



IEMA-OHS

ILLINOIS EMERGENCY MANAGEMENT AGENCY
AND OFFICE OF HOMELAND SECURITY

2022 Radiological Environmental Monitoring Report for Illinois Nuclear Power Stations



(This Page Intentionally Left Blank)

Table of Contents

Section Title	Page Number
Executive Summary.....	4
Introduction.....	5
IEMA-OHS 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
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
Ambient Gamma Analysis.....	12
Minimum Detectable Concentration (MDC).....	12
Background Reference Areas.....	12
Results at a Glance.....	12
Braidwood Nuclear Power Station.....	14
Bryon Nuclear Power Station.....	32
Clinton Nuclear Power Station.....	49
Dresden Nuclear Power Station.....	69
LaSalle Nuclear Power Station.....	88
Quad Cities Nuclear Power Station.....	106
Zion Nuclear Power Station.....	123
Background Sampling Locations.....	127
Appendix A: Radionuclide Abbreviations in this Report.....	137

Executive Summary

The Illinois Emergency Management Agency and Office of Homeland Security (IEMA-OHS) 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-OHS conducts radiological environmental monitoring around Illinois' six operating nuclear power stations (NPS) and the Zion NPS which ceased operation in 1998 and is currently in the process of decommissioning. The remaining spent fuel for the power station is stored in an on-site Independent Spent Fuel Storage Installation (ISFSI).

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 2022, 426 environmental samples were collected and analyzed for radioactivity. The samples collected by IEMA-OHS included water, sediment, soil, vegetation, and fish. In addition, 1556 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 2022, all test results for samples collected as part of IEMA-OHS's environmental monitoring program for NPSs were below federal and state safety standards and guidelines.

Introduction

With 11 operating reactors at six nuclear power stations (NPS), 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 and Office of Homeland Security (IEMA-OHS) 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-OHS conducts radiological environmental monitoring in the environs of each operating NPS within Illinois. IEMA-OHS also maintains a radiological environmental monitoring program at Zion NPS, which ceased operation in 1998 and is currently in the process of decommissioning. 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. Background location information and sample results can be found on pages 129-138.

In addition to “traditional” radiological environmental monitoring, IEMA-OHS has a Remote Monitoring System (RMS) around each NPS. IEMA-OHS’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-OHS 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-OHS personnel.

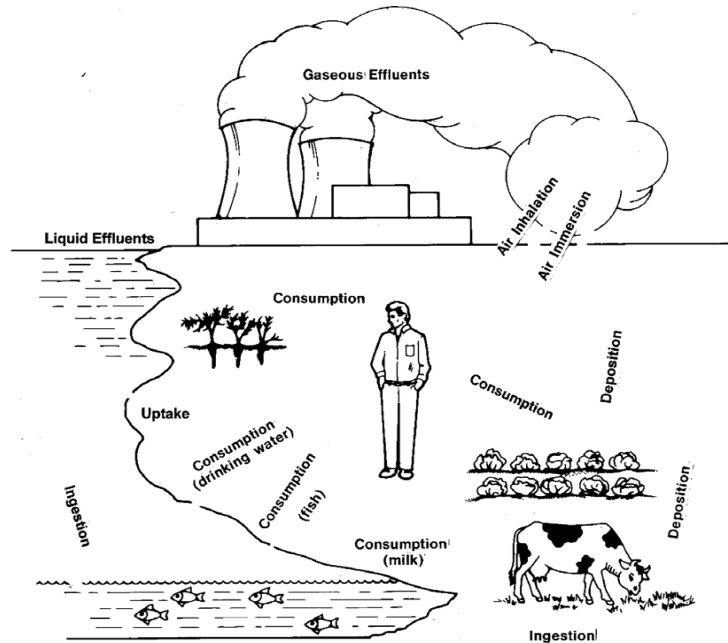
This report details IEMA-OHS’s radiological environmental monitoring program, including data from the RMS for the period January 2022 through December 2022 for the six operating NPSs in Illinois, the now decommissioned NPS at Zion, and the background sampling locations in Kincaid.

IEMA-OHS Radiological Environmental Monitoring Program

The IEMA-OHS 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-OHS 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 an NPS. IEMA-OHS 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-OHS include soil, vegetation, water, sediment, and fish from nearby waterways. Additionally, IEMA-OHS deploys an array of radiological

environmental dosimeters around each NPS to measure direct radiation from all sources. In 2022, 426 samples were collected and analyzed, and 1556 radiological environmental dosimeters were deployed. A description of IEMA-OHS 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 IEPA. Samples are collected and analyzed from potentially impacted 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 EPA and IEPA's drinking water standards; IEMA-OHS'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 one inch to monitor for deposition of radionuclides on the soil surface and at six inches to monitor the migration of radionuclides away from 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 an NPS into a surrounding body of water. Radionuclides released into surrounding bodies of water would be expected to accumulate in sediments downstream of an NPS.

Fish Sampling

Fish are excellent bio-accumulators of radionuclides. Fish samples are collected from rivers and lakes near NPS discharge points two times a year. Edible portions of the fish are then harvested and submitted for analysis. When possible, both “top-feeders” and “bottom feeders” are collected from each sampling location and are analyzed separately.

Direct Radiation Monitoring

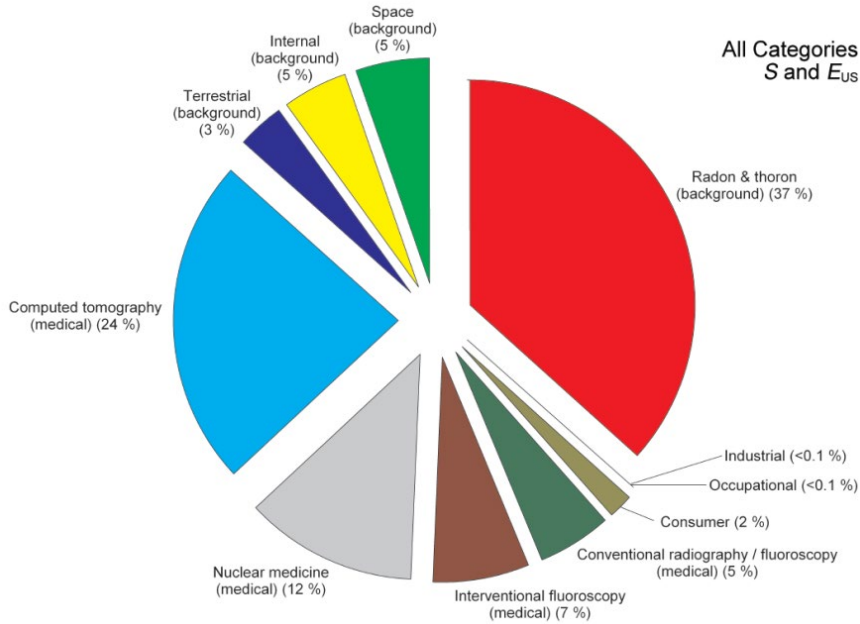
IEMA-OHS maintains a network of 389 environmental dosimeters around the six operating NPSs and the independent spent fuel storage installation located at the decommissioned Zion NPS. Unlike the environmental samples described previously, dosimeters do not provide information about what radionuclides 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 onsite.

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-OHS.

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 (mrem/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

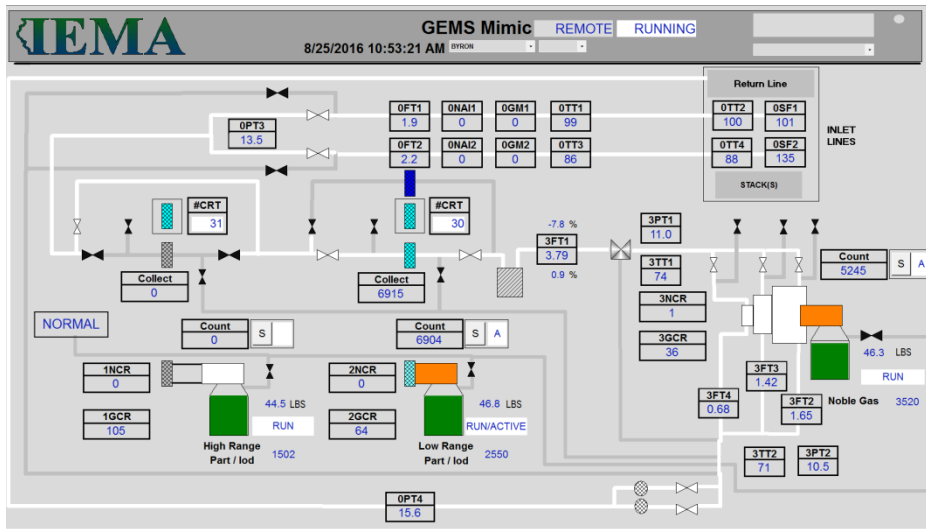


Reprinted with permission of the National Council on Radiation Protection and Measurements. (<http://NCRPpublications.org>)

Gaseous Effluent Monitoring System (GEMS)

IEMA-OHS 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-OHS manages a GDN. The GDN consists of a network of Reuter-Stokes (RS) gamma 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 4 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-OHS's Radiological Emergency Assessment Center to evaluate environmental impacts of a release.

Figure 4. Display of Gamma Detection Network around Clinton NPS

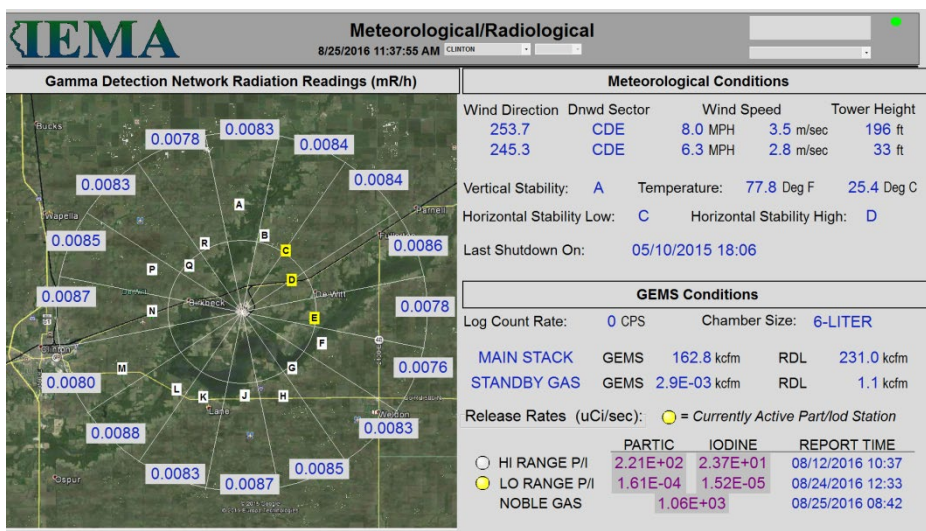


Figure 5. Typical IEMA-OHS GDN Field Installation



General Sampling and Monitoring Information

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

Laboratory Analysis

Soil, sediment, vegetation, water, and fish samples are analyzed by the IEMA-OHS 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 Radiological Field Services (RFS) 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 US NRC operating license to waterways, per the station's National Pollutant Discharge Elimination System (NPDES) 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 picocuries per liter (pCi/L). Drinking Water Standards are regulated by the US EPA and IEPA. IEMA-OHS'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. Tritium results for water samples are included within the NPS specific information provided in this report.

Total Strontium Analysis (Water)

Strontium is another radionuclide released in the effluent stream of NPSs. Liquid effluents from the NPSs are released in accordance with the station's US NRC operating license to waterways, per the station's IEPA NPDES permit.

Strontium results are compared to historical data, data collected from the background reference location, and to the US EPA drinking water standard (National Primary Drinking Water Regulations: Maximum Contaminant Levels and Maximum Residual Disinfectant Levels, 2000), as well as the IEPA's 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. Strontium results for water samples are included within the NPS specific information provided in this report.

Gross Beta Analysis (Water)

Water samples are analyzed for radioactivity through gross beta analysis using a liquid scintillation 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. Gross beta results for water samples are included within the NPS specific information provided in this report.

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 Cesium-137 concentrations ranging between 0.1 – 0.2 picocurie per gram (pCi/g) as a result of atmospheric nuclear

weapons testing. However, studies have shown that Cesium-137 concentrations of 1.0 pCi/g or higher are possible.

Ambient Gamma Analysis

OSLs are analyzed by RFS staff using a Landauer InLight 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 2022 are included in the site-specific sections of this report.

Minimum Detectable Concentration (MDC)

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, if the MDC for IEMA-OHS’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 near Kincaid, IL. Background location information and sample results can be found on pages 126-135.

Results at a Glance

Federal regulations establish standards for protection of the public against ionizing radiation resulting from activities conducted under US NRC licenses, such as operation of NPSs. The 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 Braidwood, Byron, Dresden, LaSalle, and Quad Cities stations. The elevated levels found near Braidwood, Dresden and LaSalle stations are likely attributable to the liquid effluent releases from the Braidwood station, while elevated levels near Byron and Quad Cities stations are likely due to liquid effluent releases from the respective stations. 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.

Gamma spectroscopy results for the fourth quarter water sample collected from the Kankakee River at Wilmington Island Park near the Braidwood station indicated the presence of Cerium-144 in concentrations greater than the established MDC. IEMA-OHS will continue to monitor this location for the presence of this and other gamma emitting radionuclides.

Cesium-137 in concentrations greater than the established MDC was detected in soil and sediment samples near most NPSs; however, the concentrations seen were consistent with soil concentrations historically found from atmospheric nuclear weapons testing.

Results from the second quarter soil sampling at the North Fork Creek near the Clinton station indicated the presence of Cesium-134 in a concentration greater than the established MDC. Second quarter deposition and migrations soil samples collected from the Sunbury Railroad Preserve near the LaSalle station indicated the presence of Niobium-95 at a concentration greater than the established MDC. Results from soil samples collected at both locations during the third quarter sampling were below the established MDC for all radionuclides.

Results from total strontium analyses for all NPSs indicate no concentrations above the established MDCs.

Results from gross beta analysis indicate that the established MDC was met at many water sampling locations. Concentrations above MDC are routinely found in background samples collected, and most concentrations found were consistent with historical background levels. However, concentrations found at some locations were above typical background levels and can likely be attributed to routine liquid effluent releases. All sample results for gross beta remained well below the established US EPA and IEPA standards.

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

In 2022, all results for samples collected as part of IEMA-OHS's radiological environmental monitoring program for NPSs were below federal and state safety standards and guidelines.

Braidwood Nuclear Power Station

The Braidwood NPS, consisting of two 3,587 Megawatt (MW) pressurized water reactors (PWR), is owned and operated by Constellation Energy 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 NPDES permit. In 2022, there were 68 liquid effluent batch releases from the Braidwood station.

Maps of the monitoring and sampling locations for the Braidwood NPS provided in this section (Figures 6-8) 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 8 represents the Dresden NPS.

Significant Events or Changes for 2022

No significant events or changes for 2022.

Sampling and Monitoring Results

Water Sampling Results

Detectable levels of tritium were found in surface water samples taken from the Kankakee River at Wilmington Island Park during third quarter sampling and the Des Plaines Conservation Area boat launch during third and fourth quarter sampling. These elevated concentrations are likely attributable to the liquid effluent releases from the station. 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 some sampling locations. Concentrations above MDC are historically found in background samples collected. The concentrations seen at many water sampling locations for the Braidwood NPS were consistent with background levels. However, concentrations found at some locations were above typical background levels and can likely be attributed to the routine liquid effluent releases from the Braidwood station. All sample results for gross beta remained well below the established US EPA and IEPA standards.

A water samples collected from the Braidwood Cooling Lake sampling location during the first quarter indicated Manganese-54 at a concentration equal to the established MDC, and a water sample collected from the Kankakee River at Wilmington Island Park sampling location during the fourth quarter indicated Cerium-144 at a concentration greater than the established MDC. The elevated concentrations are likely attributable to routine liquid effluent releases from the Braidwood Station. All other gamma spectroscopy results for water samples were below the established MDC.

Water sample analysis for total strontium indicated no concentrations above the established MDC.

Soil Sampling Results

Cesium-137 in concentrations greater than the established MDC was detected but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing and with concentrations found at background sampling locations. All other gamma spectroscopy results for soil samples were below the established MDC.

Sediment Sampling Results

Cesium-137 at a concentration greater than the established MDC was detected but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing and with concentrations found at background sampling locations. All other gamma spectroscopy results for sediment samples were below 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 from deployed OSLs were comparable to historical data and to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois.

GDN network results were consistent with historical data.

Figure 7. OSL and GDN Monitoring Locations- Braidwood (continued)

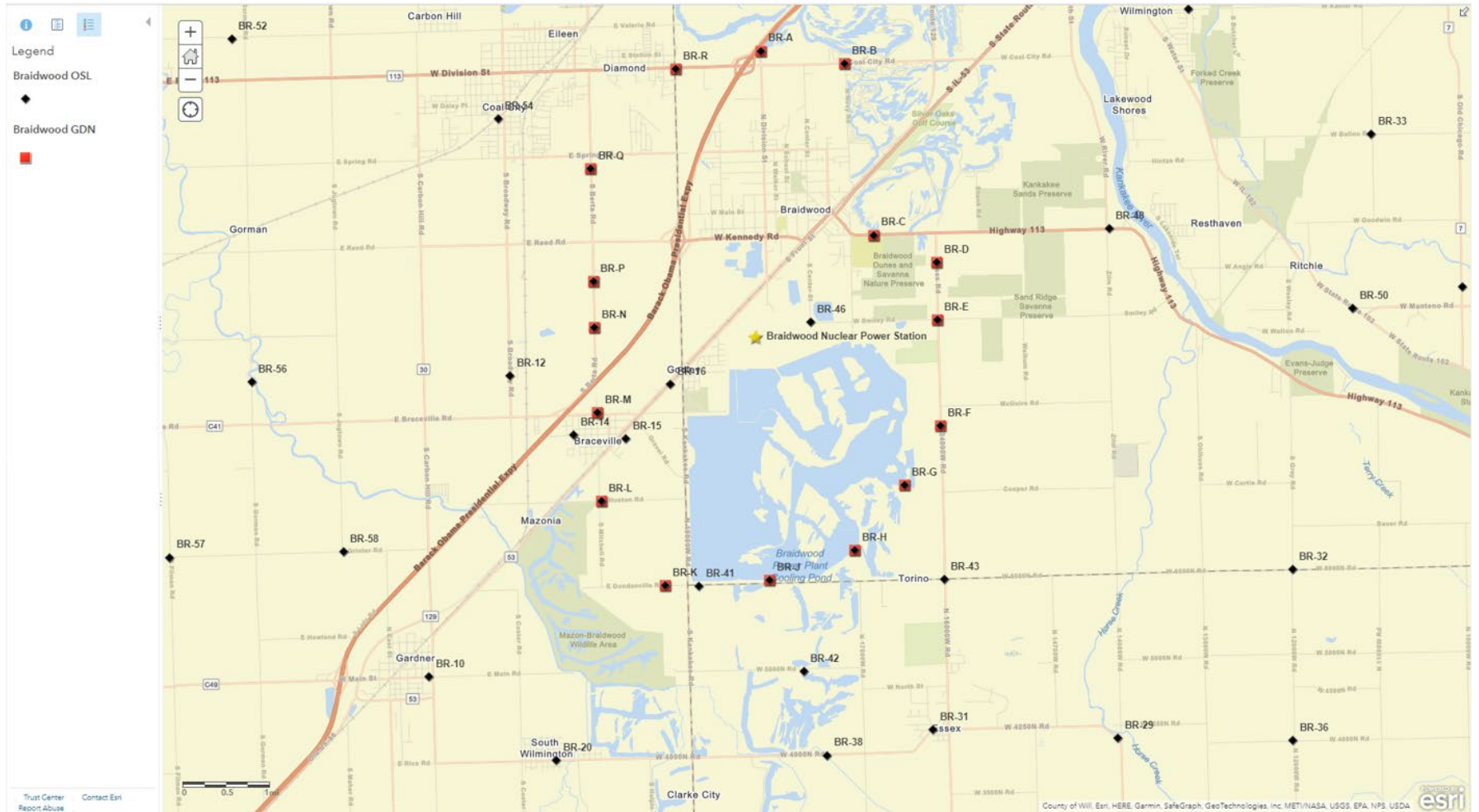
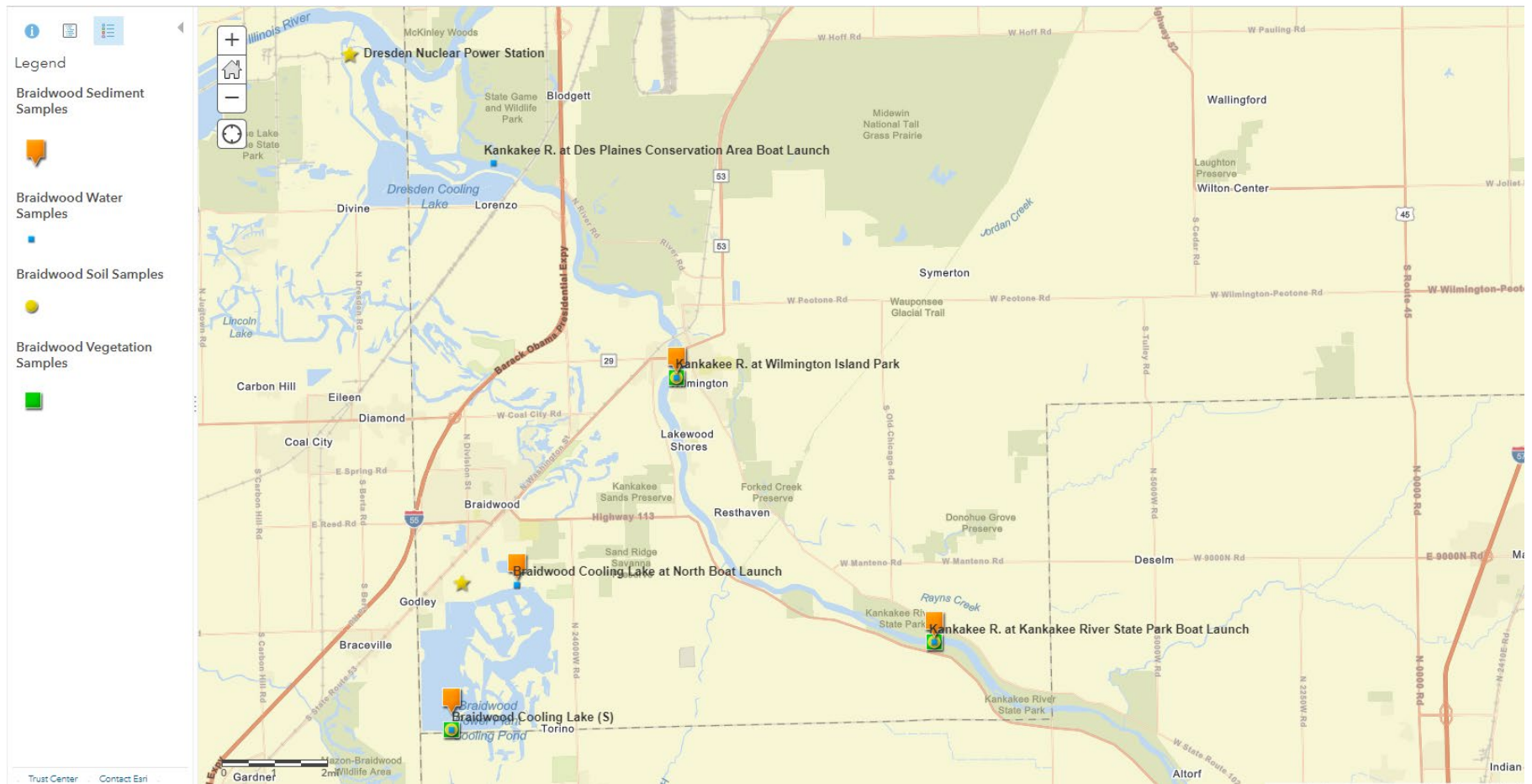


Figure 8. Environmental Sampling Locations – Braidwood

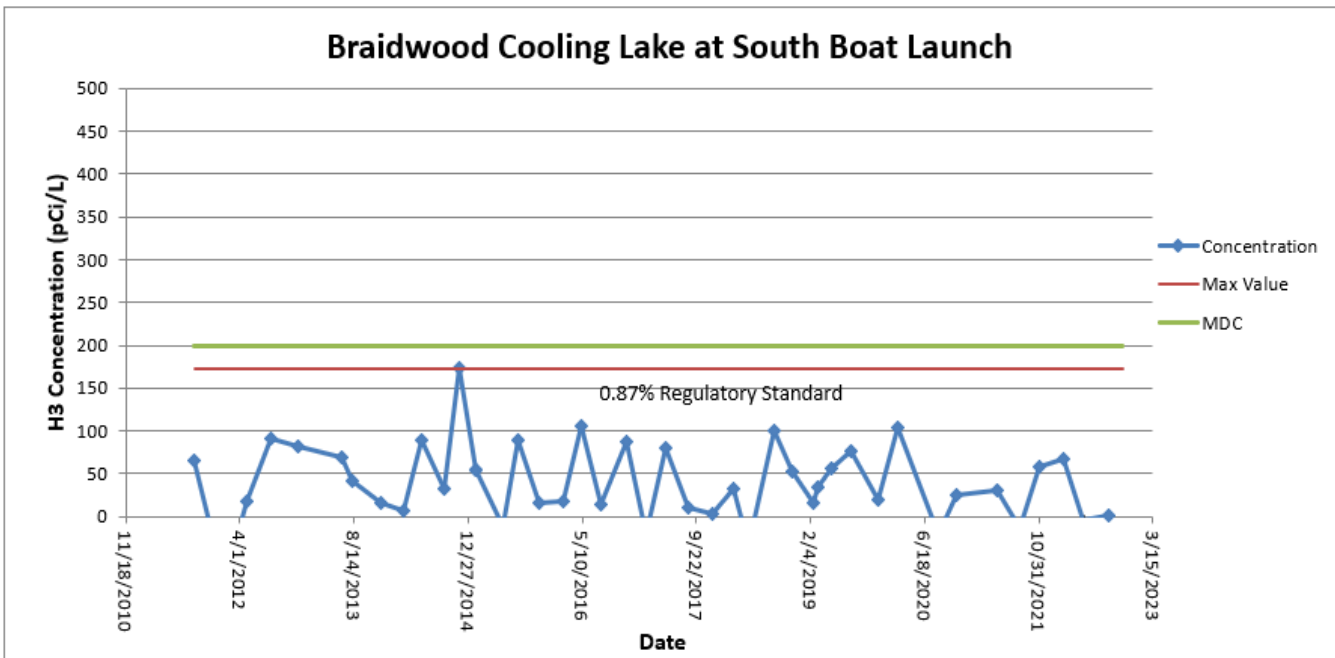
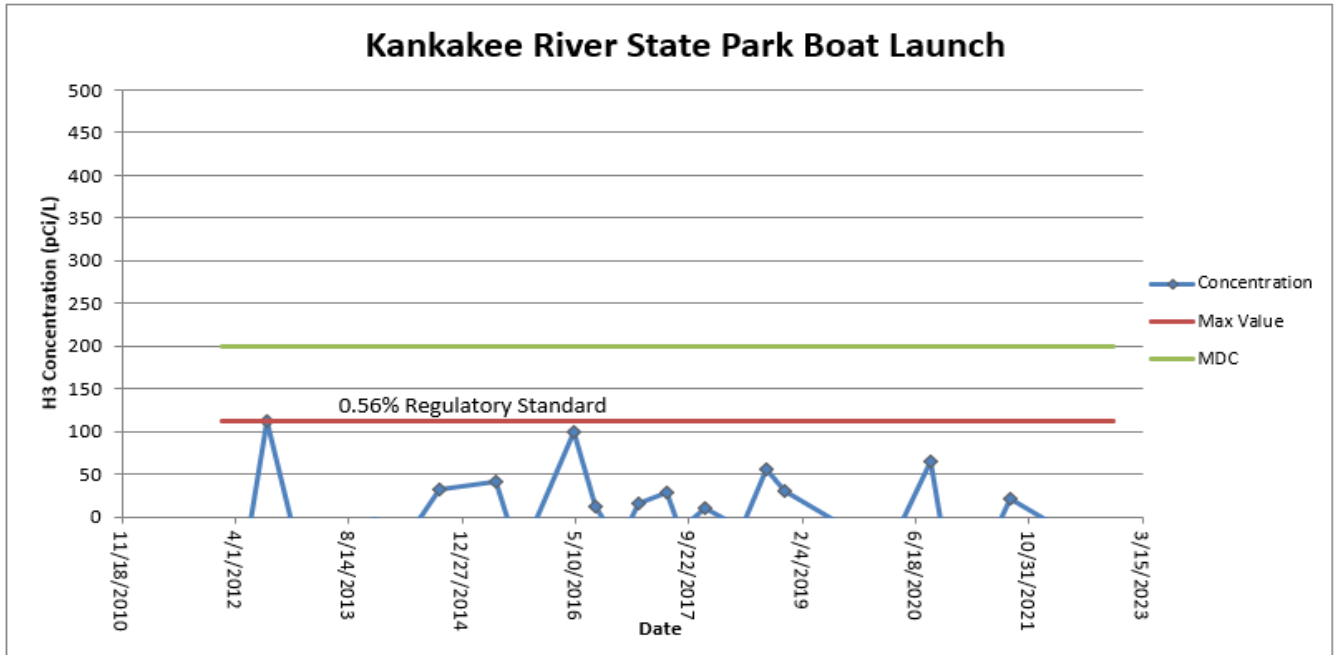


Braidwood Sample Result Tables and Graphs

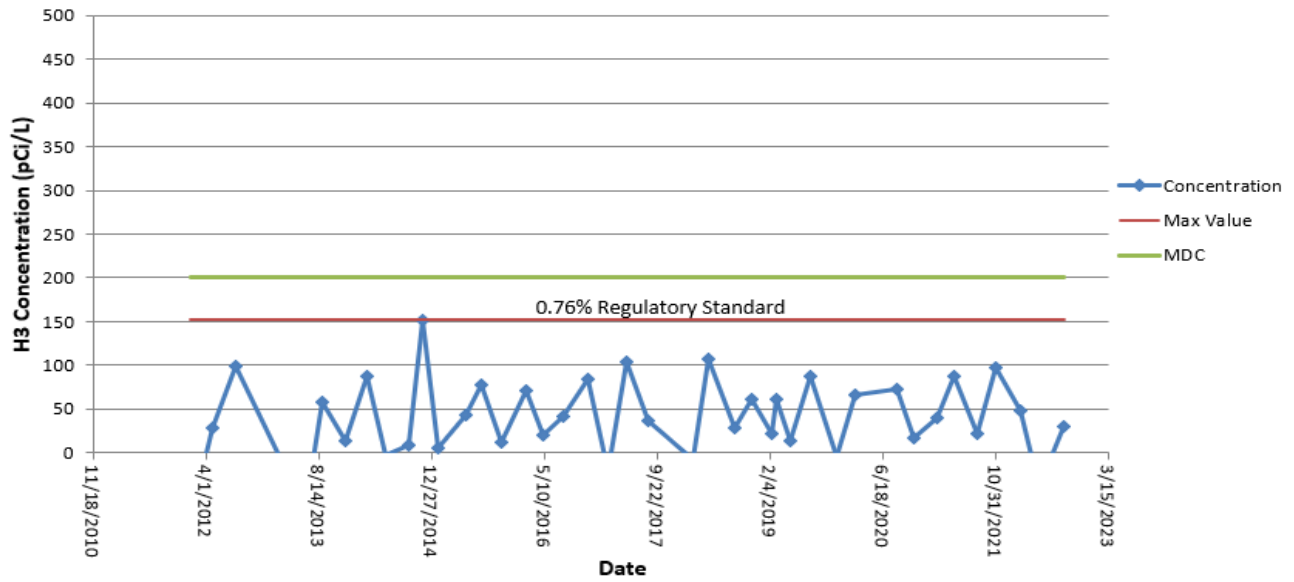
Tritium (H-3) in Water Results - Braidwood
Results are in picocuries per liter (pCi/L)

Location Date	H-3	
	Result	MDC
Braidwood Cooling Lake (N)		
2/16/2022	<MDC	134
5/10/2022	<MDC	134
8/31/2022	<MDC	134
Braidwood Cooling Lake (S)		
2/16/2022	<MDC	134
5/10/2022	<MDC	134
8/31/2022	<MDC	134
11/2/2022	<MDC	134
Kankakee R. at Des Plaines Conservation Area Boat Launch		
8/31/2022	795	134
11/2/2022	1290	134
Kankakee R. at Kankakee R. State Park Boat Launch		
5/10/2022	<MDC	134
8/31/2022	<MDC	134
11/2/2022	<MDC	134
Kankakee R. at Wilmington Island Park		
5/10/2022	<MDC	134
8/31/2022	956	134
11/2/2022	<MDC	134

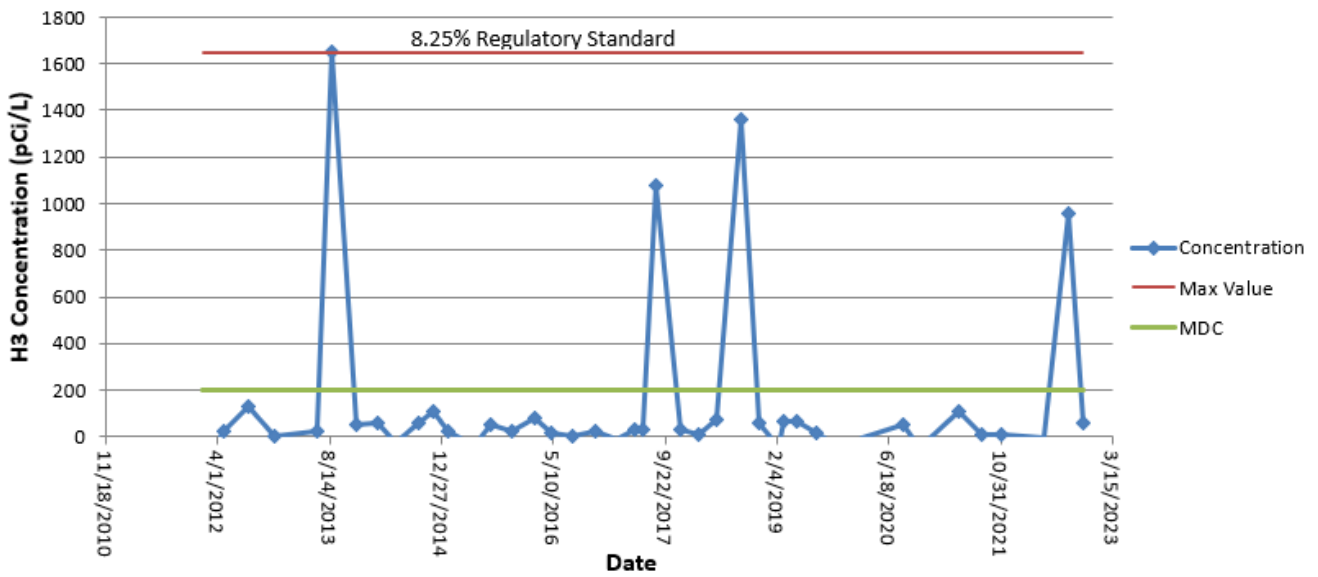
Trending Graphs for Tritium (H-3) in Water - Braidwood
 (Max value compared to IEPA and US EPA Class regulatory standard of 20,000 pCi/L; MDC represented at 200 pCi/L to account for normal fluctuations)



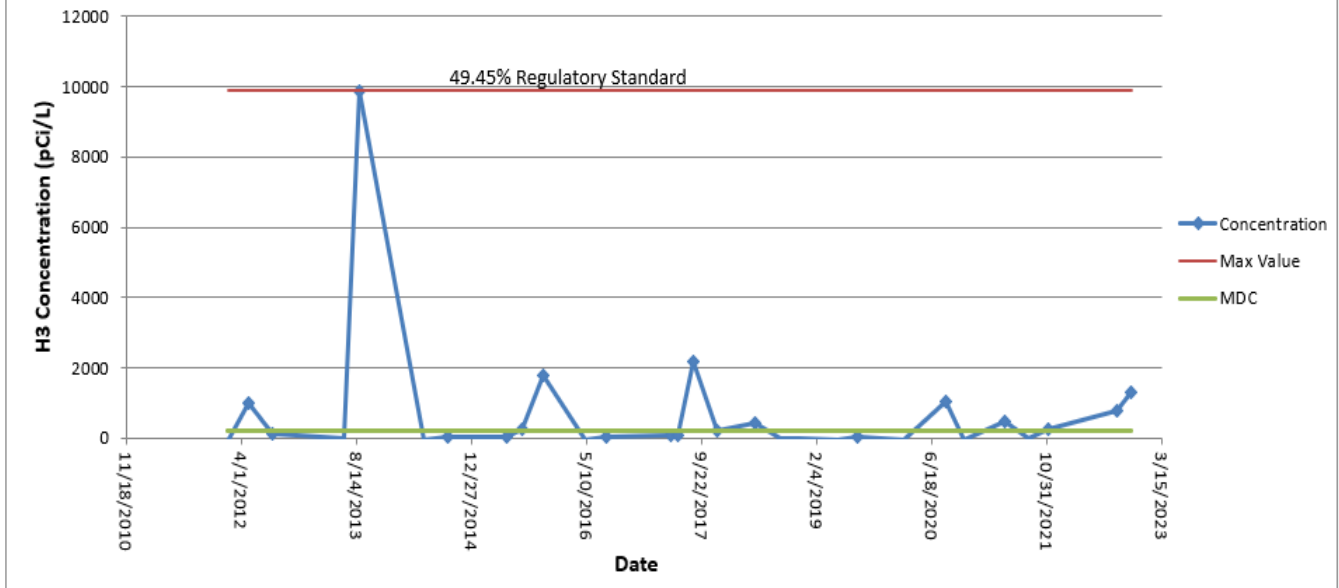
Braidwood Cooling Lake at North Boat Launch



Kankakee R. at Wilmington Island Park



Kankakee R. at Des Plaines Conservation Area Boat Launch



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

Location	Strontium	
Date	Result	MDC
Braidwood Cooling Lake (S)		
5/10/2022	<MDC	0.5

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)		
2/16/2022	6.0	4.3
5/10/2022	5.5	4.3
8/31/2022	6.1	4.3
Braidwood Cooling Lake (S)		
2/16/2022	7.6	4.3
5/10/2022	4.4	4.3
8/31/2022	7.6	4.3
11/2/2022	6.7	4.3
Kankakee R. at Des Plaines Conserv. Area		
8/31/2022	<MDC	4.3
11/2/2022	<MDC	4.3
Kankakee R. at Kankakee R. State Park Boat Launch		
5/10/2022	<MDC	4.3
8/31/2022	<MDC	4.3
11/2/2022	<MDC	4.3
Kankakee R. at Wilmington Island Park		
5/10/2022	<MDC	4.3
8/31/2022	<MDC	4.3
11/2/2022	4.5	4.3

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)																								
2/16/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	3.3	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
5/10/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
8/31/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
Braidwood Cooling Lake (S)																								
2/16/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
5/10/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
8/31/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
11/2/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
Kankakee R. @ Des Plaines Conservation Area Boat Launch																								
8/31/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
11/2/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
Kankakee R. @ Kankakee R. State Park Boat Launch																								
5/10/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
8/31/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
11/2/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
Kankakee R. @ Wilmington Island Park																								
5/10/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
8/31/2022	<MDC	15.2	<MDC	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8
11/2/2022	<MDC	15.2	21.4	18.1	<MDC	3.0	<MDC	3.5	<MDC	3.7	<MDC	3.0	<MDC	6.8	<MDC	5.7	<MDC	3.3	<MDC	3.5	<MDC	6.0	<MDC	5.8

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	MDC
Braidwood Cooling Lake (S)																							
5/10/2022	<MDC	0.16	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06	
8/31/2022	<MDC	0.16	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06	
Kankakee R. at Kankakee R. State Park Boat Launch																							
5/10/2022	<MDC	0.16	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.04	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06	
8/31/2022	<MDC	0.16	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.06	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06	
Kankakee R. at Wilmington Island Park																							
5/10/2022	<MDC	0.16	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.07	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06	
8/31/2022	<MDC	0.16	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.11	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06	

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	MDC
Braidwood Cooling Lake (S)																							
5/10/2022	<MDC	0.58	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.03	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.07	
8/31/2022	<MDC	0.58	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.03	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.07	
Kankakee R. at Kankakee R. State Park Boat Launch																							
5/10/2022	<MDC	0.58	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.04	0.03	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.07	
8/31/2022	<MDC	0.58	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.08	0.03	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.07	
Kankakee R. at Wilmington Island Park																							
5/10/2022	<MDC	0.58	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.07	0.03	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.07	
8/31/2022	<MDC	0.58	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.07	0.03	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.07	

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)																						
5/10/2022	<MDC	0.56	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.07
8/31/2022	<MDC	0.56	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.07
Kankakee R. at Kankakee R. State Park Boat Launch																						
5/10/2022	<MDC	0.56	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.06	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.07
8/31/2022	<MDC	0.56	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.07
Kankakee R. at Wilmington Island Park																						
5/10/2022	<MDC	0.56	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.08	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.07

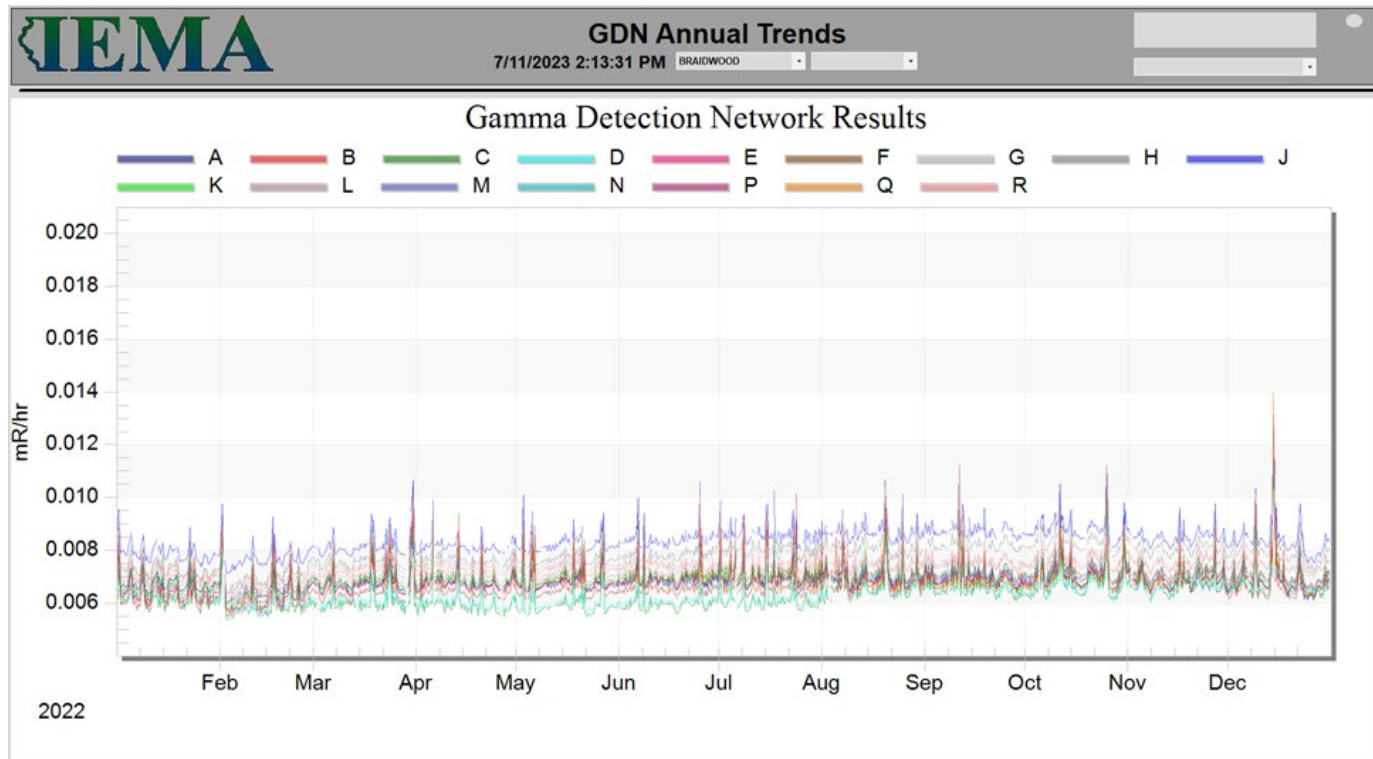
Gamma Spectroscopy Results for Radionuclides in Vegetation - Braidwood
Results are in picocuries per gram (pCi/g)

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)																								
5/10/2022	<MDC	1.61	<MDC	0.27	<MDC	0.07	<MDC	0.06	<MDC	0.05	<MDC	0.06	<MDC	0.20	<MDC	1.68	<MDC	0.06	<MDC	0.10	<MDC	0.14	<MDC	0.13
8/31/2022	<MDC	1.61	<MDC	0.27	<MDC	0.07	<MDC	0.06	<MDC	0.05	<MDC	0.06	<MDC	0.20	<MDC	1.68	<MDC	0.06	<MDC	0.10	<MDC	0.14	<MDC	0.13
Kankakee R. at Kankakee R. State Park Boat Launch																								
5/10/2022	<MDC	1.61	<MDC	0.27	<MDC	0.07	<MDC	0.06	<MDC	0.05	<MDC	0.06	<MDC	0.20	<MDC	1.68	<MDC	0.06	<MDC	0.10	<MDC	0.14	<MDC	0.13
8/31/2022	<MDC	1.61	<MDC	0.27	<MDC	0.07	<MDC	0.06	<MDC	0.05	<MDC	0.06	<MDC	0.20	<MDC	1.68	<MDC	0.06	<MDC	0.10	<MDC	0.14	<MDC	0.13
Kankakee R. at Wilmington Island Park																								
5/10/2022	<MDC	1.61	<MDC	0.27	<MDC	0.07	<MDC	0.06	<MDC	0.05	<MDC	0.06	<MDC	0.20	<MDC	1.68	<MDC	0.06	<MDC	0.10	<MDC	0.14	<MDC	0.13
8/31/2022	<MDC	1.61	<MDC	0.27	<MDC	0.07	<MDC	0.06	<MDC	0.05	<MDC	0.06	<MDC	0.20	<MDC	1.68	<MDC	0.06	<MDC	0.10	<MDC	0.14	<MDC	0.13

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	
Kanakee R. (Top Feeder)																										
7/14/2022	<MDC	2190.0	<MDC	168.0	<MDC	46.0	<MDC	42.0	<MDC	35.3	<MDC	36.0	<MDC	125.0	<MDC	5100.0	<MDC	37.0	<MDC	74.0	<MDC	92.0	<MDC	93.0		
11/4/2022	<MDC	2190.0	<MDC	168.0	<MDC	46.0	<MDC	42.0	<MDC	35.3	<MDC	36.0	<MDC	125.0	<MDC	5100.0	<MDC	37.0	<MDC	74.0	<MDC	92.0	<MDC	93.0		
Kankakee R. (Bottom Feeder)																										
7/14/2022	<MDC	2190.0	<MDC	168.0	<MDC	46.0	<MDC	42.0	<MDC	35.3	<MDC	36.0	<MDC	125.0	<MDC	5100.0	<MDC	37.0	<MDC	74.0	<MDC	92.0	<MDC	93.0		
11/4/2022	<MDC	2190.0	<MDC	168.0	<MDC	46.0	<MDC	42.0	<MDC	35.3	<MDC	36.0	<MDC	125.0	<MDC	5100.0	<MDC	37.0	<MDC	74.0	<MDC	92.0	<MDC	93.0		

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
BR-01	11.9	10.0	9.9	11.9	43.6
BR-05	8.9	5.8	10.8	9.7	35.2
BR-08	9.2	9.3	10.0	10.9	39.4
BR-10	7.9	5.9	7.3	7.9	28.9
BR-12	7.0	3.9	5.8	7.3	24.0
BR-14	5.2	6.6	5.7	7.2	24.7
BR-15	6.6		3.9	6.6	22.8
BR-16	6.4	4.9	6.2	6.0	23.5
BR-20	8.0	4.7	5.2	6.3	24.3
BR-25	9.2	6.8	6.5	7.9	30.3
BR-27	7.1	4.3	6.5	7.6	25.5
BR-29	4.5	6.9	7.6	6.9	26.1
BR-31		3.9	5.5	4.9	19.0
BR-32	6.4	4.4	4.9	6.9	22.6
BR-33	9.0	6.8	5.9	7.1	28.7
BR-34	7.9	8.5		8.7	33.4
BR-35	10.5	7.9	11.0	10.8	40.3
BR-36	6.5	4.0	4.9	7.0	22.3
BR-37	8.0	3.9	9.3		28.3
BR-38	7.2	5.0	5.0	7.9	25.1
BR-39	10.7	6.7	9.0	10.2	36.8
BR-40	10.8	10.0	11.4	10.2	42.3
BR-41	7.5	2.8	6.1	7.4	23.8
BR-42	8.9	7.7	9.2	8.5	34.3
BR-43		4.8	5.1	5.8	20.8
BR-46	5.5	3.0	4.0		16.6

Summary of Ambient Gamma Results – Braidwood (Continued)

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
BR-48	6.1	2.6	4.5	6.0	19.2
BR-49	5.8	6.2	6.4	6.8	25.1
BR-50	8.2	5.5	6.3	9.3	29.3
BR-51	5.8	6.0	6.1	4.6	22.5
BR-52	7.5	4.7	4.4	6.0	22.7
BR-53	10.1	7.2	9.1	7.5	33.9
BR-54	6.0	4.6	4.5	4.9	19.9
BR-56	7.5	4.5	8.2	10.6	30.8
BR-57	7.9	10.7	10.8	8.4	37.9
BR-58	10.0	9.1	8.7	11.1	38.8
BR-A	6.9	7.4	7.2	5.0	26.5
BR-B	8.0	4.2	5.5	7.5	25.2
BR-C	6.7	6.0	1.9	7.1	21.7
BR-D	4.7	6.6	4.4	5.9	21.6
BR-E	4.9	4.8	3.4	5.1	18.2
BR-F	5.2	3.1	7.3	6.1	21.8
BR-G	6.2	5.9	8.4		27.4
BR-H	7.1	4.9	8.2		27.0
BR-J	8.3	5.4	10.5		32.2
BR-K	5.0	4.9	4.3	7.4	21.6
BR-L	4.9	4.5	4.9	6.5	20.8
BR-M	7.2	5.8	6.0	5.4	24.3
BR-N	4.7	5.3	3.2	6.7	20.0
BR-P	6.8	5.0	5.3	5.7	22.9
BR-Q	5.2	3.6	4.8	5.6	19.2
BR-R	8.4	8.1	9.1	10.4	36.0

Blanks in the table indicate dosimeters that 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 Constellation Energy 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 NPDES permit. In 2022, there were 76 liquid effluent batch releases from the Byron station.

Figures 9 through 11 provide an overview of all sampling and monitoring locations in the vicinity of the Byron NPS (yellow star).

Significant Events or Changes for 2022

No significant events or changes for 2022.

Sampling and Monitoring Results

Water Sampling Results

Detectable levels of tritium were found in surface water samples taken from the Rock River at Oregon Park East during first and second quarter sampling. These elevated concentrations are likely attributable to the liquid effluent releases from the station. 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 some sampling locations, however the concentrations found were consistent with historical levels found at background sampling locations.

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

Soil Sampling Results

Gamma spectroscopy results for most soil samples indicated the presence of Cesium-137 in concentrations above the established MDC. Although above MDC, the concentrations present were consistent with concentrations historically found from atmospheric nuclear weapons testing and with concentrations found at background sampling locations. All other Gamma spectroscopy results for soil samples indicated no concentrations above the established MDC.

Sediment Sampling Results

Cesium-137 at a concentration greater than the established MDC was detected but was consistent with sediment concentrations historically found from atmospheric nuclear weapons testing and with concentrations found at background sampling locations. All other gamma spectroscopy results for sediment samples were below the established MDC.

Vegetation Sampling Results

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

Fish Sampling Results

Unable to schedule one of two fish collections and top feeders were not available for collection, so only bottom feeders received. Gamma spectroscopy results for fish samples indicated no concentrations above the established MDC.

Direct Radiation Monitoring Results

The ambient gamma monitoring results from deployed OSLs were comparable to historical data and to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois. GDN network results were consistent with historical data.

Byron Maps of Monitoring and Sampling Locations

Figure 9. OSL and GDN Monitoring Locations- Byron

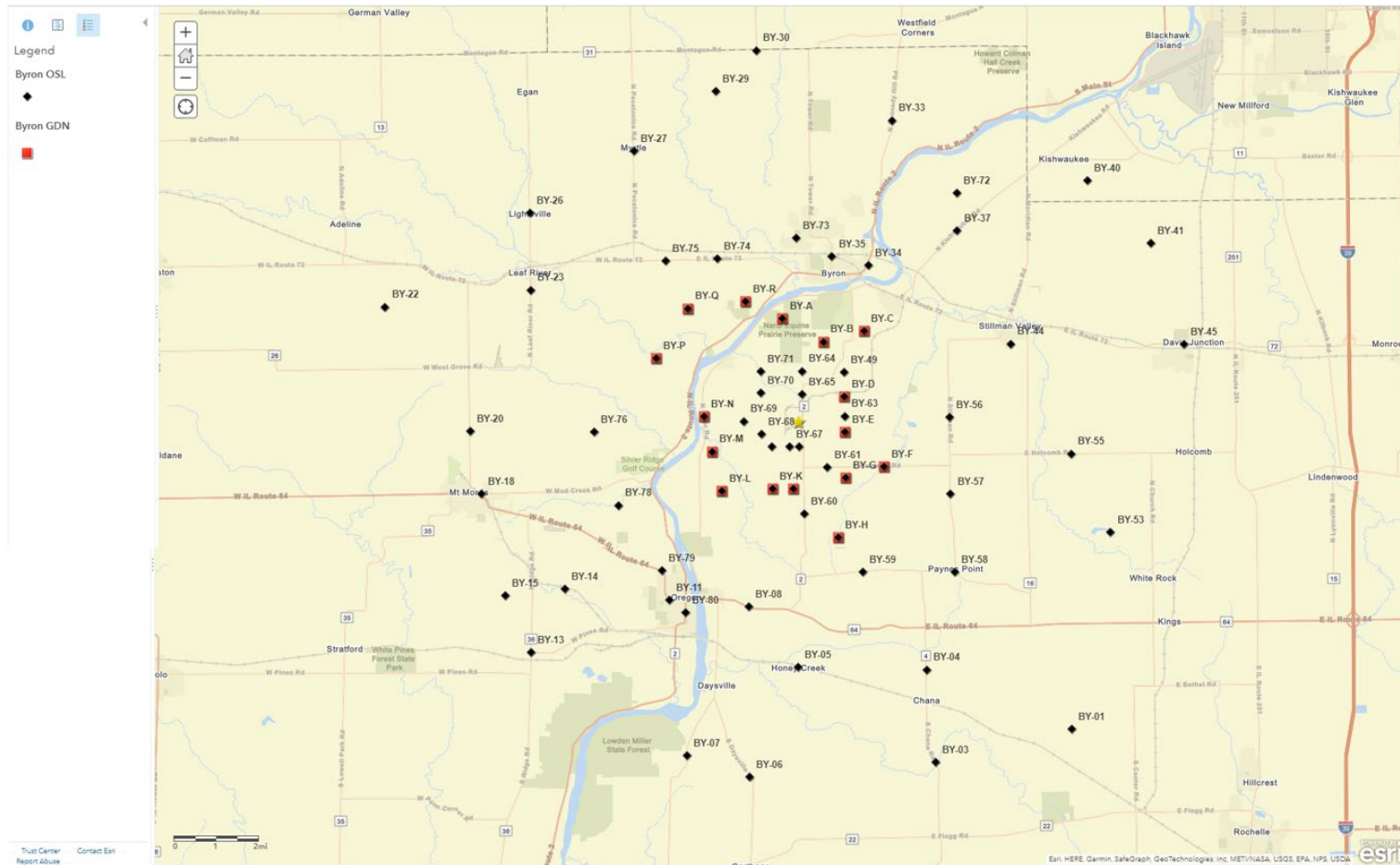


Figure 10. OSL and GDN Monitoring Locations- Byron (continued)

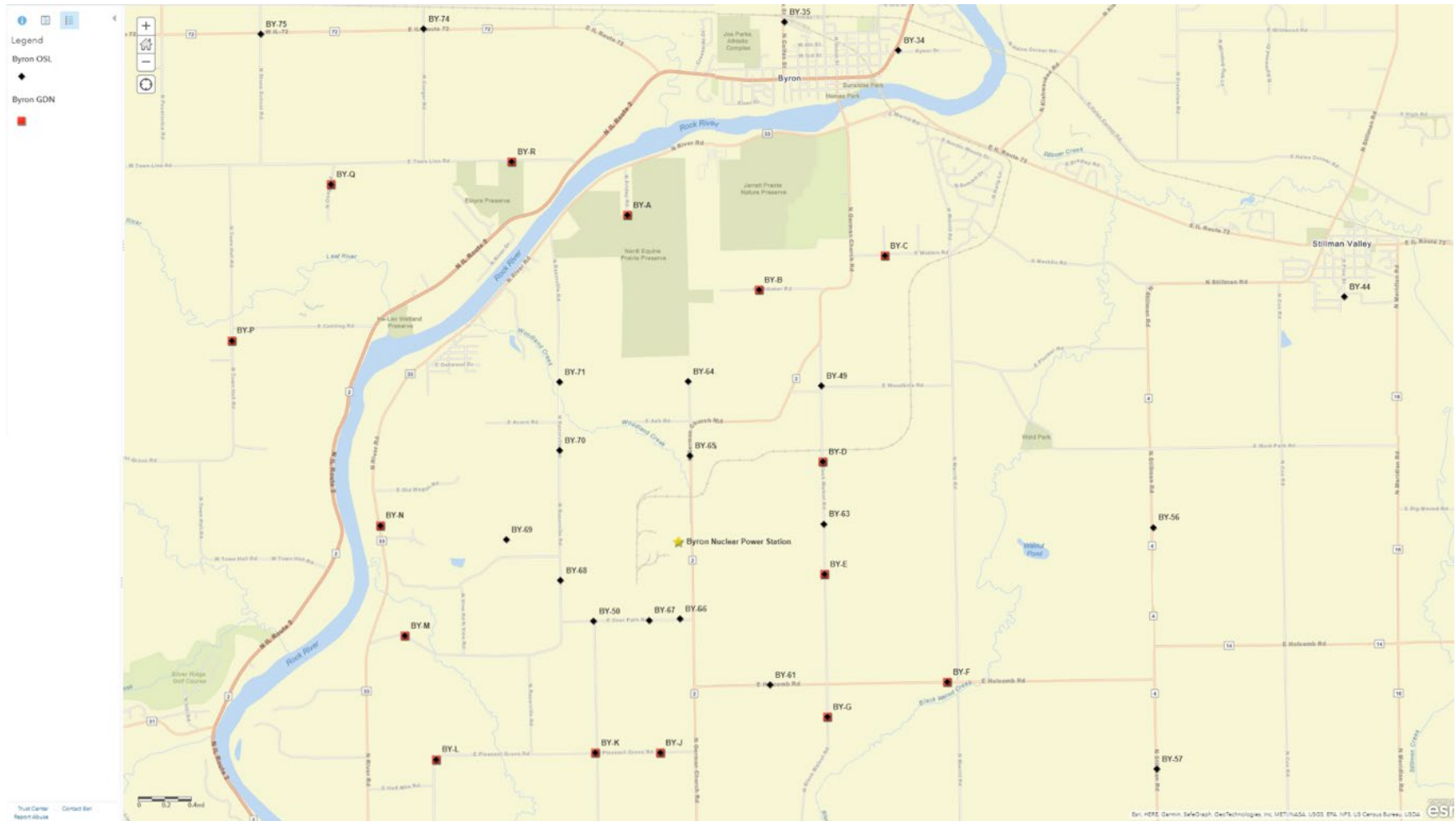
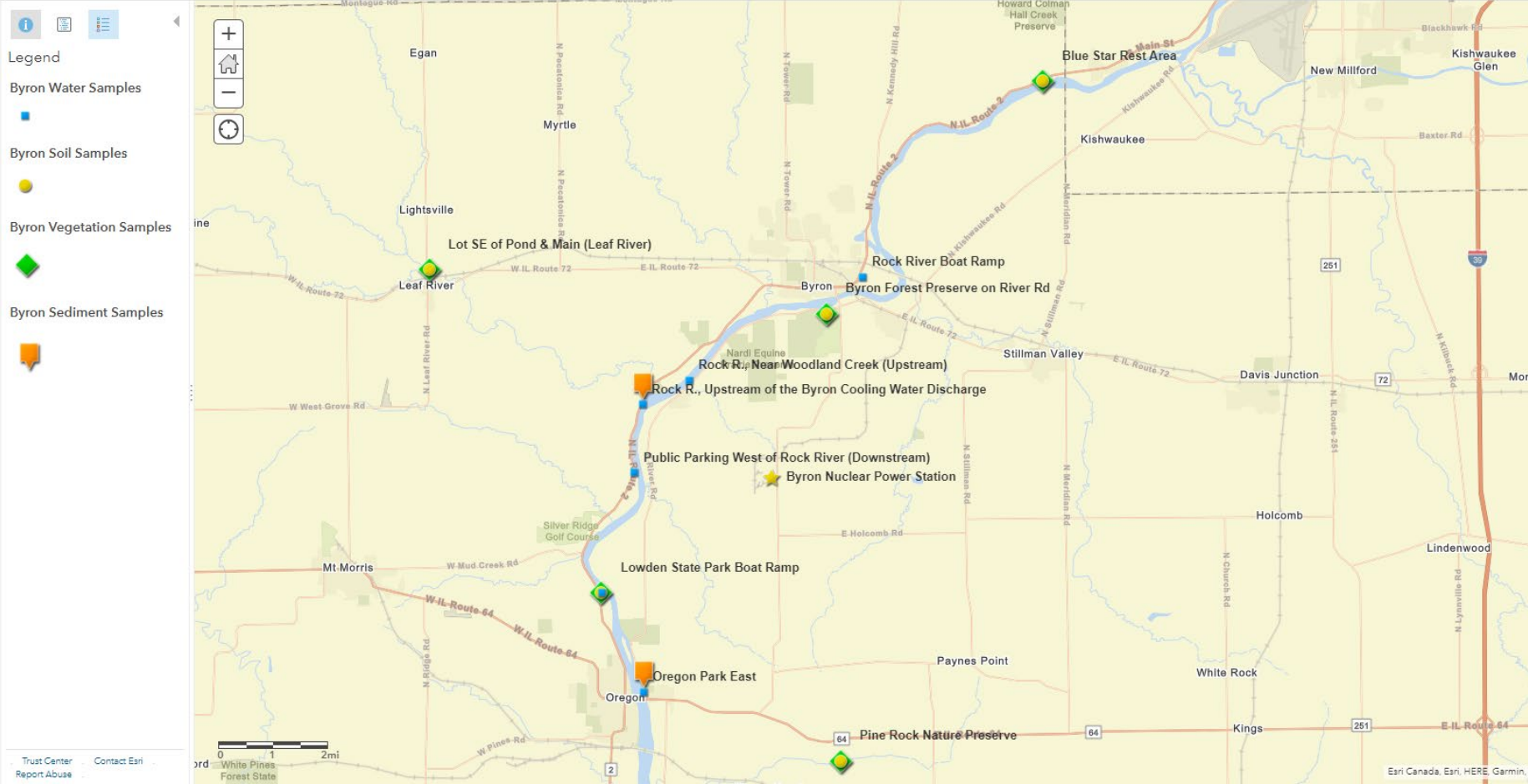


Figure 11. Environmental Sampling Locations- Byron

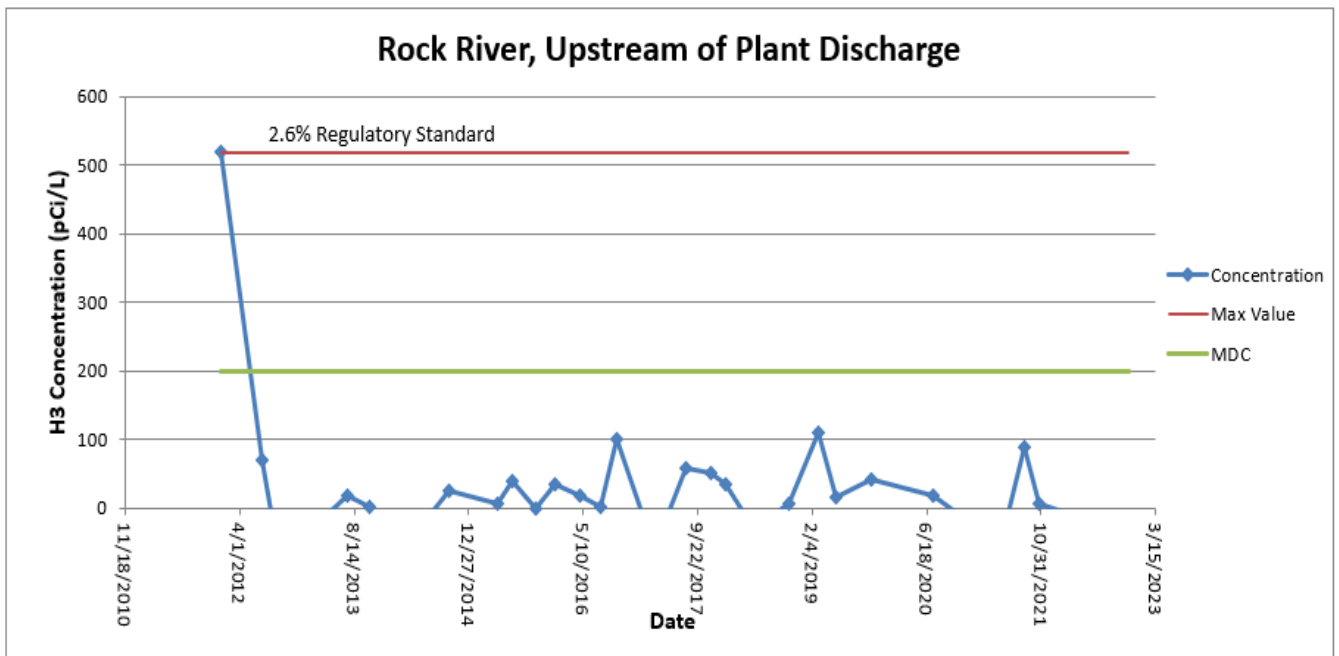
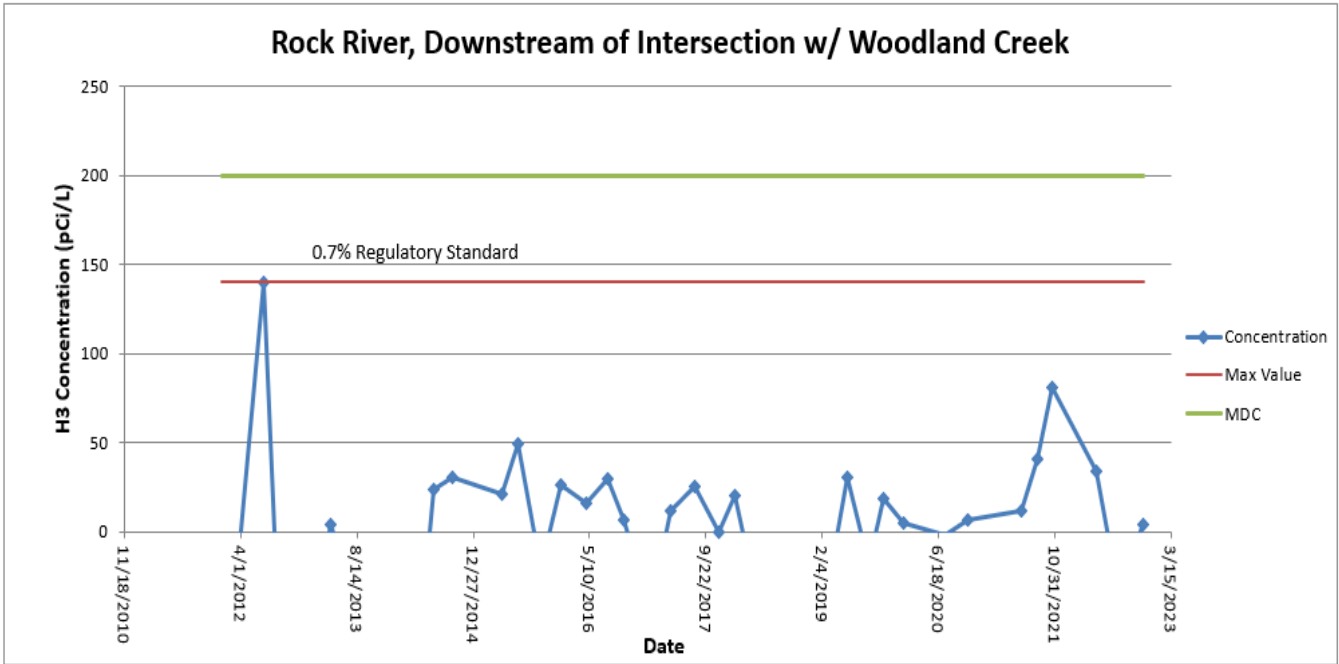


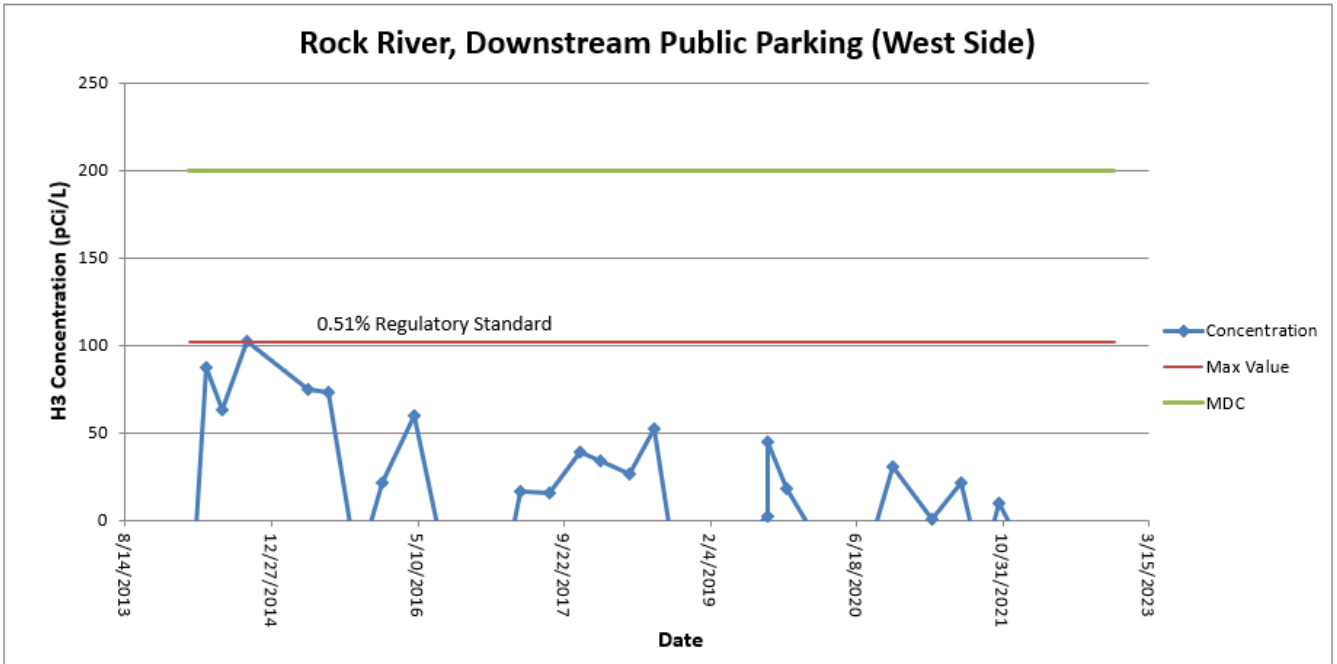
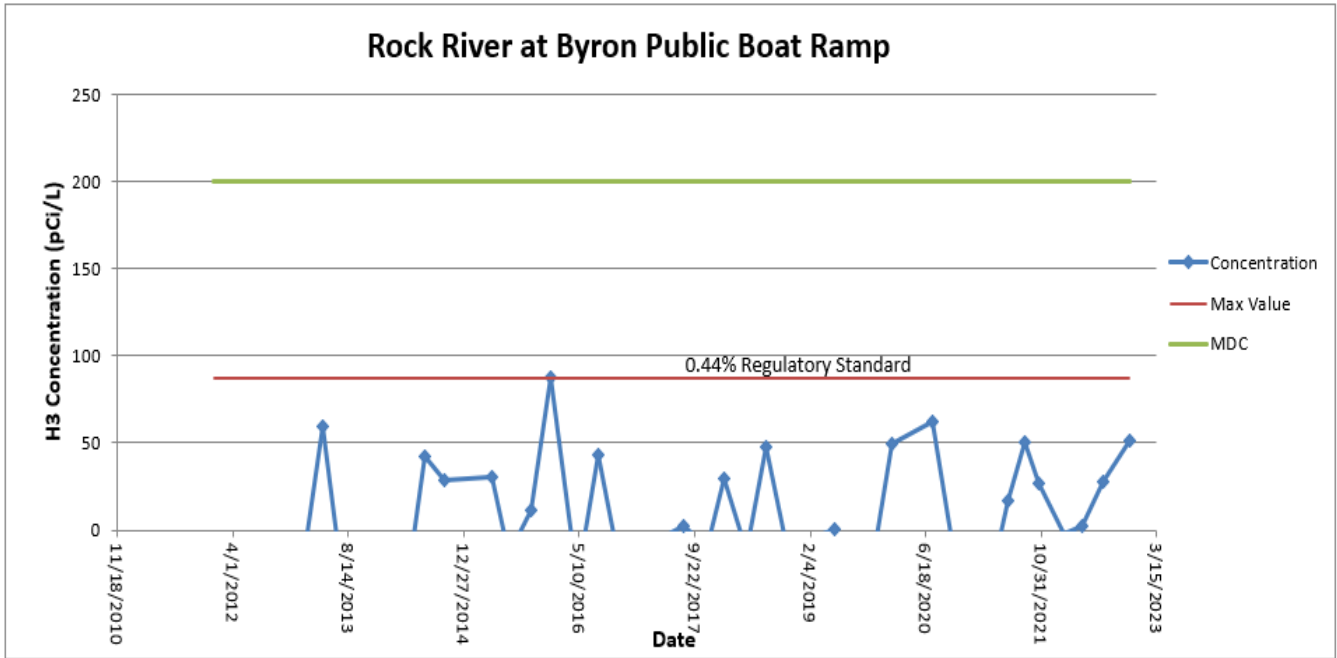
Byron Sample Result Tables and Graphs

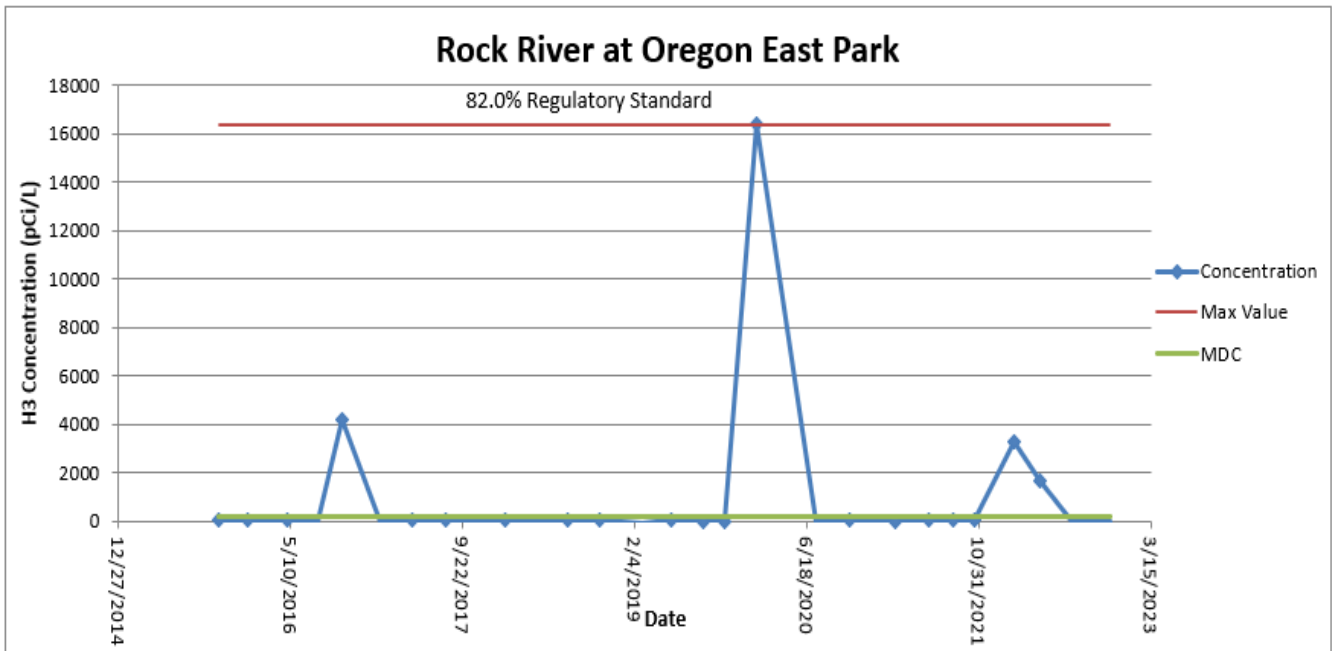
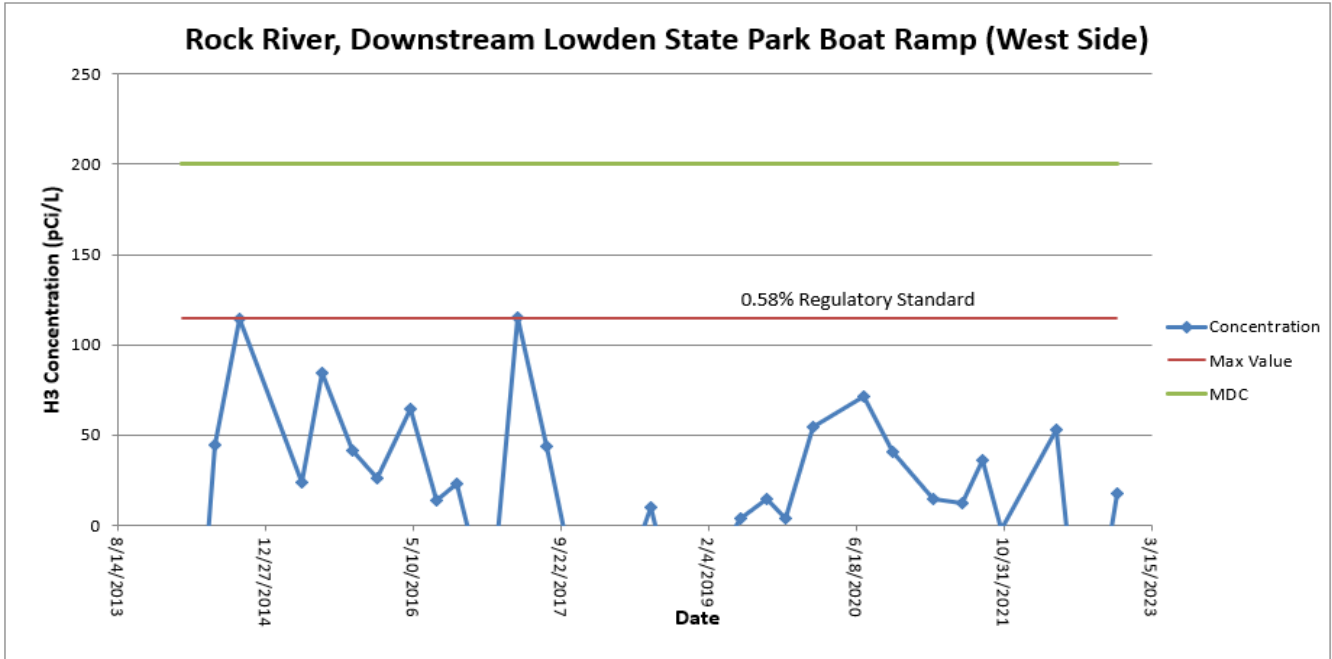
Tritium (H-3) in Water Results - Byron
Results are in picocuries per liter (pCi/L)

Location Date	H-3	
	Result	MDC
Lowden State Park Boat Ramp		
4/26/2022	<MDC	172
7/27/2022	<MDC	172
11/16/2022	<MDC	172
Oregon Park East		
2/9/2022	3270	172
4/26/2022	1640	172
7/27/2022	<MDC	172
11/16/2022	<MDC	172
Public Parking W. of Rock River		
4/26/2022	<MDC	172
7/27/2022	<MDC	172
11/16/2022	<MDC	172
Rock R. Byron Boat Ramp		
2/9/2022	<MDC	172
4/26/2022	<MDC	172
7/27/2022	<MDC	172
11/16/2022	<MDC	172
Rock R., UpS of the Byron Cooling Water Discharge		
2/9/2022	<MDC	172
4/26/2022	<MDC	172
7/27/2022	<MDC	172
11/16/2022	<MDC	172
Rock R., Near Woodland Creek		
4/26/2022	<MDC	172
7/27/2022	<MDC	172
11/16/2022	<MDC	172

Trending Graphs for Tritium (H-3) in Water - Byron
 (Max value compared to IEPA and US EPA Class regulatory standard of 20,000 pCi/L; MDC represented at 200 pCi/L to account for normal fluctuations)







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

Location	Strontium	
Date	Result	MDC
Public Parking W. of Rock R.		
4/26/2022	<MDC	0.5
Lowden State Park Boat Ramp		
4/26/2022	<MDC	0.5

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

Location	Beta	
Date	Result	MDC
Lowden State Park Boat Ramp		
4/26/2022	<MDC	3.2
7/27/2022	<MDC	3.2
11/16/2022	<MDC	3.2
Oregon Park East		
2/9/2022	<MDC	3.2
4/26/2022	<MDC	3.2
7/27/2022	<MDC	3.2
11/16/2022	3.4	3.2
Public Parking W. of Rock River		
4/26/2022	<MDC	3.2
7/27/2022	<MDC	3.2
11/16/2022	<MDC	3.2
Rock R. Byron Boat Ramp		
2/9/2022	<MDC	3.2
4/26/2022	<MDC	3.2
7/27/2022	<MDC	3.2
11/16/2022	3.6	3.2
Rock R., UpS of the Byron Cooling Water Discharge		
4/26/2022	<MDC	3.2
7/27/2022	<MDC	3.2
11/16/2022	<MDC	3.2
Rock R., Near Woodland Creek		
4/26/2022	<MDC	3.2
7/27/2022	<MDC	3.2
11/16/2022	3.8	3.2

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																								
4/26/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
7/27/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
11/16/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
Oregon Park East																								
2/9/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
4/26/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
7/27/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
11/16/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
Public Parking W. of Rock River																								
4/26/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
7/27/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
11/16/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
Rock R. Byron Boat Ramp																								
2/9/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
4/26/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
7/27/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
11/16/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
Rock R., UpS of the Byron Cooling Water Discharge																								
4/26/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
7/27/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
11/16/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
Rock R., Near Woodland Creek																								
4/26/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
7/27/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5
11/16/2022	<MDC	20.5	<MDC	18.2	<MDC	3.2	<MDC	3.6	<MDC	3.4	<MDC	3.3	<MDC	6.6	<MDC	8.9	<MDC	3.1	<MDC	3.6	<MDC	7.0	<MDC	5.5

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.																						
4/26/2022	<MDC	0.97	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.09	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
7/27/2022	<MDC	0.97	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.08	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
Lot SE of Pond & Main (Leaf River)																						
4/26/2022	<MDC	0.97	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.07	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
7/27/2022	<MDC	0.97	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.05	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
Lowden State Park Boat Ramp																						
4/26/2022	<MDC	0.97	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.13	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
7/27/2022	<MDC	0.97	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.09	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
Pine Rock Nature Preserve																						
4/26/2022	<MDC	0.97	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.09	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
7/27/2022	<MDC	0.97	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
Blue Star Rest Area																						
4/26/2022	<MDC	0.97	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.13	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
7/27/2022	<MDC	0.97	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.13	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07

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	MDC
Forest preserve on River Rd.																						
4/26/2022	<MDC	1.28	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.07	0.04	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
7/27/2022	<MDC	1.28	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.07	0.04	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
Lot SE of Pond & Main (Leaf River)																						
4/26/2022	<MDC	1.28	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.09	0.04	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
7/27/2022	<MDC	1.28	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.05	0.04	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
Lowden State Park Boat Ramp																						
4/26/2022	<MDC	1.28	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.10	0.04	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
7/27/2022	<MDC	1.28	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.07	0.04	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
Pine Rock Nature Preserve																						
4/26/2022	<MDC	1.28	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.08	0.04	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
7/27/2022	<MDC	1.28	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
Blue Star Rest Area																						
4/26/2022	<MDC	1.28	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.11	0.04	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07
7/27/2022	<MDC	1.28	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.09	0.04	<MDC	0.11	<MDC	0.03	<MDC	0.07	<MDC	0.07	<MDC	0.07

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	MDC
Oregon Park East																						
4/26/2022	<MDC	0.59	<MDC	0.20	<MDC	0.03	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.06	<MDC	0.07
7/27/2022	<MDC	0.59	<MDC	0.20	<MDC	0.03	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.06	<MDC	0.07
Rock R., Up S of the Byron Cooling Water Discharge																						
4/26/2022	<MDC	0.59	<MDC	0.20	<MDC	0.03	<MDC	0.03	<MDC	0.03	0.09	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.06	<MDC	0.07
7/27/2022	<MDC	0.59	<MDC	0.20	<MDC	0.03	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.06	<MDC	0.07

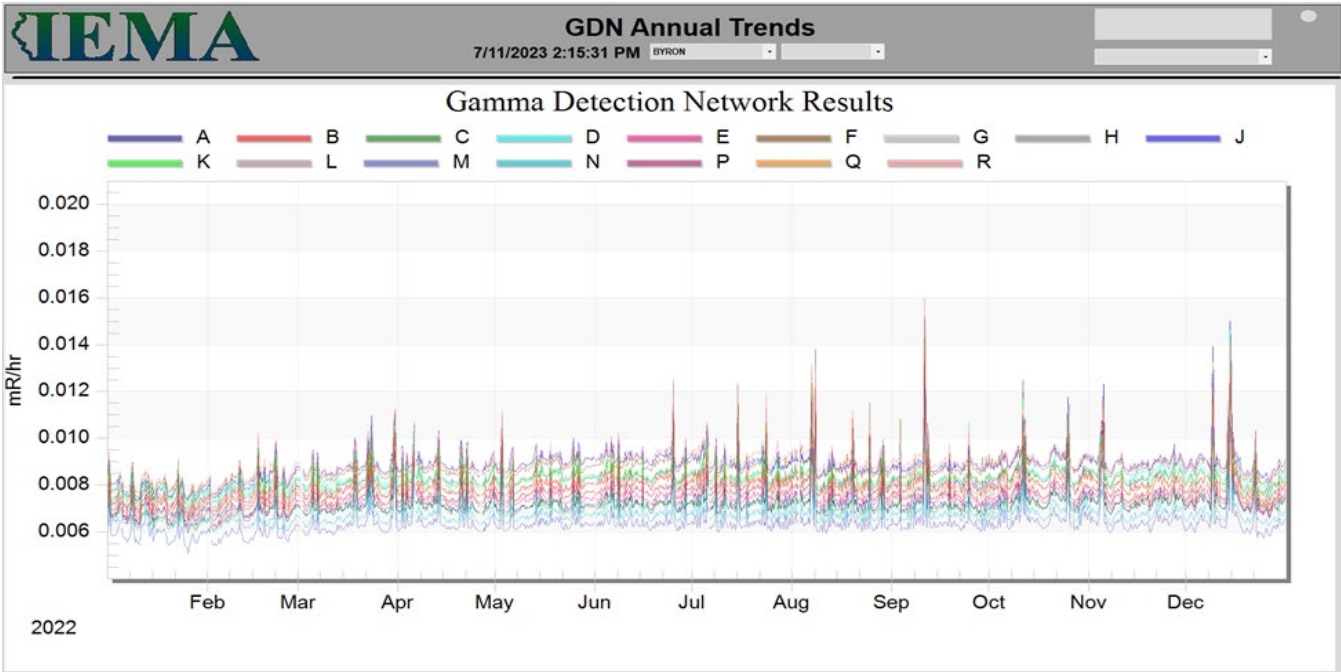
Gamma Spectroscopy Results for Radionuclides in Vegetation - Byron
Results are in picocuries per gram (pCi/g)

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.																								
4/26/2022	<MDC	7.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	15.3	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
7/27/2022	<MDC	7.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	15.3	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
Lot SE of Pond & Main (Leaf River)																								
4/26/2022	<MDC	7.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	15.3	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
7/27/2022	<MDC	7.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	15.3	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
Lowden State Park Boat Ramp																								
4/26/2022	<MDC	7.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	15.3	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
7/27/2022	<MDC	7.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	15.3	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
Pine Rock Nature Preserve																								
4/26/2022	<MDC	7.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	15.3	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
7/27/2022	<MDC	7.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	15.3	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
Blue Star Rest Area																								
4/26/2022	<MDC	7.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	15.3	<MDC	0.1	<MDC	0.3	<MDC	0.3	<MDC	0.3
7/27/2022	<MDC	7.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	15.3	<MDC	0.1	<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)																								
11/9/2022	<MDC	1090	<MDC	162	<MDC	47	<MDC	38	<MDC	35	<MDC	33	<MDC	133	<MDC	1010	<MDC	36	<MDC	72	<MDC	91	<MDC	84

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
BY-01	6.2	7.3	8.6	7.9	30.0
BY-03	5.1	4.7	5.9	7.1	22.8
BY-04	6.7	11.1	7.6	4.8	30.1
BY-05	7.2	6.3	6.9	5.7	26.0
BY-06	7.8	6.4	6.6	5.2	25.9
BY-07	8.3	7.6	5.4	5.5	26.8
BY-08	7.1	6.1	9.1	7.8	30.0
BY-11	5.7	8.3	7.2	6.0	27.2
BY-13	9.8	8.9		8.1	35.7
BY-14	6.3		7.5	7.1	27.9
BY-15	8.4	10.3	10.2	8.4	37.2
BY-18	2.7		7.4	4.7	19.8
BY-20	8.8	9.6	8.3	8.1	34.7
BY-22		6.7	12.3	8.6	36.8
BY-23	6.2	8.5	9.0	7.8	31.5
BY-26	5.7	12.5	6.3	7.1	31.6
BY-27	11.1	10.0	11.9	9.5	42.6
BY-29	8.1	8.0	9.4	8.2	33.6
BY-30	6.8	8.8	6.4	6.1	28.2
BY-33	6.9	10.9	8.1	8.1	34.0
BY-34	4.7	6.7	8.5	5.6	25.4
BY-35	3.5	5.2	5.3	6.3	20.3
BY-37	4.6	6.5	6.7	6.8	24.7
BY-40	4.6	12.2	8.8	8.5	34.1
BY-41	8.5	7.2	7.2	5.1	28.0
BY-44	8.6	9.1	7.7		34.0
BY-45	6.2	7.2	8.7	5.0	27.1
BY-49	5.1		10.3	5.7	28.1
BY-50	5.9	5.6	12.6	6.8	31.0
BY-53	9.6	8.8	8.8	8.9	36.1
BY-55	8.7	10.5	12.4	10.0	41.7
BY-56	5.8	8.9	8.3		30.6
BY-57	7.7	7.5	9.0	8.5	32.8
BY-58	7.9	8.2	8.3	9.3	33.8
BY-59	8.3	9.6	10.5	8.0	36.3

Summary of Ambient Gamma Results – Byron (Continued)

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Exposure
Location	mR/quarter	mR/quarter	mR/quarter	mR/quarter	mr/year
BY-60	8.2	5.4	9.0	7.3	30.0
BY-61	5.9	6.3	6.7	7.5	26.4
BY-63	9.4	8.7	8.2	8.3	34.6
BY-64	8.8	9.7	10.1	8.7	37.4
BY-65	7.6	7.4	8.9	8.6	32.5
BY-66	8.3	9.7	8.8	6.7	33.6
BY-67	8.7	8.5	9.2	7.0	33.5
BY-68	7.8	9.3	10.1	7.0	34.2
BY-69	7.6	6.0	9.9	7.8	31.3
BY-70	7.7	11.6	7.5	9.1	36.0
BY-71	4.4	8.5	8.0	6.2	27.1
BY-72	7.8	10.2	9.4	8.5	35.9
BY-73	8.8		6.7	10.1	34.0
BY-74	8.3	9.4	11.2	7.0	36.0
BY-75	7.5	7.6	6.5	7.0	28.8
BY-76	6.4	9.6	6.9	6.5	29.5
BY-78	5.0	8.1	8.8	5.5	27.4
BY-79	6.9	6.0	5.8	6.5	25.2
BY-80	4.1	10.3	6.9	3.9	25.3
BY-A	4.9	5.8	6.7	5.9	23.3
BY-B	8.0	9.9	9.0	6.8	33.7
BY-C	6.8	7.3	5.4	4.9	24.4
BY-D	7.7	10.7	9.5		37.2
BY-E	4.8	6.3	7.3	6.5	25.0
BY-F	8.0	13.1	9.7	7.1	37.9
BY-G	7.4	9.2	6.4	6.8	29.7
BY-H	7.5	9.3	7.1	8.6	32.5
BY-J	7.2	10.1	9.4	7.3	34.0
BY-K	6.1	6.9	11.0	8.2	32.2
BY-L	7.4	6.7	7.9	7.4	29.4
BY-M	6.9	5.5	7.1	4.6	24.2
BY-N	5.7	5.8	3.9	6.1	21.6
BY-P	7.9	7.5	9.0	8.9	33.3
BY-Q	5.6	7.8	11.0	5.2	29.6
BY-R	10.9	11.6	12.9	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 Constellation Energy 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 NPDES permit. The outflow from Clinton Lake falls into Salt Creek, a tributary of the Sangamon River. No liquid effluents were discharged in 2022.

Figures 12 through 14 provide an overview of all sampling and monitoring locations in the vicinity of the Clinton NPS (yellow star).

Significant Events or Changes for 2022

No significant events or changes for 2022.

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, however the concentrations found were consistent with historical levels found at background sampling locations.

Soil Sampling Results

Cesium-137 in concentrations greater than the established MDC was detected but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing and with concentrations found at background sampling locations.

A deposition soil sample containing Cesium-134 with a concentration above the established MDC was found at the North Fork Creek sampling location during the second quarter sampling. The result from the sample collected at that location in the third quarter was below the established MDC.

All other gamma spectroscopy results for soil samples were below the established MDC.

Sediment Sampling Results

Cesium-137 at a concentration greater than the established MDC was detected but was consistent with sediment concentrations historically found from atmospheric nuclear weapons testing and with concentrations found at background sampling locations. All other gamma spectroscopy results for sediment samples were below the established MDC.

Vegetation Sampling Results

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

Fish Sampling Results

Unable to coordinate the collection of fish with the Illinois Department of Natural Resources (IDNR); therefore, fish samples were not analyzed at this location for 2022.

Direct Radiation Monitoring Results

The ambient gamma monitoring results from deployed OSLs were comparable to historical data and to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois.

GDN network results were consistent with historical data.

Clinton Maps of Monitoring and Sampling Locations

Figure 12. OSL and GDN Monitoring Locations- Clinton

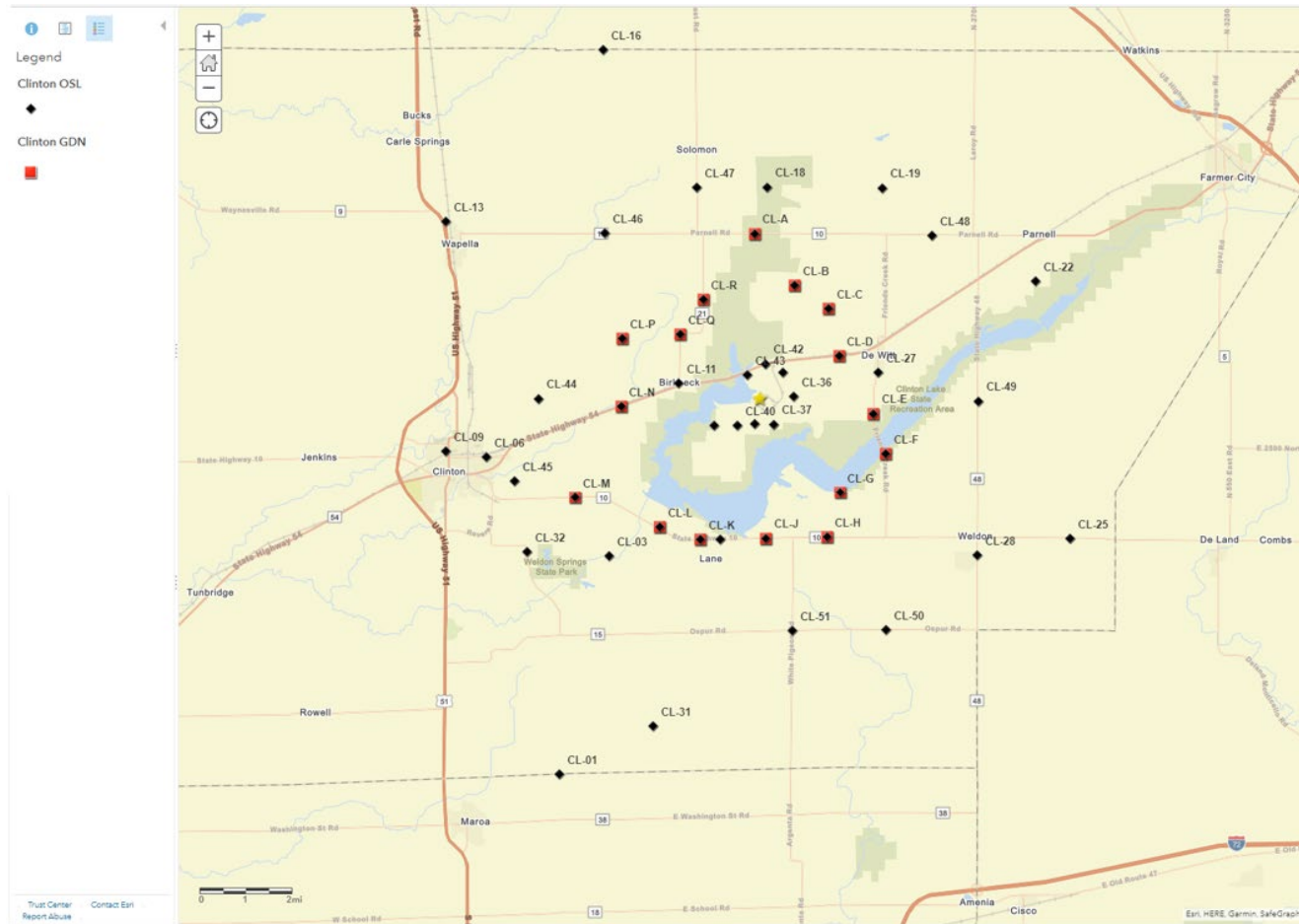


Figure 13. OSL and GDN Monitoring Locations (continued) - Clinton

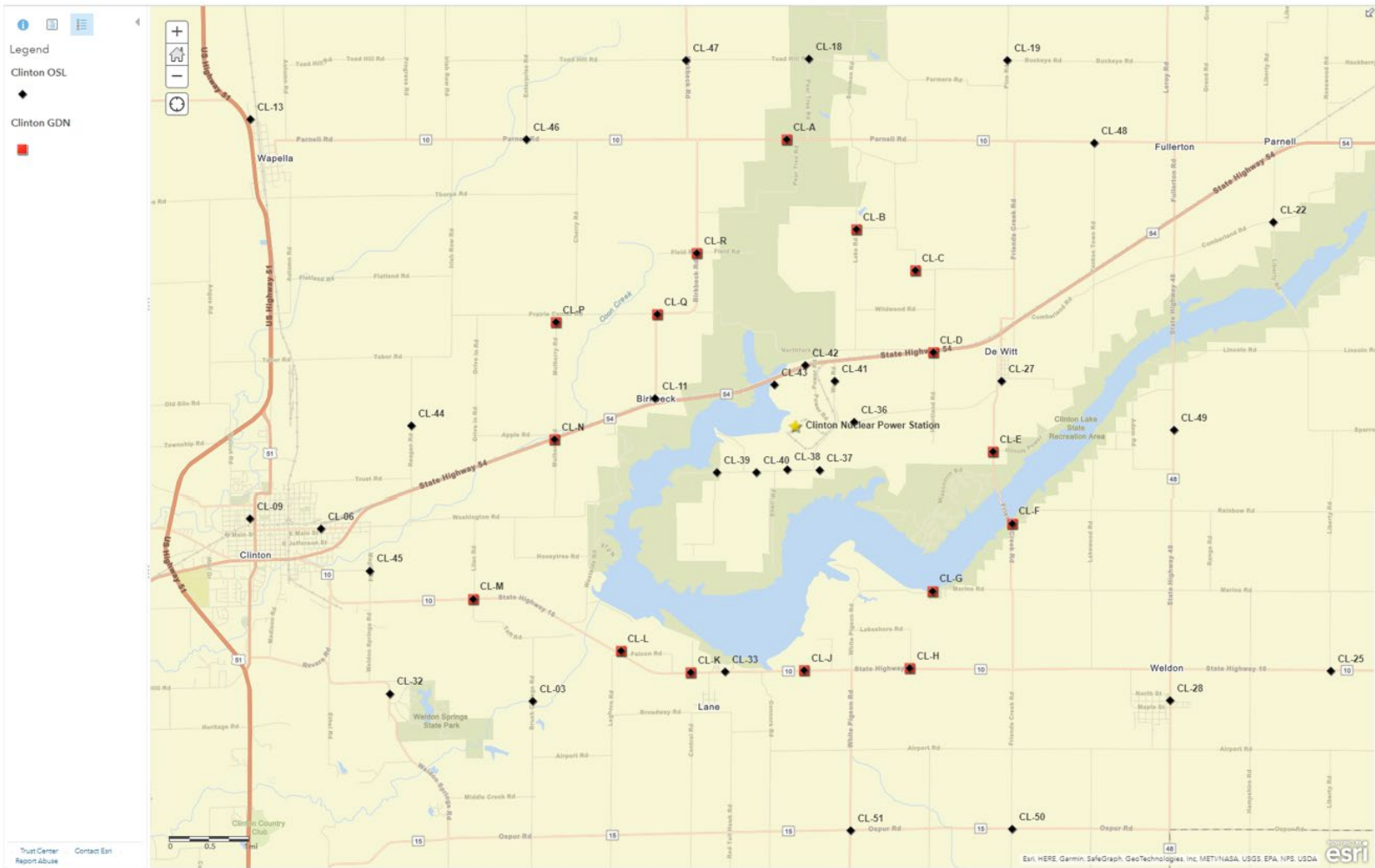
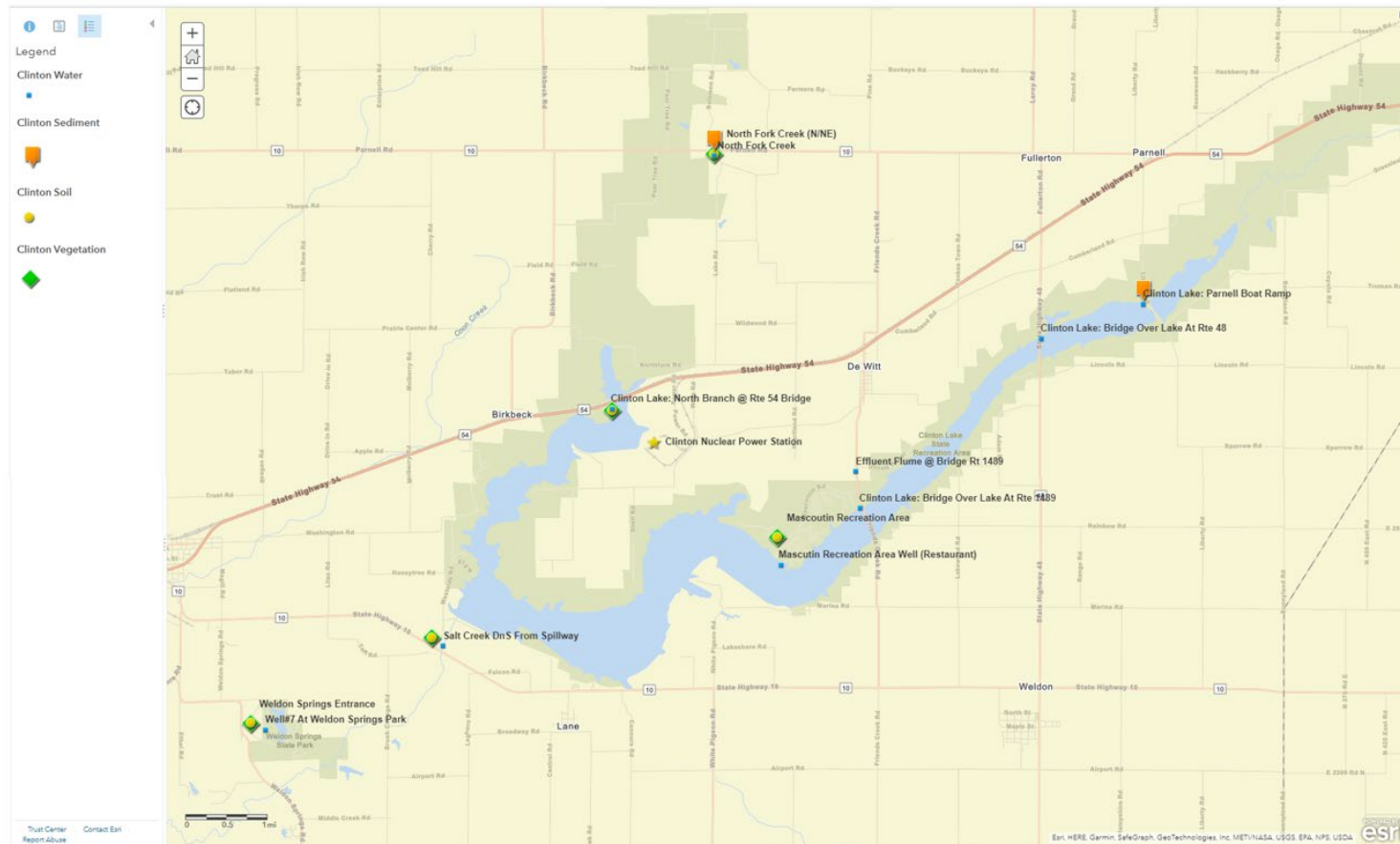


Figure 14. Environmental Sampling Locations - Clinton



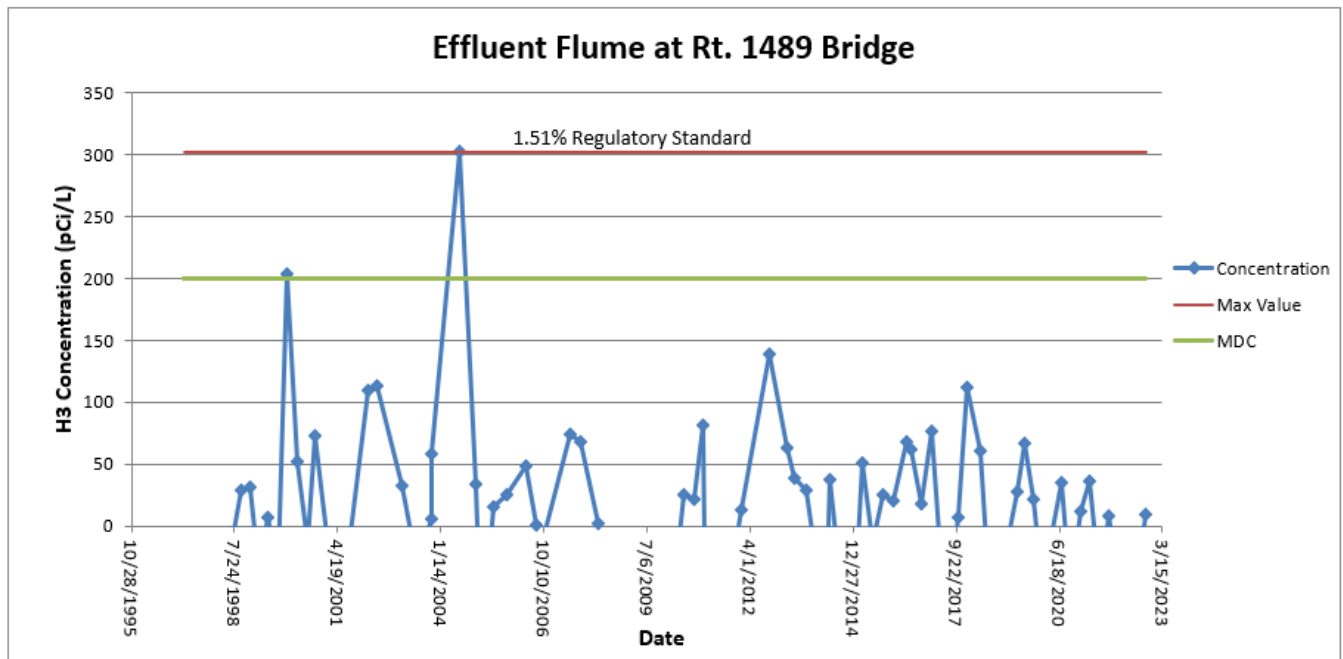
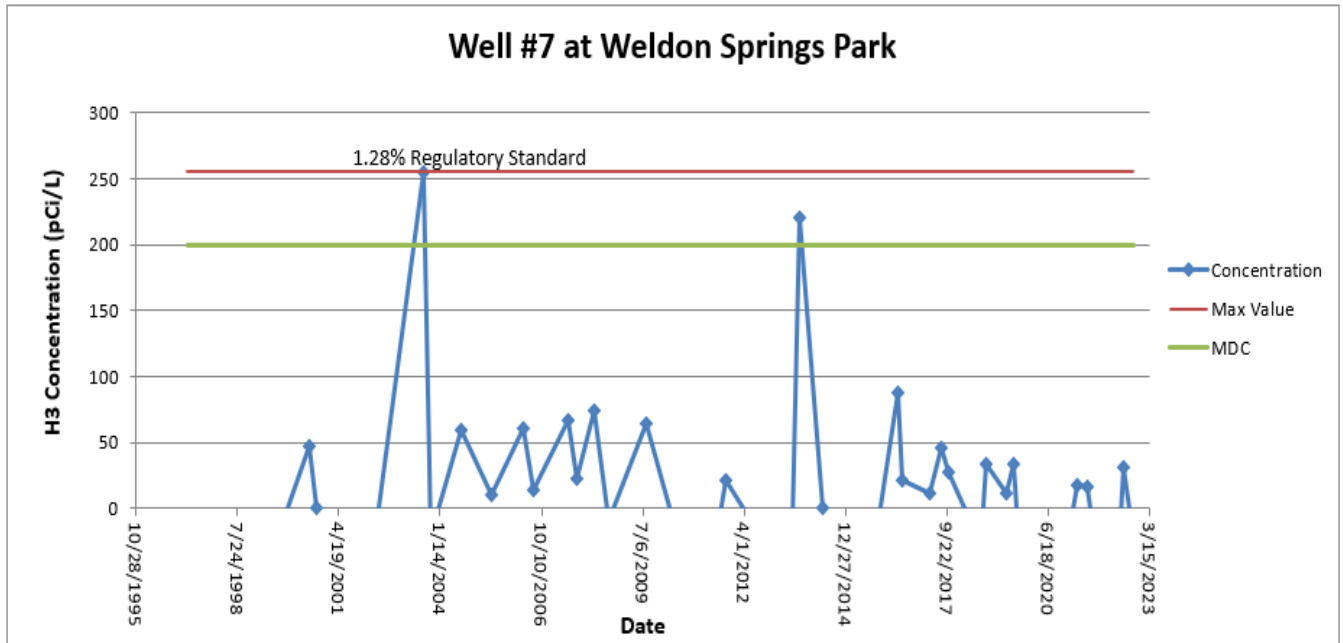
Clinton Sample Result Tables and Graphs

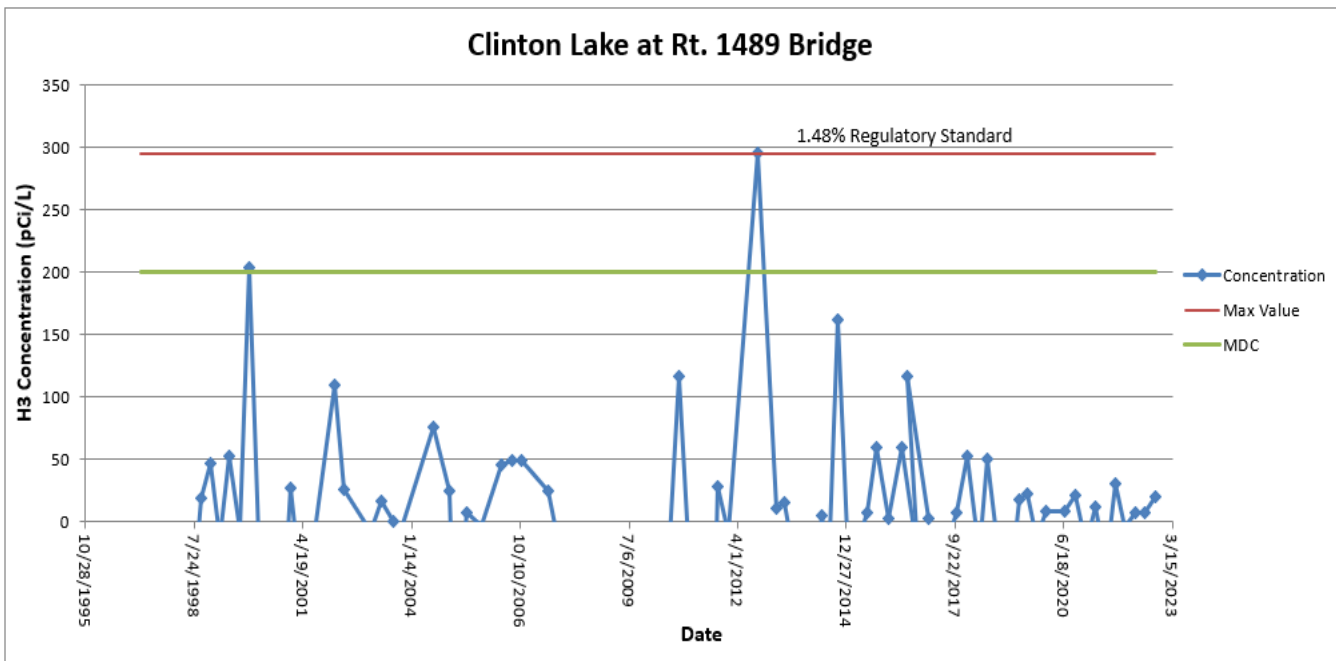
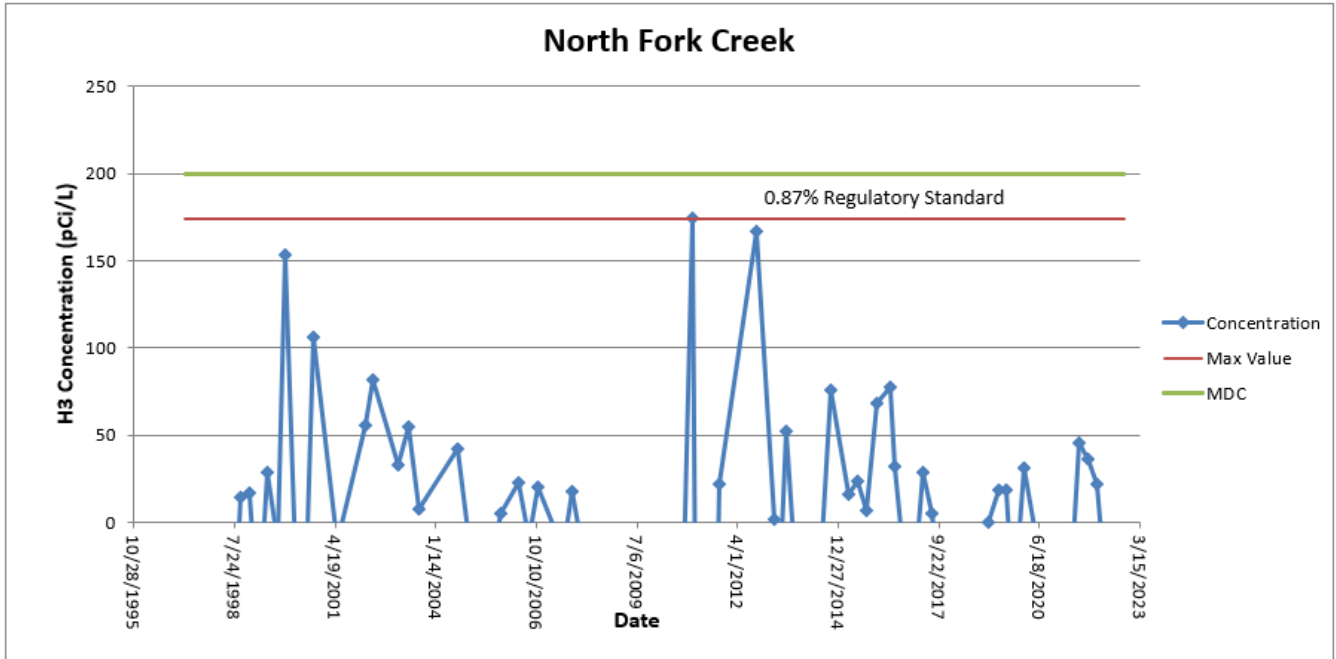
Tritium (H-3) in Water Results– Clinton
Results are in picocuries per liter (pCi/L)

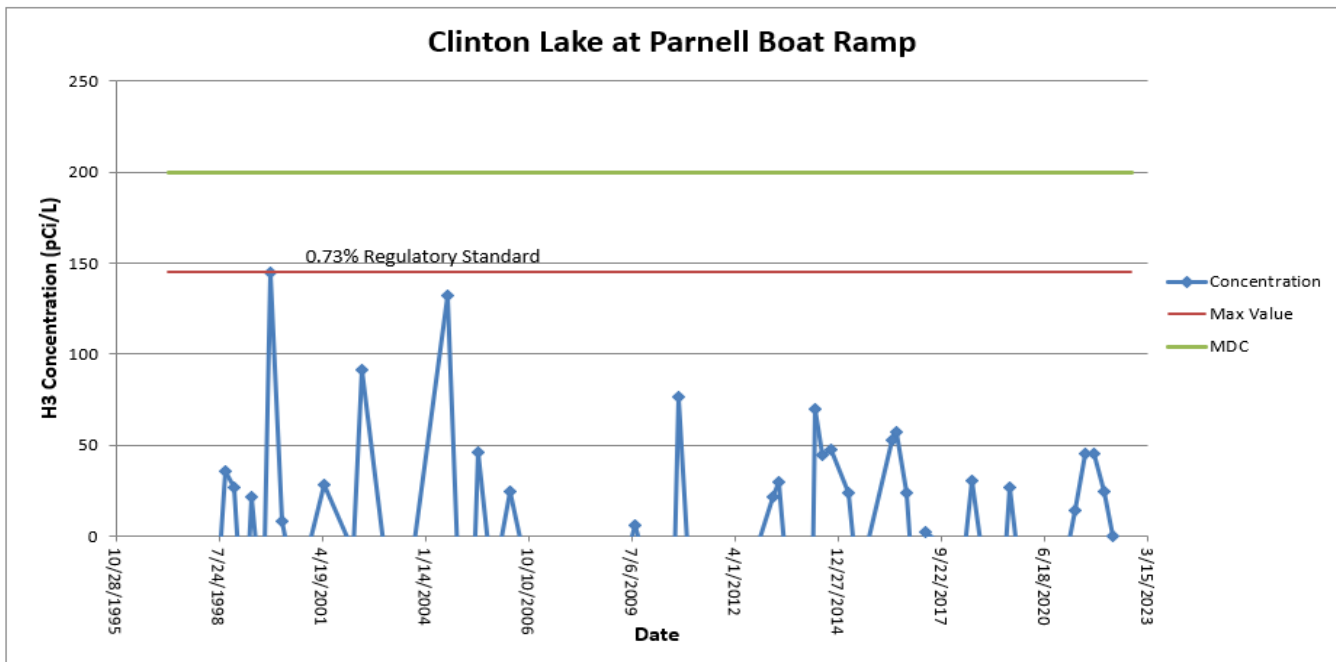
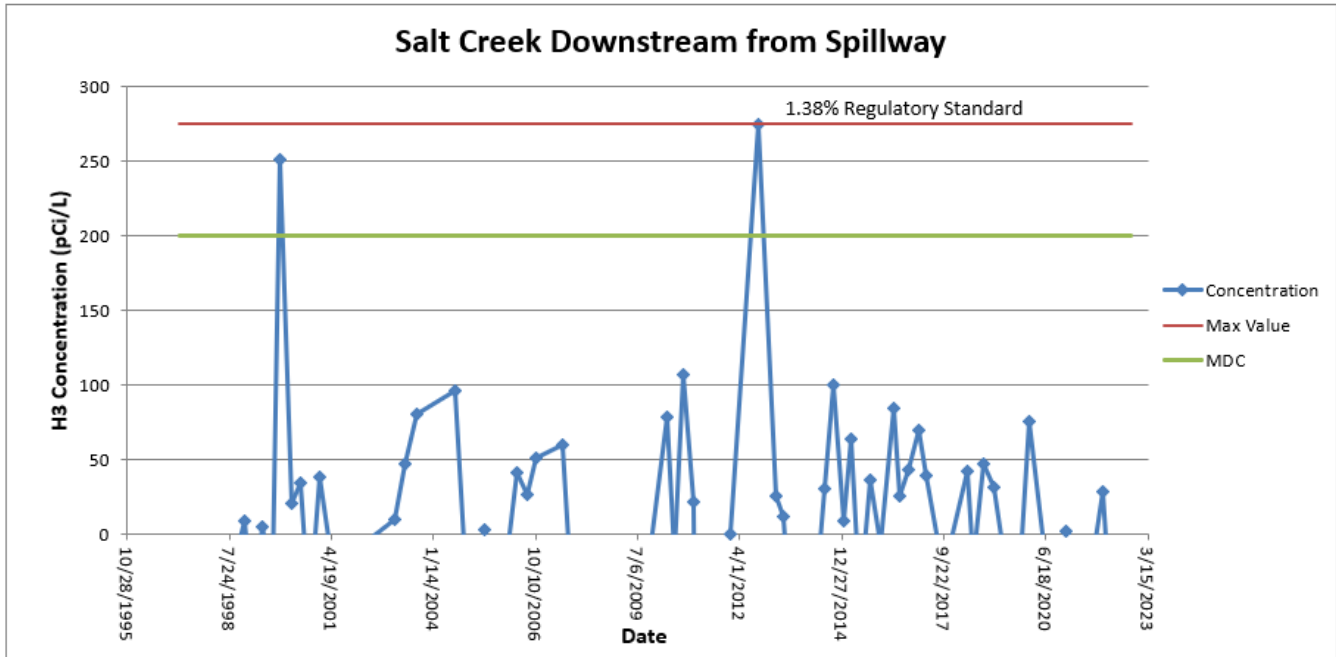
Location	H-3	
Date	Result	MDC
Bridge Over Lake at Rte 1489		
1/5/2022	<MDC	173
4/6/2022	<MDC	173
7/6/2022	<MDC	173
10/5/2022	<MDC	173
Bridge Over Lake at Rte 48		
1/5/2022	<MDC	173
4/6/2022	<MDC	173
7/6/2022	<MDC	173
10/5/2022	<MDC	173
Effluent Flume at Bridge Rt 1489		
1/5/2022	<MDC	173
4/6/2022	<MDC	173
7/6/2022	<MDC	173
10/5/2022	<MDC	173
Mascutin Recreation Area (Restaurant)		
7/6/2022	<MDC	173
10/5/2022	<MDC	173
North Branch at Rte 54 Bridge		
1/5/2022	<MDC	173
4/6/2022	<MDC	173
7/6/2022	<MDC	173
10/5/2022	<MDC	173

Location	H-3	
Date	Result	MDC
North Fork Creek		
1/5/2022	<MDC	173
4/6/2022	<MDC	173
7/6/2022	<MDC	173
10/5/2022	<MDC	173
Parnell Boat Ramp		
1/5/2022	<MDC	173
4/6/2022	<MDC	173
7/6/2022	<MDC	173
10/5/2022	<MDC	173
Salt Creek DnS from Spillway		
1/5/2022	<MDC	173
4/6/2022	<MDC	173
7/6/2022	<MDC	173
10/5/2022	<MDC	173
Well #7 at Weldon Springs Park		
4/6/2022	<MDC	173
7/6/2022	<MDC	173
10/5/2022	<MDC	173

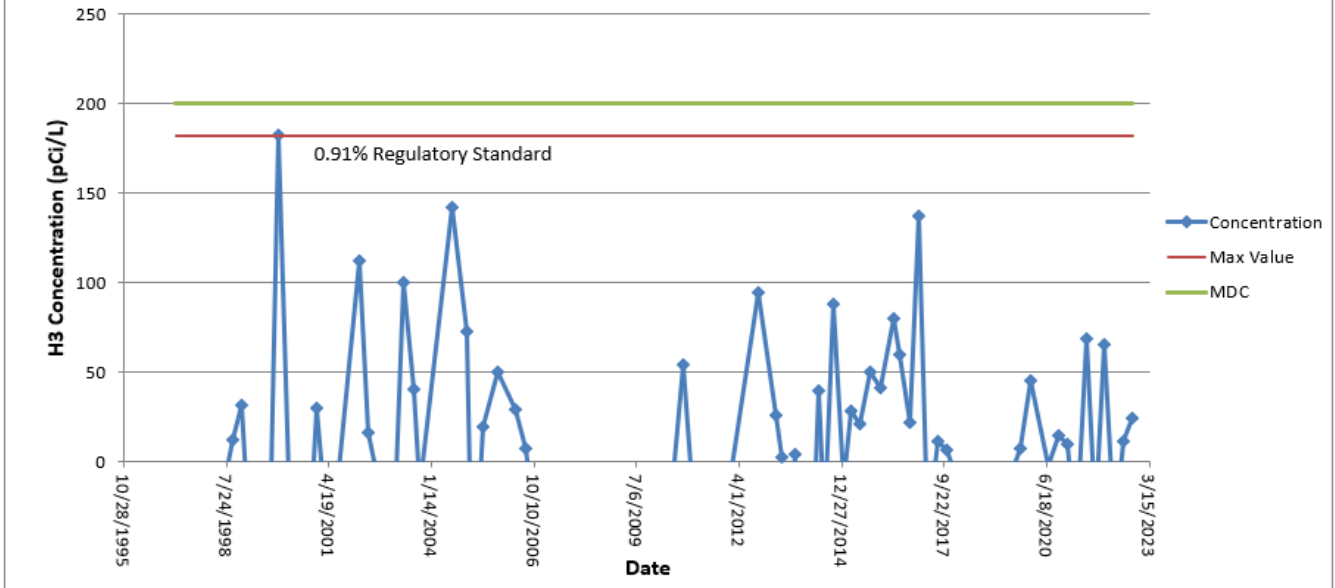
Trending Graphs for Tritium (H-3) in Water - Clinton
 (Max value compared to IEPA and US EPA Class regulatory standard of 20,000 pCi/L; MDC represented at 200 pCi/L to account for normal fluctuations)



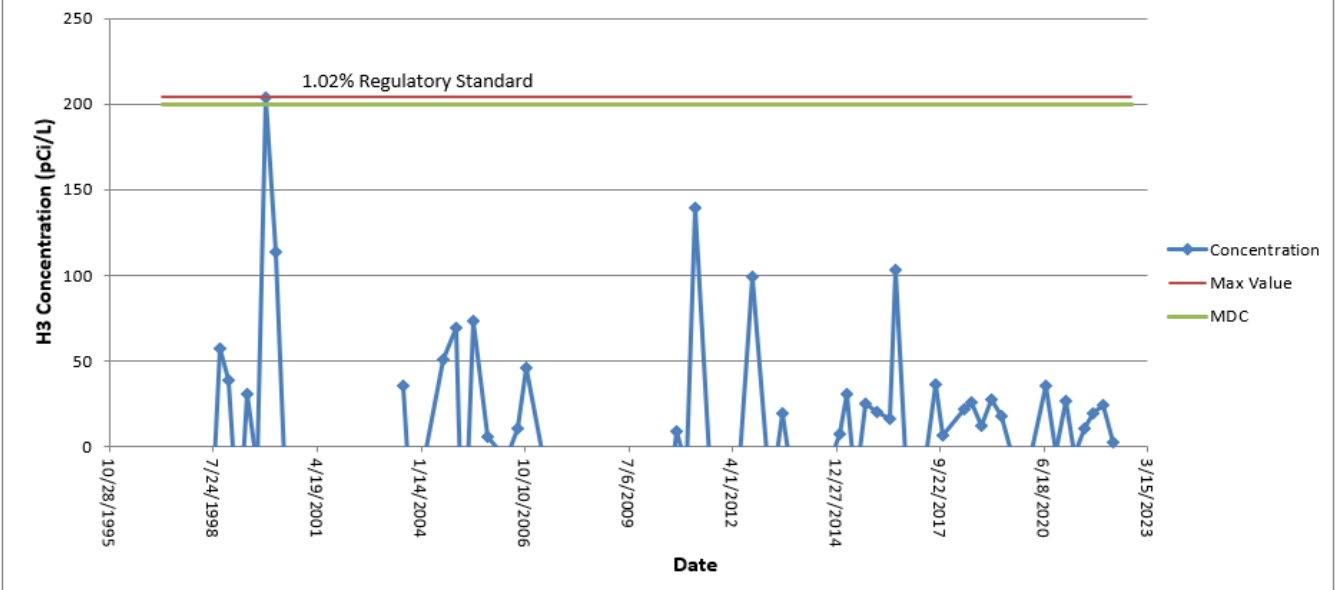


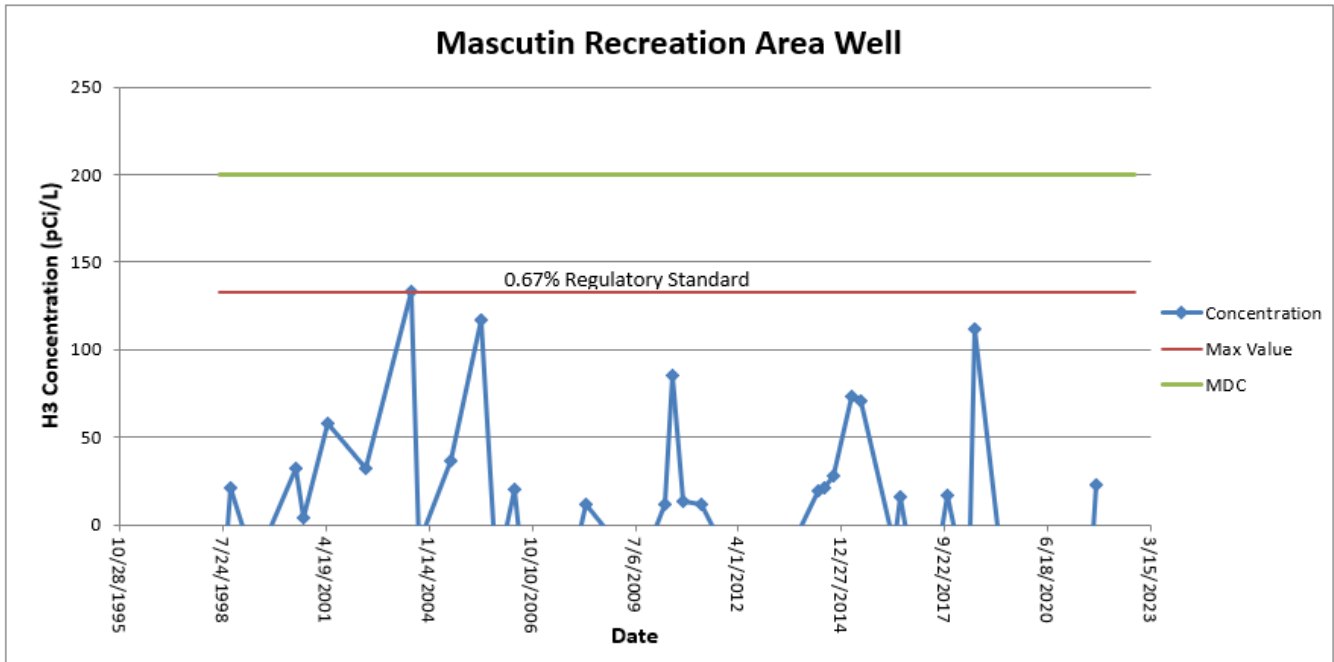


Clinton Lake at Rt. 48 Bridge



Clinton Lake North Branch at Rt. 54 Bridge





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

Location	Strontium	
Date	Result	MDC
Bridge Over Lake at Rte 48		
1/5/2022	<MDC	0.7
4/6/2022	<MDC	0.7
Effluent Flume at Bridge Rt 1489		
1/5/2022	<MDC	0.7

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

Location	Beta		Location	Beta	
Date	Result	MDC	Date	Result	MDC
Bridge Over Lake at Rte 1489			North Fork Creek		
1/5/2022	<MDC	3.6	1/5/2022	<MDC	3.6
4/6/2022	<MDC	3.6	4/6/2022	<MDC	3.6
7/6/2022	<MDC	3.6	7/6/2022	<MDC	3.6
10/5/2022	<MDC	3.6	10/5/2022	5.8	3.6
Bridge Over Lake at Rte 48			Parnell Boat Ramp		
1/5/2022	3.8	3.6	1/5/2022	<MDC	3.6
4/6/2022	<MDC	3.6	4/6/2022	<MDC	3.6
7/6/2022	<MDC	3.6	7/6/2022	<MDC	3.6
10/5/2022	<MDC	3.6	10/5/2022	<MDC	3.6
Effluent Flume at Bridge Rt 1489			Salt Creek DnS from Spillway		
1/5/2022	<MDC	3.6	1/5/2022	<MDC	3.6
4/6/2022	<MDC	3.6	4/6/2022	<MDC	3.6
7/6/2022	<MDC	3.6	7/6/2022	<MDC	3.6
10/5/2022	<MDC	3.6	10/5/2022	<MDC	3.6
Mascutin Recreation Area (Restaurant)			Well #7 at Weldon Springs Park		
7/6/2022	<MDC	3.6	4/6/2022	<MDC	3.6
10/5/2022	<MDC	3.6	7/6/2022	<MDC	3.6
North Branch at Rte 54 Bridge			10/5/2022	<MDC	3.6
1/5/2022	<MDC	3.6			
4/6/2022	<MDC	3.6			
7/6/2022	<MDC	3.6			
10/5/2022	<MDC	3.6			

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 Rte 1489																								
1/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
4/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
7/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
10/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
Bridge Over Lake at Rte 48																								
1/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
4/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
7/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
10/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
Effluent Flume at Bridge Rt 1489																								
1/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
4/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
7/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
10/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
Mascutin Recreation Area (Restaurant)																								
7/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
10/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
North Branch at Rte 54 Bridge																								
1/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
4/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
7/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
10/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6

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

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
North Fork Creek																								
1/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
4/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
7/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
10/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
Parnell Boat Ramp																								
1/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
4/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
7/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
10/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
Salt Creek DnS from Spillway																								
1/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
4/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
7/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
10/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
Well#7 at Weldon Springs Park																								
4/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
7/6/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6
10/5/2022	<MDC	15.7	<MDC	18.2	<MDC	3.1	<MDC	3.8	<MDC	3.7	<MDC	3.4	<MDC	6.2	<MDC	5.4	<MDC	3.3	<MDC	3.3	<MDC	6.5	<MDC	5.6

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																						
4/6/2022	<MDC	0.32	<MDC	0.19	<MDC	0.03	<MDC	0.04	<MDC	0.03	0.04	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.08	<MDC	0.07
7/6/2022	<MDC	0.32	<MDC	0.19	<MDC	0.03	<MDC	0.04	<MDC	0.03	<MDC	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.08	<MDC	0.07
North Branch at Rte 54 Bridge																						
4/6/2022	<MDC	0.32	<MDC	0.19	<MDC	0.03	<MDC	0.04	<MDC	0.03	<MDC	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.08	<MDC	0.07
7/6/2022	<MDC	0.32	<MDC	0.19	<MDC	0.03	<MDC	0.04	<MDC	0.03	<MDC	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.08	<MDC	0.07
North Fork Creek																						
4/6/2022	<MDC	0.32	<MDC	0.19	<MDC	0.03	<MDC	0.04	<MDC	0.03	<MDC	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.08	<MDC	0.07
7/6/2022	<MDC	0.32	<MDC	0.19	<MDC	0.03	<MDC	0.04	<MDC	0.03	<MDC	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.08	<MDC	0.07
Weldon Springs Entrance																						
4/6/2022	<MDC	0.32	<MDC	0.19	<MDC	0.03	<MDC	0.04	<MDC	0.03	0.08	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.08	<MDC	0.07
7/6/2022	<MDC	0.32	<MDC	0.19	<MDC	0.03	<MDC	0.04	<MDC	0.03	<MDC	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.08	<MDC	0.07

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																						
4/6/2022	<MDC	0.27	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.06	0.04	0.03	<MDC	0.08	<MDC	0.03	0.06	0.05	<MDC	0.10	<MDC	0.07
7/6/2022	<MDC	0.27	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.06	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.10	<MDC	0.07
North Branch at Rte 54 Bridge																						
4/6/2022	<MDC	0.27	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.06	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.10	<MDC	0.07
7/6/2022	<MDC	0.27	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.06	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.10	<MDC	0.07
North Fork Creek																						
4/6/2022	<MDC	0.27	<MDC	0.18	<MDC	0.03	<MDC	0.03	0.18	0.06	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.10	<MDC	0.07
7/6/2022	<MDC	0.27	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.06	0.04	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.10	<MDC	0.07
Weldon Springs Entrance																						
4/6/2022	<MDC	0.27	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.06	0.05	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.10	<MDC	0.07
7/6/2022	<MDC	0.27	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.06	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.10	<MDC	0.07

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																						
4/6/2022	<MDC	0.27	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.03	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.06
7/6/2022	<MDC	0.27	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.06
Parnell Boat Ramp																						
4/6/2022	<MDC	0.27	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.06
7/6/2022	<MDC	0.27	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.06

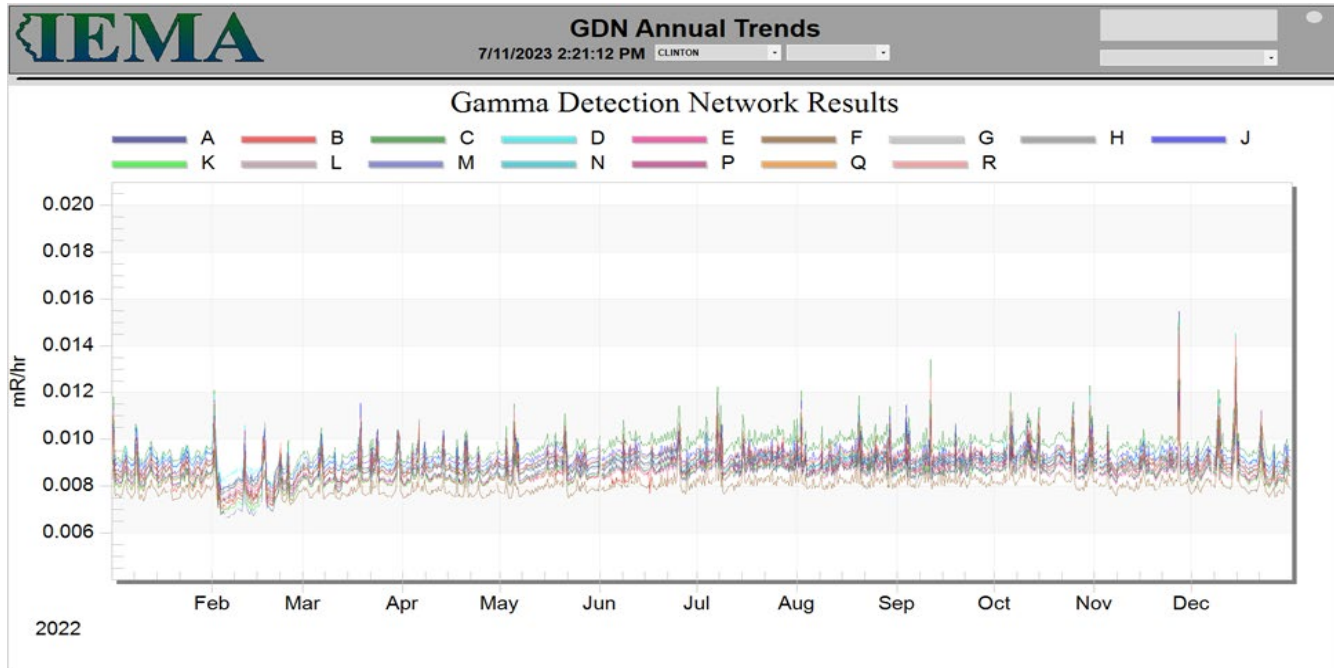
Gamma Spectroscopy Results for Radionuclides in Vegetation- Clinton
Results are in picocuries per gram (pCi/g)

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																										
7/6/2022	<MDC	5.2	<MDC	0.7	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	8.1	<MDC	0.1	<MDC	0.3	<MDC	0.4	<MDC	0.4		
North Branch at Rte 54 Bridge																										
4/6/2022	<MDC	5.2	<MDC	0.7	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	8.1	<MDC	0.1	<MDC	0.3	<MDC	0.4	<MDC	0.4		
7/6/2022	<MDC	5.2	<MDC	0.7	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	8.1	<MDC	0.1	<MDC	0.3	<MDC	0.4	<MDC	0.4		
North Fork Creek																										
7/6/2022	<MDC	5.2	<MDC	0.7	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	8.1	<MDC	0.1	<MDC	0.3	<MDC	0.4	<MDC	0.4		
Weldon Springs Entrance																										
4/6/2022	<MDC	5.2	<MDC	0.7	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	8.1	<MDC	0.1	<MDC	0.3	<MDC	0.4	<MDC	0.4		
7/6/2022	<MDC	5.2	<MDC	0.7	<MDC	0.2	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	8.1	<MDC	0.1	<MDC	0.3	<MDC	0.4	<MDC	0.4		

Gamma Spectroscopy Results for Radionuclides in Fish- Clinton
Results are in picocuries per kilogram (pCi/kg)

No fish samples collected in 2022 from Clinton Lake.

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
CL-01	10.0	8.3	11.5	8.2	38.0
CL-03	7.5	7.8	8.1	9.5	32.8
CL-06	6.7			8.9	31.2
CL-09	5.5	8.1	8.7	7.8	30.1
CL-11	8.1	9.7	12.3	10.6	40.7
CL-13	2.5	6.8	9.2	5.7	24.3
CL-16	11.9	12.6	10.4	12.4	47.2
CL-18	11.0	11.7	12.0	12.3	47.0
CL-19	7.9	9.9	10.9	12.1	40.9
CL-22	6.2	8.7	10.9	11.5	37.4
CL-25	7.7	10.9	14.0	14.3	46.9
CL-27	6.7	9.5	6.9	10.4	33.5
CL-28	8.5	11.7	12.5	12.7	45.4
CL-31	8.9	7.6	12.2	11.6	40.2
CL-32	8.5	11.1	10.7	9.4	39.6
CL-33	6.8	9.1	7.1	10.3	33.3
CL-36	7.1	9.7	8.2	12.0	37.0
CL-37	9.6	11.1	9.2	12.8	42.7
CL-38	8.4			11.0	38.8
CL-39	9.8	11.0		8.5	39.0
CL-40	7.8	13.3	8.0	11.6	40.8
CL-41	11.7	9.9	10.6	11.7	44.0
CL-42	9.6	9.5	8.6	14.2	41.8
CL-43	7.2	9.5	9.7	10.9	37.2

Summary of Ambient Gamma Results - Clinton (Continued)

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
CL-44	8.8	8.5	11.8	10.0	39.1
CL-45	8.5	10.4	11.3	9.1	39.3
CL-46	9.7	9.2	13.3	12.8	45.1
CL-47	9.3	11.5	13.0	11.2	45.1
CL-48	8.9	11.6	10.9	12.7	44.1
CL-49	11.7	11.1	10.2	11.0	44.0
CL-50	7.7	9.2	10.9	10.2	38.1
CL-51	11.2	11.9	11.7	11.1	46.0
CL-A	9.6	11.2	13.0	11.0	44.8
CL-B	9.3	9.8	9.7	8.7	37.5
CL-C	9.7	7.5	11.2	9.9	38.3
CL-D	11.7	8.8	10.0	11.5	42.0
CL-E	8.2	11.1	11.6	10.3	41.1
CL-F	6.1	10.7	7.7	9.8	34.3
CL-G	7.7	8.4	8.5	10.4	35.0
CL-H	9.9	14.1	8.9	11.3	44.1
CL-J	9.4	13.2	8.4	12.9	43.9
CL-K	8.5	10.1	10.2	9.1	37.9
CL-L	9.4	11.4	10.7	12.0	43.6
CL-M	8.8	9.2	7.9	9.9	35.8
CL-N	10.5	10.0	10.1	8.2	38.7
CL-P	8.5	11.0	12.8	11.7	43.9
CL-Q	6.9	8.7	10.5	12.9	39.0
CL-R	8.9	11.4	9.7	11.1	41.1

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 Constellation Energy 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 Illinois River in accordance to release limits governed by the station's license with the NRC and the station's IEPA NPDES permit. No liquid effluents were discharged in 2022.

Figures 15 through 17 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 15 is the Braidwood NPS.

Significant Events or Changes for 2022

No significant events or changes for 2022.

Sampling and Monitoring Results

Water Sampling Results

Detectable levels of tritium were found in surface water samples taken from the Illinois River at the Dresden Lock and Dam and Illinois River at Morris. The elevated levels are likely attributable to liquid effluent releases from the Braidwood Station. All tritium levels were well below the Drinking Water Standards established by the US EPA and IEPA.

Results from gross beta analysis indicate that the established MDC was met at most surface water sampling locations. Concentrations above MDC are historically found in background samples collected. The concentrations seen at many of the surface water sampling locations for the Dresden NPS were consistent with historical background levels. However, concentrations found at some locations were above typical background levels and can likely be attributed to the routine liquid effluent releases from the Braidwood station. All sample results for gross beta remained well below the established US EPA and IEPA standards. Gross beta results for groundwater samples collected from a well located at the Dresden Lock and Dam were also above the established MDC. However, it is not unusual to see elevated gross beta results in groundwater samples due to the presence of dissolved naturally occurring radionuclides.

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

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

Soil Sampling Results

Cesium-137 in concentrations greater than the established MDC was detected but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing and with concentrations found at background sampling locations. All other gamma spectroscopy results for soil samples were below the established MDC.

Sediment Sampling Results

Cesium-137 in concentrations equal to the established MDC was detected but was consistent with sediment concentrations historically found from atmospheric nuclear weapons testing and with concentrations found at background sampling locations. All other gamma spectroscopy results for sediment samples were below 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 from deployed OSLs were comparable to historical data and to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois.

GDN network results were consistent with historical data.

Dresden Maps of Monitoring and Sampling Locations

Figure 15. OSL and GDN Monitoring Locations - Dresden

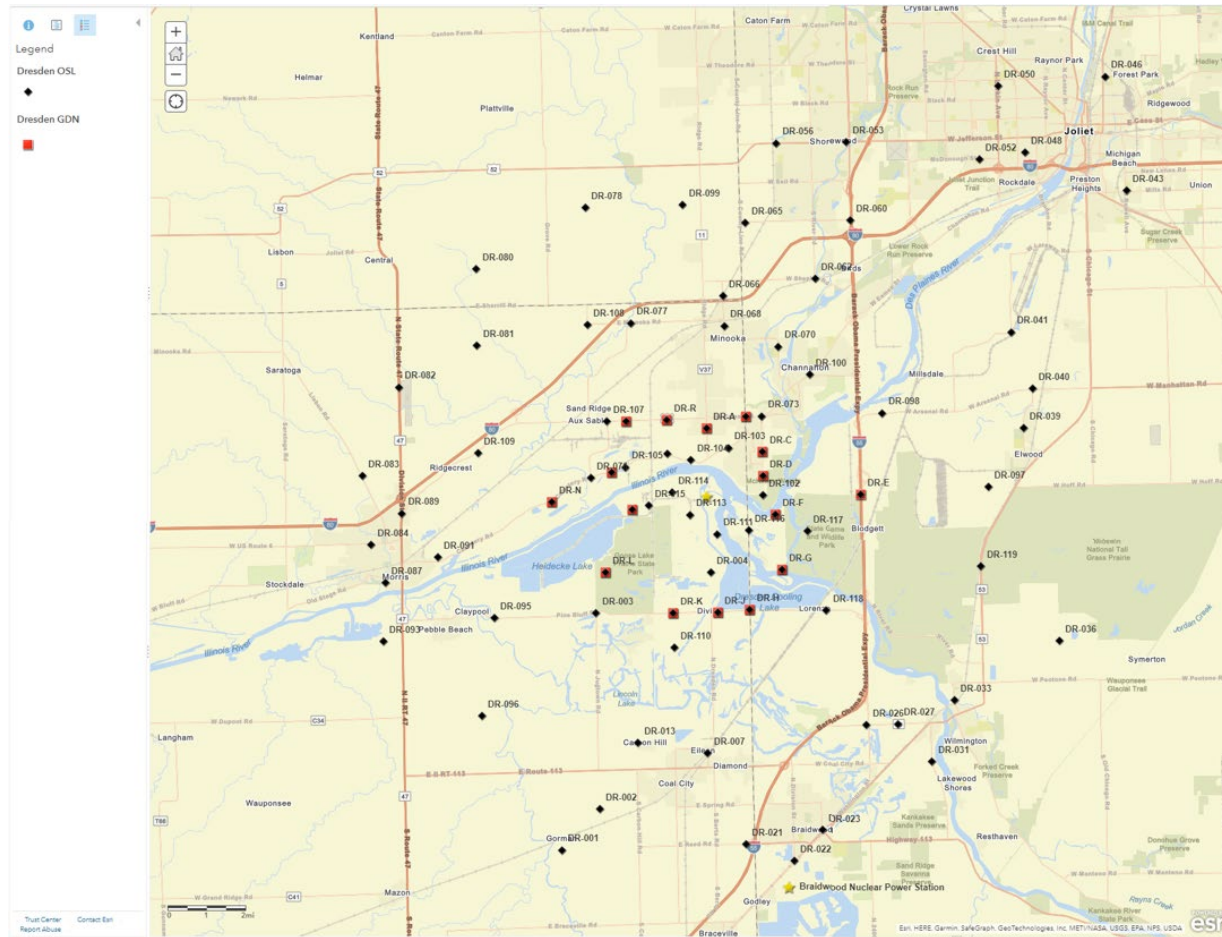


Figure 16. OSL and GDN Monitoring Locations - Dresden (continued)

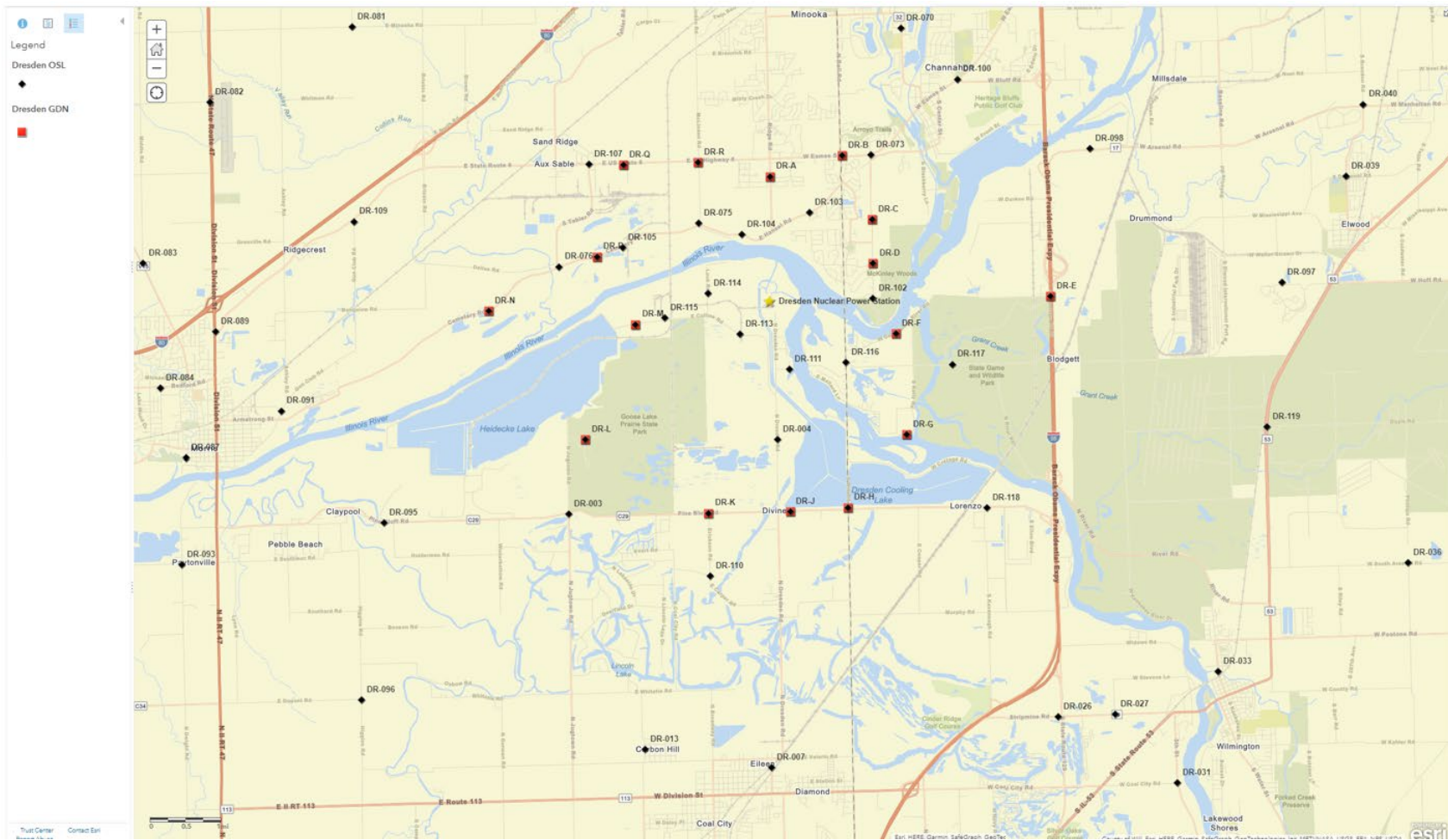
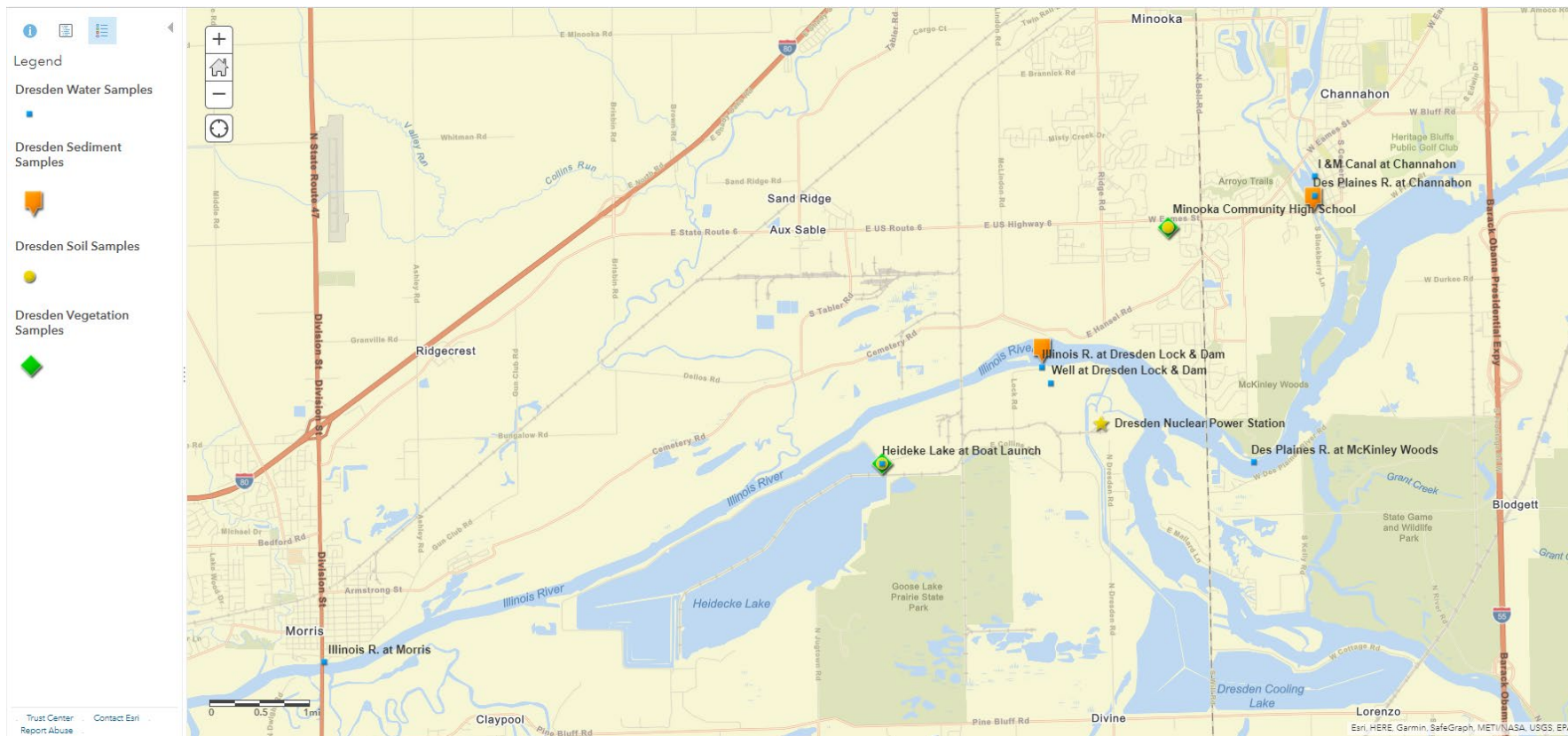


Figure 17. Environmental Sampling Locations - Dresden

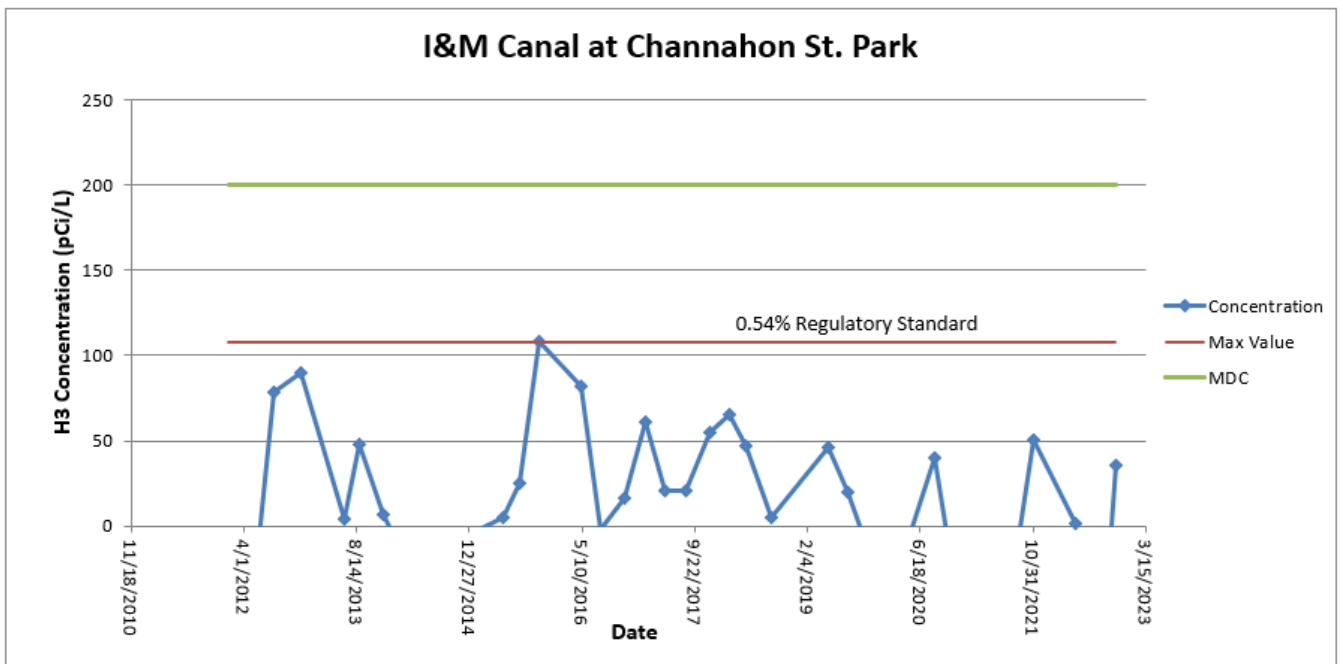
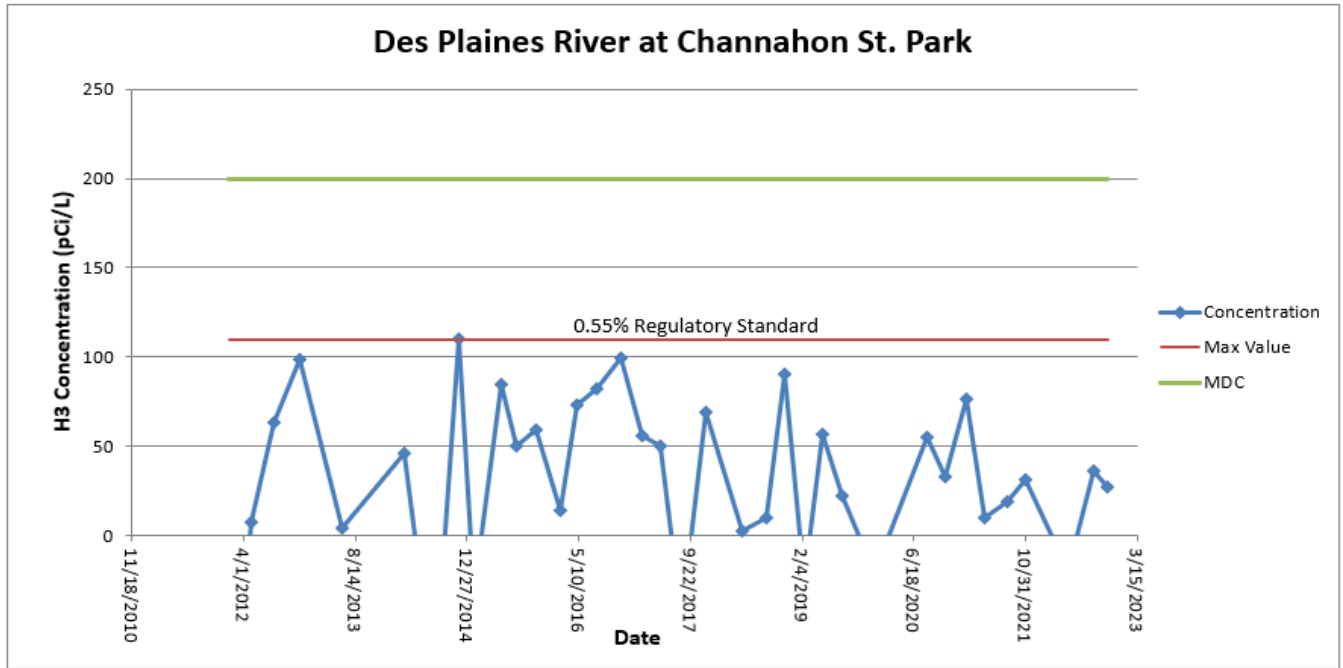


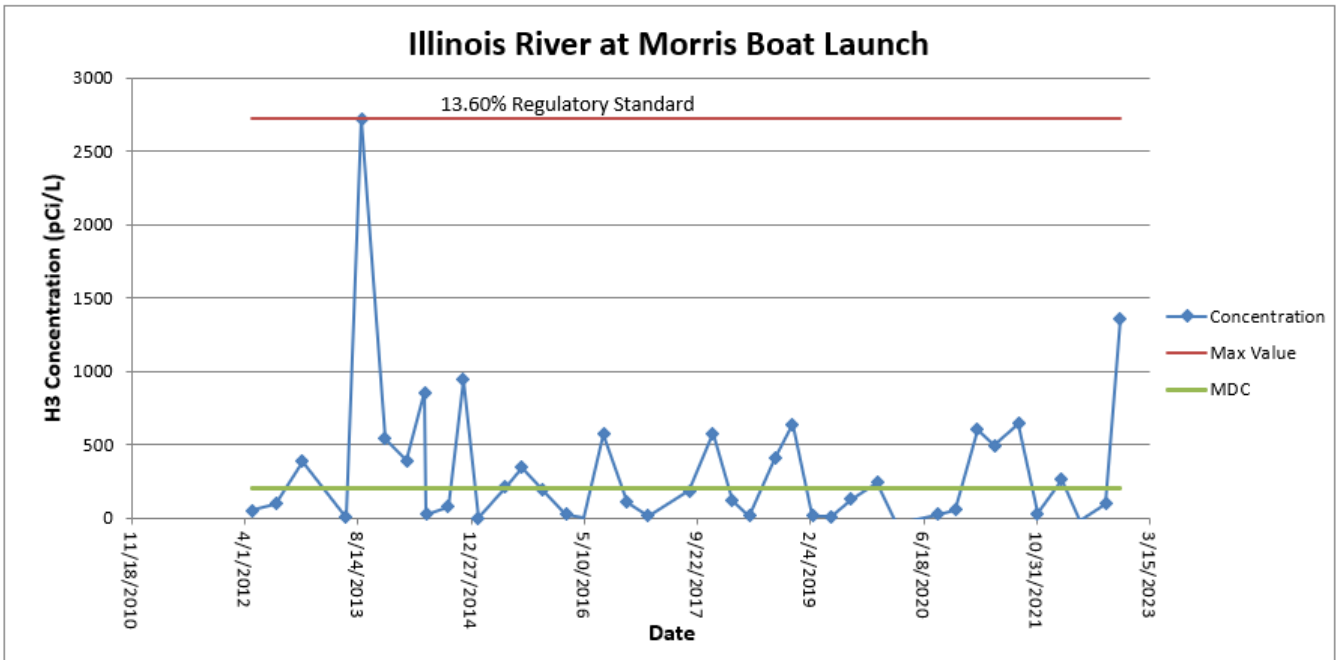
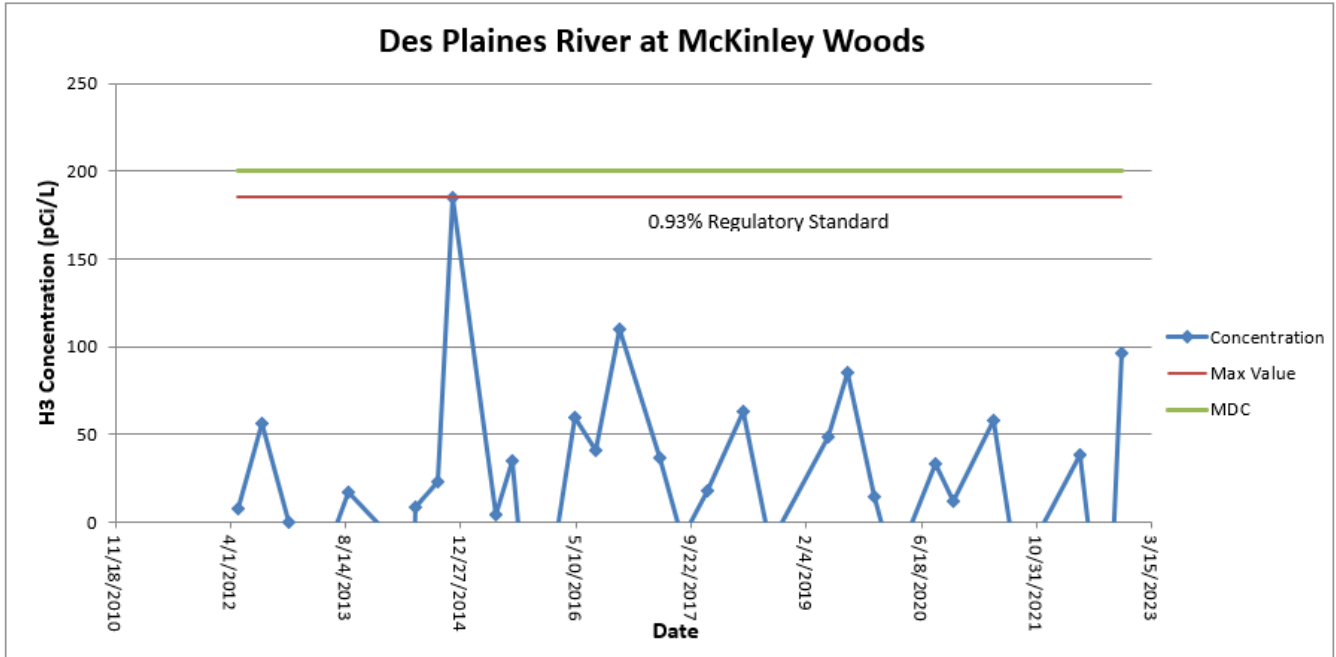
Dresden Sample Result Tables and Graphs

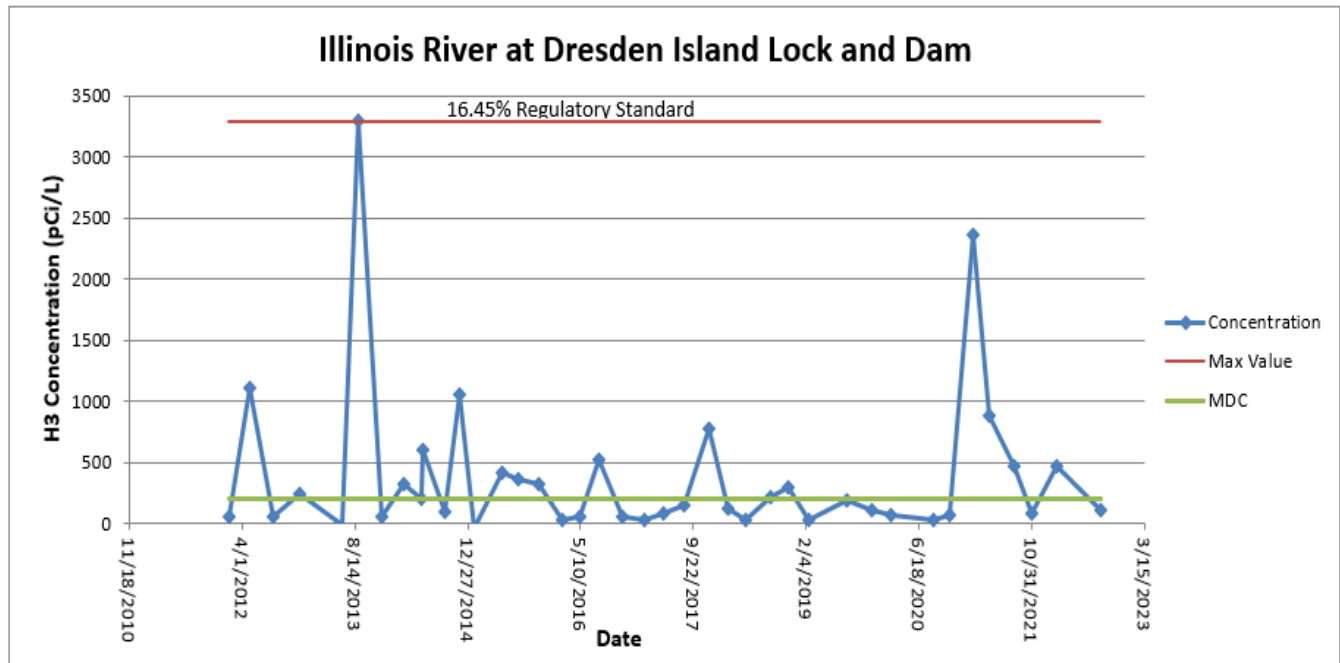
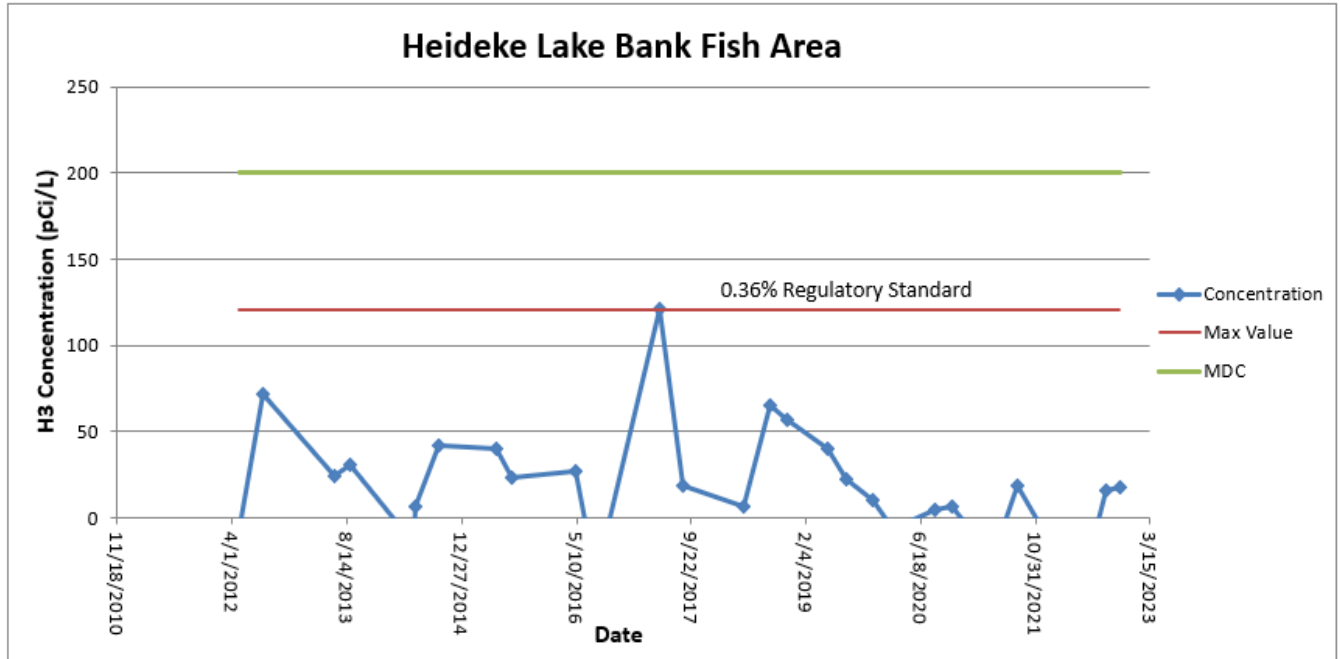
Tritium (H-3) in Water - Dresden
Results are in picocuries per liter (pCi/L)

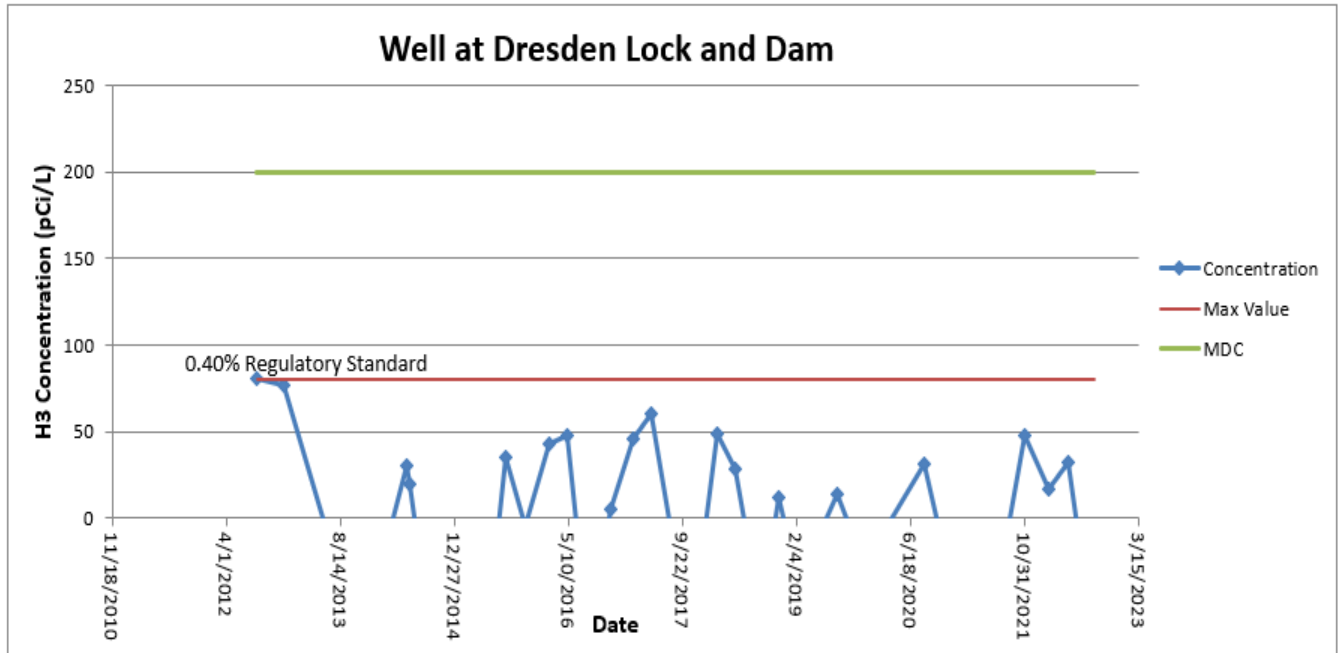
Location	H-3	
Date	Result	MDC
Des Plaines R. at Channahon		
5/10/2022	<MDC	173
8/31/2022	<MDC	173
11/2/2022	<MDC	173
Des Plaines R. at McKinley Woods		
5/10/2022	<MDC	173
8/31/2022	<MDC	173
11/2/2022	<MDC	173
Heideke Lake		
5/10/2022	<MDC	173
8/31/2022	<MDC	173
I & M Canal at Channahon		
5/10/2022	<MDC	173
8/31/2022	<MDC	173
11/2/2022	<MDC	173
Illinois R. at Dresden Lock & Dam		
2/16/2022	469	173
8/31/2022	<MDC	173
Illinois R. at Morris		
2/16/2022	262	173
5/10/2022	<MDC	173
8/31/2022	<MDC	173
11/2/2022	1360	173
Well at Dresden Lock & Dam		
2/16/2022	<MDC	173
5/10/2022	<MDC	173
8/31/2022	<MDC	173

Trending Graphs for Tritium (H-3) in Water - Dresden Area
 (Max value compared to IEPA and US EPA Class regulatory standard of 20,000 pCi/L; MDC represented at 200 pCi/L to account for normal fluctuations)









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

Location	Strontium	
	Date	Result MDC
Bridge Over Lake At Rte 48		
5/10/2022	<MDC	0.6

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

Location	Beta	
Date	Result	MDC
Des Plaines R. at Channahon		
5/10/2022	<MDC	4.3
8/31/2022	<MDC	4.3
11/2/2022	7.0	4.3
Des Plaines R. at McKinley Woods		
5/10/2022	<MDC	4.3
8/31/2022	8.8	4.3
11/2/2022	6.3	4.3
Heideke Lake		
5/10/2022	<MDC	4.3
8/31/2022	<MDC	4.3
11/2/2022	4.5	4.3
I & M Canal at Channahon		
5/10/2022	<MDC	4.3
8/31/2022	<MDC	4.3
11/2/2022	<MDC	4.3
Illinois R. at Dresden Lock & Dam		
2/16/2022	<MDC	4.3
8/31/2022	5.2	4.3
Illinois R. at Morris		
2/16/2022	5.0	4.3
5/10/2022	<MDC	4.3
8/31/2022	5.7	4.3
11/2/2022	6.4	4.3
Well at Dresden Lock & Dam		
2/16/2022	18.8	4.3
5/10/2022	14.5	4.3
8/31/2022	17.2	4.3

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. at Channahon																								
5/10/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
8/31/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
11/2/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
Des Plaines R. at McKinley Woods																								
5/10/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
8/31/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
11/2/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
Heideke Lake																								
5/10/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
8/31/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
11/2/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
I & M Canal at Channahon																								
5/10/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
8/31/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
11/2/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
Illinois R. at Dresden Lock & Dam																								
2/16/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
8/31/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
Illinois R. at Morris																								
2/16/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
5/10/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
8/31/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
11/2/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
Well at Dresden Lock & Dam																								
2/16/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
5/10/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5
8/31/2022	<MDC	14.3	<MDC	17.9	<MDC	3.1	<MDC	3.5	<MDC	3.4	<MDC	3.2	<MDC	6.2	<MDC	5.5	<MDC	3.3	<MDC	3.4	<MDC	6.0	<MDC	5.5

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	MDC	
Heideke Lake																								
5/10/2022	<MDC	0.51	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.10	0.03	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.06	<MDC	0.06	<MDC	0.06
8/31/2022	<MDC	0.51	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.09	0.03	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.06	<MDC	0.06	<MDC	0.06
Minooka Comm HS																								
5/10/2022	<MDC	0.51	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.06	<MDC	0.06	<MDC	0.06
8/31/2022	<MDC	0.51	<MDC	0.14	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.06	<MDC	0.06	<MDC	0.06

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	MDC	
Heideke Lake																								
5/10/2022	<MDC	0.50	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.09	0.03	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.06	<MDC	0.06
8/31/2022	<MDC	0.50	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.08	0.03	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.06	<MDC	0.06
Minooka Comm HS																								
5/10/2022	<MDC	0.50	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.06	<MDC	0.06
8/31/2022	<MDC	0.50	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.06	<MDC	0.06

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
Des Plaines R. at Channahon																						
5/10/2022	<MDC	0.64	<MDC	0.10	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.07	<MDC	0.02	<MDC	0.05	<MDC	0.04	<MDC	0.05
8/31/2022	<MDC	0.64	<MDC	0.10	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.07	<MDC	0.02	<MDC	0.05	<MDC	0.04	<MDC	0.05
Illinois R. at Dresden Lock & Dam																						
8/31/2022	<MDC	0.64	<MDC	0.10	<MDC	0.02	<MDC	0.02	<MDC	0.01	0.02	0.02	<MDC	0.07	<MDC	0.02	<MDC	0.05	<MDC	0.04	<MDC	0.05

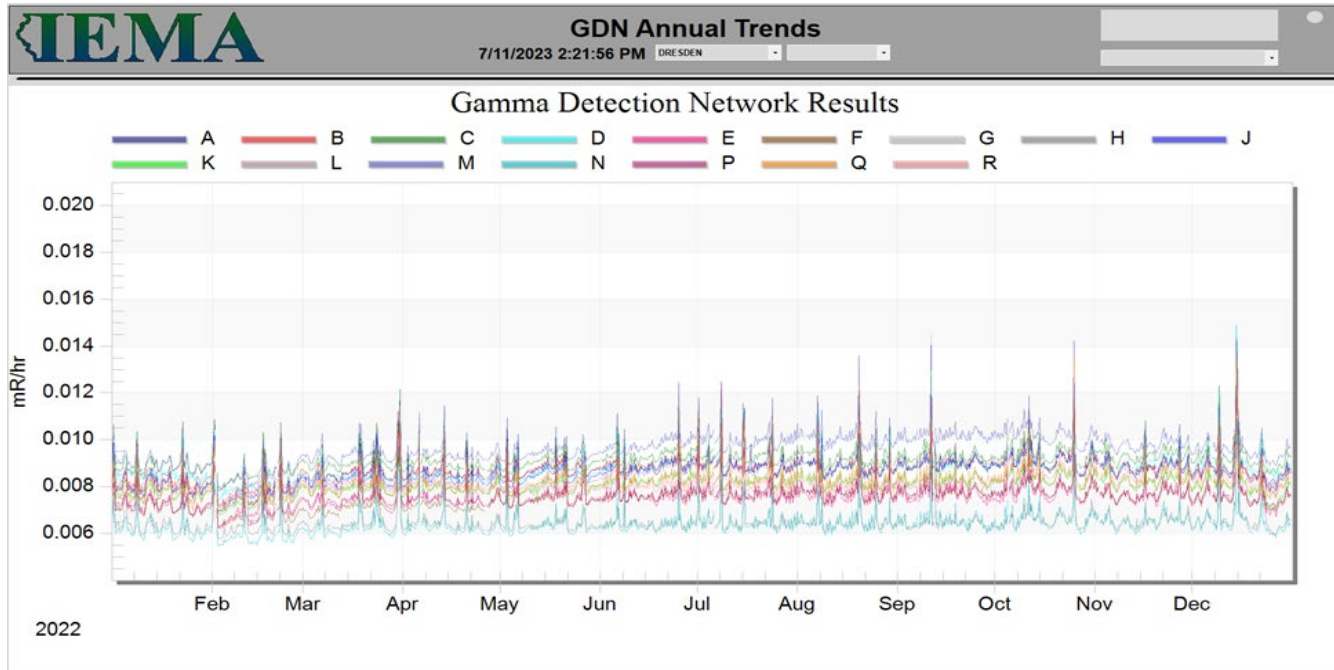
Gamma Spectroscopy Results for Radionuclides in Vegetation - Dresden
Results are in picocuries per gram (pCi/g)

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																								
5/10/2022	<MDC	2.75	<MDC	0.37	<MDC	0.11	<MDC	0.08	<MDC	0.09	<MDC	0.08	<MDC	0.30	<MDC	3.40	<MDC	0.09	<MDC	0.19	<MDC	0.18	<MDC	0.22
8/31/2022	<MDC	2.75	<MDC	0.37	<MDC	0.11	<MDC	0.08	<MDC	0.09	<MDC	0.08	<MDC	0.30	<MDC	3.40	<MDC	0.09	<MDC	0.19	<MDC	0.18	<MDC	0.22
Minooka Comm HS																								
5/10/2022	<MDC	2.75	<MDC	0.37	<MDC	0.11	<MDC	0.08	<MDC	0.09	<MDC	0.08	<MDC	0.30	<MDC	3.40	<MDC	0.09	<MDC	0.19	<MDC	0.18	<MDC	0.22
8/31/2022	<MDC	2.75	<MDC	0.37	<MDC	0.11	<MDC	0.08	<MDC	0.09	<MDC	0.08	<MDC	0.30	<MDC	3.40	<MDC	0.09	<MDC	0.19	<MDC	0.18	<MDC	0.22

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	
Illinois River (Top Feeder)																								
7/14/2022	<MDC	7700	<MDC	169	<MDC	111	<MDC	68	<MDC	53	<MDC	59	<MDC	400	<MDC	15500	<MDC	71	<MDC	222	<MDC	192	<MDC	225
Illinois River (Bottom Feeder)																								
7/14/2022	<MDC	7700	<MDC	169	<MDC	111	<MDC	68	<MDC	53	<MDC	59	<MDC	400	<MDC	15500	<MDC	71	<MDC	222	<MDC	192	<MDC	225

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



Summary of Ambient Gamma Results - Dresden

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Exposure
Location	mR/quarter	mR/quarter	mR/quarter	mR/quarter	mR/year
DR-001	7.1	4.7	5.7	8.7	26.2
DR-002	7.7	7.3	5.6	8.4	29.0
DR-003	7.0	7.4	7.9	10.0	32.3
DR-004	9.3	4.5	8.6	9.0	31.4
DR-007	7.6	5.2	8.3	9.1	30.2
DR-013	10.7	4.6	7.5	9.7	32.4
DR-021	7.9	5.2	5.8	8.2	27.1
DR-022	7.6	5.7	7.1	9.4	29.7
DR-023	8.1	6.3	5.3	8.9	28.6
DR-026	7.2		4.7	8.4	27.0
DR-027	10.8	3.9	5.2	8.8	28.7
DR-031	0.0	5.7	6.2	9.7	28.8
DR-033	6.2			7.2	26.8
DR-036	7.8	4.8	9.0	10.0	31.6
DR-039			8.0	9.6	35.3
DR-040	9.1	8.2	9.3	9.5	36.2
DR-041	0.0	4.7	7.4	10.7	30.4
DR-043	10.0	8.0	9.5	10.9	38.4
DR-046	8.1	3.7	7.7	8.7	28.3
DR-048	9.3	9.7	9.9	10.7	39.5
DR-050	6.9	3.9	7.6	8.2	26.6
DR-052	12.4	7.0	9.5		38.5
DR-053		4.8	4.8	7.1	22.4
DR-056	10.0		10.2	14.7	46.6
DR-060	8.9	5.4	7.7	8.7	30.7
DR-062	8.9		6.6	10.5	34.6
DR-065	11.3	7.6	11.4	13.8	44.1
DR-066	7.5	4.6	7.5	7.8	27.4
DR-068	8.5	5.1	8.1	8.3	30.0
DR-070	8.6	5.5	9.2	9.0	32.2
DR-073		6.6	10.7	12.3	39.3
DR-075	8.2	6.2	7.4	12.7	34.4
DR-076	7.2	2.3	6.7	7.8	24.0

Summary of Ambient Gamma Results – Dresden (Continued)

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Exposure
Location	mR/quarter	mR/quarter	mR/quarter	mR/quarter	mR/year
DR-077	7.9	6.9	6.8	8.9	30.5
DR-078	10.9	8.4	8.6	11.1	39.1
DR-080	10.7	8.5	11.3	14.9	45.4
DR-081	9.1		9.2	15.2	44.6
DR-082	10.9	8.2			38.3
DR-083	9.3	3.5	7.8	8.7	29.4
DR-084	11.1	7.4	6.5	10.8	35.7
DR-087	10.2	5.1	8.6	9.5	33.4
DR-089	8.0	5.1	8.2	7.0	28.4
DR-091	9.2	7.0	6.6	9.4	32.2
DR-093	8.2	7.3	8.8	9.4	33.7
DR-095	8.7	7.0	8.6	9.8	34.0
DR-096	10.3	4.9	7.2	11.0	33.5
DR-097				11.3	45.1
DR-098	8.5	5.6	8.4	9.9	32.4
DR-099	12.0	10.0	11.3	13.0	46.4
DR-100	9.8	8.9	8.3	8.5	35.5
DR-102	9.2	4.7	10.9	12.7	37.4
DR-103	10.5	9.8	9.2	12.3	41.8
DR-104	12.2	4.7	11.5	11.0	39.4
DR-105	7.6	6.2	5.6	8.5	27.9
DR-107	7.0	5.7	7.9	8.6	29.2
DR-108	10.2	7.3	11.6	10.6	39.7
DR-109	8.6	7.5	13.0	9.7	38.7
DR-110	7.9	3.3	6.7	7.7	25.6
DR-111	7.4	4.4	5.5	9.2	26.5
DR-113	10.2	8.4	10.7	10.9	40.3
DR-114	9.2	10.2	11.1	12.3	42.9
DR-115	10.1	10.3	8.9	11.7	41.0
DR-116	6.5	5.3	6.9	9.2	27.9
DR-117	9.3	8.1	10.8	10.3	38.5
DR-118	7.3		6.7		28.1
DR-119	9.0	6.2	8.8	11.7	35.8

Summary of Ambient Gamma Results – Dresden (Continued)

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Exposure
Location	mR/quarter	mR/quarter	mR/quarter	mR/quarter	mR/year
DR-A	9.9	7.5	10.6	9.1	37.1
DR-B	7.8		10.0	9.3	36.1
DR-C	11.7	10.3	10.0	11.1	43.0
DR-D	11.1	11.2	10.3	15.8	48.3
DR-E	9.7	6.1	8.8	9.2	33.8
DR-F	8.2	6.5	7.1	9.2	31.0
DR-G	9.7	6.1	9.2	9.0	34.0
DR-H	6.6	3.1	6.2	7.6	23.5
DR-J	9.5	6.7	8.3	9.9	34.5
DR-K	5.2	5.7	7.5	9.0	27.4
DR-L	8.2	6.0	7.7	9.4	31.3
DR-M	11.1	9.5	12.1	13.8	46.5
DR-N	6.6	6.5	7.0	8.3	28.5
DR-P	8.5	5.8	7.4	12.3	34.0
DR-Q	8.0	6.0	8.2	9.8	32.0
DR-R	11.3	7.6	8.8	11.1	38.7

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.

LaSalle Nuclear Power Station

The LaSalle NPS, consisting of two 3,546 Megawatt BWRs, is owned and operated by Constellation Energy 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 NPDES 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 2022.

Figures 18-20 provide an overview of all sampling and monitoring locations in the vicinity of the LaSalle NPS (yellow star).

Significant Events or Changes for 2022

No significant events or changes for 2022.

Sampling and Monitoring Results

Water Sampling Results

Detectable levels of tritium were found in a surface water sample taken at the Seneca Boat Launch during second quarter sampling and several surface water samples taken in the fourth quarter of 2022. The elevated levels are likely attributable to the routine liquid effluent releases from the Braidwood station. All tritium levels were well below the Drinking Water Standards established by the US EPA and IEPA.

Results from gross beta analysis indicate that the established MDC was met at most water sampling locations. Concentrations above MDC are historically found in background samples collected. The concentrations seen at many of the water sampling locations for the LaSalle NPS were consistent with historical background levels. However, concentrations found at some locations were above typical background levels and can likely be attributed to the routine liquid effluent releases from the Braidwood station. All sample results for gross beta remained well below the established US EPA and IEPA standards.

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

Soil Sampling Results

Cesium-137 in concentrations greater than the established MDC was detected at all sampling locations but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing.

Niobium-95 concentrations above the established MDC were found in migration and deposition soil samples at the Sunbury Railroad Preserve sampling location during second quarter sampling. The results from the samples collected at that location in the third quarter were below the established MDC.

All other gamma spectroscopy results for soil samples were below the established 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

Unable to schedule one of two fish collections and top feeders were not available for collection, so only bottom feeders received. Gamma spectroscopy results for fish samples indicated no concentrations above the established MDC.

Direct Radiation Monitoring Results

The ambient gamma monitoring results from deployed OSLs were comparable to historical data and to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois.

GDN network results were consistent with historical data.

LaSalle Maps of Monitoring and Sampling Locations

Figure 18. OSL and GDN Monitoring Locations – LaSalle

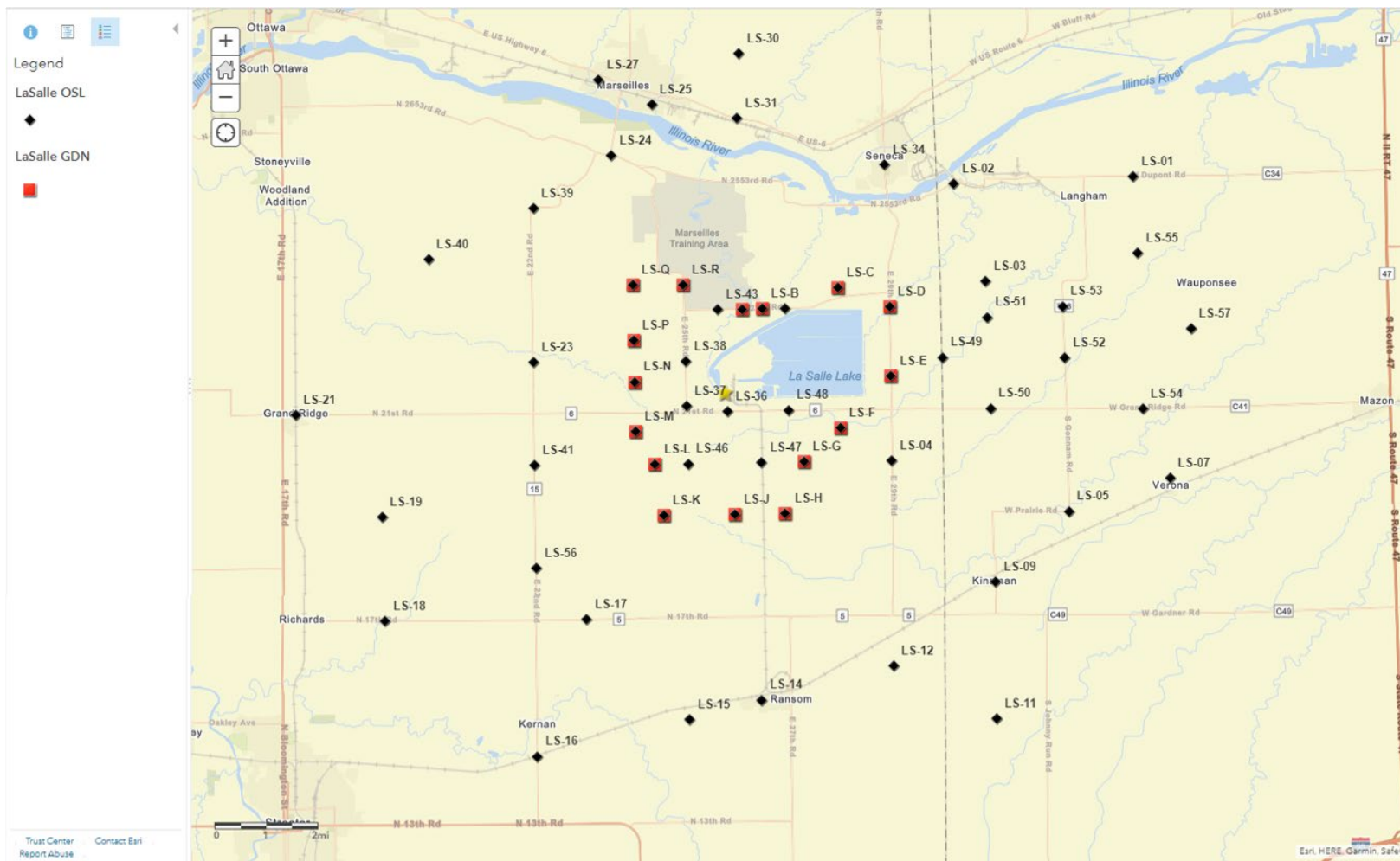
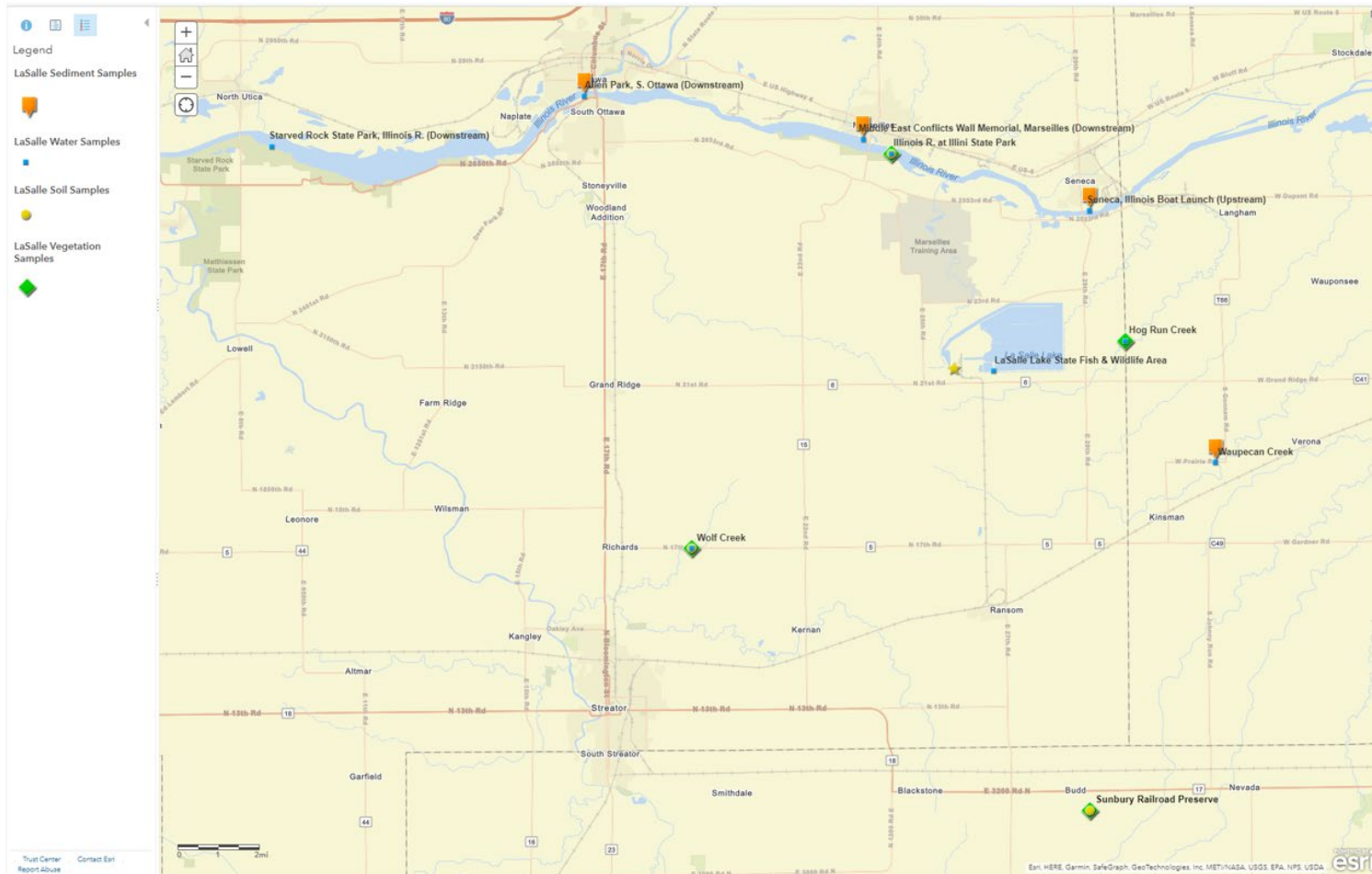


Figure 20. Environmental Sampling Locations - LaSalle

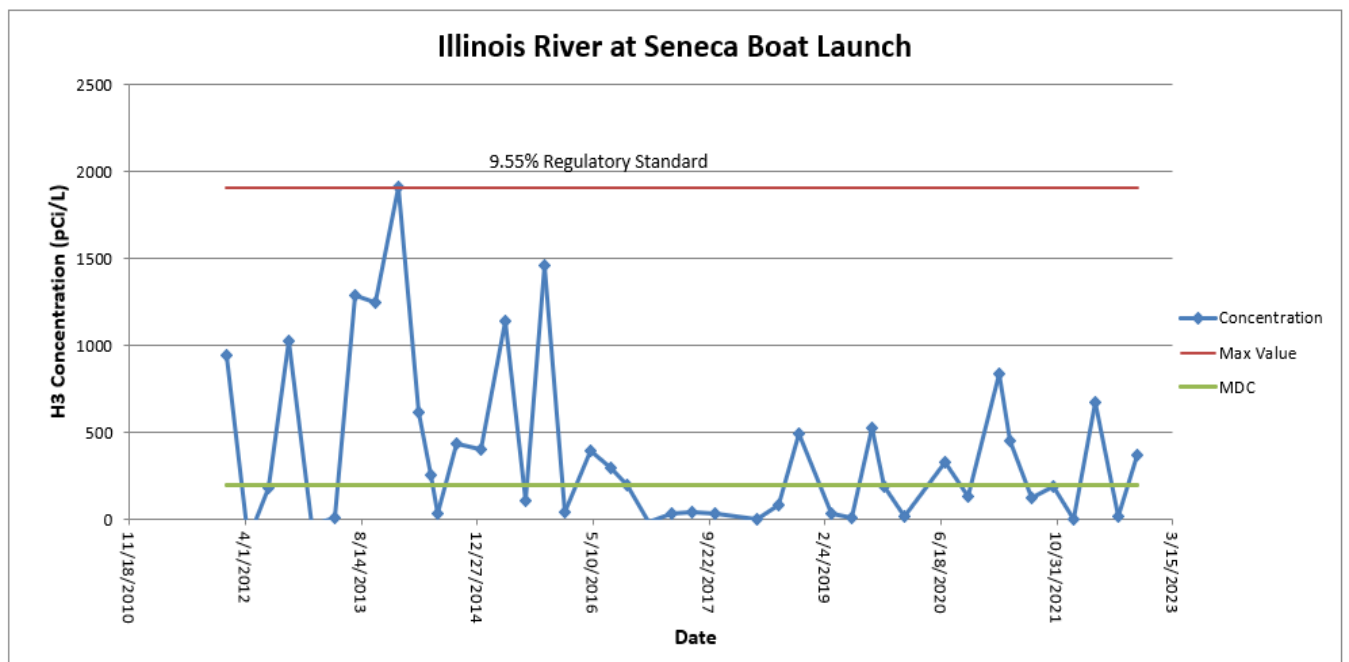
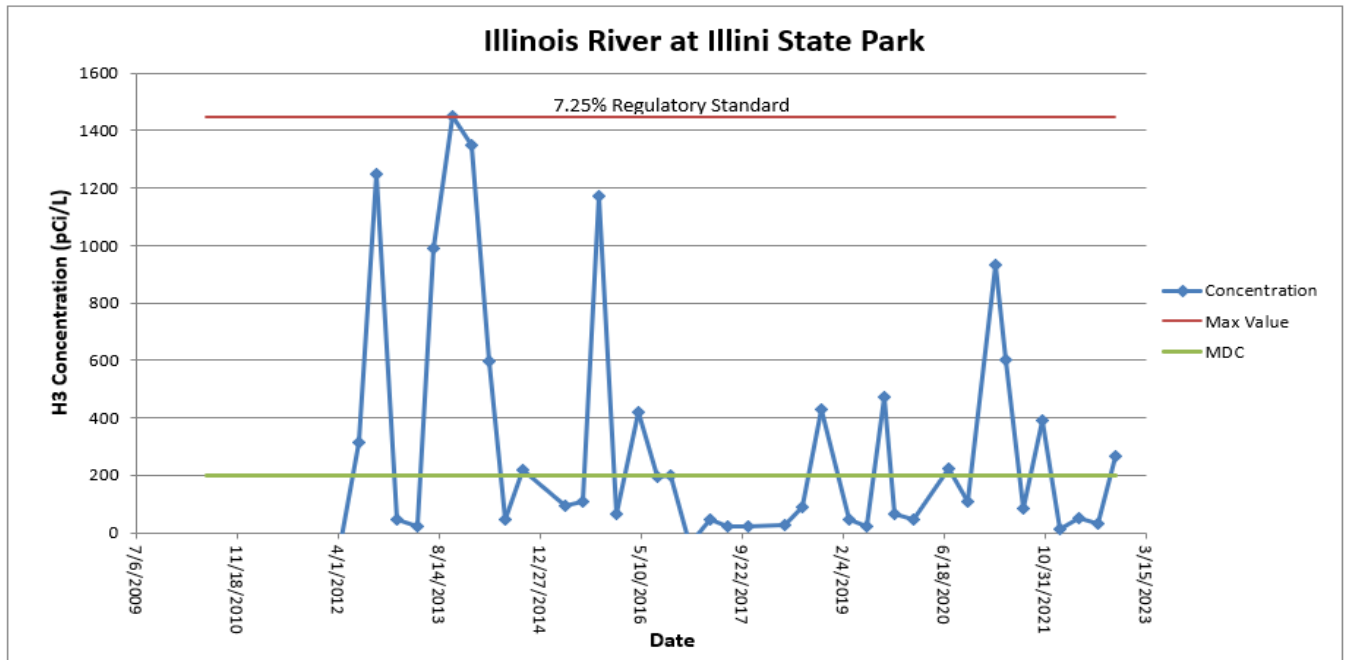


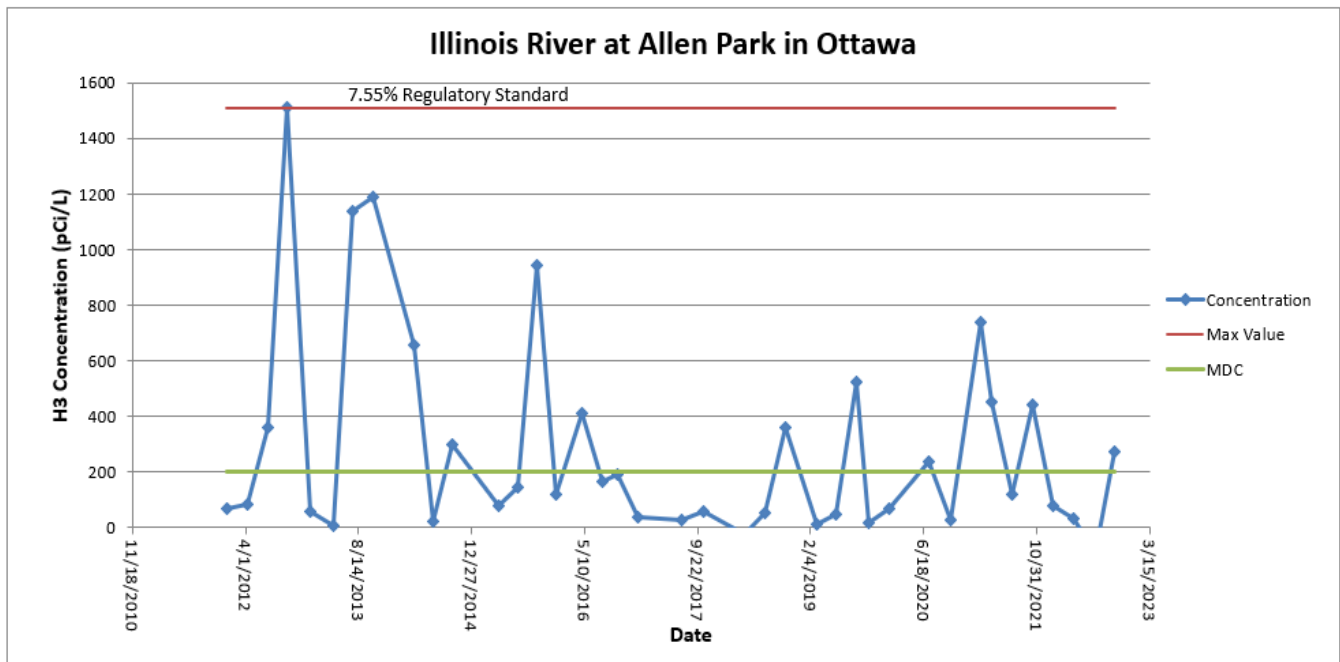
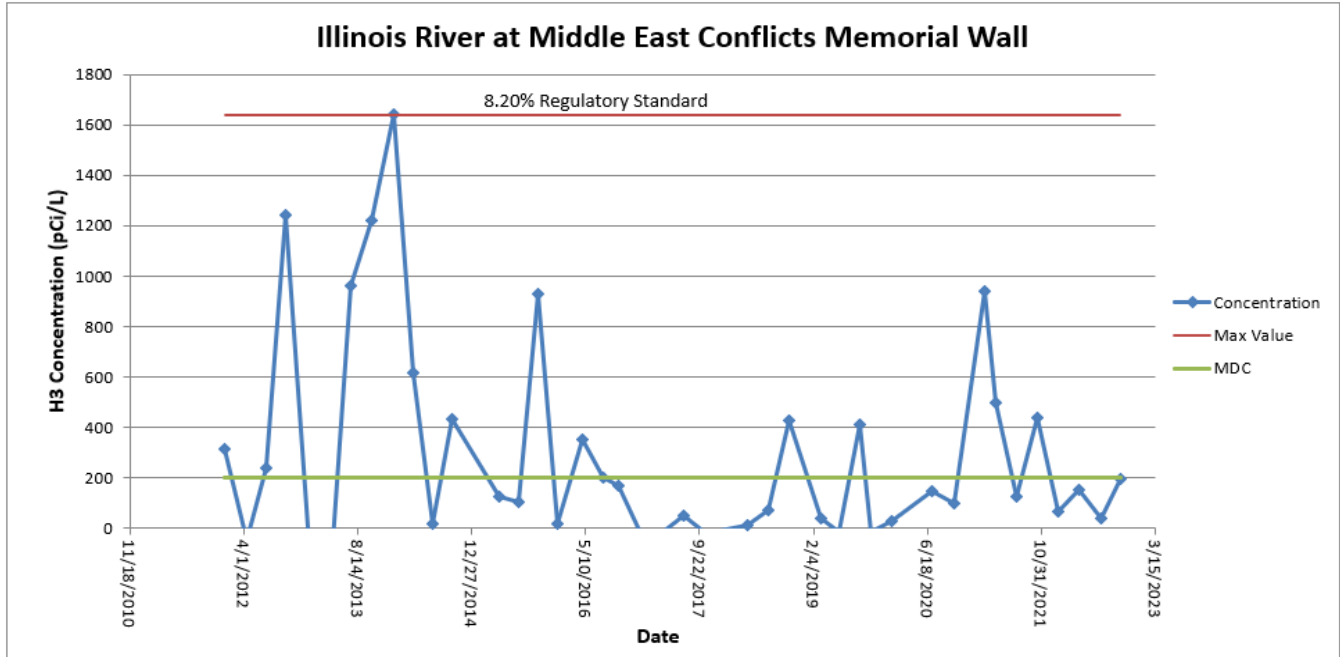
LaSalle Sample Result Tables and Graphs

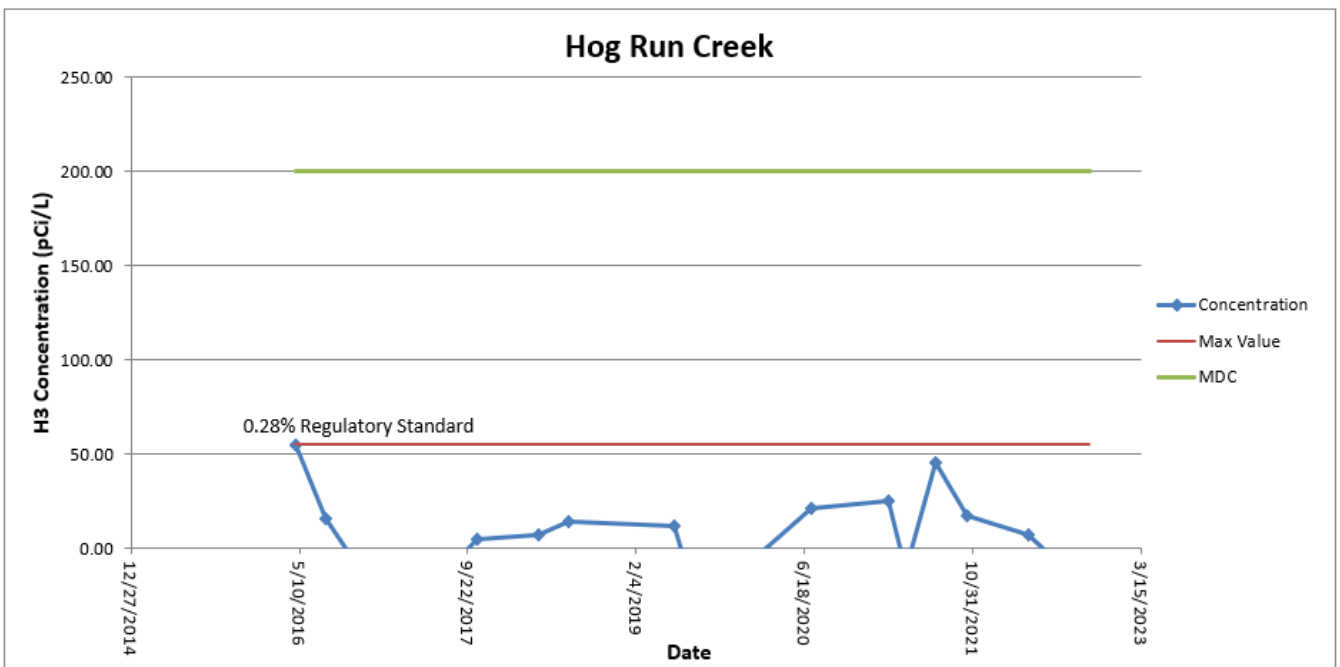
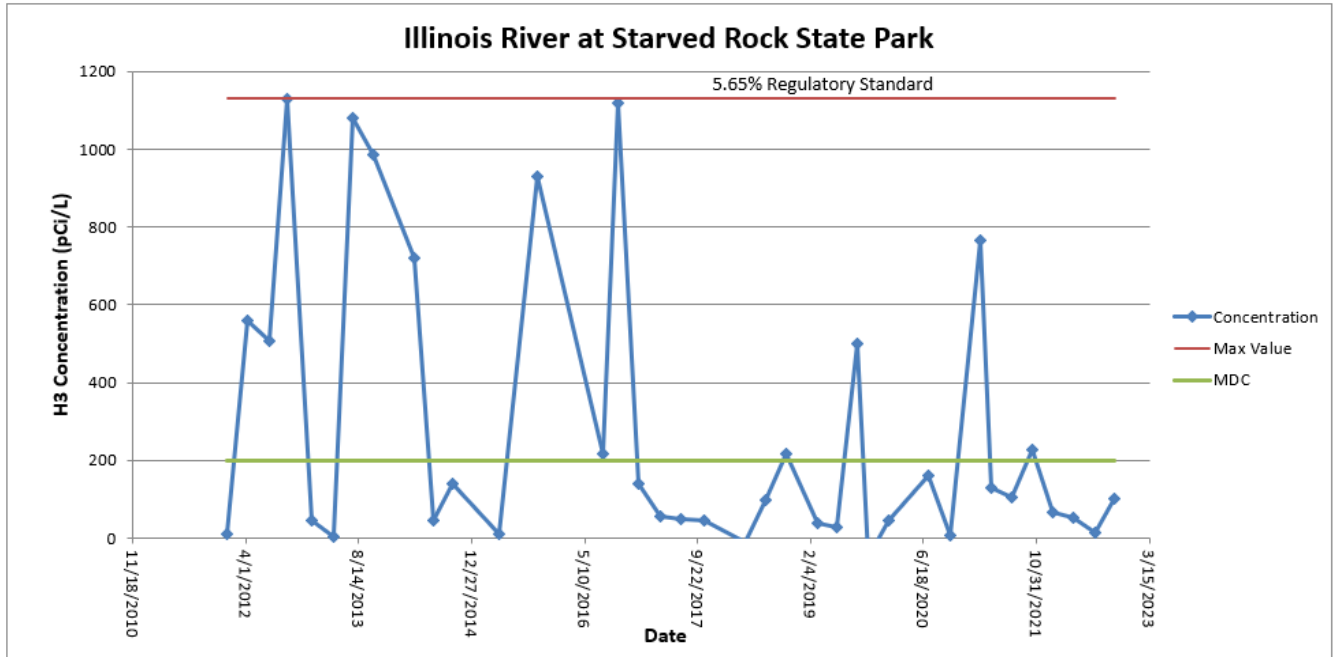
Tritium (H-3) in Water Results - LaSalle
Results are in picocuries per liter (pCi/L)

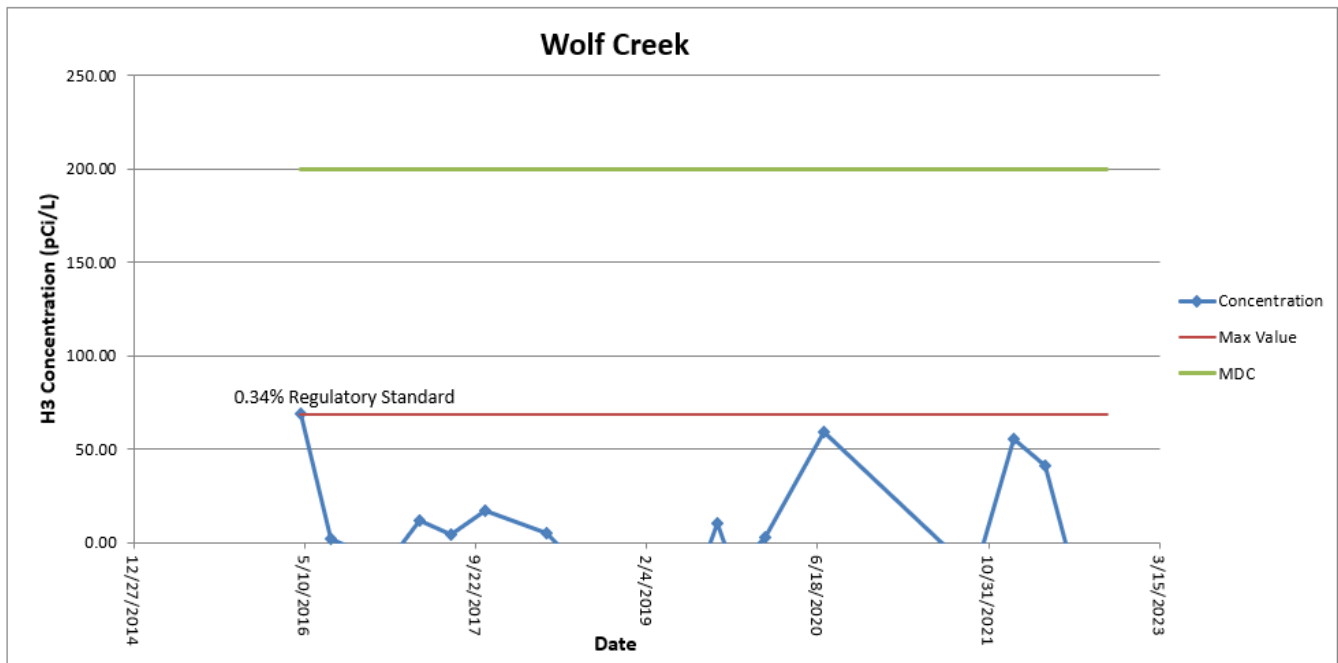
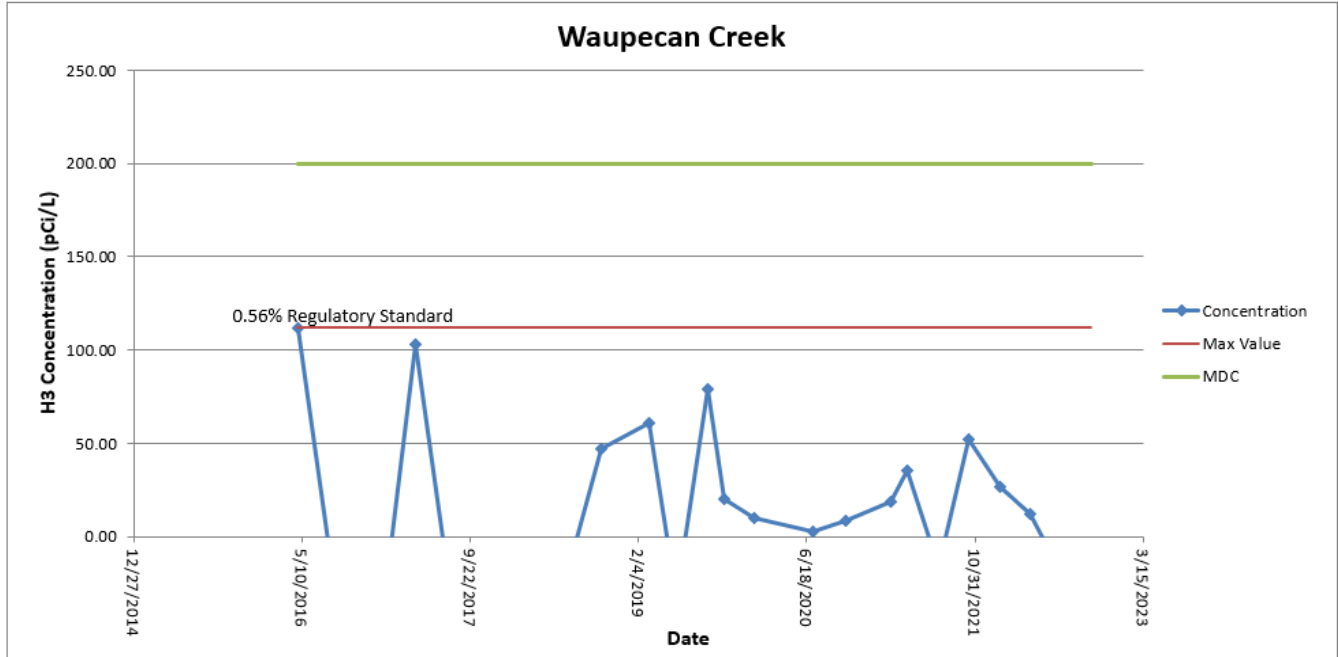
Location	H-3	
Date	Result	MDC
Allen Park, South Ottawa		
1/12/2022	<MDC	173
4/14/2022	<MDC	173
7/20/2022	<MDC	173
10/12/2022	275	173
Hog Run Creek		
4/14/2022	<MDC	173
7/20/2022	<MDC	173
10/12/2022	<MDC	173
Illinois R. at Illini State Park		
1/12/2022	<MDC	173
4/14/2022	<MDC	173
7/20/2022	<MDC	173
10/12/2022	267	173
Middle East Conflicts Wall Memorial		
1/12/2022	<MDC	173
4/14/2022	<MDC	173
7/20/2022	<MDC	173
10/12/2022	195	173
Seneca, Illinois Boat Launch		
1/12/2022	<MDC	173
4/14/2022	674	173
7/20/2022	<MDC	173
10/12/2022	372	173
Starved Rock State Park		
1/12/2022	<MDC	173
4/14/2022	<MDC	173
7/20/2022	<MDC	173
10/12/2022	<MDC	173
Waupecan Creek		
1/12/2022	<MDC	173
4/14/2022	<MDC	173
7/20/2022	<MDC	173
10/12/2022	<MDC	173
Wolf Creek		
1/12/2022	<MDC	173
4/14/2022	<MDC	173
7/20/2022	<MDC	173
10/12/2022	<MDC	173

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; MDC represented at 200 pCi/L to account for normal fluctuations)









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		
4/14/2022	<MDC	0.54

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

Location	Beta		Location	Beta	
Date	Result	MDC	Date	Result	MDC
Allen Park, South Ottawa			Seneca, Illinois Boat Launch		
1/12/2022	4.8	3.2	1/12/2022	<MDC	3.2
4/14/2022	3.3	3.2	4/14/2022	<MDC	3.2
7/20/2022	4.0	3.2	7/20/2022	6.4	3.2
10/12/2022	7.4	3.2	10/12/2022	4.4	3.2
Hog Run Creek			Starved Rock State Park		
4/14/2022	<MDC	3.2	1/12/2022	6.2	3.2
7/20/2022	<MDC	3.2	4/14/2022	<MDC	3.2
10/12/2022	4.4	3.2	7/20/2022	5.0	3.2
Illinois R. at Illini State Park			10/12/2022	5.8	3.2
1/12/2022	4.2	3.2	Waupecan Creek		
4/14/2022	4.4	3.2	1/12/2022	<MDC	3.2
7/20/2022	4.5	3.2	4/14/2022	<MDC	3.2
10/12/2022	7.0	3.2	7/20/2022	<MDC	3.2
Middle East Conflicts Wall Memorial, Marseilles			10/12/2022	<MDC	3.2
1/12/2022	4.2	3.2	Wolf Creek		
4/14/2022	3.8	3.2	1/12/2022	<MDC	3.2
7/20/2022	<MDC	3.2	4/14/2022	<MDC	3.2
10/12/2022	6.1	3.2	7/20/2022	<MDC	3.2
			10/12/2022	<MDC	3.2

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

Location	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
Illini State Park																					
4/14/2022	<MDC	0.23	<MDC	0.04	<MDC	0.04	<MDC	0.05	0.09	0.05	<MDC	0.12	<MDC	0.04	<MDC	0.08	<MDC	0.12	<MDC	0.09	
7/20/2022	<MDC	0.23	<MDC	0.04	<MDC	0.04	<MDC	0.05	0.09	0.05	<MDC	0.12	<MDC	0.04	<MDC	0.08	<MDC	0.12	<MDC	0.09	
Sunbury Railroad Preserve																					
4/14/2022	<MDC	0.23	<MDC	0.04	<MDC	0.04	<MDC	0.05	0.32	0.05	<MDC	0.12	<MDC	0.04	0.15	0.08	<MDC	0.12	<MDC	0.09	
7/20/2022	<MDC	0.23	<MDC	0.04	<MDC	0.04	<MDC	0.05	0.22	0.05	<MDC	0.12	<MDC	0.04	<MDC	0.08	<MDC	0.12	<MDC	0.09	
Wolf Creek																					
4/14/2022	<MDC	0.23	<MDC	0.04	<MDC	0.04	<MDC	0.05	0.11	0.05	<MDC	0.12	<MDC	0.04	<MDC	0.08	<MDC	0.12	<MDC	0.09	
7/20/2022	<MDC	0.23	<MDC	0.04	<MDC	0.04	<MDC	0.05	0.16	0.05	<MDC	0.12	<MDC	0.04	<MDC	0.08	<MDC	0.12	<MDC	0.09	

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	MDC
Illini State Park																							
4/14/2022	<MDC	0.57	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.13	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.08	<MDC	0.07	
7/20/2022	<MDC	0.57	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.11	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.08	<MDC	0.07	
Sunbury Railroad Preserve																							
4/14/2022	<MDC	0.57	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.34	0.04	<MDC	0.10	<MDC	0.03	0.06	0.06	<MDC	0.08	<MDC	0.07	
7/20/2022	<MDC	0.57	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.21	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.08	<MDC	0.07	
Wolf Creek near 18																							
4/14/2022	<MDC	0.57	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.13	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.08	<MDC	0.07	
7/20/2022	<MDC	0.57	<MDC	0.21	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.14	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.08	<MDC	0.07	

*The sample taken at Sunbury Railroad Preserve on April 4, 2022 had a Niobium-95 concentration of 0.064 pCi/g. This exceeded the Niobium-95 MDC of 0.063, however this is not demonstrated in the table because results are rounded to the nearest hundredth.

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	MDC	
Allen Park, South Ottawa																								
4/14/2022	<MDC	0.57	<MDC	0.22	<MDC	0.04	<MDC	0.04	<MDC	0.03	<MDC	0.05	<MDC	0.11	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.08	<MDC	0.08
7/20/2022	<MDC	0.57	<MDC	0.22	<MDC	0.04	<MDC	0.04	<MDC	0.03	<MDC	0.05	<MDC	0.11	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.08	<MDC	0.08
Middle East Conflicts Wall Memorial, Marseilles																								
4/14/2022	<MDC	0.57	<MDC	0.22	<MDC	0.04	<MDC	0.04	<MDC	0.03	<MDC	0.05	<MDC	0.11	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.08	<MDC	0.08
7/20/2022	<MDC	0.57	<MDC	0.22	<MDC	0.04	<MDC	0.04	<MDC	0.03	<MDC	0.05	<MDC	0.11	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.08	<MDC	0.08
Seneca, Illinois Boat Launch																								
4/14/2022	<MDC	0.57	<MDC	0.22	<MDC	0.04	<MDC	0.04	<MDC	0.03	<MDC	0.05	<MDC	0.11	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.08	<MDC	0.08
7/20/2022	<MDC	0.57	<MDC	0.22	<MDC	0.04	<MDC	0.04	<MDC	0.03	<MDC	0.05	<MDC	0.11	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.08	<MDC	0.08
Waupecan Creek near 5																								
4/14/2022	<MDC	0.57	<MDC	0.22	<MDC	0.04	<MDC	0.04	<MDC	0.03	<MDC	0.05	<MDC	0.11	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.08	<MDC	0.08
7/20/2022	<MDC	0.57	<MDC	0.22	<MDC	0.04	<MDC	0.04	<MDC	0.03	<MDC	0.05	<MDC	0.11	<MDC	0.04	<MDC	0.08	<MDC	0.08	<MDC	0.08	<MDC	0.08

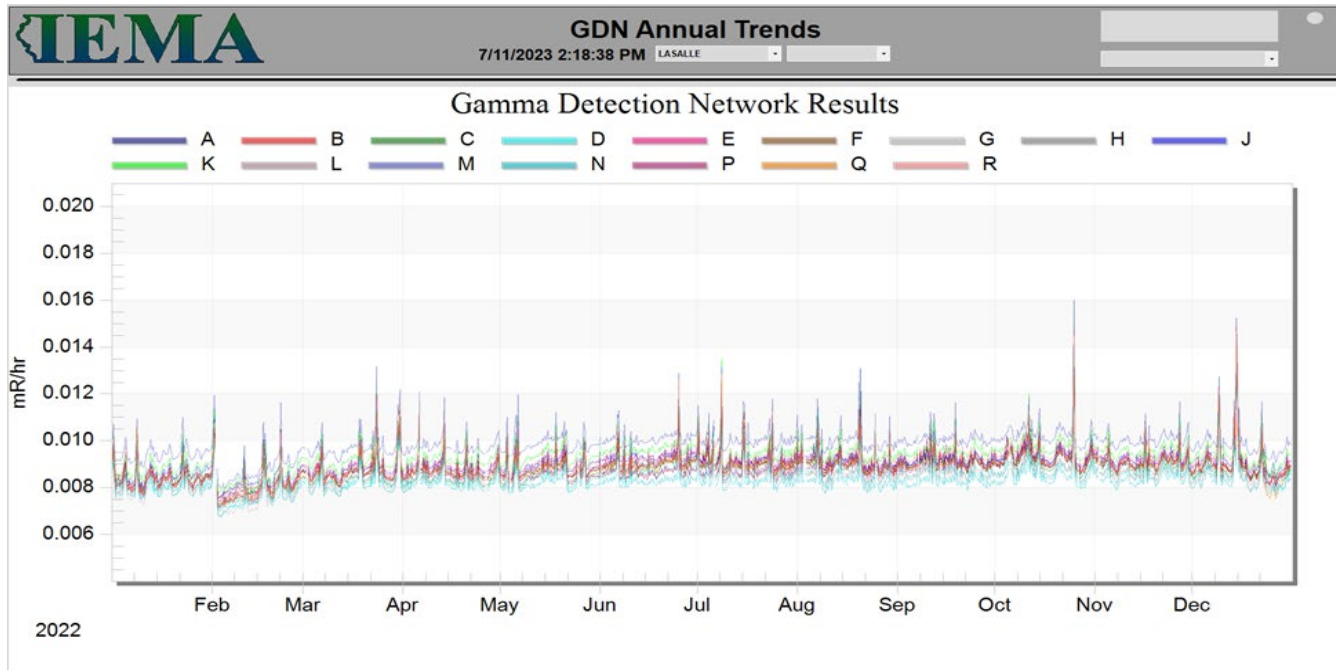
Gamma Spectroscopy Results for Radionuclides in Vegetation - LaSalle
Results are in picocuries per gram (pCi/g)

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																										
4/14/2022	<MDC	4.30	<MDC	0.62	<MDC	0.20	<MDC	0.15	<MDC	0.14	<MDC	0.14	<MDC	0.45	<MDC	4.70	<MDC	0.16	<MDC	0.28	<MDC	0.29	<MDC	0.33	<MDC	0.33
7/20/2022	<MDC	4.30	<MDC	0.62	<MDC	0.20	<MDC	0.15	<MDC	0.14	<MDC	0.14	<MDC	0.45	<MDC	4.70	<MDC	0.16	<MDC	0.28	<MDC	0.29	<MDC	0.33	<MDC	0.33
Illini State Park																										
4/14/2022	<MDC	4.30	<MDC	0.62	<MDC	0.20	<MDC	0.15	<MDC	0.14	<MDC	0.14	<MDC	0.45	<MDC	4.70	<MDC	0.16	<MDC	0.28	<MDC	0.29	<MDC	0.33	<MDC	0.33
7/20/2022	<MDC	4.30	<MDC	0.62	<MDC	0.20	<MDC	0.15	<MDC	0.14	<MDC	0.14	<MDC	0.45	<MDC	4.70	<MDC	0.16	<MDC	0.28	<MDC	0.29	<MDC	0.33	<MDC	0.33
Sunbury Railroad Preserve																										
4/14/2022	<MDC	4.30	<MDC	0.62	<MDC	0.20	<MDC	0.15	<MDC	0.14	<MDC	0.14	<MDC	0.45	<MDC	4.70	<MDC	0.16	<MDC	0.28	<MDC	0.29	<MDC	0.33	<MDC	0.33
7/20/2022	<MDC	4.30	<MDC	0.62	<MDC	0.20	<MDC	0.15	<MDC	0.14	<MDC	0.14	<MDC	0.45	<MDC	4.70	<MDC	0.16	<MDC	0.28	<MDC	0.29	<MDC	0.33	<MDC	0.33
Wolf Creek near 18																										
4/14/2022	<MDC	4.30	<MDC	0.62	<MDC	0.20	<MDC	0.15	<MDC	0.14	<MDC	0.14	<MDC	0.45	<MDC	4.70	<MDC	0.16	<MDC	0.28	<MDC	0.29	<MDC	0.33	<MDC	0.33
7/20/2022	<MDC	4.30	<MDC	0.62	<MDC	0.20	<MDC	0.15	<MDC	0.14	<MDC	0.14	<MDC	0.45	<MDC	4.70	<MDC	0.16	<MDC	0.28	<MDC	0.29	<MDC	0.33	<MDC	0.33

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)																										
11/2/2022	<MDC	1170	<MDC	83	<MDC	45	<MDC	37	<MDC	30	<MDC	135	<MDC	1270	<MDC	1270	<MDC	69	<MDC	87	<MDC	87	<MDC	79	<MDC	79

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



Summary of Ambient Gamma Results – LaSalle

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Exposure
Location	mR/quarter	mR/quarter	mR/quarter	mR/quarter	mR/year
LS-01	7.0	7.1	12.0	8.7	34.9
LS-02	9.8	7.6	11.9	8.9	38.2
LS-03	10.2	7.5	11.3	9.2	38.2
LS-04		7.9	10.6	11.2	39.6
LS-05	8.6	6.7	9.2	8.1	32.6
LS-07	9.5	6.9	9.9	8.3	34.6
LS-09	7.1	6.2	7.7	6.6	27.6
LS-11	8.9	8.1	10.3	8.5	35.8
LS-12	7.6	8.9	8.4	7.0	31.9
LS-14	6.5	7.8	8.9	7.6	30.8
LS-15	10.2	7.3	10.5	7.7	35.6
LS-16	5.8	7.0	7.8	6.0	26.6
LS-17	9.4	11.0	12.6	12.2	45.2
LS-18	6.7	7.5	9.7	12.3	36.2
LS-19	7.9	8.9	8.2	9.1	34.0
LS-21	8.2	7.1	7.2	5.6	28.1
LS-23	11.4	9.1	10.9	8.6	40.0
LS-24	10.1	7.3	11.6	9.5	38.5
LS-25	9.2	7.4	10.1	8.9	35.5
LS-27	5.8	5.9	6.9	7.6	26.2
LS-30	6.6	6.5	9.6	11.0	33.7
LS-31	4.5	5.6	6.2	6.5	22.8
LS-34	5.5	7.1	5.9	4.9	23.5
LS-36	7.4	9.4	9.1	7.9	33.7
LS-37	9.8	8.9		8.9	36.8
LS-38	8.5	9.3	11.5	8.2	37.5
LS-39	8.0	5.6	8.7	7.7	30.0
LS-40	7.7			7.3	29.9
LS-41	7.9	9.4	10.9	8.4	36.6
LS-42	10.3	0.0	10.0	7.5	37.1

Summary of Ambient Gamma Results – LaSalle (Continued)

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Exposure
Location	mR/quarter	mR/quarter	mR/quarter	mR/quarter	mR/year
LS-43	10.3	11.1	9.9	10.2	41.6
LS-46	7.6	9.8	9.1	9.4	35.9
LS-47	9.1	8.4	9.3	8.6	35.5
LS-48		6.5	10.0	7.0	31.3
LS-49	10.0	9.2	11.6	6.1	36.9
LS-50	10.0	6.4	11.4	9.8	37.7
LS-51	9.6	8.0	13.2	11.9	42.8
LS-52	8.7	6.7		6.8	29.6
LS-53	9.6	6.9		6.2	30.4
LS-54	7.9	8.3	10.0	9.9	36.2
LS-55	9.6			12.9	45.0
LS-56	10.5	5.7	7.6	7.7	31.6
LS-57	8.3	8.1	10.8	6.7	33.9
LS-A	6.8	8.1	10.4	7.0	32.3
LS-B	9.7	7.4	8.1	9.0	34.2
LS-C	8.9	7.8	7.1	7.0	30.8
LS-D	6.0	6.3	8.5	7.8	28.6
LS-E	7.1	8.3	7.6	5.9	28.9
LS-F	7.2	6.6	9.5	6.0	29.3
LS-G	6.8	4.2	7.5	9.4	27.9
LS-H	8.8	7.2	9.7	7.3	33.0
LS-J	8.4	8.4	8.7	10.0	35.5
LS-K	7.2	6.6	9.2	8.6	31.7
LS-L	6.5	8.6	10.3	7.7	33.1
LS-M	12.7	10.0	12.4	13.1	48.2
LS-N	8.2	6.5	8.4	6.5	29.6
LS-P	8.3	8.3		5.9	30.0
LS-Q	6.4	8.8	8.9	5.7	29.8
LS-R	9.1	8.0	10.9	8.8	36.8

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 Constellation Energy 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 NPDES permit. In 2022, there were 2 liquid effluent batch releases from the Quad Cities station.

Figures 21-23 provide an overview of all sampling and monitoring locations in the vicinity of the Quad Cities NPS (yellow star).

Significant Events or Changes for 2022

No significant events or changes for 2022.

Sampling and Monitoring Results

Water Sampling Results

Detectable levels of tritium were found in a surface water sample taken from the Mississippi River at Rapid City during fourth quarter sampling. The elevated concentration is likely attributable to the liquid effluent releases from the station. All other tritium levels were below the established MDC, and 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 one sampling location, however the concentration found was consistent with historical levels found at background sampling locations.

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

Soil Sampling Results

Cesium-137 in concentrations greater than the established MDC was detected but was consistent with soil concentrations historically found from atmospheric nuclear weapons testing.

All other gamma spectroscopy results for soil samples were below the established 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 from deployed OSLs were comparable to historical data and to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois.

GDN network results were consistent with historical data.

Maps of Monitoring and Sampling Locations – Quad Cities

Figure 21. OSL and GDN Monitoring Locations - Quad Cities

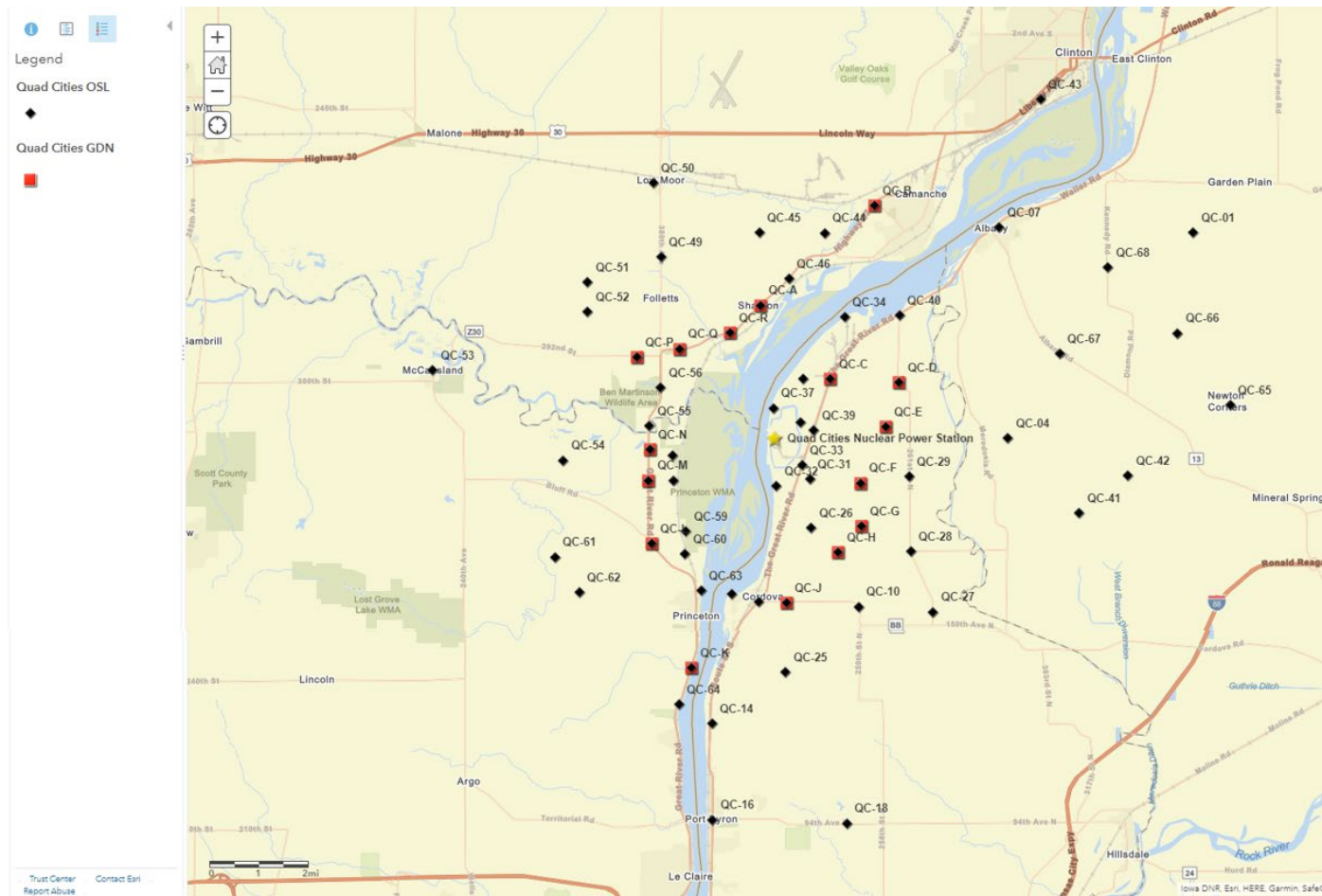


Figure 22. OSL and GDN Monitoring Locations (continued) - Quad Cities

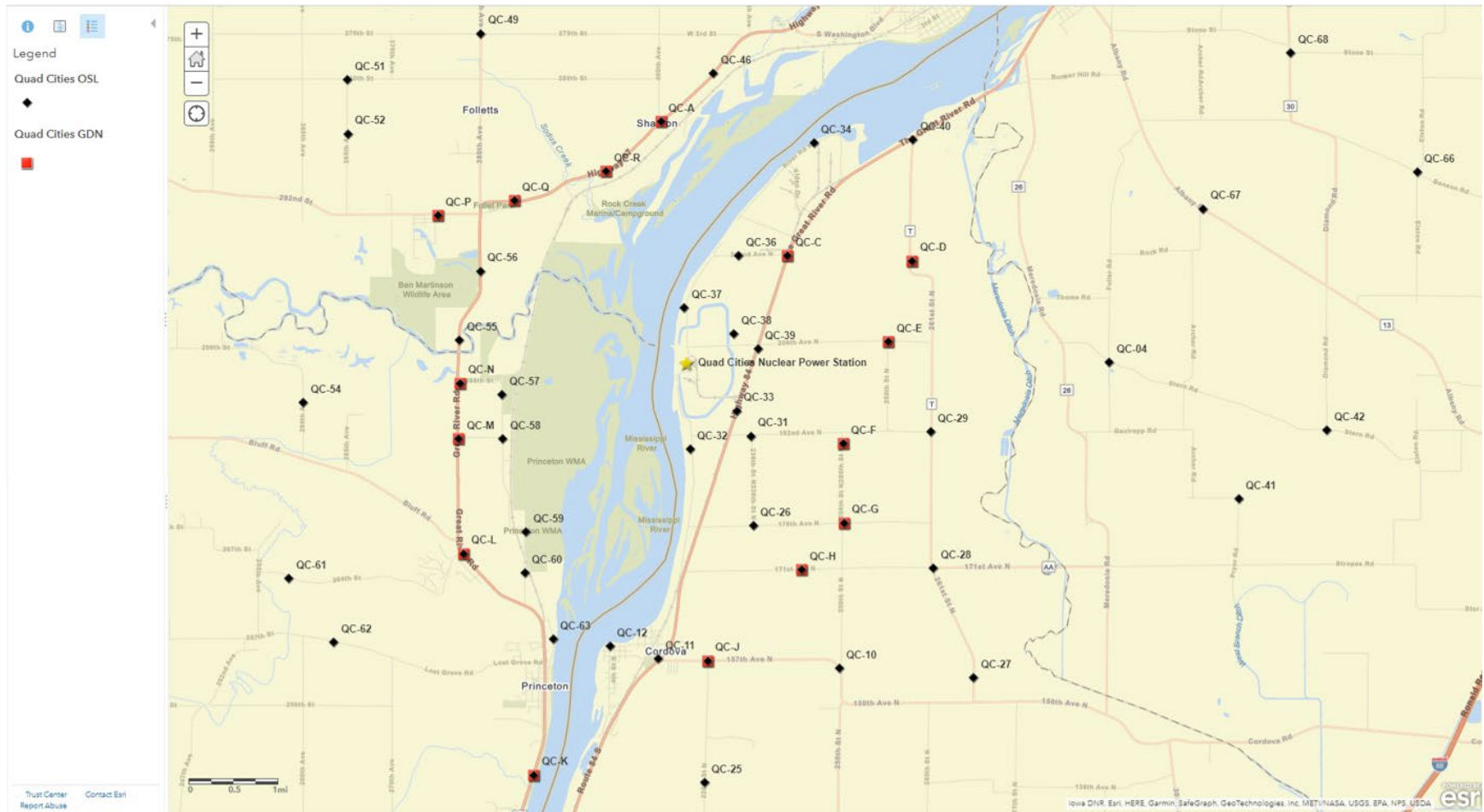
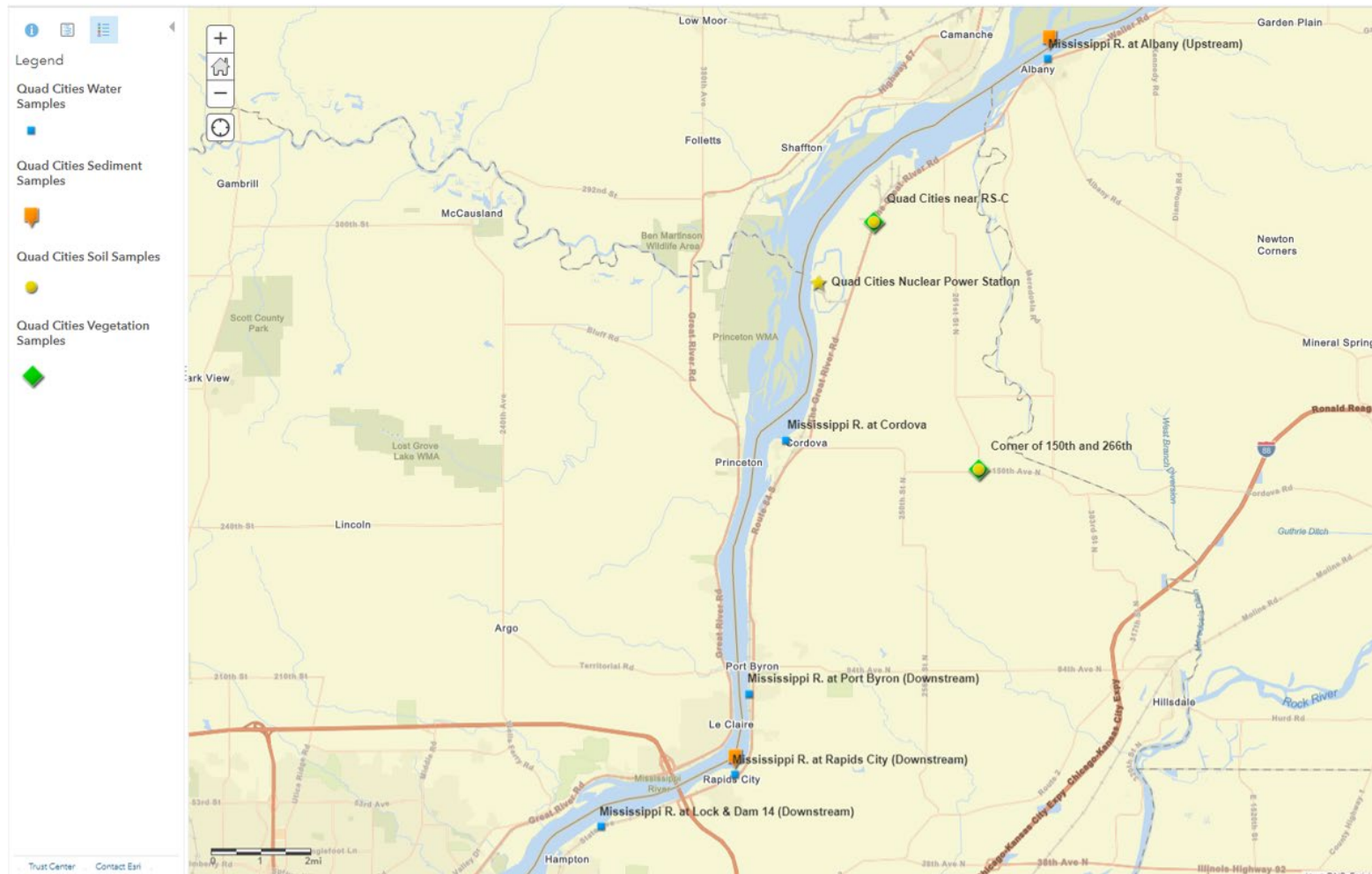


Figure 23. Environmental Sampling Locations – Quad Cities

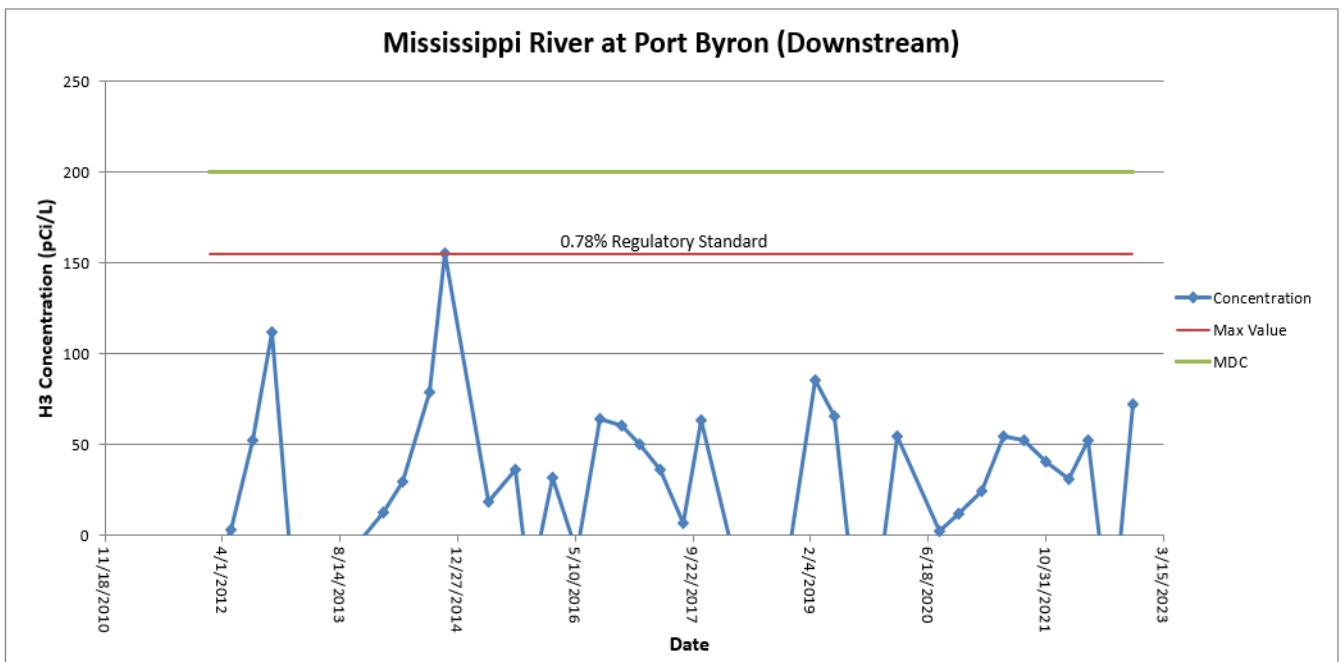
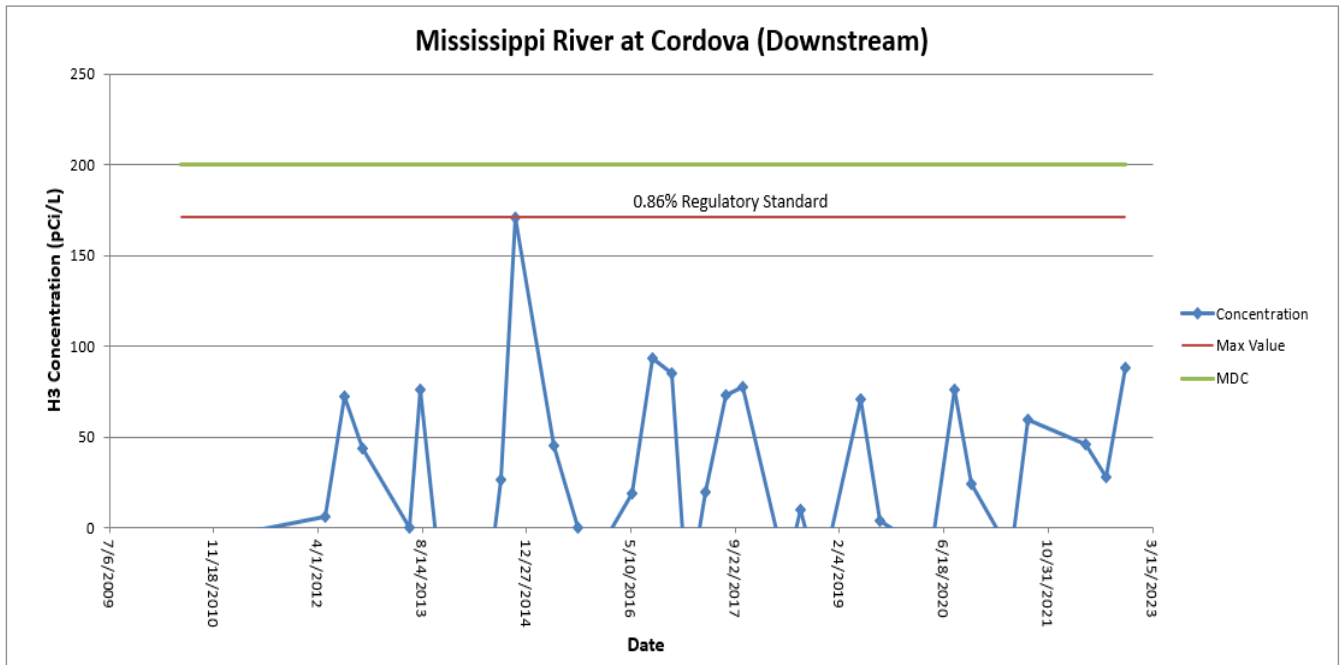


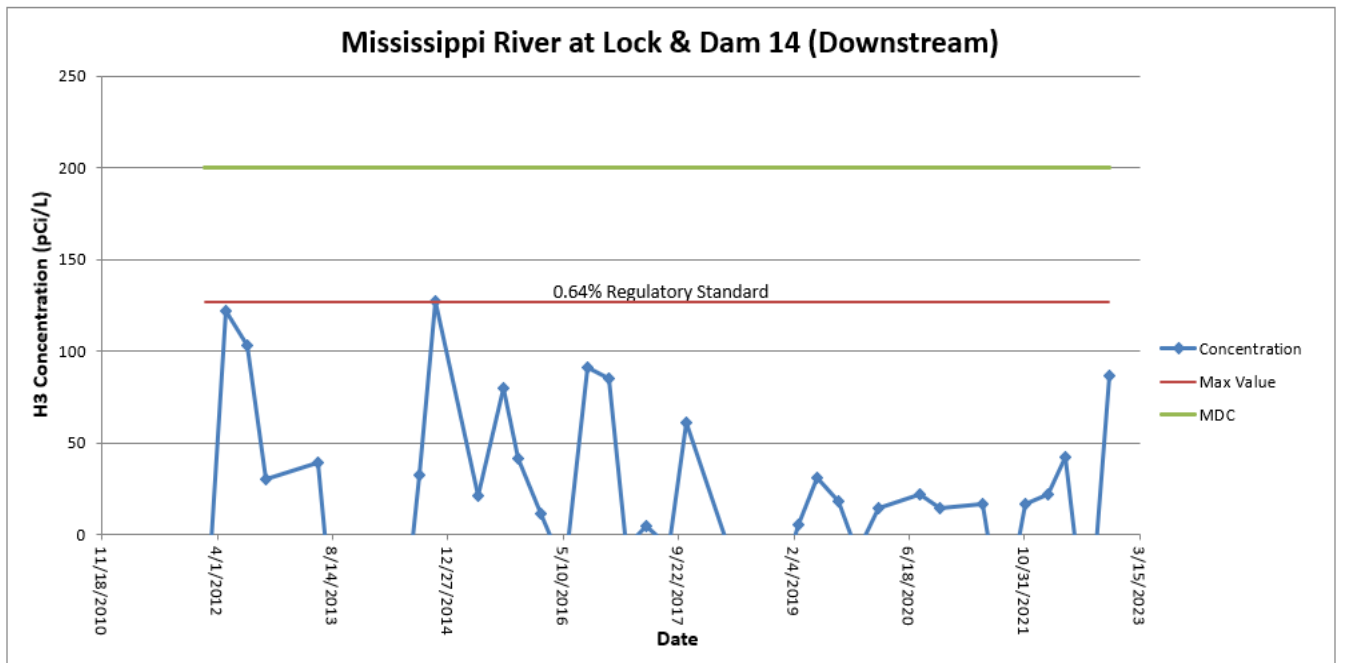
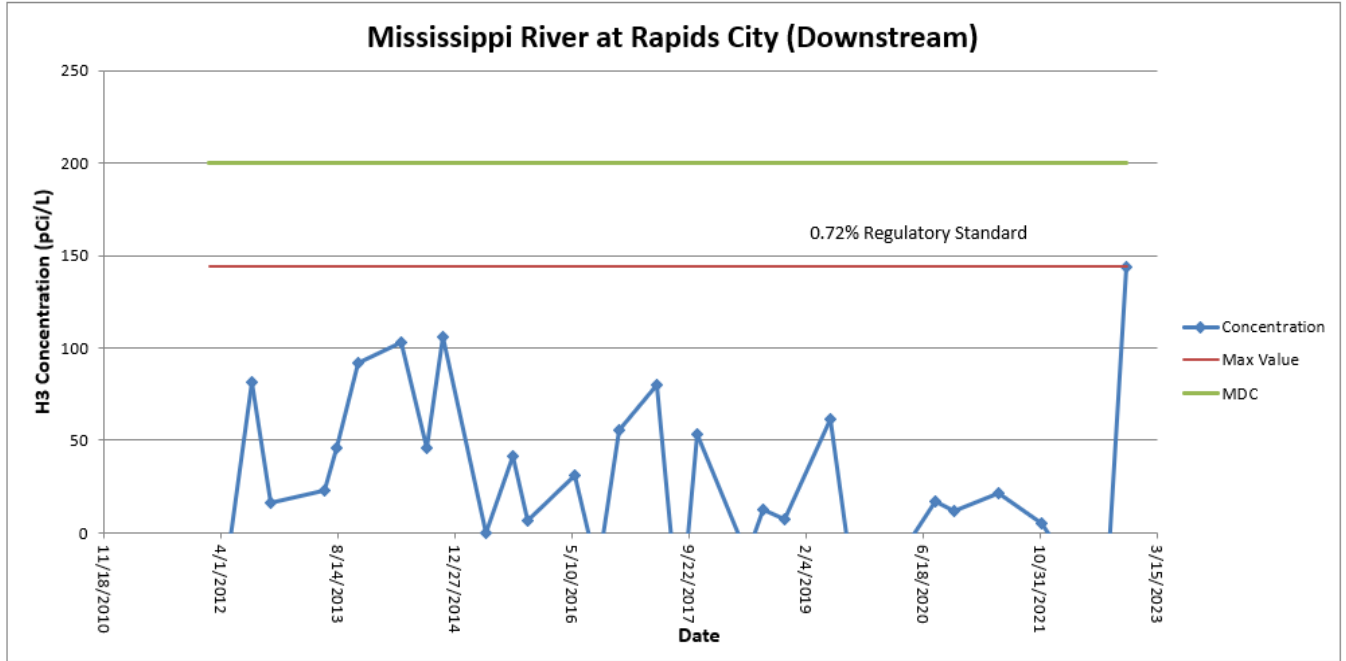
Quad Cities Sample Results

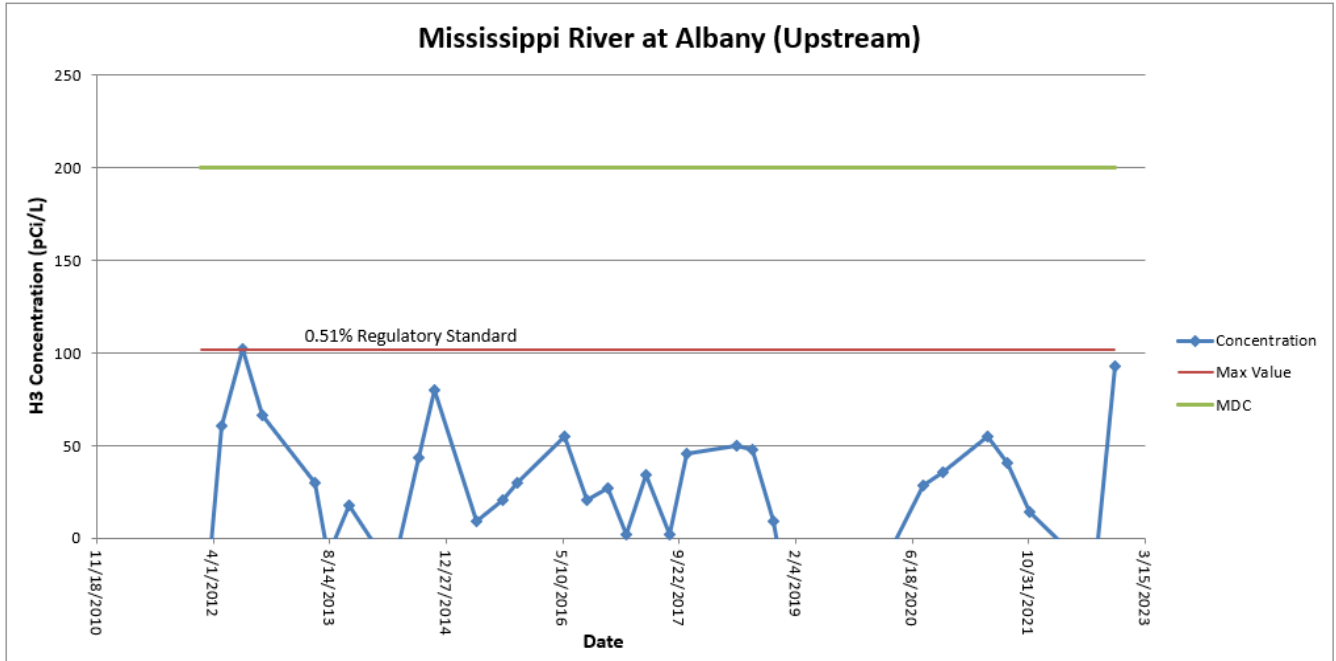
Tritium (H-3) in Water Sample Results - Quad Cities
Results are in picocuries per liter (pCi/L)

Location	H-3	
Date	Result	MDC
Mississippi R. at Albany		
4/27/2022	<MDC	135
8/3/2022	<MDC	135
11/3/2022	<MDC	135
Mississippi R. at Cordova		
4/27/2022	<MDC	135
8/3/2022	<MDC	135
11/3/2022	<MDC	135
Mississippi R. at Lock&Dam 14		
2/8/2022	<MDC	135
4/27/2022	<MDC	135
8/3/2022	<MDC	135
11/3/2022	<MDC	135
Mississippi R. at Port Byron		
2/8/2022	<MDC	135
4/27/2022	<MDC	135
8/3/2022	<MDC	135
11/3/2022	<MDC	135
Mississippi R. at Rapid City		
8/3/2022	<MDC	135
11/3/2022	144	135

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; MDC represented at 200 pCi/L to account for normal fluctuations)







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

Location	Strontium	
Date	Result	MDC
Mississippi R. at Cordova		
4/27/2022	<MDC	0.67
8/3/2022	<MDC	0.67
Mississippi R. at Rapid City		
4/27/2022	<MDC	0.67

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

Location	Beta	
Date	Result	MDC
Mississippi R. at Albany		
4/27/2022	4.81	4.28
8/3/2022	<MDC	4.28
11/3/2022	<MDC	4.28
Mississippi R. at Cordova		
4/27/2022	<MDC	4.28
8/3/2022	<MDC	4.28
11/3/2022	<MDC	4.28
Mississippi R. at Lock&Dam 14		
4/8/2022	<MDC	4.28
4/27/2022	<MDC	4.28
8/3/2022	<MDC	4.28
11/3/2022	<MDC	4.28
Mississippi R. at Port Byron		
4/8/2022	<MDC	4.28
4/27/2022	<MDC	4.28
8/3/2022	<MDC	4.28
11/3/2022	<MDC	4.28
Mississippi R. at Rapid City		
4/27/2022	<MDC	4.28
8/3/2022	<MDC	4.28
11/3/2022	<MDC	4.28

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																								
4/27/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
8/3/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
11/2/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
Mississippi R. at Cordova																								
4/27/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
8/3/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
11/2/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
Mississippi R. at Lock&Dam 14																								
2/8/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
4/27/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
8/3/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
11/2/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
Mississippi R. at Port Byron																								
2/8/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
4/27/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
8/3/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
11/2/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
Mississippi R. at Rapid City																								
4/27/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
8/3/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4
11/2/2022	<MDC	14.1	<MDC	17.8	<MDC	3.1	<MDC	3.6	<MDC	3.5	<MDC	3.2	<MDC	6.0	<MDC	5.2	<MDC	2.9	<MDC	3.1	<MDC	6.1	<MDC	5.4

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																						
4/27/2022	<MDC	0.71	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.01	0.21	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.05	<MDC	0.05
8/3/2022	<MDC	0.71	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.01	0.21	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.05	<MDC	0.05
Near RS-C																						
4/27/2022	<MDC	0.71	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.01	0.21	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.05	<MDC	0.05
8/3/2022	<MDC	0.71	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.01	0.23	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.05	<MDC	0.05

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																						
4/27/2022	<MDC	0.87	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.20	0.03	<MDC	0.09	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06
8/3/2022	<MDC	0.87	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.22	0.03	<MDC	0.09	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06
Near RS-C																						
4/27/2022	<MDC	0.87	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.21	0.03	<MDC	0.09	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06
8/3/2022	<MDC	0.87	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.20	0.03	<MDC	0.09	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06

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
Mississippi R. at Albany																						
8/3/2022	<MDC	0.59	<MDC	0.10	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.06	<MDC	0.01	<MDC	0.04	<MDC	0.04	<MDC	0.04
Mississippi R. at Rapid City																						
4/27/2022	<MDC	0.59	<MDC	0.10	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.06	<MDC	0.01	<MDC	0.04	<MDC	0.04	<MDC	0.04
8/3/2022	<MDC	0.59	<MDC	0.10	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.06	<MDC	0.01	<MDC	0.04	<MDC	0.04	<MDC	0.04

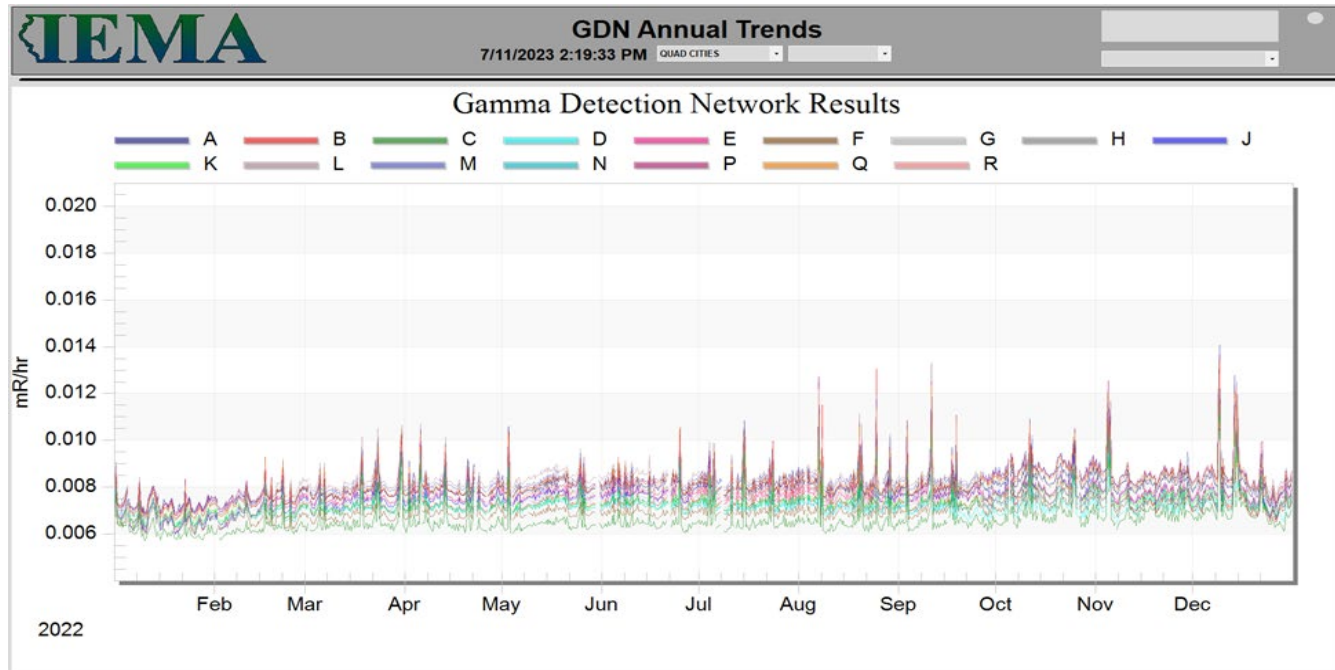
Gamma Spectroscopy Results for Radionuclides in Vegetation- Quad Cities
Results are in picocuries per gram (pCi/g)

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	
Corner of 150th and 266th																								
4/27/2022	<MDC	5.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	10.6	<MDC	0.1	<MDC	0.3	<MDC	0.2	<MDC	0.3
8/3/2022	<MDC	5.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	10.6	<MDC	0.1	<MDC	0.3	<MDC	0.2	<MDC	0.3
Near RS-C																								
4/27/2022	<MDC	5.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	10.6	<MDC	0.1	<MDC	0.3	<MDC	0.2	<MDC	0.3
8/3/2022	<MDC	5.9	<MDC	0.5	<MDC	0.2	<MDC	0.1	<MDC	0.1	<MDC	0.1	<MDC	0.5	<MDC	10.6	<MDC	0.1	<MDC	0.3	<MDC	0.2	<MDC	0.3

Gamma Spectroscopy Results for Radionuclides in Fish - Quad Cities
Results are in picocuries per kilogram (pCi/kg)

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
Mississippi R. (Top Feeder)																								
5/27/2022	<MDC	4420	<MDC	346	<MDC	90	<MDC	64	<MDC	70	<MDC	66	<MDC	284	<MDC	3400	<MDC	70	<MDC	192	<MDC	172	<MDC	194
11/4/2022	<MDC	4420	<MDC	346	<MDC	90	<MDC	64	<MDC	70	<MDC	66	<MDC	284	<MDC	3400	<MDC	70	<MDC	192	<MDC	172	<MDC	194
Mississippi R. (Bottom Feeder)																								
5/27/2022	<MDC	4420	<MDC	346	<MDC	90	<MDC	64	<MDC	70	<MDC	66	<MDC	284	<MDC	3400	<MDC	70	<MDC	192	<MDC	172	<MDC	194
11/4/2022	<MDC	4420	<MDC	346	<MDC	90	<MDC	64	<MDC	70	<MDC	66	<MDC	284	<MDC	3400	<MDC	70	<MDC	192	<MDC	172	<MDC	194

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 1 mR/quarter	Quarter 1 mR/quarter	Quarter 1 mR/quarter	Annual Exposure mR/year
QC-01	9.3	8.2	9.8	8.8	36.1
QC-04	5.4	4.4	8.3		24.0
QC-07	6.7		7.6	7.6	29.0
QC-10	5.9	6.9	7.0	6.7	26.6
QC-11	3.4	2.6	7.0	7.5	20.5
QC-12	4.8	3.2	6.9	6.0	20.9
QC-14		4.7		9.1	27.6
QC-16		7.2	6.3	6.3	26.4
QC-18	8.8	9.7	11.1	11.3	40.9
QC-25	8.7	7.0		11.7	36.4
QC-26	5.9	9.4	11.2	9.2	35.7
QC-27	6.3	9.0	9.5	8.7	33.5
QC-28	6.8	5.7		8.7	28.3
QC-29	6.3	6.4	7.9	9.1	29.8
QC-31	8.0	5.2	7.1	8.2	28.4
QC-32	6.9	5.0	10.1	6.7	28.7
QC-33	5.7	4.5	9.2	7.9	27.2
QC-34	6.4	7.1	8.7	9.0	31.2
QC-36	7.5	5.8	7.1	10.0	30.5
QC-37	5.0	5.3	7.3	7.7	25.2
QC-38	4.9	5.2	9.5	7.6	27.3
QC-39	4.0	5.5	7.4	6.6	23.4
QC-40	7.6	6.2	7.8	9.8	31.4
QC-41	4.3	4.3	8.0	8.2	24.8
QC-42	9.2		8.5	8.9	35.5
QC-43	9.2	5.8	9.6	9.0	33.6
QC-44	6.6	5.2	7.6	9.6	29.0
QC-45	7.4	6.9	9.2	9.6	33.1
QC-46	9.0	7.6	9.3	8.2	34.1
QC-49	6.2	8.0	10.2	8.8	33.2
QC-50	7.6	2.5	9.2	7.6	26.9
QC-51	9.0	6.5	10.5	10.6	36.7
QC-52	8.1	6.9	11.2	11.6	37.8

Summary of Ambient Gamma Results - Quad Cities (Continued)

Location	Quarter 1 mR/quarter	Quarter 1 mR/quarter	Quarter 1 mR/quarter	Quarter 1 mR/quarter	Annual Exposure mR/year
QC-53	7.2	4.0	5.0	6.4	22.7
QC-54	5.0	4.6	8.0	7.9	25.5
QC-55	8.6	6.9	6.8	8.7	30.9
QC-56	6.0	7.6	8.1	8.6	30.3
QC-57	6.7	2.8	8.8	5.9	24.2
QC-58	3.9	8.7	8.8	7.8	29.2
QC-59	6.6		7.8	9.4	31.8
QC-60	5.7	7.3	8.5	10.6	32.1
QC-61	8.5	5.0	9.9	10.1	33.5
QC-62	8.6	9.4	11.0	11.2	40.2
QC-63	9.4	6.0	7.2	8.7	31.3
QC-64	5.7	7.5	9.3	7.7	30.1
QC-65	7.2	7.9	10.0	9.5	34.6
QC-66	9.9	6.5	10.8	10.3	37.4
QC-67	6.3	9.5	9.7	11.9	37.3
QC-68	9.2	8.5	10.3	11.3	39.3
QC-A	4.2	3.8	9.5	8.6	26.1
QC-B	8.6	5.8	7.3		29.0
QC-C	6.1	7.0	7.3	8.1	28.5
QC-D	4.7	8.6	7.1	8.1	28.5
QC-E	4.8	5.8	8.6	8.4	27.5
QC-F	6.7	4.3	7.4	7.1	25.7
QC-G	7.7	9.0	9.7	8.4	34.9
QC-H	5.1	8.6	6.7	10.3	30.7
QC-J	7.4		7.0	7.9	29.7
QC-K	6.4	6.9	8.0	8.3	29.6
QC-L	6.3	10.6	9.5	9.2	35.5
QC-M	4.4	10.4	10.8	8.2	33.8
QC-N	7.0	7.6	7.0	8.6	30.3
QC-P	7.3	6.7	9.8	10.8	34.5
QC-Q	7.3	8.1	7.2	9.2	31.7
QC-R	6.3	7.3	9.8		31.2

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.

Zion Nuclear Power Station

Zion NPS consisted of two PWRs that were owned and operated by Constellation Energy 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 (now Constellation) to Zion Solutions for the express purpose of expediting the decommissioning of the site. The site continues to store 61 dry casks that store spent nuclear fuel as well as 4 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 building and equipment removal

Figure 24 provides an overview of all sampling and monitoring locations in the vicinity of the Zion NPS (yellow star).

Significant Events or Changes for 2021

With the completion of large-scale invasive activities associated with the Zion decommissioning project in December of 2019, IEMA-OHS's radiological environmental monitoring activities for the site were scaled back beginning in January 2020. All soil, sediment, vegetation, and water sampling activities ceased at that time. IEMA-OHS has continued to monitor for direct radiation, and OSLs will be deployed for as long as there is an independent spent fuel storage installation (ISFSI) on site.

Sampling and Monitoring Results

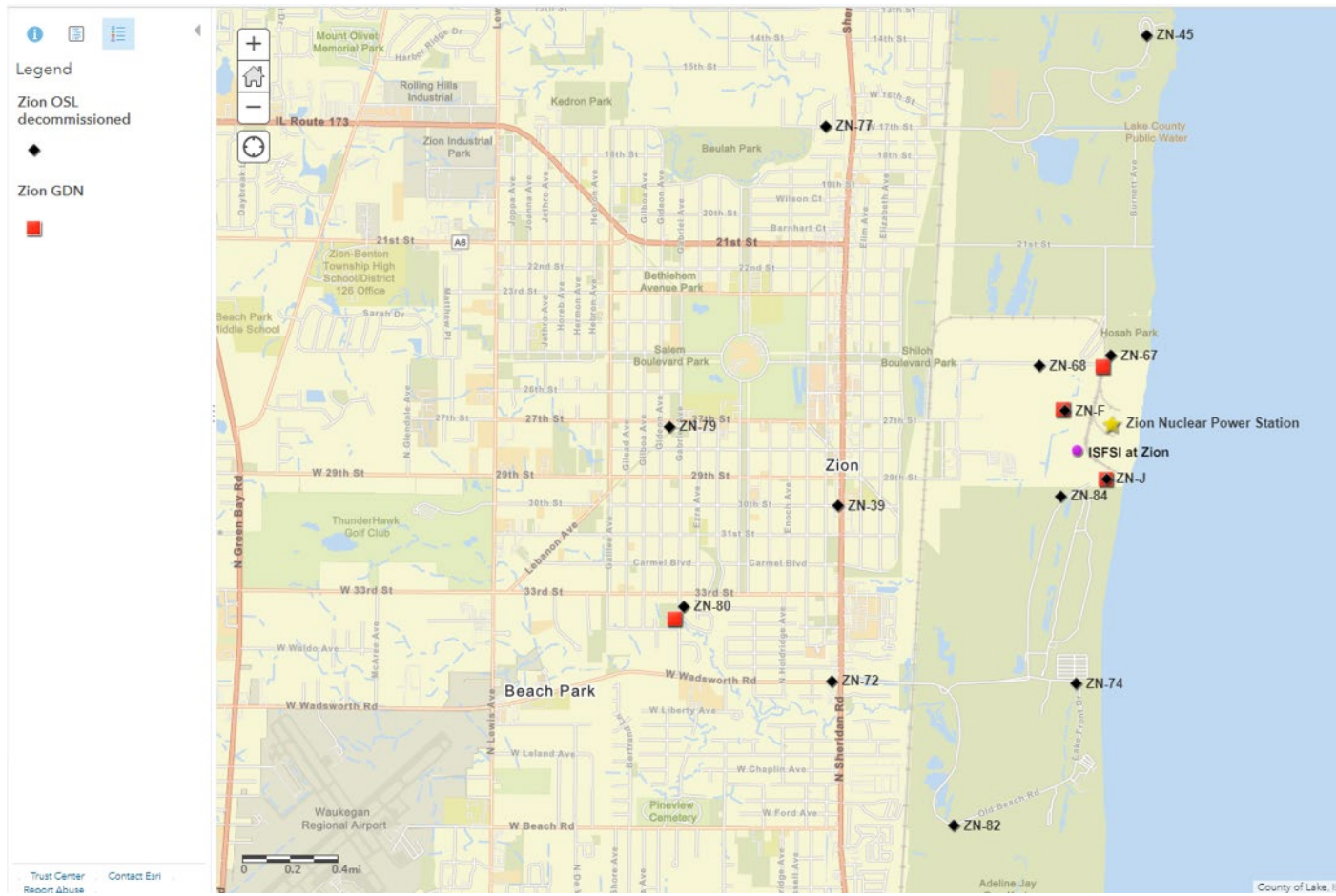
Direct Radiation Monitoring Results

The ambient gamma monitoring results from deployed OSLs were comparable to historical data and to results found at the background monitoring locations at Sangchris Lake State Park near Kincaid, Illinois.

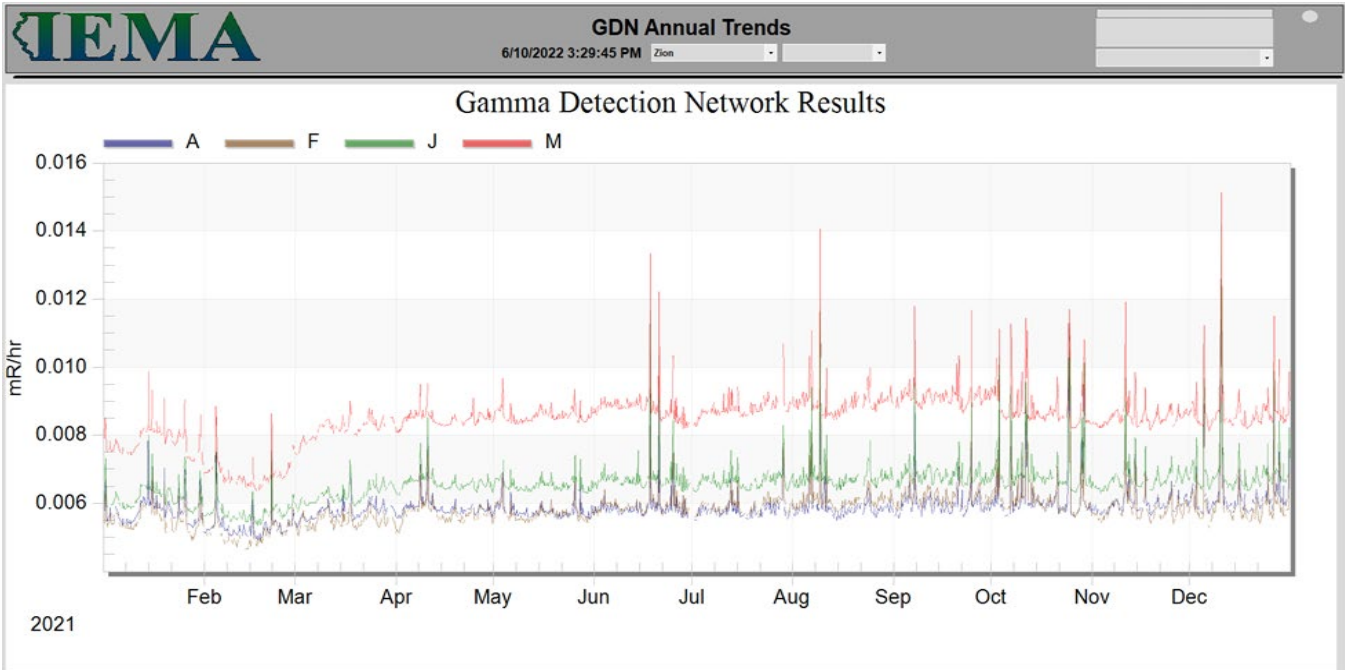
GDN network results were consistent with historical data.

Zion Maps of Monitoring and Sampling Locations

Figure 24. OSL and GDN Monitoring Locations- Zion



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 1 mR/quarter	Quarter 1 mR/quarter	Quarter 1 mR/quarter	Annual Exposure mR/year
ZN-39	6.3		5.5	11.4	31.0
ZN-45	6.0	11.5	3.0	11.0	31.4
ZN-67	5.7	6.2	1.9	4.6	18.4
ZN-68	9.0	5.4	6.1	9.2	29.7
ZN-72	8.4	5.0	5.5	8.2	27.0
ZN-74	6.9	7.8	4.7	5.7	25.0
ZN-77	9.7	9.1	7.6	10.3	36.7
ZN-79	7.4	9.5	7.7	13.7	38.3
ZN-80	8.4	9.8	9.0	14.0	41.2
ZN-82	4.7	6.7	6.2	3.9	21.6
ZN-84	7.0	8.8	4.7	6.1	26.6
ZN-JC	7.4	8.6	5.2	4.8	26.1
ZN-NC	4.6	6.7	2.6	4.1	18.0

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.

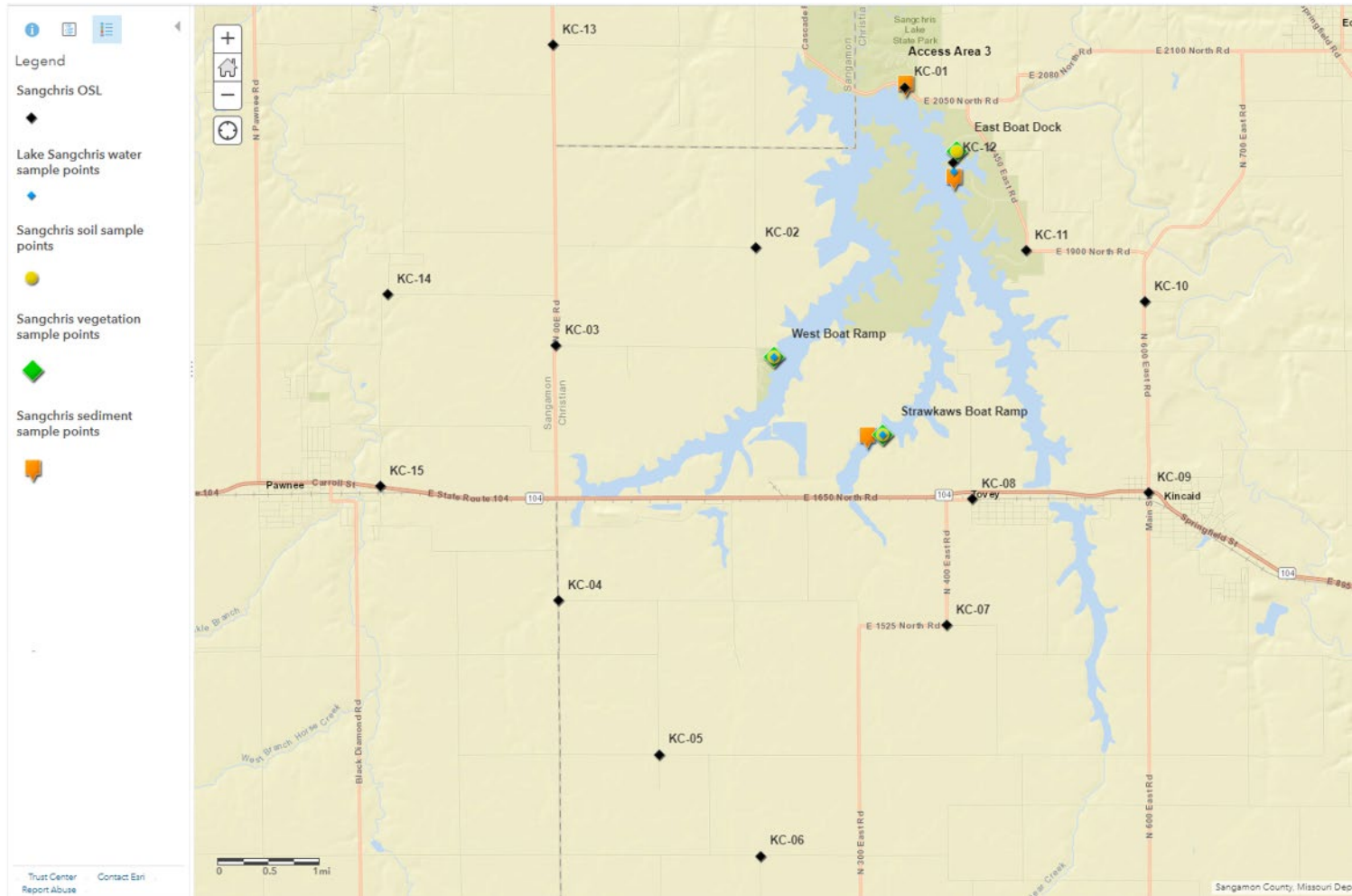
Background Sampling Locations

IEMA-OHS 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 coal-fired power station, similar to what can be found around each NPS.

Figure 25 provides 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 2022 background environmental monitoring locations can be found on pages 128-135.

Sangchris Lake State Park Maps of Monitoring and Sampling Locations

Figure 25. Monitoring and Sampling Locations - Sangchris Lake State Park

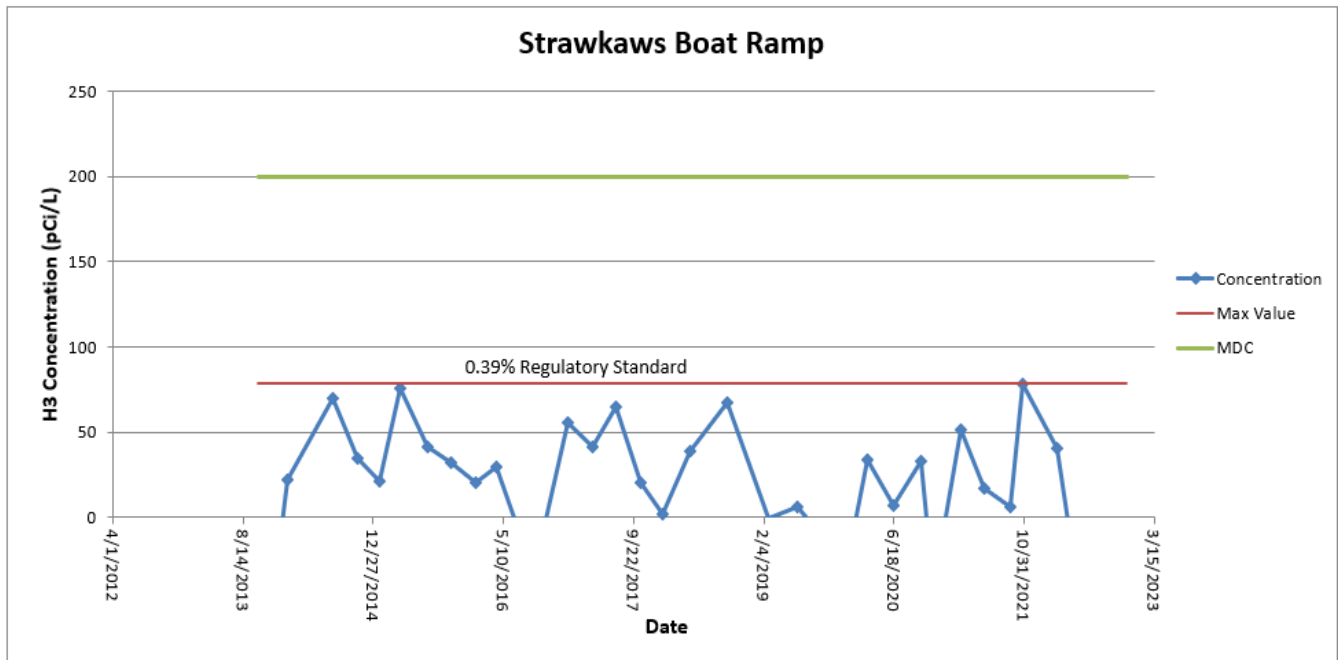
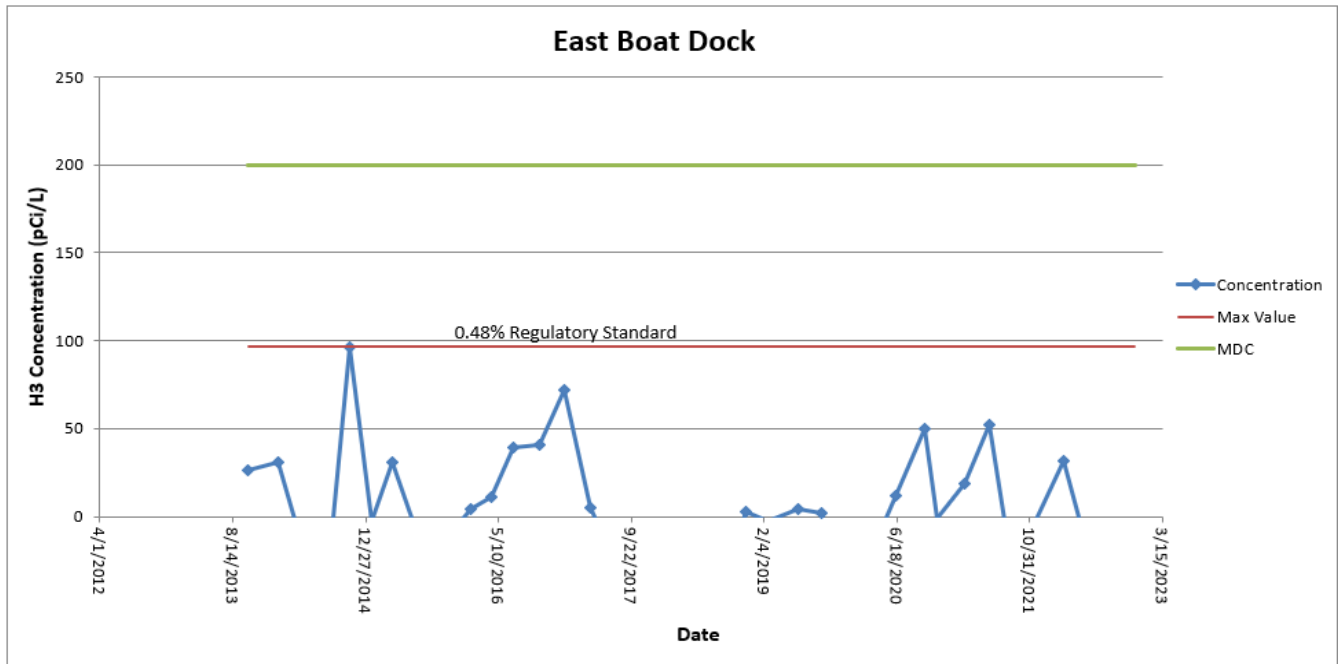


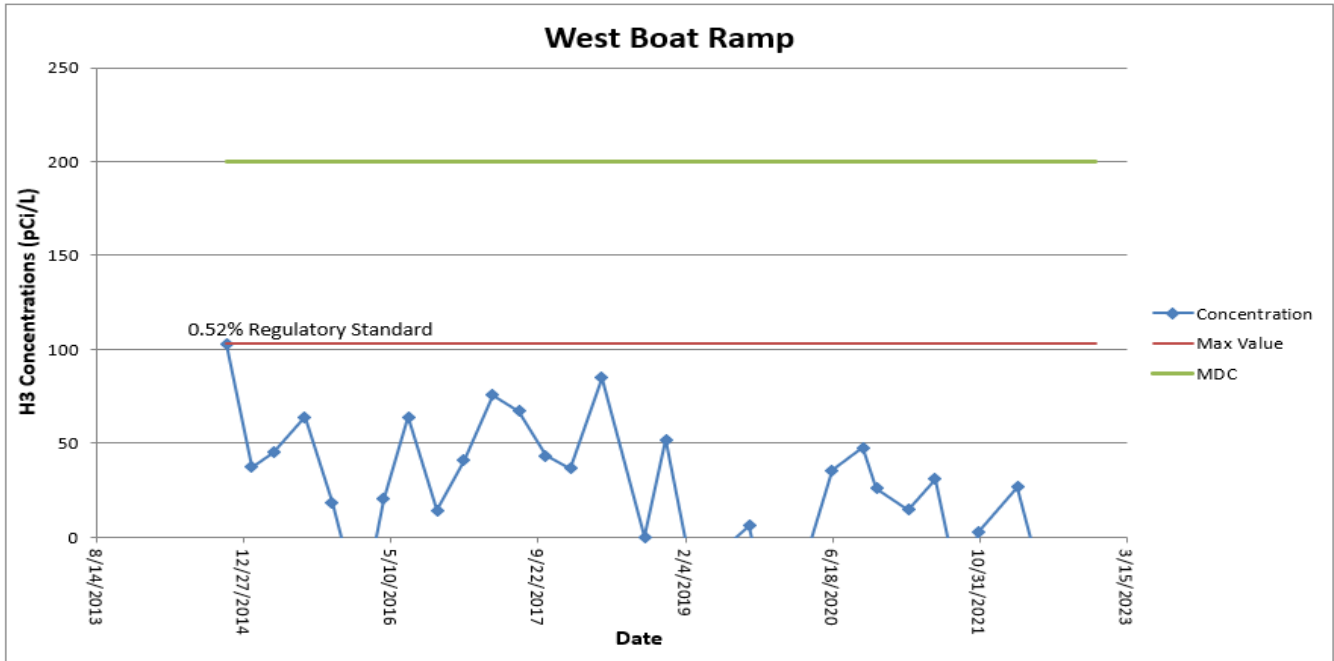
Sangchris Lake State Park Result Tables and Graphs

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

Location Date	H-3	
	Result	MDC
East Boat Dock		
3/8/2022	<MDC	173
5/27/2022	<MDC	173
9/14/2022	<MDC	173
11/30/2022	<MDC	173
Strawkaws Boat Ramp		
3/8/2022	<MDC	173
5/27/2022	<MDC	173
9/14/2022	<MDC	173
11/30/2022	<MDC	173
West Boat Ramp		
3/8/2022	<MDC	173
5/27/2022	<MDC	173
9/14/2022	<MDC	173
11/30/2022	<MDC	173

Trending Graphs for Tritium (H-3) in Water - Sangchris Lake State Park
 (Max value compared to IEPA and US EPA Class regulatory standard of 20,000 pCi/L; MDC represented at 200 pCi/L to account for normal fluctuations)





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

Location Date	Strontium	
	Result	MDC
East Boat Dock		
5/27/2022	<MDC	0.7
Strawkaws Boat Ramp		
3/8/2022	<MDC	0.7
11/30/2022	<MDC	0.7
West Boat Ramp		
9/14/2022	<MDC	0.7

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

Location Date	Beta	
	Result	MDC
East Boat Dock		
3/8/2022	<MDC	4.3
5/27/2022	<MDC	4.3
9/14/2022	<MDC	4.3
11/30/2022	<MDC	4.3
Strawkaws Boat Ramp		
3/8/2022	<MDC	4.3
5/27/2022	<MDC	4.3
9/14/2022	<MDC	4.3
11/30/2022	<MDC	4.3
West Boat Ramp		
3/8/2022	<MDC	4.3
5/27/2022	<MDC	4.3
9/14/2022	<MDC	4.3
11/30/2022	<MDC	4.3

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
East Boat Dock																								
3/8/2022	<MDC	42.0	<MDC	15.5	<MDC	2.9	<MDC	3.6	<MDC	3.5	<MDC	3.4	<MDC	6.4	<MDC	5.6	<MDC	3.1	<MDC	3.6	<MDC	5.8	<MDC	5.5
5/27/2022	<MDC	42.0	<MDC	15.5	<MDC	2.9	<MDC	3.6	<MDC	3.5	<MDC	3.4	<MDC	6.4	<MDC	5.6	<MDC	3.1	<MDC	3.6	<MDC	5.8	<MDC	5.5
9/14/2022	<MDC	42.0	<MDC	15.5	<MDC	2.9	<MDC	3.6	<MDC	3.5	<MDC	3.4	<MDC	6.4	<MDC	5.6	<MDC	3.1	<MDC	3.6	<MDC	5.8	<MDC	5.5
11/30/2022	<MDC	42.0	<MDC	15.5	<MDC	2.9	<MDC	3.6	<MDC	3.5	<MDC	3.4	<MDC	6.4	<MDC	5.6	<MDC	3.1	<MDC	3.6	<MDC	5.8	<MDC	5.5
Strawkaws Boat Ramp																								
3/8/2022	<MDC	42.0	<MDC	15.5	<MDC	2.9	<MDC	3.6	<MDC	3.5	<MDC	3.4	<MDC	6.4	<MDC	5.6	<MDC	3.1	<MDC	3.6	<MDC	5.8	<MDC	5.5
5/27/2022	<MDC	42.0	<MDC	15.5	<MDC	2.9	<MDC	3.6	<MDC	3.5	<MDC	3.4	<MDC	6.4	<MDC	5.6	<MDC	3.1	<MDC	3.6	<MDC	5.8	<MDC	5.5
9/14/2022	<MDC	42.0	<MDC	15.5	<MDC	2.9	<MDC	3.6	<MDC	3.5	<MDC	3.4	<MDC	6.4	<MDC	5.6	<MDC	3.1	<MDC	3.6	<MDC	5.8	<MDC	5.5
11/30/2022	<MDC	42.0	<MDC	15.5	<MDC	2.9	<MDC	3.6	<MDC	3.5	<MDC	3.4	<MDC	6.4	<MDC	5.6	<MDC	3.1	<MDC	3.6	<MDC	5.8	<MDC	5.5
West Boat Ramp																								
3/8/2022	<MDC	42.0	<MDC	15.5	<MDC	2.9	<MDC	3.6	<MDC	3.5	<MDC	3.4	<MDC	6.4	<MDC	5.6	<MDC	3.1	<MDC	3.6	<MDC	5.8	<MDC	5.5
5/27/2022	<MDC	42.0	<MDC	15.5	<MDC	2.9	<MDC	3.6	<MDC	3.5	<MDC	3.4	<MDC	6.4	<MDC	5.6	<MDC	3.1	<MDC	3.6	<MDC	5.8	<MDC	5.5
9/14/2022	<MDC	42.0	<MDC	15.5	<MDC	2.9	<MDC	3.6	<MDC	3.5	<MDC	3.4	<MDC	6.4	<MDC	5.6	<MDC	3.1	<MDC	3.6	<MDC	5.8	<MDC	5.5
11/30/2022	<MDC	42.0	<MDC	15.5	<MDC	2.9	<MDC	3.6	<MDC	3.5	<MDC	3.4	<MDC	6.4	<MDC	5.6	<MDC	3.1	<MDC	3.6	<MDC	5.8	<MDC	5.5

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
East Boat Dock																							
5/27/2022	<MDC	2.92	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.10	0.04	<MDC	0.13	<MDC	0.04	<MDC	0.10	<MDC	0.08	<MDC	0.09	
9/14/2022	<MDC	2.92	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.05	0.04	<MDC	0.13	<MDC	0.04	<MDC	0.10	<MDC	0.08	<MDC	0.09	
Strawkaws Boat Ramp																							
5/27/2022	<MDC	2.92	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.09	0.04	<MDC	0.13	<MDC	0.04	<MDC	0.10	<MDC	0.08	<MDC	0.09	
9/14/2022	<MDC	2.92	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.13	<MDC	0.04	<MDC	0.10	<MDC	0.08	<MDC	0.09	
West Boat Ramp																							
5/27/2022	<MDC	2.92	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.10	0.04	<MDC	0.13	<MDC	0.04	<MDC	0.10	<MDC	0.08	<MDC	0.09	
9/14/2022	<MDC	2.92	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.05	0.04	<MDC	0.13	<MDC	0.04	<MDC	0.10	<MDC	0.08	<MDC	0.09	

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
East Boat Dock																							
5/27/2022	<MDC	0.95	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.09	0.04	<MDC	0.14	<MDC	0.03	<MDC	0.09	<MDC	0.07	<MDC	0.03	
9/14/2022	<MDC	0.95	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.06	0.04	<MDC	0.14	<MDC	0.03	<MDC	0.09	<MDC	0.07	<MDC	0.03	
Strawkaws Boat Ramp																							
5/27/2022	<MDC	0.95	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.05	0.04	<MDC	0.14	<MDC	0.03	<MDC	0.09	<MDC	0.07	0.03	0.03	
9/14/2022	<MDC	0.95	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.14	<MDC	0.03	<MDC	0.09	<MDC	0.07	0.05	0.03	
West Boat Ramp																							
5/27/2022	<MDC	0.95	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.07	0.04	<MDC	0.14	<MDC	0.03	<MDC	0.09	<MDC	0.07	0.05	0.03	
9/14/2022	<MDC	0.95	<MDC	0.20	<MDC	0.04	<MDC	0.03	<MDC	0.02	0.04	0.04	<MDC	0.14	<MDC	0.03	<MDC	0.09	<MDC	0.07	<MDC	0.03	

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																						
5/27/2022	<MDC	2.91	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.13	<MDC	0.03	<MDC	0.10	<MDC	0.07	<MDC	0.07
9/14/2022	<MDC	2.91	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.13	<MDC	0.03	<MDC	0.10	<MDC	0.07	<MDC	0.07
West Boat Ramp																						
5/27/2022	<MDC	2.91	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.13	<MDC	0.03	<MDC	0.10	<MDC	0.07	<MDC	0.07
9/14/2022	<MDC	2.91	<MDC	0.18	<MDC	0.04	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.13	<MDC	0.03	<MDC	0.10	<MDC	0.07	<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
East Boat Dock																								
5/27/2022	<MDC	1.80	<MDC	0.21	<MDC	0.06	<MDC	0.06	<MDC	0.04	<MDC	0.05	<MDC	0.17	<MDC	3.40	<MDC	0.05	<MDC	0.09	<MDC	0.15	<MDC	0.11
9/14/2022	<MDC	1.80	<MDC	0.21	<MDC	0.06	<MDC	0.06	<MDC	0.04	<MDC	0.05	<MDC	0.17	<MDC	3.40	<MDC	0.05	<MDC	0.09	<MDC	0.15	<MDC	0.11
Strawkaws Boat Ramp																								
5/27/2022	<MDC	1.80	<MDC	0.21	<MDC	0.06	<MDC	0.06	<MDC	0.04	<MDC	0.05	<MDC	0.17	<MDC	3.40	<MDC	0.05	<MDC	0.09	<MDC	0.15	<MDC	0.11
9/14/2022	<MDC	1.80	<MDC	0.21	<MDC	0.06	<MDC	0.06	<MDC	0.04	<MDC	0.05	<MDC	0.17	<MDC	3.40	<MDC	0.05	<MDC	0.09	<MDC	0.15	<MDC	0.11
West Boat Ramp																								
5/27/2022	<MDC	1.80	<MDC	0.21	<MDC	0.06	<MDC	0.06	<MDC	0.04	<MDC	0.05	<MDC	0.17	<MDC	3.40	<MDC	0.05	<MDC	0.09	<MDC	0.15	<MDC	0.11
9/14/2022	<MDC	1.80	<MDC	0.21	<MDC	0.06	<MDC	0.06	<MDC	0.04	<MDC	0.05	<MDC	0.17	<MDC	3.40	<MDC	0.05	<MDC	0.09	<MDC	0.15	<MDC	0.11

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	
Sangchris Lake (Top Feeder)																								
10/19/2022	<MDC	2180.0	<MDC	182.0	<MDC	58.0	<MDC	38.2	<MDC	39.8	<MDC	37.8	<MDC	154.0	<MDC	3460.0	<MDC	40.4	<MDC	98.0	<MDC	90.0	<MDC	116.0
Sangchris Lake (Bottom Feeder)																								
10/19/2022	<MDC	2180.0	<MDC	182.0	<MDC	58.0	<MDC	38.2	<MDC	39.8	<MDC	37.8	<MDC	154.0	<MDC	3460.0	<MDC	40.4	<MDC	98.0	<MDC	90.0	<MDC	116.0

Summary of Ambient Gamma Results - Sangchris Lake State Park

Location	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual exposure
	mR/quarter	mR/quarter	mR/quarter	mR/quarter	mR/year
KC-01	12.8	9.2	10.7	8.3	41.1
KC-02	12.7		8.4	8.3	39.2
KC-03	8.6	9.5	7.7	10.1	35.9
KC-04	9.6	8.4	11.6	11.8	41.5
KC-05	10.1	7.2	11.8	11.2	40.4
KC-06	9.3	6.0	11.3	8.9	35.4
KC-07			11.5	11.3	45.7
KC-08		8.4	9.3	10.3	37.4
KC-09	8.3	7.7	8.9	9.1	34.0
KC-10		7.6	12.2	10.8	40.8
KC-11	11.9	11.5	11.4	10.8	45.6
KC-12	11.3	10.6	11.4	9.7	43.1
KC-13	8.6	8.2	12.0		38.4
KC-14	10.7	10.6	10.0	8.5	39.8
KC-15	10.6	7.0	9.3	9.1	36.0

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

Illinois Emergency Management Agency
1035 Outer Park Drive
Springfield, IL 62704

www.iema.illinois.gov
