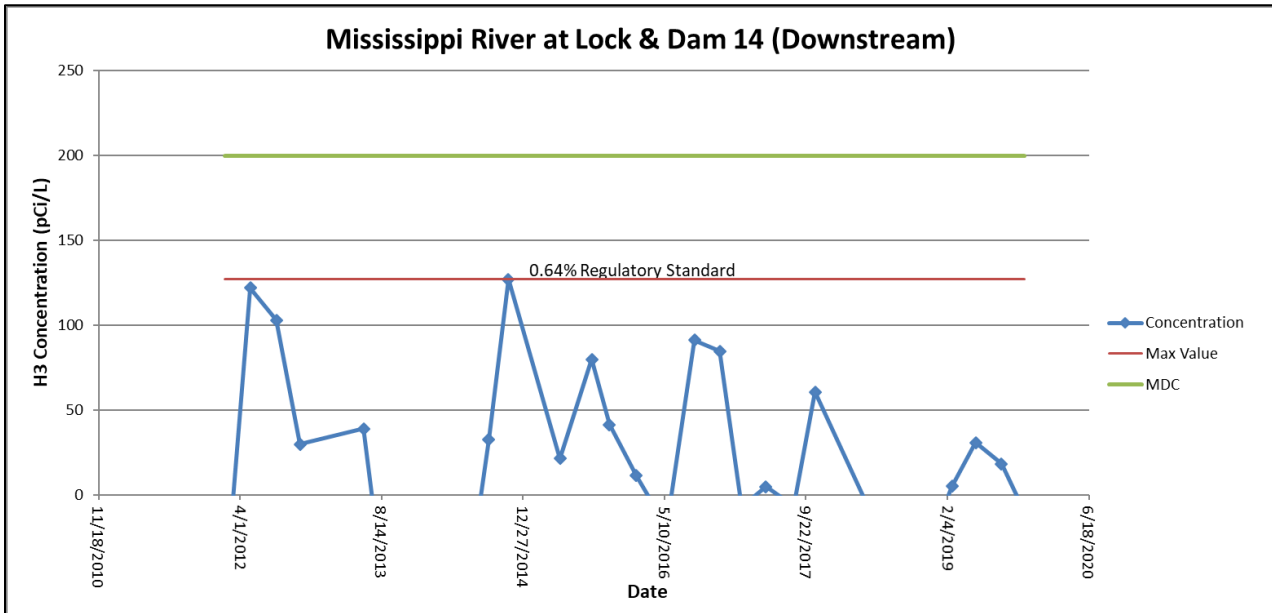
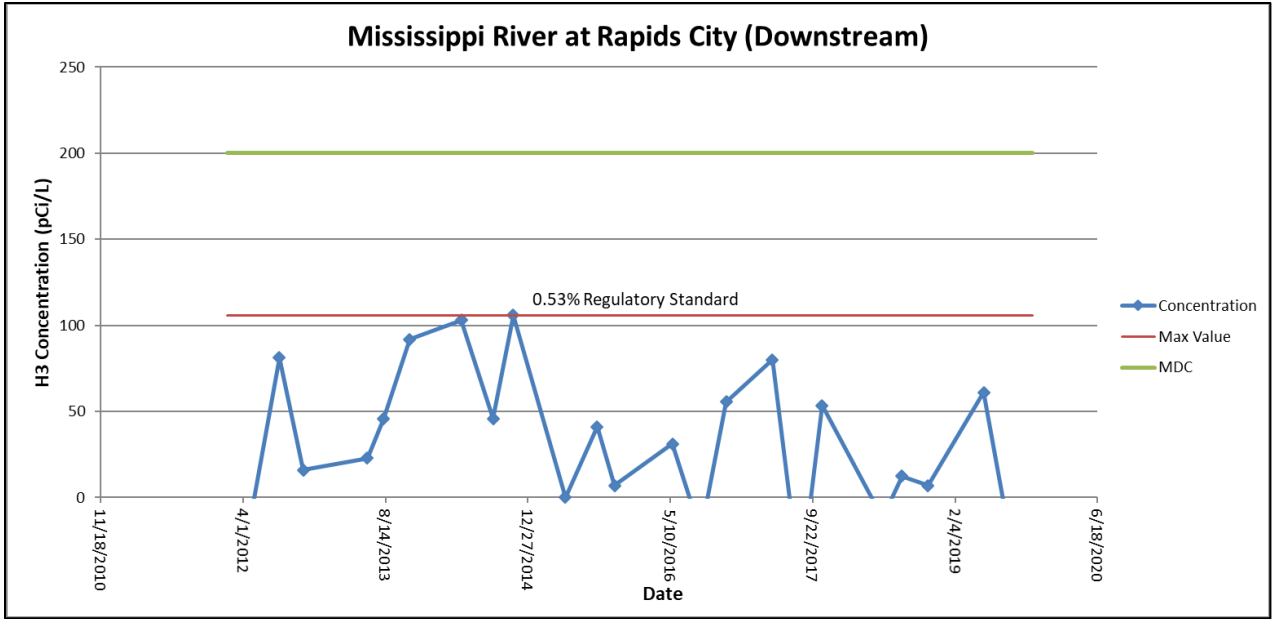
Quad Cities Sample Results

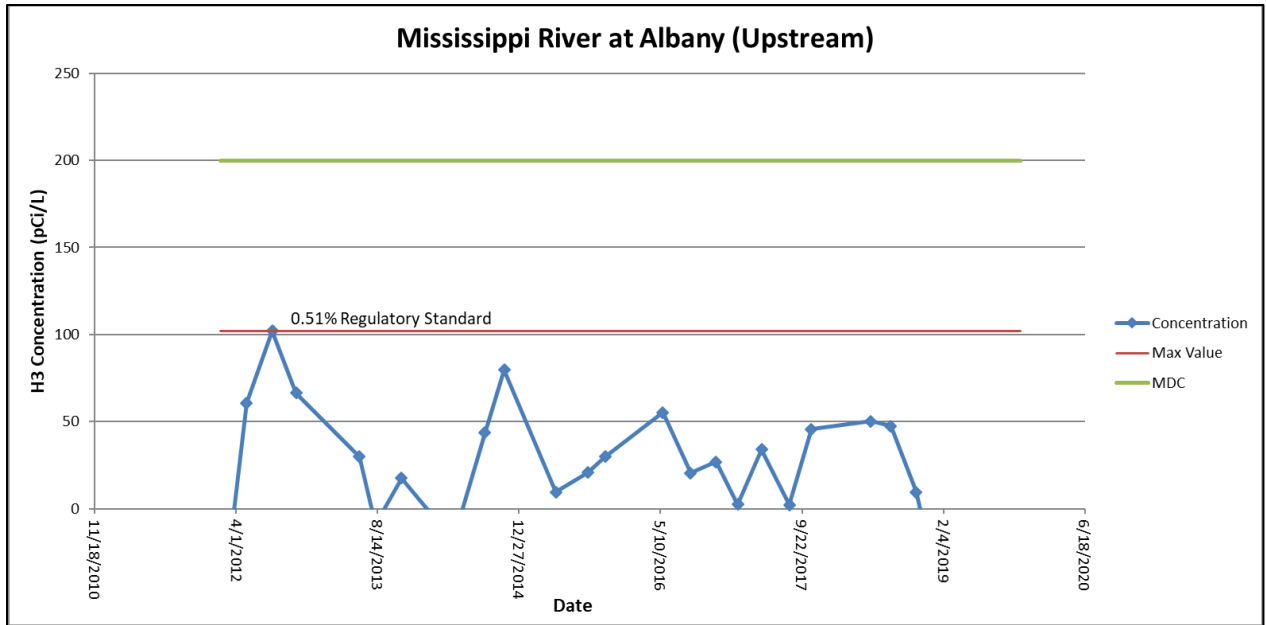
Tritium (H-3) in Water Sample Results - Quad Cities
Results are in picocuries per liter (pCi/L)

Location	H-3	
Date	Result	MDC
Mississippi R. at Albany		
2/21/2019	<MDC	200
5/15/2019	<MDC	200
8/14/2019	<MDC	200
11/4/2019	<MDC	200
Mississippi R. at Cordova		
5/15/2019	<MDC	200
8/14/2019	<MDC	200
11/4/2019	<MDC	200
Mississippi R. at Lock & Dam 14		
2/21/2019	<MDC	200
5/15/2019	<MDC	200
8/14/2019	<MDC	200
11/4/2019	<MDC	200
Mississippi R. at Port Byron		
2/21/2019	<MDC	200
5/15/2019	<MDC	200
8/14/2019	<MDC	200
11/4/2019	<MDC	200
Mississippi R. at Rapid City		
5/15/2019	<MDC	200
8/14/2019	<MDC	200
11/4/2019	<MDC	200

Trending Graphs for Tritium (H-3) in Water - Quad Cities
 (Max value compared to IEPA and US EPA Class regulatory standard of 20,000 pCi/L)







Total Strontium in Water Results - Quad Cities
Results in picocuries per liter (pCi/L)

Location	Strontium	
Date	Result	MDC
Mississippi R. at Cordova		
5/15/2019	<MDC	0.5
Mississippi R. at Rapid City		
5/15/2019	0.7	0.5
8/14/2019	<MDC	0.5

Results for Beta Screening of Water - Quad Cities
Results are in picocuries per liter (pCi/L)

Location	Beta	
Date	Result	MDC
Mississippi R. at Albany		
2/21/2019	3.8	3.8
5/15/2019	<MDC	3.8
8/14/2019	<MDC	3.8
11/4/2019	<MDC	3.8
Mississippi R. at Cordova		
5/15/2019	<MDC	3.8
8/14/2019	<MDC	3.8
11/4/2019	4.2	3.8
Mississippi R. at Lock & Dam 14		
2/21/2019	<MDC	3.8
5/15/2019	4.4	3.8
8/14/2019	<MDC	3.8
11/4/2019	4.2	3.8
Mississippi R. at Port Byron		
2/21/2019	<MDC	3.8
5/15/2019	<MDC	3.8
8/14/2019	<MDC	3.8
11/4/2019	<MDC	3.8
Mississippi R. at Rapid City		
5/15/2019	<MDC	3.8
8/14/2019	<MDC	3.8
11/4/2019	<MDC	3.8

Gamma Spectroscopy Results for Other Radionuclides in Water - Quad Cities
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 R. at Albany																								
2/21/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
5/15/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
8/14/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
11/4/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
Mississippi R. at Cordova																								
5/15/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
8/14/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
11/4/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
Mississippi R. at Lock & Dam 14																								
2/21/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
5/15/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
8/14/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
11/4/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
Mississippi R. at Port Byron																								
2/21/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
5/15/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
8/14/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
11/4/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
Mississippi R. at Rapid City																								
5/15/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
8/14/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8
11/4/2019	<MDC	23.7	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.7	<MDC	8.1	<MDC	10.1	<MDC	3.7	<MDC	4.3	<MDC	8	<MDC	6.8

Gamma Spectroscopy Results for Radionuclides in Soil (Migration) - Quad Cities
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
Corner of 150th and 266th																						
5/15/2019	<MDC	1.04	<MDC	0.13	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.24	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.07
8/14/2019	<MDC	1.04	<MDC	0.13	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.16	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.07
Near RS-C																						
5/15/2019	<MDC	1.04	<MDC	0.13	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.15	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.07
8/14/2019	<MDC	1.04	<MDC	0.13	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.40	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.07

Gamma Spectroscopy Results for Radionuclides in Soil (Deposition) - Quad Cities
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
Corner of 150th and 266th																						
5/15/2019	<MDC	1.18	<MDC	0.16	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.23	0.03	<MDC	0.10	<MDC	0.02	<MDC	0.07	<MDC	0.05	<MDC	0.09
8/14/2019	<MDC	1.18	<MDC	0.16	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.15	0.03	<MDC	0.10	<MDC	0.02	<MDC	0.07	<MDC	0.05	<MDC	0.09
Near RS-C																						
5/15/2019	<MDC	1.18	<MDC	0.16	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.32	0.03	<MDC	0.10	<MDC	0.02	<MDC	0.07	<MDC	0.05	<MDC	0.09
8/14/2019	<MDC	1.18	<MDC	0.16	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.62	0.03	<MDC	0.10	<MDC	0.02	<MDC	0.07	<MDC	0.05	<MDC	0.09

Gamma Spectroscopy Results for Radionuclides in Sediment - Quad Cities
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 R. at Albany																								
8/14/2019	<MDC	1.09	<MDC	0.15	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.09		
Mississippi R. at Rapid City																								
5/15/2019	<MDC	1.09	<MDC	0.15	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.09		
8/14/2019	<MDC	1.09	<MDC	0.15	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.09		

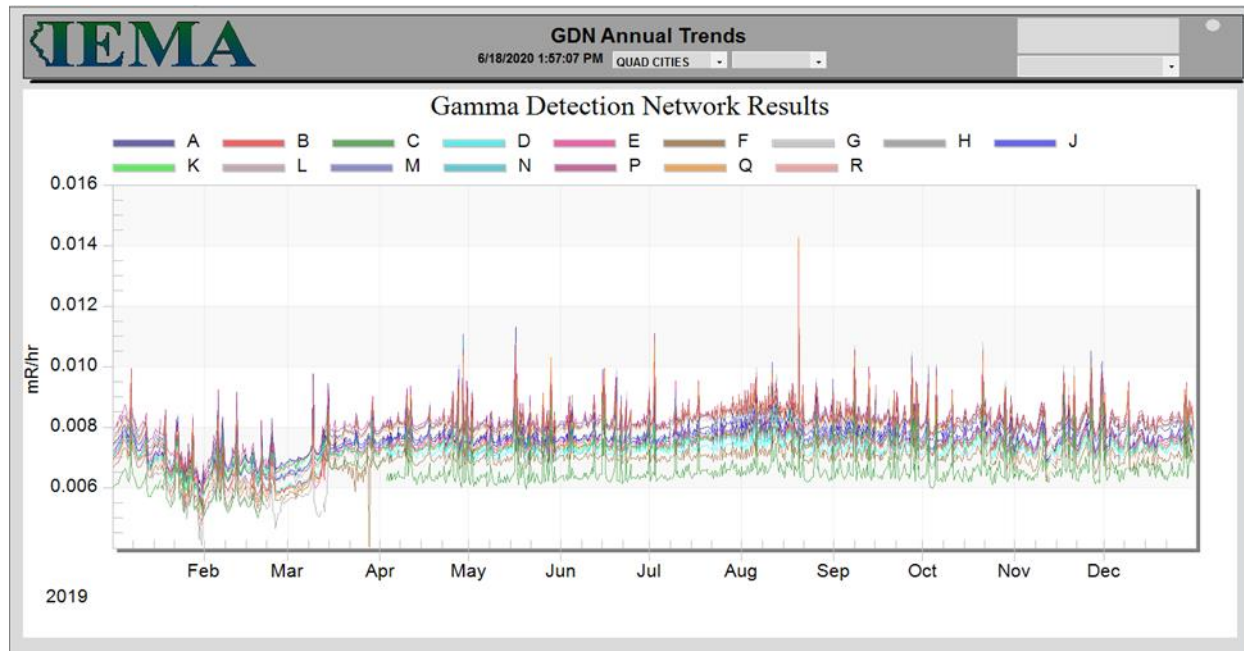
Gamma Spectroscopy Results for Radionuclides in Vegetation- Quad Cities
Results are in picocuries per gram (pCi/g)

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																										
5/15/2019	<MDC	3.6	<MDC	2.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	5.1	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2
8/14/2019	<MDC	3.6	<MDC	2.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	5.1	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2
Near RS-C																										
5/15/2019	<MDC	3.6	<MDC	2.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	5.1	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2
8/14/2019	<MDC	3.6	<MDC	2.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.3	<MDC	5.1	<MDC	0.1	<MDC	0.2	<MDC	0.2	<MDC	0.2	<MDC	0.2

Gamma Spectroscopy Results for Radionuclides in Fish - Quad Cities
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 R. (Bottom Feeder)																									
8/14/2019	<MDC	7300	<MDC	3250	<MDC	91	<MDC	63	<MDC	59	<MDC	57	<MDC	275	<MDC	19100	<MDC	58	<MDC	196	<MDC	129	<MDC	185	
10/15/2019	<MDC	7300	<MDC	3250	<MDC	91	<MDC	63	<MDC	59	<MDC	57	<MDC	275	<MDC	19100	<MDC	58	<MDC	196	<MDC	129	<MDC	185	
Mississippi R. (Top Feeder)																									
8/14/2019	<MDC	7300	<MDC	3250	<MDC	91	<MDC	63	<MDC	59	<MDC	57	<MDC	275	<MDC	19100	<MDC	58	<MDC	196	<MDC	129	<MDC	185	
10/15/2019	<MDC	7300	<MDC	3250	<MDC	91	<MDC	63	<MDC	59	<MDC	57	<MDC	275	<MDC	19100	<MDC	58	<MDC	196	<MDC	129	<MDC	185	

Gamma Detection Network Results - Quad Cities
Results are in milliroentgen per hour (mR/hr)



Summary of Ambient Gamma Results - Quad Cities

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
QC001	8.9	7.8	8.8	9.5	35.0
QC004	7.1	6.7	8.9	6.7	29.4
QC007	7.2	7.6	8.6	7.7	31.0
QC010	3.6	4.4	6.0	4.7	18.7
QC011	6.2	5.7	5.3	4.0	21.3
QC012	6.2	5.5	5.7	6.8	24.1
QC014		4.7	5.6	5.2	20.7
QC016	6.7	5.7	4.6	3.9	20.9
QC018	11.8	9.4	11.5	9.5	42.2
QC025	7.6	9.9	8.0	9.1	34.6
QC026	8.1	9.3	9.0	10.1	36.6
QC027	9.4	8.5	8.5	8.9	35.2
QC028	6.0	8.2	4.7	8.5	27.4
QC029	6.4	7.1	8.0	6.7	28.3
QC031	5.0	7.3	5.7	5.2	23.2
QC032	6.3	6.0	6.5	7.5	26.3
QC033	5.6	8.4	5.4	6.4	25.7
QC034	5.1	6.6	8.4	6.7	26.8
QC036	5.8	7.7	8.9	8.5	30.8
QC037	5.9	5.7	6.2	5.5	23.3
QC038	5.5	6.6	7.7	7.2	26.9
QC039	7.3	6.1	4.7	5.8	23.9
QC040	8.8	8.9	6.5	9.2	33.3
QC041	6.4	7.3	6.9	7.0	27.6
QC042	7.8	7.9	4.7	4.0	24.4
QC043	7.1	7.1	5.9	6.0	26.2
QC044	7.9	8.1	6.0	6.6	28.7
QC045	6.0	11.5	7.1	7.9	32.5
QC046	10.9	9.1	9.6	7.7	37.3
QC049	8.1	7.0	7.6	7.0	29.7
QC050	7.0	9.2		8.8	33.3
QC051	5.4	7.7	7.1	7.8	27.9
QC052	6.8	8.4	7.1	8.4	30.8

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
QC053	6.4	6.9	5.4	9.1	27.8
QC054	7.2	7.1	6.4	10.1	30.8
QC055	6.3	7.7	8.2	7.7	29.8
QC056	4.4	6.1	6.8	4.3	21.6
QC057	5.8	6.0	5.6	7.5	24.9
QC058	8.1	7.7	8.0	6.0	29.9
QC059	5.3	6.1	7.3	5.2	23.9
QC060	4.3	7.6	6.2	4.8	22.9
QC061	5.8	7.0	4.7	6.2	23.7
QC062	10.3	11.2	10.9	9.0	41.4
QC063	5.7	7.9	7.0	5.7	26.3
QC064		5.5	6.8	7.4	26.2
QC065	7.0	9.3	7.3	8.8	32.4
QC066		10.7	8.1	8.9	36.9
QC067	10.3	9.7	8.9	10.2	39.1
QC068	9.4	8.9	9.7	9.1	37.1
QC-RSA	11.6	6.4	10.7	6.7	35.3
QC-RSB	9.9	10.4	6.2	8.9	35.3
QC-RSC	8.2	7.7	7.2	4.8	27.9
QC-RSD	6.9	7.8	4.1	7.0	25.7
QC-RSE	7.5	8.0	6.7	6.5	28.7
QC-RSF	5.1	6.5	7.4	7.2	26.2
QC-RSG	6.4	6.9	7.7	5.5	26.5
QC-RSH	6.3	10.4	8.4	8.0	33.1
QC-RSJ	7.0	8.4	6.1	8.3	29.9
QC-RSK	7.2	5.6	6.5	7.9	27.2
QC-RSL	6.1	10.5	9.3	7.9	33.9
QC-RSM	6.1	9.4	5.2	6.9	27.6
QC-RSN	7.3	5.6	6.8	8.2	27.9
QC-RSP	9.5	11.0	8.0	8.7	37.2
QC-RSQ	9.0	8.3	9.0	6.5	32.9
QC-RSR	7.7	6.8	7.1	5.8	27.3

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.

Zion Nuclear Power Station

Zion NPS 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 station ceased operation permanently in February 1998 and was defueled soon thereafter. In September 2010, the facility license was transferred from Exelon to Zion Solutions for the express purpose of expediting the decommissioning of the site. The decommissioning process was completed in December 2019. 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 in an Independent Spent Fuel Storage Installation (ISFSI).



Zion station prior to decommissioning



Zion station post decommissioning

Figures 26 and 27 provide an overview of all sampling and monitoring locations in the vicinity of the Zion NPS (yellow star).

Significant Events or Changes for 2019

Completion of the decommissioning process in December 2019.

Sampling and Monitoring Results

Water Sampling Results

Water sample analysis for tritium, gross beta, and gamma spectroscopy indicated no concentrations above the established MDCs.

Soil Sampling Results

Gamma spectroscopy results for soil samples indicated no concentrations of reactor-produced radionuclides above background. Cesium-137 in concentrations greater than the established MDC was seen but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing.

Sediment Sampling Results

Gamma spectroscopy results for sediment samples indicated no concentrations above the established MDC.

Vegetation Sampling Results

Gamma spectroscopy results for vegetation samples indicated no concentrations above the established MDC.

Air Sampling Results

Results are comparable to those obtained from background EMSs located in Marion, Springfield, and West Chicago, Illinois and are consistent with data previously collected by IEMA as part of its radiological environmental monitoring program.

Direct Radiation Monitoring Results

The ambient gamma monitoring results were comparable to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois.

Zion Maps of Monitoring and Sampling Locations

Figure 26. GDN, OSL, and Air Monitoring and Sampling Locations – Zion

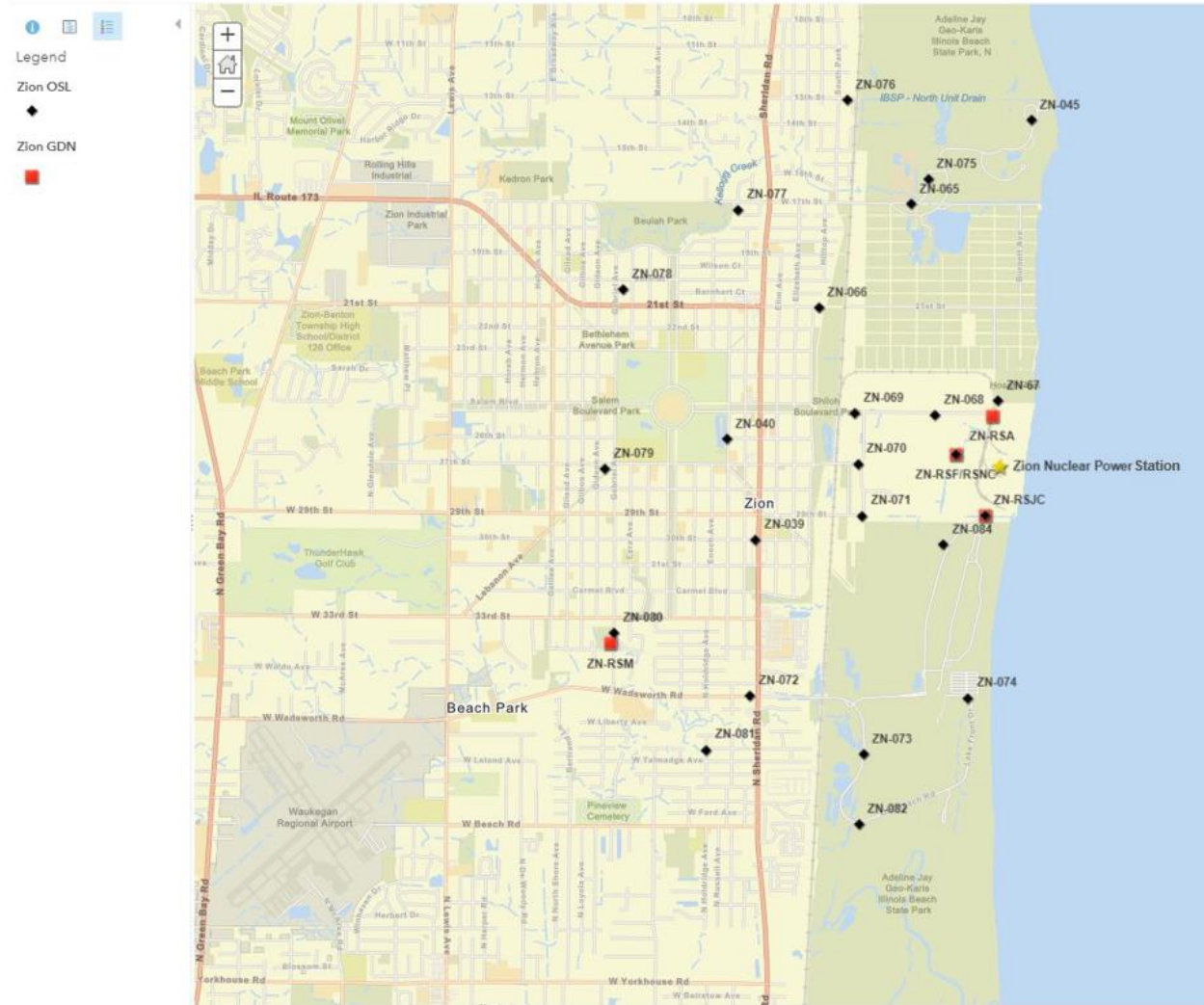
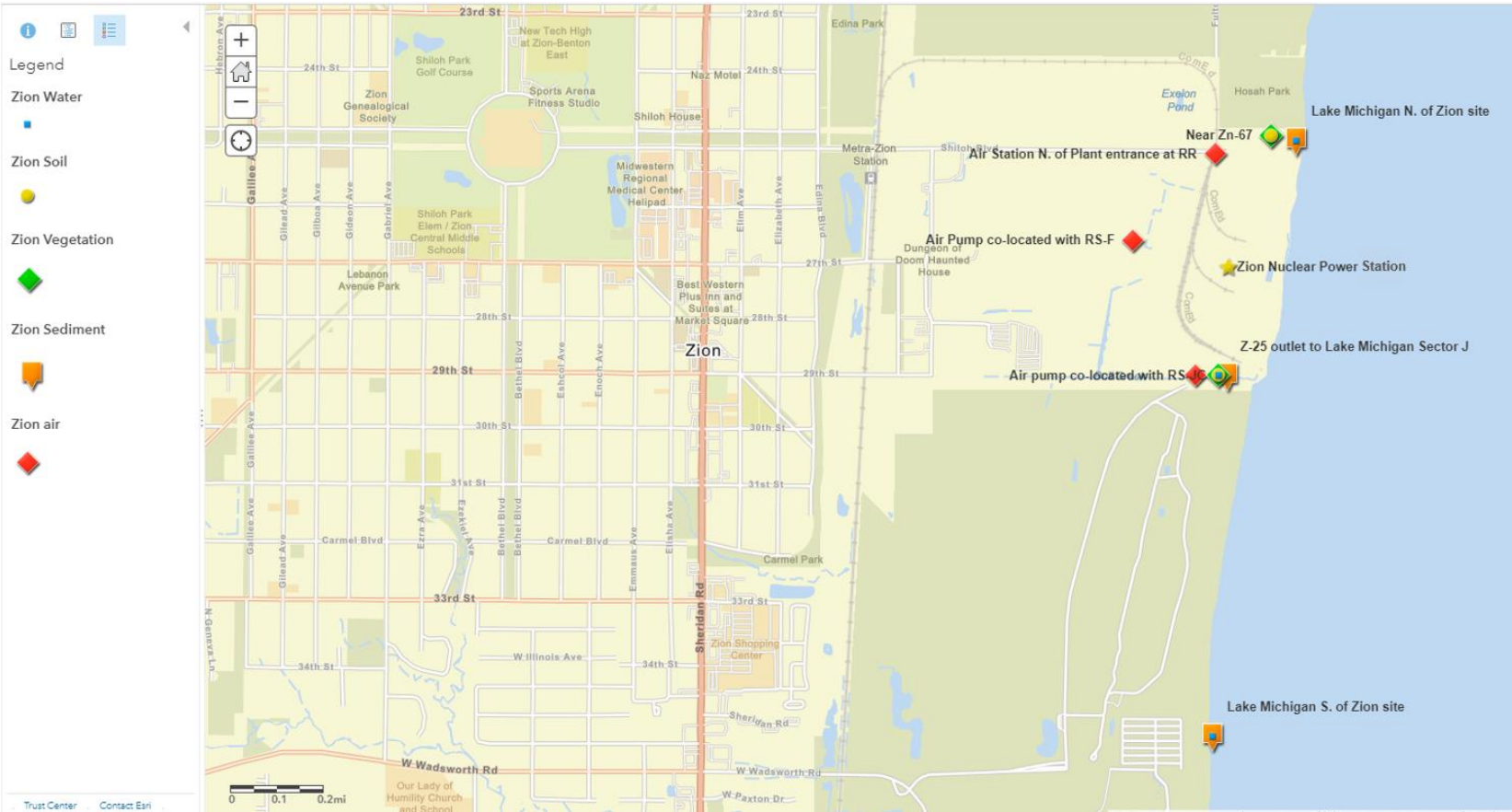


Figure 27. Environmental Sampling Locations – Zion

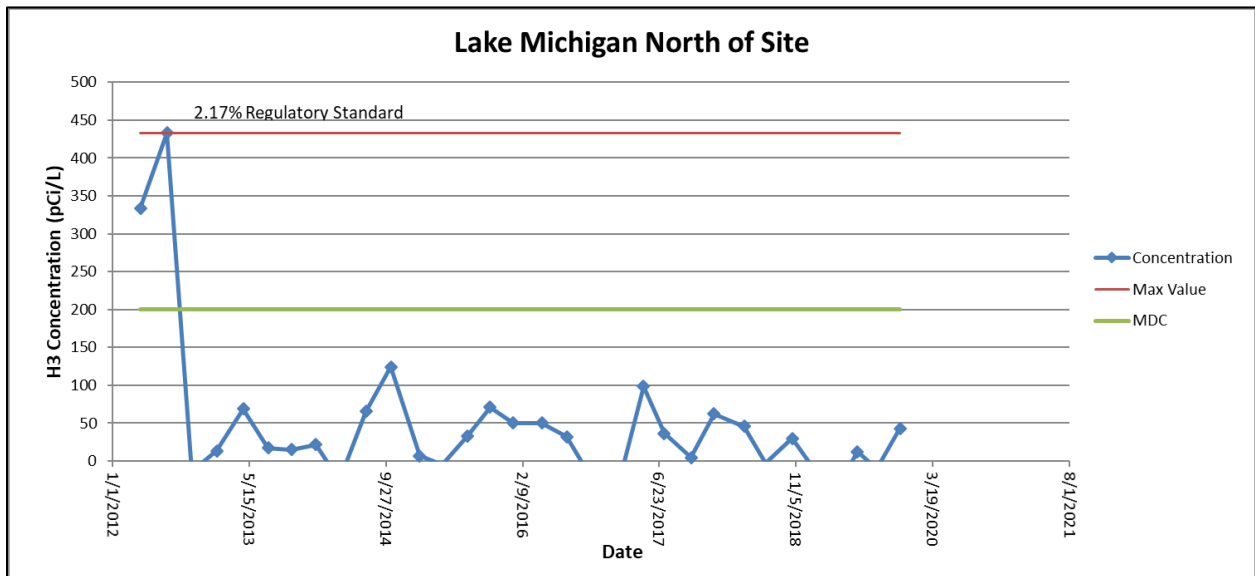
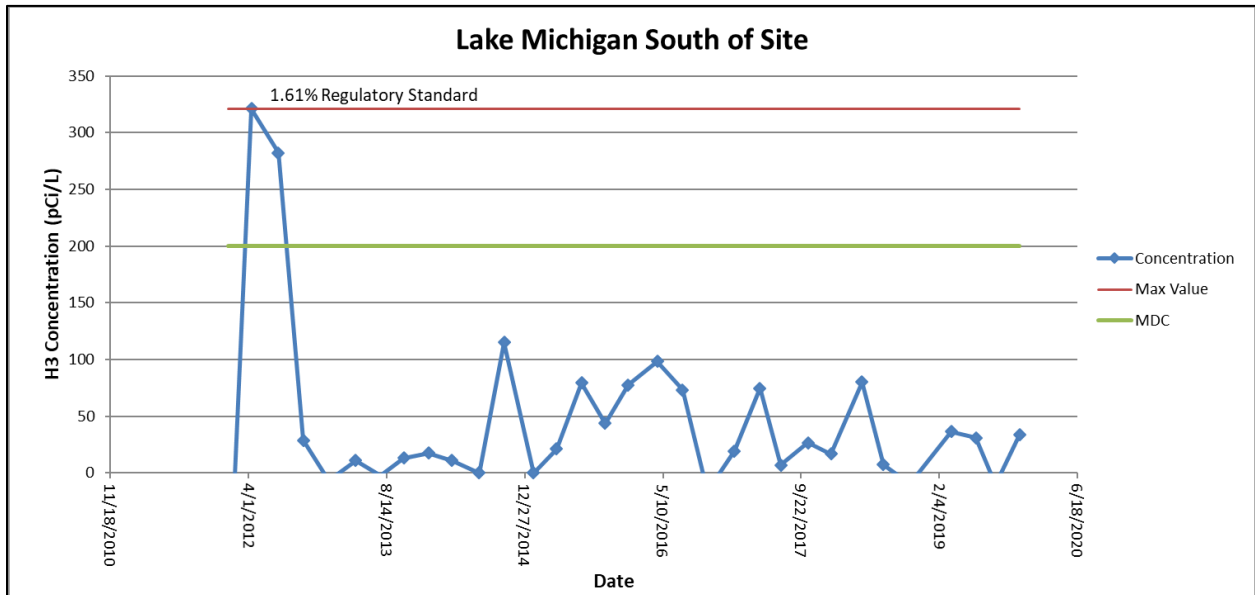


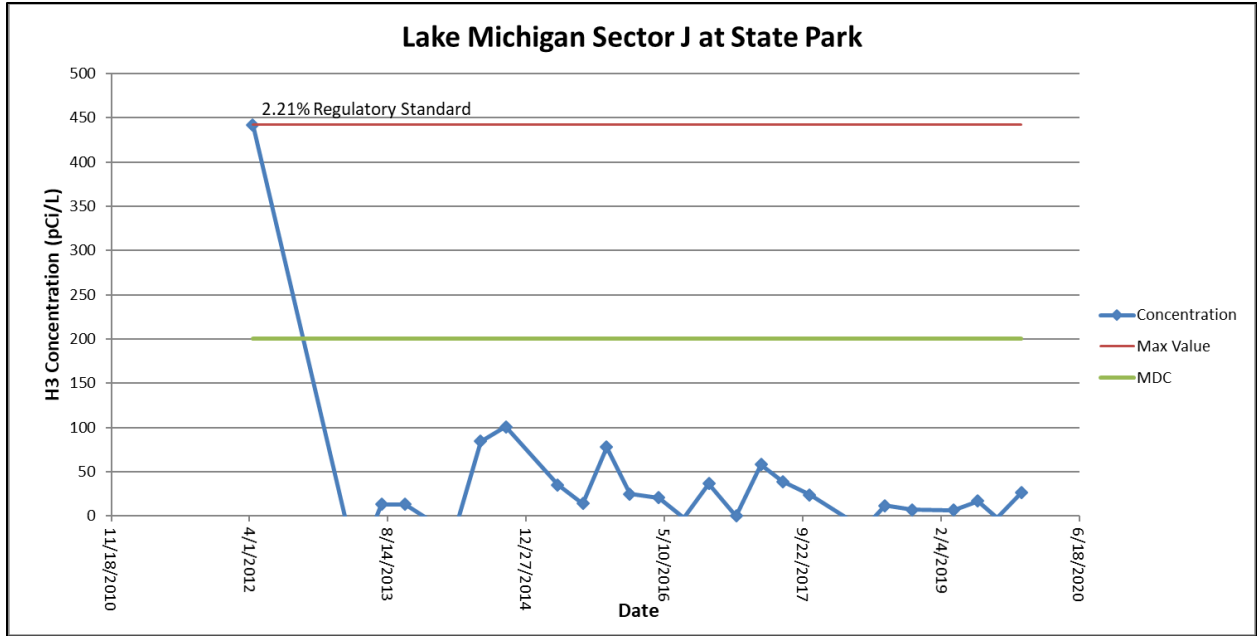
Zion Sample Result Tables and Graphs

Tritium (H-3) in Water Results - Zion Area Results are in picocuries per liter (pCi/L)

Location	H-3	
Date	Result	MDC
Lake Michigan N. of site		
3/20/2019	<MDC	200
6/17/2019	<MDC	200
8/27/2019	<MDC	200
11/21/2019	<MDC	200
Lake Michigan S. of site		
3/20/2019	<MDC	200
6/17/2019	<MDC	200
8/27/2019	<MDC	200
11/21/2019	<MDC	200
Z-25 outlet to Lake Michigan		
3/20/2019	<MDC	200
6/17/2019	<MDC	200
8/27/2019	<MDC	200
11/21/2019	<MDC	200

Trending Graphs for Tritium (H-3) in Water - Zion
 (Max value compared to IEPA and US EPA regulatory standard of 20,000 pCi/L)





Results for Beta Screening of Water - Zion
 Results are in picocuries per liter (pCi/L)

Location Date	Beta	
	Result	MDC
Lake Michigan N. of site		
3/20/2019	<MDC	3.8
6/17/2019	<MDC	3.8
8/27/2019	<MDC	3.8
11/21/2019	<MDC	3.8
Lake Michigan S. of site		
3/20/2019	<MDC	3.8
6/17/2019	<MDC	3.8
8/27/2019	<MDC	3.8
11/21/2019	<MDC	3.8
Z-25 outlet to Lake Michigan		
3/20/2019	<MDC	3.8
6/17/2019	<MDC	3.8
8/27/2019	<MDC	3.8
11/21/2019	<MDC	3.8

Gamma Spectroscopy Results for Other Radionuclides in Water - Zion
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																										
3/20/2019	<MDC	21.2	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.9	<MDC	7.8	<MDC	9.4	<MDC	3.6	<MDC	4.2	<MDC	8.2	<MDC	6.7	<MDC	6.7
6/17/2019	<MDC	21.2	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.9	<MDC	7.8	<MDC	9.4	<MDC	3.6	<MDC	4.2	<MDC	8.2	<MDC	6.7	<MDC	6.7
8/27/2019	<MDC	21.2	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.9	<MDC	7.8	<MDC	9.4	<MDC	3.6	<MDC	4.2	<MDC	8.2	<MDC	6.7	<MDC	6.7
11/21/2019	<MDC	21.2	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.9	<MDC	7.8	<MDC	9.4	<MDC	3.6	<MDC	4.2	<MDC	8.2	<MDC	6.7	<MDC	6.7
Lake Michigan S. of site																										
3/20/2019	<MDC	21.2	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.9	<MDC	7.8	<MDC	9.4	<MDC	3.6	<MDC	4.2	<MDC	8.2	<MDC	6.7	<MDC	6.7
6/17/2019	<MDC	21.2	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.9	<MDC	7.8	<MDC	9.4	<MDC	3.6	<MDC	4.2	<MDC	8.2	<MDC	6.7	<MDC	6.7
8/27/2019	<MDC	21.2	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.9	<MDC	7.8	<MDC	9.4	<MDC	3.6	<MDC	4.2	<MDC	8.2	<MDC	6.7	<MDC	6.7
11/21/2019	<MDC	21.2	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.9	<MDC	7.8	<MDC	9.4	<MDC	3.6	<MDC	4.2	<MDC	8.2	<MDC	6.7	<MDC	6.7
Z-25 outlet to Lake Michigan																										
3/20/2019	<MDC	21.2	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.9	<MDC	7.8	<MDC	9.4	<MDC	3.6	<MDC	4.2	<MDC	8.2	<MDC	6.7	<MDC	6.7
6/17/2019	<MDC	21.2	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.9	<MDC	7.8	<MDC	9.4	<MDC	3.6	<MDC	4.2	<MDC	8.2	<MDC	6.7	<MDC	6.7
8/27/2019	<MDC	21.2	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.9	<MDC	7.8	<MDC	9.4	<MDC	3.6	<MDC	4.2	<MDC	8.2	<MDC	6.7	<MDC	6.7
11/21/2019	<MDC	21.2	<MDC	370	<MDC	3.7	<MDC	4	<MDC	4	<MDC	3.9	<MDC	7.8	<MDC	9.4	<MDC	3.6	<MDC	4.2	<MDC	8.2	<MDC	6.7	<MDC	6.7

Gamma Spectroscopy Results for Radionuclides in Soil (Migration) - Zion
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			
Co-Located with RS-JC																										
6/17/2019	<MDC	1.47	<MDC	0.12	<MDC	0.03	<MDC	0.02	<MDC	0.01	0.09	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.07	<MDC	0.07	<MDC	0.07
8/27/2019	<MDC	1.47	<MDC	0.12	<MDC	0.03	<MDC	0.02	<MDC	0.01	0.09	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.07	<MDC	0.07	<MDC	0.07
Near ZN-67 across road																										
6/17/2019	<MDC	1.47	<MDC	0.12	<MDC	0.03	<MDC	0.02	<MDC	0.01	0.10	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.07	<MDC	0.07	<MDC	0.07
8/27/2019	<MDC	1.47	<MDC	0.12	<MDC	0.03	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.07	<MDC	0.07	<MDC	0.07

Gamma Spectroscopy Results for Radionuclides in Soil (Deposition) - Zion
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
Co-Located with RS-JC																						
6/17/2019	<MDC	1.46	<MDC	0.14	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.16	0.02	<MDC	0.09	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.08
8/27/2019	<MDC	1.46	<MDC	0.14	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.15	0.02	<MDC	0.09	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.08
Near ZN-67 across road																						
6/17/2019	<MDC	1.46	<MDC	0.14	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.05	0.02	<MDC	0.09	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.08
8/27/2019	<MDC	1.46	<MDC	0.14	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.09	<MDC	0.02	<MDC	0.06	<MDC	0.05	<MDC	0.08

Gamma Spectroscopy Results for Radionuclides in Sediment - Zion
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
Lake Michigan N. of site																						
6/17/2019	<MDC	1.17	<MDC	0.12	<MDC	0.03	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.04	<MDC	0.07
8/27/2019	<MDC	1.17	<MDC	0.12	<MDC	0.03	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.04	<MDC	0.07
Lake Michigan S. of site																						
6/17/2019	<MDC	1.17	<MDC	0.12	<MDC	0.03	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.04	<MDC	0.07
8/27/2019	<MDC	1.17	<MDC	0.12	<MDC	0.03	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.04	<MDC	0.07
Z-25 outlet to Lake Michigan																						
6/17/2019	<MDC	1.17	<MDC	0.12	<MDC	0.03	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.06	<MDC	0.04	<MDC	0.07

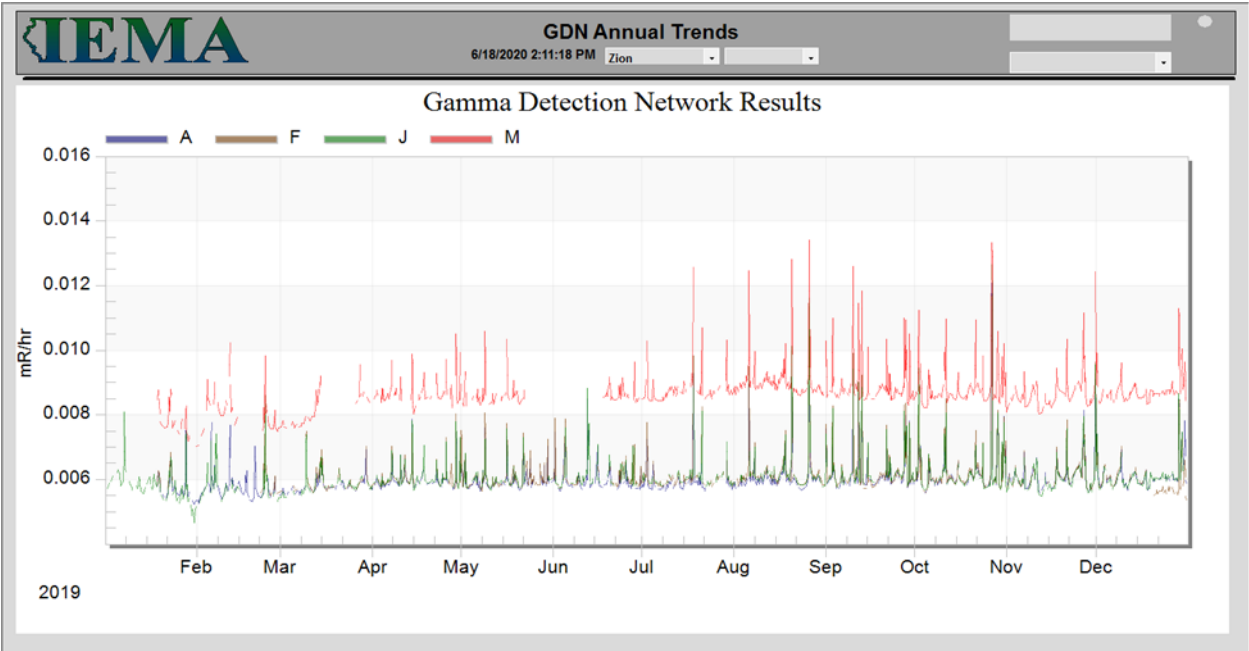
Gamma Spectroscopy Results for Radionuclides in Vegetation - Zion
Results are in picocuries per gram (pCi/g)

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
Near ZN-67 across road																								
6/17/2019	<MDC	9.1	<MDC	11.7	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	17.2	<MDC	0.1	<MDC	0.4	<MDC	0.3	<MDC	0.3
8/27/2019	<MDC	9.1	<MDC	11.7	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	17.2	<MDC	0.1	<MDC	0.4	<MDC	0.3	<MDC	0.3
Co-Located with RS-JC																								
6/17/2019	<MDC	9.1	<MDC	11.7	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	17.2	<MDC	0.1	<MDC	0.4	<MDC	0.3	<MDC	0.3
8/27/2019	<MDC	9.1	<MDC	11.7	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	17.2	<MDC	0.1	<MDC	0.4	<MDC	0.3	<MDC	0.3

Alpha /Beta Screening Results for Air Samples - Zion
Results are in femtocuries per cubic meter (fCi/m³)

Location		Alpha		Beta		Location		Alpha		Beta		Location		Alpha		Beta	
Date		Result	MDC	Result	MDC	Date		Result	MDC	Result	MDC	Date		Result	MDC	Result	MDC
Co-located with RS-F						Co-located with RS-J						N. of Plant entrance at RR					
1/2/2019		<MDC	4.2	23.0	5.7	1/2/2019		<MDC	4.2	22.8	5.7	1/2/2019		<MDC	4.2	24.0	5.7
1/9/2019		<MDC	4.2	43.1	5.7	1/9/2019		<MDC	4.2	44.5	5.7	1/9/2019		4.3	4.2	44.9	5.7
1/15/2019		<MDC	4.2	22.7	5.7	1/15/2019		<MDC	4.2	24.9	5.7	1/15/2019		<MDC	4.2	20.6	5.7
1/22/2019		<MDC	4.2	27.5	5.7	1/22/2019		<MDC	4.2	22.1	5.7	1/22/2019		<MDC	4.2	25.9	5.7
2/4/2019		<MDC	4.2	14.1	5.7	2/4/2019		<MDC	4.2	24.2	5.7	2/4/2019		<MDC	4.2	27.6	5.7
2/20/2019		<MDC	4.2	22.2	5.7	2/20/2019		<MDC	4.2	25.1	5.7	2/20/2019		<MDC	4.2	23.8	5.7
2/26/2019		<MDC	4.2	29.4	5.7	2/26/2019		<MDC	4.2	34.1	5.7	2/26/2019		<MDC	4.2	28.4	5.7
3/5/2019		<MDC	4.2	23.0	5.7	3/5/2019		4.3	4.2	27.7	5.7	3/5/2019		<MDC	4.2	32.2	5.7
3/11/2019		<MDC	4.2	27.0	5.7	3/11/2019		5.4	4.2	28.0	5.7	3/11/2019		<MDC	4.2	32.4	5.7
3/17/2019		<MDC	4.2	21.4	5.7	3/20/2019		<MDC	4.2	26.0	5.7	3/20/2019		<MDC	4.2	26.0	5.7
3/27/2019		<MDC	4.2	13.7	5.7	3/27/2019		<MDC	4.2	13.8	5.7	3/27/2019		<MDC	4.2	16.0	5.7
4/2/2019		<MDC	4.2	17.9	5.7	4/2/2019		<MDC	4.2	17.6	5.7	4/2/2019		<MDC	4.2	18.2	5.7
4/11/2019		<MDC	4.2	16.8	5.7	4/11/2019		<MDC	4.2	16.1	5.7	4/11/2019		<MDC	4.2	16.8	5.7
4/16/2019		<MDC	4.2	10.4	5.7	4/16/2019		<MDC	4.2	10.0	5.7	4/16/2019		<MDC	4.2	12.8	5.7
4/24/2019		<MDC	4.2	16.8	5.7	4/24/2019		<MDC	4.2	14.0	5.7	4/24/2019		<MDC	4.2	15.6	5.7
5/1/2019		<MDC	4.2	13.2	5.7	5/1/2019		<MDC	4.2	16.3	5.7	5/1/2019		<MDC	4.2	18.8	5.7
5/7/2019		<MDC	4.2	12.9	5.7	5/7/2019		<MDC	4.2	9.5	5.7	5/7/2019		<MDC	4.2	14.2	5.7
5/15/2019		<MDC	4.2	14.5	5.7	5/15/2019		<MDC	4.2	14.3	5.7	5/15/2019		<MDC	4.2	12.6	5.7
5/21/2019		<MDC	4.2	10.3	5.7	5/21/2019		<MDC	4.2	11.4	5.7	5/21/2019		<MDC	4.2	13.0	5.7
6/4/2019		<MDC	4.2	12.0	5.7	6/4/2019		<MDC	4.2	12.5	5.7	6/4/2019		<MDC	4.2	13.9	5.7
6/17/2019		<MDC	4.2	23.0	5.7	6/17/2019		<MDC	4.2	17.2	5.7	6/17/2019		<MDC	4.2	20.2	5.7
7/2/2019		5.3	4.2	12.6	5.7	7/2/2019		<MDC	4.2	15.5	5.7	7/2/2019		6.8	4.2	17.1	5.7
7/9/2019		<MDC	4.2	18.6	5.7	7/9/2019		<MDC	4.2	14.4	5.7	7/9/2019		<MDC	4.2	18.1	5.7
7/17/2019		<MDC	4.2	17.9	5.7	7/17/2019		<MDC	4.2	25.0	5.7	7/17/2019		<MDC	4.2	19.0	5.7
7/24/2019		<MDC	4.2	15.2	5.7	7/24/2019		<MDC	4.2	16.2	5.7	7/24/2019		<MDC	4.2	16.7	5.7
7/30/2019		<MDC	4.2	25.4	5.7	7/30/2019		<MDC	4.2	24.3	5.7	7/30/2019		<MDC	4.2	28.1	5.7
8/5/2019		<MDC	4.2	18.0	5.7	8/5/2019		<MDC	4.2	16.5	5.7	8/5/2019		<MDC	4.2	16.5	5.7
8/13/2019		<MDC	4.2	33.8	5.7	8/13/2019		<MDC	4.2	32.3	5.7	8/13/2019		<MDC	4.2	26.7	5.7
8/20/2019		<MDC	4.2	20.0	5.7	8/20/2019		<MDC	4.2	19.4	5.7	8/20/2019		<MDC	4.2	21.0	5.7
8/27/2019		<MDC	4.2	17.6	5.7	8/27/2019		<MDC	4.2	16.2	5.7	8/27/2019		<MDC	4.2	16.3	5.7
9/4/2019		<MDC	4.2	24.8	5.7	9/4/2019		<MDC	4.2	27.4	5.7	9/4/2019		<MDC	4.2	23.6	5.7
9/12/2019		4.2	4.2	21.8	5.7	9/12/2019		<MDC	4.2	22.1	5.7	9/12/2019		<MDC	4.2	21.7	5.7
9/19/2019		<MDC	4.2	27.5	5.7	9/19/2019		4.6	4.2	30.4	5.7	9/19/2019		<MDC	4.2	21.3	5.7
9/26/2019		<MDC	4.2	26.9	5.7	9/26/2019		<MDC	4.2	34.4	5.7	9/26/2019		4.7	4.2	33.5	5.7
10/2/2019		<MDC	4.2	18.9	5.7	10/2/2019		<MDC	4.2	18.5	5.7	10/2/2019		<MDC	4.2	17.7	5.7
10/11/2019		<MDC	4.2	20.9	5.7	10/11/2019		<MDC	4.2	18.0	5.7	10/11/2019		<MDC	4.2	19.7	5.7
10/17/2019		<MDC	4.2	19.6	5.7	10/17/2019		<MDC	4.2	23.4	5.7	10/17/2019		<MDC	4.2	23.9	5.7
10/21/2019		<MDC	4.2	31.0	5.7	10/21/2019		<MDC	4.2	30.8	5.7	10/21/2019		<MDC	4.2	35.1	5.7
10/29/2019		<MDC	4.2	12.3	5.7	10/29/2019		<MDC	4.2	20.1	5.7	10/29/2019		<MDC	4.2	21.4	5.7
11/8/2019		<MDC	4.2	15.9	5.7	11/8/2019		<MDC	4.2	23.4	5.7	11/8/2019		<MDC	4.2	18.5	5.7
11/13/2019		<MDC	4.2	27.0	5.7	11/13/2019		<MDC	4.2	24.2	5.7	11/13/2019		<MDC	4.2	27.1	5.7
11/21/2019		<MDC	4.2	38.1	5.7	11/21/2019		<MDC	4.2	36.7	5.7	11/21/2019		<MDC	4.2	32.1	5.7
12/2/2019		<MDC	4.2	18.4	5.7	12/2/2019		<MDC	4.2	17.8	5.7	12/2/2019		<MDC	4.2	20.1	5.7
12/11/2019		4.9	4.2	30.9	5.7	12/11/2019		<MDC	4.2	32.2	5.7	12/11/2019		<MDC	4.2	21.7	5.7
12/17/2019		<MDC	4.2	33.6	5.7	12/17/2019		5.9	4.2	37.5	5.7	12/17/2019		5.8	4.2	35.4	5.7
12/27/2019		4.9	4.2	45.1	5.7	12/27/2019		<MDC	4.2	36.6	5.7	12/27/2019		4.9	4.2	48.5	5.7

Gamma Detection Network Results – Zion
Results are in milliroentgen per hour (mR/hr)



Summary of Ambient Gamma Results - Zion

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/quarter
ZN39	5.3		2.1	16.5	31.9
ZN40	7.2	12.5	5.4	11.8	36.9
ZN45	4.0	5.9	1.4	10.8	22.0
ZN65	6.4	11.8	7.9	13.2	39.4
ZN66		13.7	7.5	15.0	48.2
ZN67	5.3	6.9	2.2	9.1	23.4
ZN68	8.0	11.2	4.7	14.9	38.7
ZN69	7.3	12.4	5.5	13.4	38.7
ZN70	5.8	9.7	3.2	9.3	28.1
ZN71	8.7	12.4	6.9	12.4	40.4
ZN72	6.3	7.3	4.4	9.9	27.9
ZN73	6.0	9.1	4.0	11.8	30.9
ZN74	4.8	9.9	4.1	6.1	24.9
ZN75	8.7	14.3	7.5	10.1	40.5
ZN76	7.2	11.9	6.1	12.0	37.3
ZN77	8.9	13.2	6.7	15.1	44.0
ZN78	8.0	12.0	6.0	11.7	37.8
ZN79	8.4	10.6	7.6	14.2	40.8
ZN80	7.2	13.4	6.3	8.0	34.9
ZN81	6.7	10.3	5.7	12.6	35.3
ZN82	6.2	9.5	4.8	10.1	30.7
ZN84	4.5	7.0	3.7	9.9	25.0
ZN-RSJ	5.4	8.9	7.5	9.5	31.4
ZN-RSN	6.3	10.9	2.3	7.9	27.4

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.

Background Sampling Locations

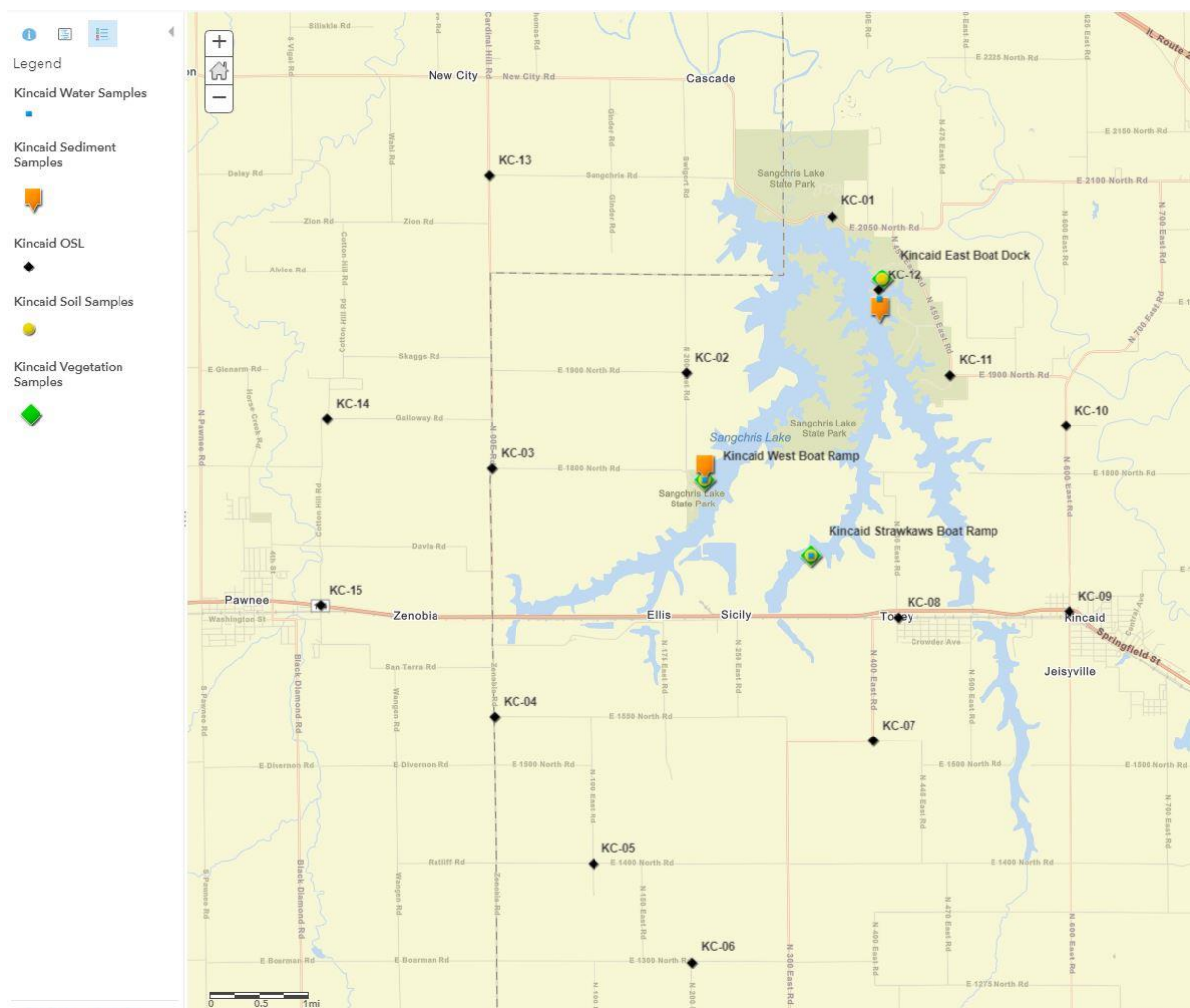
IEMA has established the environs of Sangchris Lake State Park, a cooling lake for a coal-fired power station near Kincaid, Illinois, as a background sampling location. To establish “background” radiation levels, water, soil, sediment, vegetation, and fish samples are collected and analyzed utilizing the same procedures and methodologies used for NPS samples. In addition, there is an array of environmental dosimeters around the NPS, similar to what can be found around each NPS.

IEMA routinely collects air samples around the Zion facility; therefore, background sampling locations for air samples have also been established. Continuous air sampling stations are located in Springfield, Marion, and West Chicago, Illinois. Consistent with the procedure for the Zion site, samples are collected and analyzed weekly.

Figure 28 is an overview of all sampling and monitoring locations in the vicinity of Sangchris Lake State Park. Tables and graphs containing the analytical results for the 2019 background environmental monitoring locations can be found on pages 143-155.

Sangchris Lake State Park Maps of Monitoring and Sampling Locations

Figure 28. Monitoring and Sampling Locations - Sangchris Lake State Park

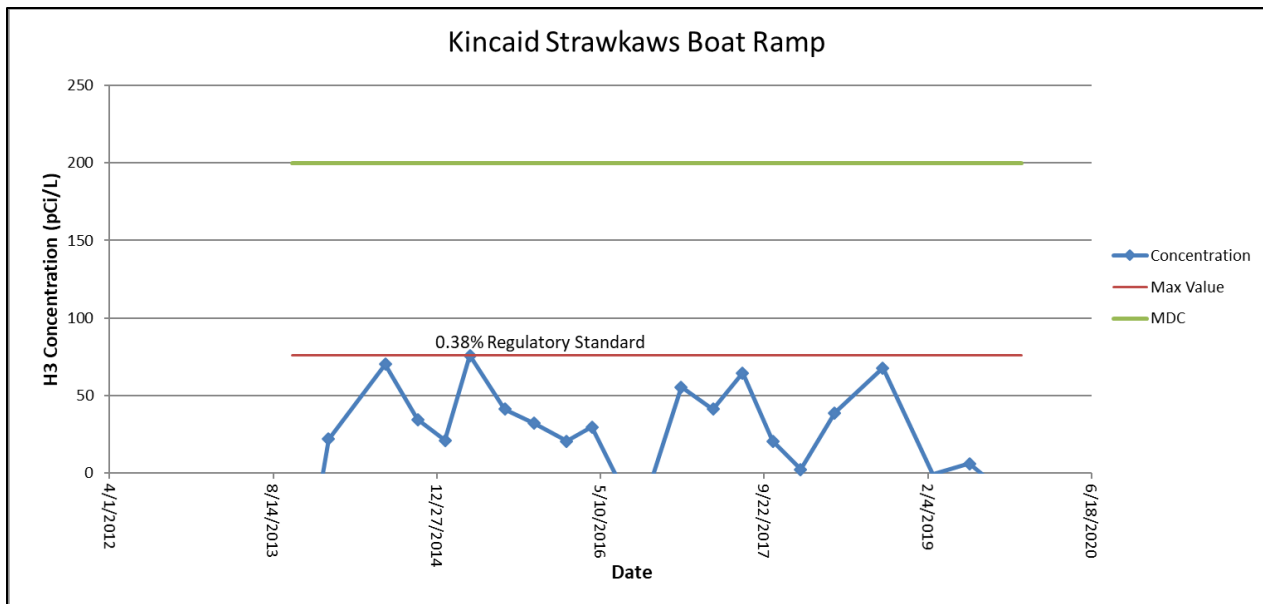
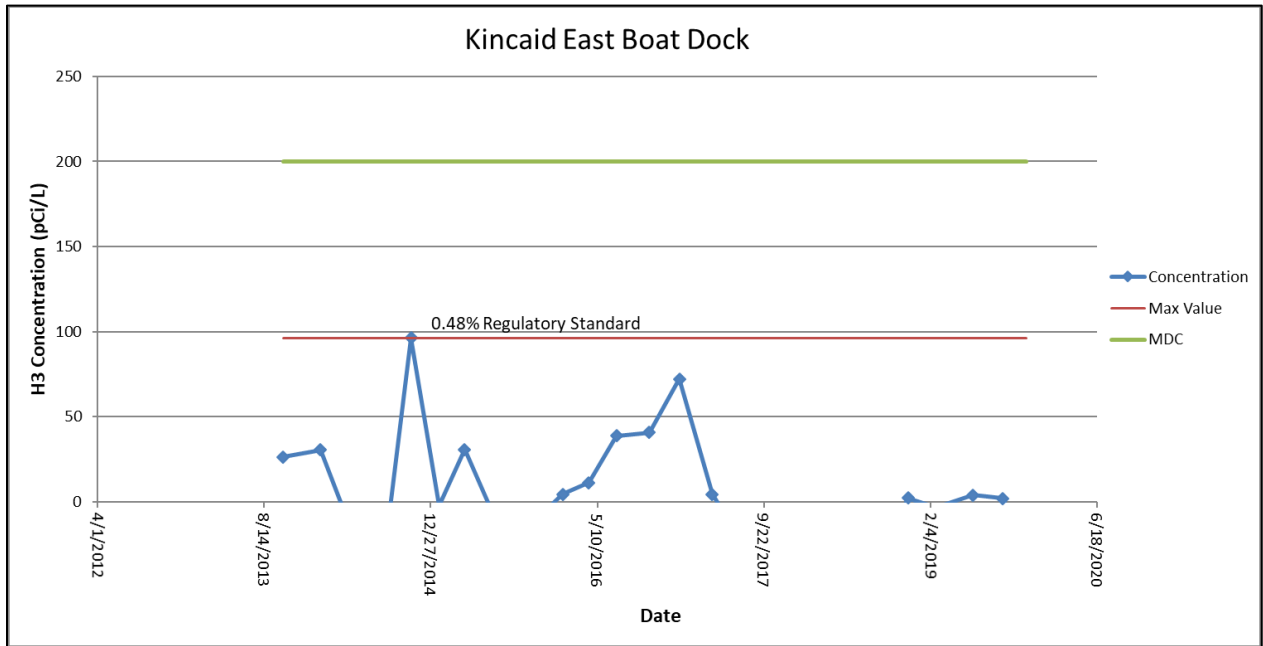


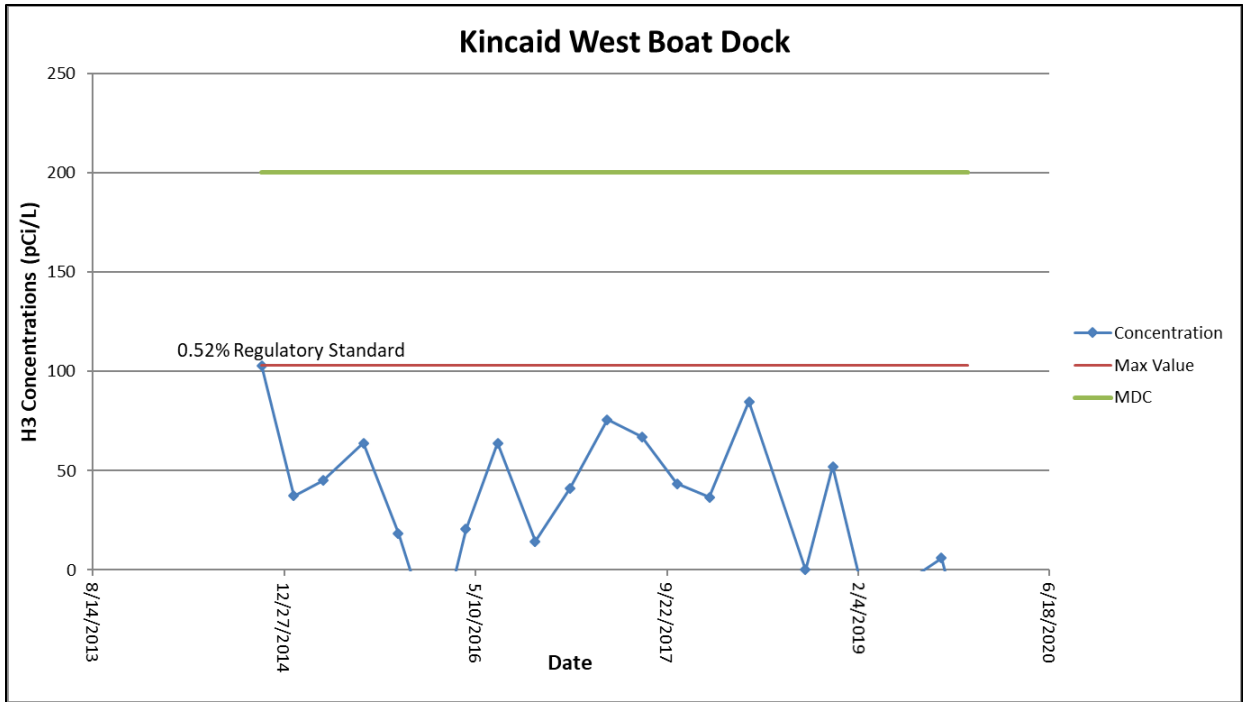
Sangchris Lake State Park Result Tables and Graphs

Tritium (H-3) in Water Results - Sangchris Lake State Park
Results are in picocuries per liter (pCi/L)

Location Date	H-3	
	Result	MDC
E Boat Ramp		
2/20/2019	<MDC	200
6/11/2019	<MDC	200
9/9/2019	<MDC	200
11/18/2019	<MDC	200
Strawkaws Boat Ramp		
2/20/2019	<MDC	200
6/11/2019	<MDC	200
9/9/2019	<MDC	200
11/18/2019	<MDC	200
W Boat Ramp		
2/20/2019	<MDC	200
6/11/2019	<MDC	200
9/9/2019	<MDC	200
11/18/2019	<MDC	200

Trending Graphs for Tritium (H-3) in Water - Sangchris Lake State Park
 (Max value compared to IEPA and US EPA regulatory standard of 20,000 pCi/L)





Results for Total Strontium in Water - Sangchris Lake State Park
Results are in picocuries per liter (pCi/L)

Location		Strontium	
Date	Result	MDC	
E Boat Ramp			
6/11/2019	<MDC	0.6	
Strawkaws Boat Ramp			
2/20/2019	<MDC	0.6	
11/18/2019	<MDC	0.6	
W Boat Ramp			
9/9/2019	<MDC	0.6	

Results for Beta Screening of Water - Sangchris Lake State Park
Results are in picocuries per liter (pCi/L)

Location		Beta	
Date	Result	MDC	
E Boat Ramp			
2/20/2019	<MDC	3.7	
6/11/2019	<MDC	3.7	
9/9/2019	<MDC	3.7	
11/18/2019	4.1	3.7	
Strawkaws Boat Ramp			
2/20/2019	<MDC	3.7	
6/11/2019	<MDC	3.7	
9/9/2019	<MDC	3.7	
11/18/2019	<MDC	3.7	
W Boat Ramp			
2/20/2019	<MDC	3.7	
6/11/2019	<MDC	3.7	
9/9/2019	<MDC	3.7	
11/18/2019	<MDC	3.7	

Gamma Spectroscopy Results for Other Radionuclides in Water - Sangchris Lake State Park
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	
E Boat Ramp																										
2/20/2019	<MDC	17.5	<MDC	360	<MDC	3.7	<MDC	3.9	<MDC	4.1	<MDC	3.8	<MDC	7.1	<MDC	6.1	<MDC	3.6	<MDC	4	<MDC	7.8	<MDC	6.3		
6/11/2019	<MDC	17.5	<MDC	360	<MDC	3.7	<MDC	3.9	<MDC	4.1	<MDC	3.8	<MDC	7.1	<MDC	6.1	<MDC	3.6	<MDC	4	<MDC	7.8	<MDC	6.3		
9/9/2019	<MDC	17.5	<MDC	360	<MDC	3.7	<MDC	3.9	<MDC	4.1	<MDC	3.8	<MDC	7.1	<MDC	6.1	<MDC	3.6	<MDC	4	<MDC	7.8	<MDC	6.3		
11/18/2019	<MDC	17.5	<MDC	360	<MDC	3.7	<MDC	3.9	<MDC	4.1	<MDC	3.8	<MDC	7.1	<MDC	6.1	<MDC	3.6	<MDC	4	<MDC	7.8	<MDC	6.3		
Strawkaws Boat Ramp																										
2/20/2019	<MDC	17.5	<MDC	360	<MDC	3.7	<MDC	3.9	<MDC	4.1	<MDC	3.8	<MDC	7.1	<MDC	6.1	<MDC	3.6	<MDC	4	<MDC	7.8	<MDC	6.3		
6/11/2019	<MDC	17.5	<MDC	360	<MDC	3.7	<MDC	3.9	<MDC	4.1	<MDC	3.8	<MDC	7.1	<MDC	6.1	<MDC	3.6	<MDC	4	<MDC	7.8	<MDC	6.3		
9/9/2019	<MDC	17.5	<MDC	360	<MDC	3.7	<MDC	3.9	<MDC	4.1	<MDC	3.8	<MDC	7.1	<MDC	6.1	<MDC	3.6	<MDC	4	<MDC	7.8	<MDC	6.3		
11/18/2019	<MDC	17.5	<MDC	360	<MDC	3.7	<MDC	3.9	<MDC	4.1	<MDC	3.8	<MDC	7.1	<MDC	6.1	<MDC	3.6	<MDC	4	<MDC	7.8	<MDC	6.3		
W Boat Ramp																										
2/20/2019	<MDC	17.5	<MDC	360	<MDC	3.7	<MDC	3.9	<MDC	4.1	<MDC	3.8	<MDC	7.1	<MDC	6.1	<MDC	3.6	<MDC	4	<MDC	7.8	<MDC	6.3		
6/11/2019	<MDC	17.5	<MDC	360	<MDC	3.7	<MDC	3.9	<MDC	4.1	<MDC	3.8	<MDC	7.1	<MDC	6.1	<MDC	3.6	<MDC	4	<MDC	7.8	<MDC	6.3		
9/9/2019	<MDC	17.5	<MDC	360	<MDC	3.7	<MDC	3.9	<MDC	4.1	<MDC	3.8	<MDC	7.1	<MDC	6.1	<MDC	3.6	<MDC	4	<MDC	7.8	<MDC	6.3		
11/18/2019	<MDC	17.5	<MDC	360	<MDC	3.7	<MDC	3.9	<MDC	4.1	<MDC	3.8	<MDC	7.1	<MDC	6.1	<MDC	3.6	<MDC	4	<MDC	7.8	<MDC	6.3		

Gamma Spectroscopy Results for Radionuclides in Soil (Migration) - Sangchris Lake State Park
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
E Boat Ramp																							
6/11/2019	<MDC	1.24	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.09	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.09	<MDC	0.08	<MDC	0.12	
9/9/2019	<MDC	1.24	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.13	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.09	<MDC	0.08	<MDC	0.12	
Strawkaws Boat Ramp																							
6/11/2019	<MDC	1.24	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.09	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.09	<MDC	0.08	<MDC	0.12	
9/9/2019	<MDC	1.24	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.08	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.09	<MDC	0.08	<MDC	0.12	
W Boat Ramp																							
6/11/2019	<MDC	1.24	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.09	<MDC	0.08	<MDC	0.12	
9/9/2019	<MDC	1.24	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.12	<MDC	0.03	<MDC	0.09	<MDC	0.08	<MDC	0.12	

Gamma Spectroscopy Results for Radionuclides in Soil (Deposition) - Sangchris Lake State Park
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
E Boat Ramp																							
6/11/2019	<MDC	1.30	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.11	0.04	<MDC	0.13	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.10	
9/9/2019	<MDC	1.30	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.09	0.04	<MDC	0.13	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.10	
Strawkaws Boat Ramp																							
6/11/2019	<MDC	1.30	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.08	0.04	<MDC	0.13	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.10	
9/9/2019	<MDC	1.30	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.06	0.04	<MDC	0.13	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.10	
W Boat Ramp																							
6/11/2019	<MDC	1.30	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.06	0.04	<MDC	0.13	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.10	
9/9/2019	<MDC	1.30	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.13	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.10	

Gamma Spectroscopy Results for Radionuclides in Sediment - Sangchris Lake State Park
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
Strawkaws Boat Ramp																						
9/9/2019	<MDC	0.73	<MDC	0.13	<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
W Boat Ramp																						
6/11/2019	<MDC	0.73	<MDC	0.13	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.02	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.07
9/9/2019	<MDC	0.73	<MDC	0.13	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.04	0.02	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.07

Gamma Spectroscopy Results for Radionuclides in Vegetation - Sangchris Lake State Park
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
E Boat Ramp																								
6/11/2019	<MDC	5.2	<MDC	7.1	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.4	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
9/9/2019	<MDC	5.2	<MDC	7.1	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.4	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
Strawkaws Boat Ramp																								
6/11/2019	<MDC	5.2	<MDC	7.1	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.4	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
9/9/2019	<MDC	5.2	<MDC	7.1	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.4	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
W Boat Ramp																								
6/11/2019	<MDC	5.2	<MDC	7.1	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.4	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
9/9/2019	<MDC	5.2	<MDC	7.1	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	7.4	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3

Gamma Spectroscopy Results for Radionuclides in Fish - Sangchris Lake State Park
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)																								
6/4/2019	<MDC	810	<MDC	1780	<MDC	24.9	<MDC	20.5	<MDC	19.1	<MDC	17.1	<MDC	64	<MDC	1100	<MDC	19	<MDC	40	<MDC	47	<MDC	45
10/15/2019	<MDC	810	<MDC	1780	<MDC	24.9	<MDC	20.5	<MDC	19.1	<MDC	17.1	<MDC	64	<MDC	1100	<MDC	19	<MDC	40	<MDC	47	<MDC	45
Sangchris Lake (Top Feeder)																								
6/4/2019	<MDC	810	<MDC	1780	<MDC	24.9	<MDC	20.5	<MDC	19.1	<MDC	17.1	<MDC	64	<MDC	1100	<MDC	19	<MDC	40	<MDC	47	<MDC	45
10/15/2019	<MDC	810	<MDC	1780	<MDC	24.9	<MDC	20.5	<MDC	19.1	<MDC	17.1	<MDC	64	<MDC	1100	<MDC	19	<MDC	40	<MDC	47	<MDC	45

Alpha / Beta Screening Results for Air Samples - Springfield
Results are in picocuries per liter (pCi/L)

Location	Alpha		Beta		Location	Alpha		Beta			
	Date	Result	MDC	Result		MDC	Date	Result	MDC	Result	MDC
Knotts Street Air Sampler					Knotts Street Air Sampler						
	1/2/2019	<MDC	3.0	32.1	4.1		7/1/2019	<MDC	3.0	30.4	4.1
	1/8/2019	4.3	3.0	47.5	4.1		7/8/2019	<MDC	3.0	28.7	4.1
	1/15/2019	<MDC	3.0	23.0	4.1		7/15/2019	<MDC	3.0	27.9	4.1
	1/22/2019	<MDC	3.0	31.6	4.1		7/23/2019	<MDC	3.0	16.7	4.1
	1/29/2019	<MDC	3.0	34.4	4.1		7/29/2019	3.5	3.0	24.1	4.1
	2/4/2019	<MDC	3.0	31.4	4.1		8/5/2019	3.5	3.0	33.2	4.1
	2/11/2019	<MDC	3.0	14.8	4.1		8/13/2019	<MDC	3.0	28.6	4.1
	2/20/2019	3.9	3.0	27.3	4.1		8/19/2019	3.1	3.0	35.8	4.1
	2/26/2019	4.5	3.0	40.4	4.1		8/27/2019	3.1	3.0	25.0	4.1
	3/4/2019	<MDC	3.0	29.0	4.1		9/3/2019	3.5	3.0	30.7	4.1
	3/11/2019	<MDC	3.0	23.0	4.1		9/10/2019	5.4	3.0	34.5	4.1
	3/18/2019	3.4	3.0	21.2	4.1		9/16/2019	6.6	3.0	42.5	4.1
	3/26/2019	<MDC	3.0	16.3	4.1		9/23/2019	7.2	3.0	49.9	4.1
	4/2/2019	<MDC	3.0	18.4	4.1		10/1/2019	3.6	3.0	28.1	4.1
	4/8/2019	<MDC	3.0	24.6	4.1		10/7/2019	<MDC	3.0	20.7	4.1
	4/16/2019	<MDC	3.0	14.5	4.1		10/15/2019	<MDC	3.0	27.3	4.1
	4/24/2019	<MDC	3.0	14.7	4.1		10/22/2019	<MDC	3.0	27.4	4.1
	4/30/2019	<MDC	3.0	22.1	4.1		10/29/2019	<MDC	3.0	25.8	4.1
	5/7/2019	<MDC	3.0	16.9	4.1		11/5/2019	<MDC	3.0	20.6	4.1
	5/14/2019	<MDC	3.0	17.4	4.1		11/12/2019	<MDC	3.0	31.4	4.1
	5/20/2019	<MDC	3.0	26.8	4.1		11/19/2019	<MDC	3.0	39.2	4.1
	5/28/2019	<MDC	3.0	16.7	4.1		11/26/2019	<MDC	3.0	33.0	4.1
	6/3/2019	<MDC	3.0	20.8	4.1		12/3/2019	<MDC	3.0	11.5	4.1
	6/10/2019	<MDC	3.0	25.7	4.1		12/10/2019	<MDC	3.0	29.3	4.1
	6/17/2019	4.2	3.0	15.3	4.1		12/16/2019	4.4	3.0	30.8	4.1
	6/25/2019	<MDC	3.0	20.8	4.1		12/23/2019	3.1	3.0	43.3	4.1

Alpha / Beta Screening Results for Air Samples - Marion
Results are in picocuries per liter (pCi/L)

Location	Alpha		Beta		
	Date	Result	MDC	Result	MDC
Marion Office					
1/2/2019	<MDC	3.2	30.9	4.5	
1/9/2019	4.5	3.2	43.1	4.5	
1/15/2019	<MDC	3.2	27.9	4.5	
1/28/2019	<MDC	3.2	20.1	4.5	
2/5/2019	<MDC	3.2	26.4	4.5	
2/11/2019	<MDC	3.2	16.1	4.5	
2/20/2019	<MDC	3.2	28.2	4.5	
2/27/2019	5.2	3.2	38.2	4.5	
3/6/2019	<MDC	3.2	26.9	4.5	
3/12/2019	3.4	3.2	25.2	4.5	
3/27/2019	<MDC	3.2	12.0	4.5	
4/3/2019	3.6	3.2	17.8	4.5	
4/22/2019	<MDC	3.2	17.7	4.5	
4/30/2019	<MDC	3.2	19.1	4.5	
5/8/2019	<MDC	3.2	18.0	4.5	
5/14/2019	<MDC	3.2	15.0	4.5	
5/22/2019	<MDC	3.2	15.1	4.5	
5/29/2019	<MDC	3.2	19.0	4.5	
6/25/2019	<MDC	3.2	19.0	4.5	
7/3/2019	3.8	3.2	30.3	4.5	
7/9/2019	4.6	3.2	26.3	4.5	

Location	Alpha		Beta		
	Date	Result	MDC	Result	MDC
Marion Office					
7/15/2019	<MDC	3.2	21.9	4.5	
7/22/2019	<MDC	3.2	14.1	4.5	
7/31/2019	<MDC	3.2	27.5	4.5	
8/7/2019	3.4	3.2	39.7	4.5	
8/12/2019	3.2	3.2	33.2	4.5	
8/21/2019	3.9	3.2	29.4	4.5	
8/27/2019	<MDC	3.2	17.4	4.5	
9/11/2019	5.9	3.2	36.1	4.5	
9/25/2019	4.6	3.2	35.3	4.5	
10/9/2019	<MDC	3.2	28.6	4.5	
10/21/2019	3.3	3.2	32.9	4.5	
10/29/2019	<MDC	3.2	21.1	4.5	
11/4/2019	<MDC	3.2	21.0	4.5	
11/13/2019	<MDC	3.2	30.7	4.5	
11/20/2019	<MDC	3.2	40.4	4.5	
12/4/2019	<MDC	3.2	21.0	4.5	
12/10/2019	6.3	3.2	37.3	4.5	
12/18/2019	5.2	3.2	31.0	4.5	
12/23/2019	4.7	3.2	37.6	4.5	
12/31/2019	<MDC	3.2	33.4	4.5	

Alpha / Beta Screening Results for Air Samples – West Chicago
Results are in picocuries per liter (pCi/L)

Location	Alpha		Beta		Location	Alpha		Beta		
	Date	Result	MDC	Result		MDC	Date	Result	MDC	Result
IDNS Lab					IDNS Lab					
1/3/2019	<MDC	3.9	26.7	5.5	7/15/2019	<MDC	3.9	21.5	5.5	
1/9/2019	<MDC	3.9	49.8	5.5	7/24/2019	<MDC	3.9	16.1	5.5	
1/15/2019	<MDC	3.9	23.0	5.5	7/30/2019	<MDC	3.9	26.6	5.5	
1/22/2019	<MDC	3.9	27.5	5.5	8/6/2019	<MDC	3.9	23.3	5.5	
2/4/2019	<MDC	3.9	31.4	5.5	8/14/2019	<MDC	3.9	35.6	5.5	
2/20/2019	<MDC	3.9	23.8	5.5	8/20/2019	<MDC	3.9	19.5	5.5	
2/27/2019	4.6	3.9	39.7	5.5	8/29/2019	<MDC	3.9	21.2	5.5	
3/6/2019	4.3	3.9	22.9	5.5	9/5/2019	<MDC	3.9	24.6	5.5	
3/11/2019	<MDC	3.9	28.7	5.5	9/12/2019	6.1	3.9	35.5	5.5	
3/21/2019	4.4	3.9	25.1	5.5	9/20/2019	5.2	3.9	39.0	5.5	
3/28/2019	<MDC	3.9	10.9	5.5	9/27/2019	4.1	3.9	31.3	5.5	
4/2/2019	<MDC	3.9	19.0	5.5	10/2/2019	<MDC	3.9	23.9	5.5	
4/11/2019	<MDC	3.9	11.2	5.5	10/11/2019	<MDC	3.9	24.4	5.5	
4/17/2019	<MDC	3.9	13.2	5.5	10/17/2019	<MDC	3.9	20.1	5.5	
4/25/2019	<MDC	3.9	17.4	5.5	10/21/2019	<MDC	3.9	39.7	5.5	
5/1/2019	<MDC	3.9	14.5	5.5	10/29/2019	<MDC	3.9	15.3	5.5	
5/7/2019	<MDC	3.9	14.0	5.5	11/8/2019	<MDC	3.9	24.0	5.5	
5/15/2019	<MDC	3.9	14.9	5.5	11/14/2019	<MDC	3.9	29.1	5.5	
5/22/2019	<MDC	3.9	15.6	5.5	11/20/2019	<MDC	3.9	43.1	5.5	
6/4/2019	<MDC	3.9	17.7	5.5	12/3/2019	<MDC	3.9	18.8	5.5	
6/18/2019	<MDC	3.9	20.0	5.5	12/13/2019	4.7	3.9	30.3	5.5	
7/3/2019	9.7	3.9	20.5	5.5	12/17/2019	4.3	3.9	25.5	5.5	
7/9/2019	<MDC	3.9	23.0	5.5	12/27/2019	4.2	3.9	34.0	5.5	

Summary of Ambient Gamma Results - Sangchris Lake State Park

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
KC-01	11.0	11.0	10.3	10.6	42.9
KC-02	10.8	14.7	7.7	8.1	41.3
KC-03		9.3	12.7	7.8	39.7
KC-04		9.0	8.4	9.1	35.4
KC-05		13.1	8.6	9.4	41.6
KC-06	9.0	10.0	9.0	9.4	37.4
KC-07	8.5	11.5	8.8	7.6	36.4
KC-08	9.3	9.9	8.3	8.0	35.5
KC-09	11.3	11.9	9.0	6.0	38.2
KC-10	10.3	10.4	10.7	7.9	39.3
KC-11	12.0	12.5	10.6	10.7	45.8
KC-12	13.1	11.7	10.1	10.2	45.1
KC-13	10.8	12.2	8.9	10.4	42.3
KC-14		10.8	7.7	10.4	38.4
KC-15	9.9	12.9	7.5	7.4	37.7

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 A

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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