



IEMA-OHS

ILLINOIS EMERGENCY MANAGEMENT AGENCY
AND OFFICE OF HOMELAND SECURITY

2023 Radiological Environmental Monitoring Report for Illinois Nuclear Power Stations



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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, underwent decommissioning, and was released for unrestricted public use in November 2023. The remaining spent fuel from the power station is stored in an on-site Independent Spent Fuel Storage Installation (ISFSI).

IEMA-OHS'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 2023, 515 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 2023, with the exception of one surface water sample collected from the Rock River near the Byron Station, 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. This sample was found to contain tritium in excess of the US EPA maximum contamination limit and the IEPA groundwater standard for tritium in drinking water. While this limit is used as a reference for tritium concentrations in this report, there are no public water systems in the immediate vicinity of the Byron station that use the Rock River as a source of drinking water. Additionally, the tritium concentration found was well below the limit established in 10 Code of Federal Regulations (CFR) 20 Appendix B and referenced in the station's Offsite Dose Calculation Manual to limit the dose to the public.

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, underwent decommissioning, and was released for unrestricted public use in November 2023. 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 129-136.

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.

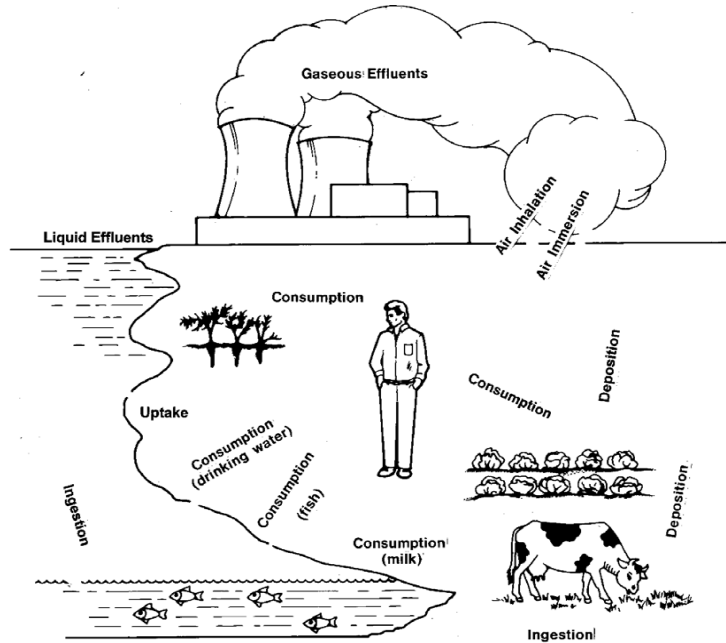
This report details IEMA-OHS’s radiological environmental monitoring program, including data from the RMS for the period January 2023 through December 2023 for the six operating NPSs in Illinois, the now decommissioned NPS at Zion, and the background sampling locations in Kincaid.

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 2023, 515 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 Illinois Environmental Protection Agency (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 U.S. Environmental Protection Agency (US 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.

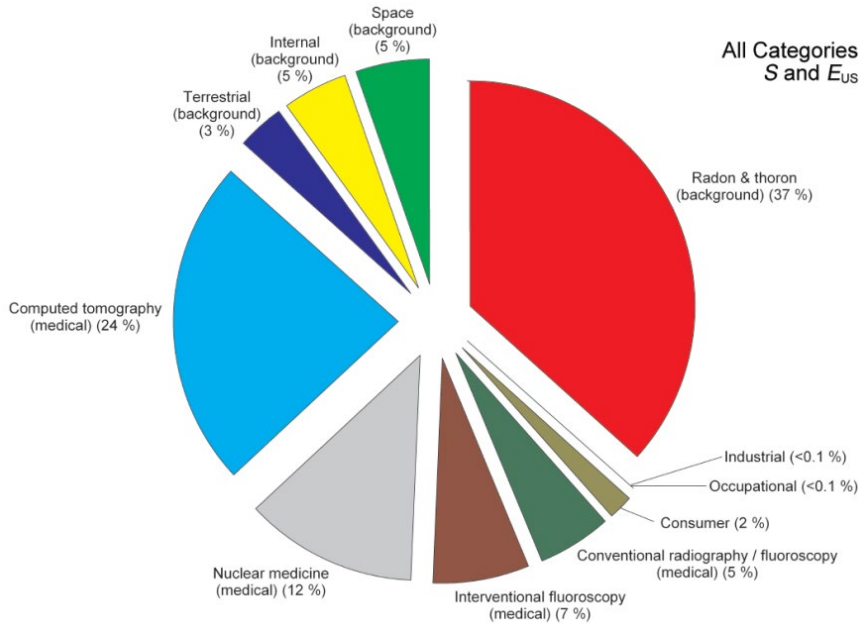
Direct Radiation Monitoring

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

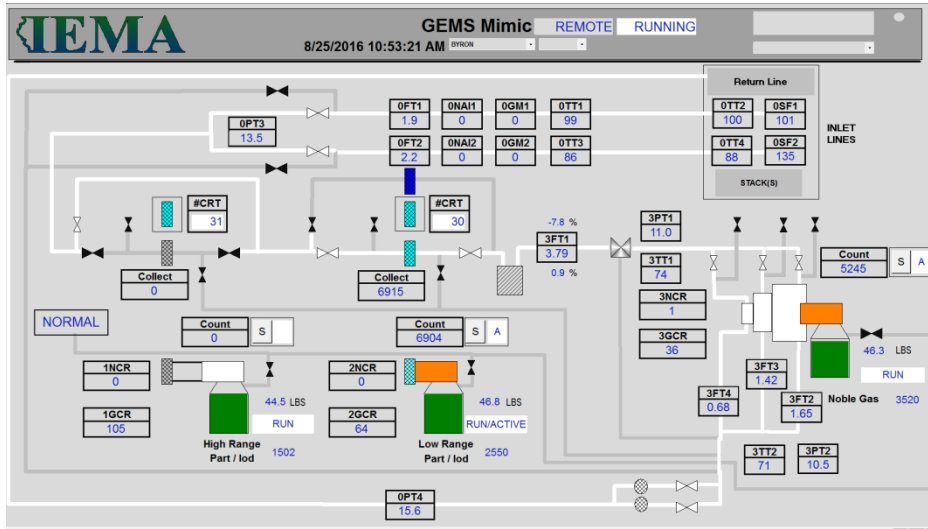


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Gaseous Effluent Monitoring System (GEMS)

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 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

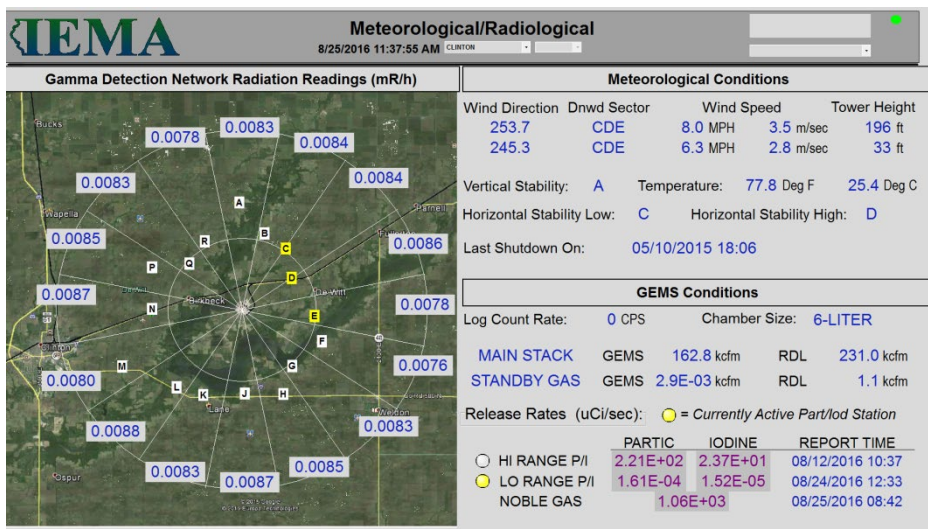


Figure 5. Typical IEMA-OHS GDN Field Installation



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 United States Department of Energy (US DOE) Radiological and Environmental Science Laboratory's Mixed Analyte Performance Evaluation Program (MAPEP). OSLs are analyzed by Radiological Field Services (RFS) staff using a Landauer OSLR 250 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 OSLR 250 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 2023 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 132-139.

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 standards for tritium and strontium 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 near the Braidwood, Dresden, LaSalle, and Quad Cities stations were all below the US EPA maximum contamination limit and the IEPA groundwater standard for tritium in drinking water. One sample collected near the Byron station saw a result in excess of the US EPA limit. While this limit is used as a reference for

tritium concentrations in this report, there are no public water systems in the immediate vicinity of the Byron station that use the Rock River as a source of drinking water. Additionally, the tritium concentration found was well below the limit established in 10 Code of Federal Regulations (CFR) 20 Appendix B and referenced in the station's Offsite Dose Calculation Manual to limit the dose to the public.

Gamma spectroscopy results for the third quarter water sample collected from the North Fork Branch of Salt Creek near the Clinton station indicated the presence of I-131 in concentrations greater than the established MDC. The I-131 concentration from the sample collected at this location in the following quarter was below the established MDC. Constellation reported no releases from the Clinton station during 2023, and since Salt Creek is a tributary of Clinton Lake it is unlikely that the I-131 originated from the station. I-131 is a commonly used medical isotope that could have entered the creek via medical patient excreta. 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. Gamma spectroscopy results for all other radionuclides in deposition and migration soil samples collected for all NPSs are less than the established MDC.

Results from total strontium analyses indicated the presence of strontium in concentrations near the levels found historically at background sampling locations. All strontium 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 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 2023, with the exception of one surface water sample collected from the Rock River near the Byron Station, 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. This sample was found to contain tritium in excess of the US EPA maximum contamination limit and the IEPA groundwater standard for tritium in drinking water. While this limit is used as a reference for tritium concentrations in this report, there are no public water systems in the immediate vicinity of the Byron station that use the Rock River as a source of drinking water. Additionally, the tritium concentration found was well below the limit established in 10 Code of Federal Regulations (CFR) 20 Appendix B and referenced in the station's Offsite Dose Calculation Manual to limit the dose to the public.

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 US NRC and the station's IEPA NPDES permit. In 2023, there were 80 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 2023

No significant events or changes for 2023.

Sampling and Monitoring Results

Water Sampling Results

Detectable levels of tritium were found in surface water samples taken from the Kankakee River at the Des Plaines Conservation Area boat launch during the 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 several sampling locations. Concentrations above MDC are historically found in background samples collected, and the concentrations seen at many water sampling locations for the Braidwood NPS were consistent with background levels. However, concentrations found at some locations were slightly 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.

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

Detectable levels of strontium were found in surface water samples taken from the Kankakee River at the Kankakee River State Park Boat Launch and at Wilmington Island Park . The elevated levels are likely attributable to liquid effluent releases from the Braidwood Station. The strontium level was well below the Drinking Water Standards established by the US EPA and IEPA.

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 Barium-140 concentrations greater than the established MDC for fish collected from the Braidwood Cooling Lake, however due to the short half-life of Barium-140 and the number of days between collection and analysis, the activity in the sample was determined to be too low to measure reliably.

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.

Braidwood Maps of Monitoring and Sampling Locations

Figure 6. OSL and GDN Monitoring Locations- Braidwood

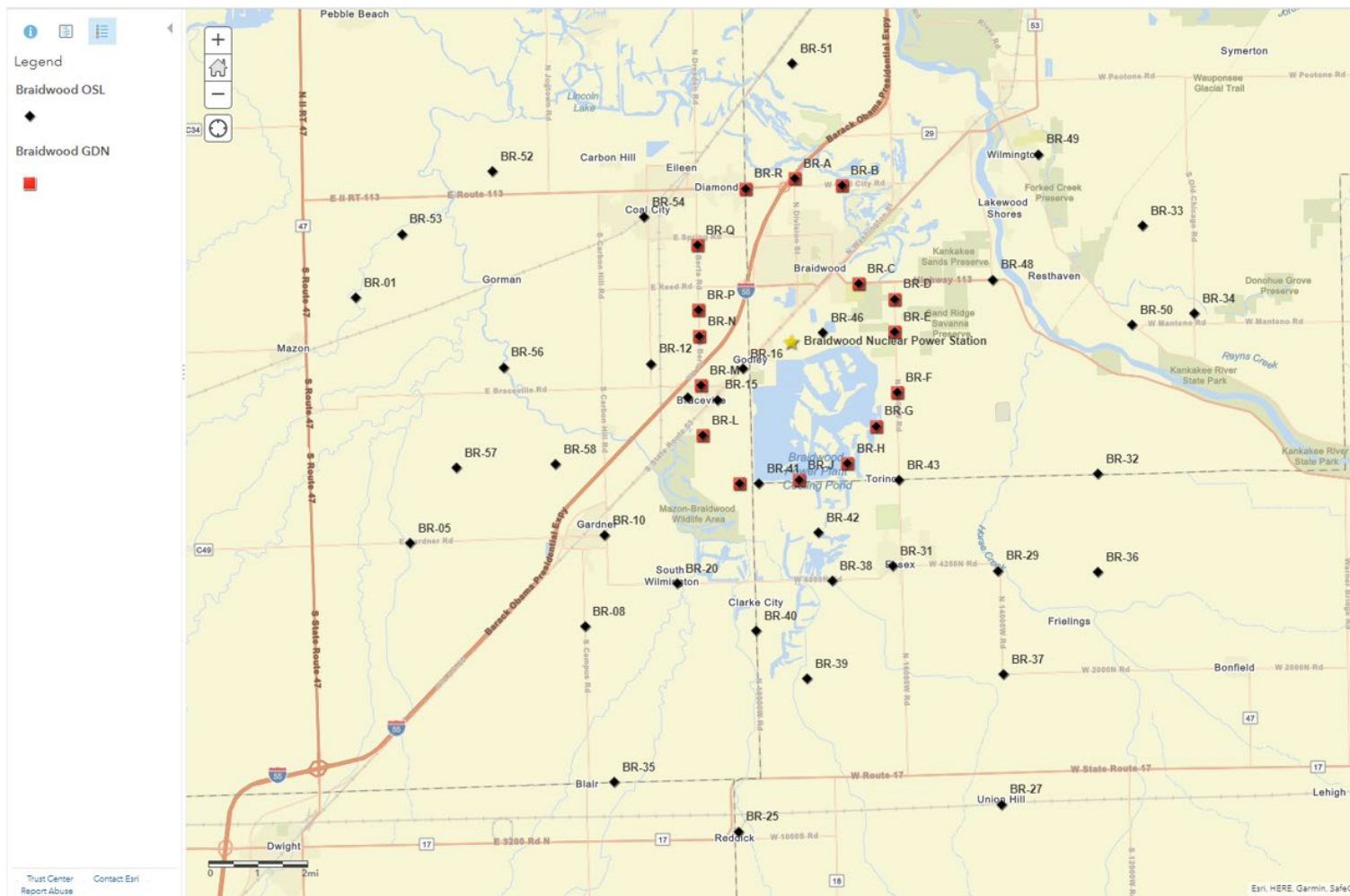


Figure 7. OSL and GDN Monitoring Locations- Braidwood (continued)

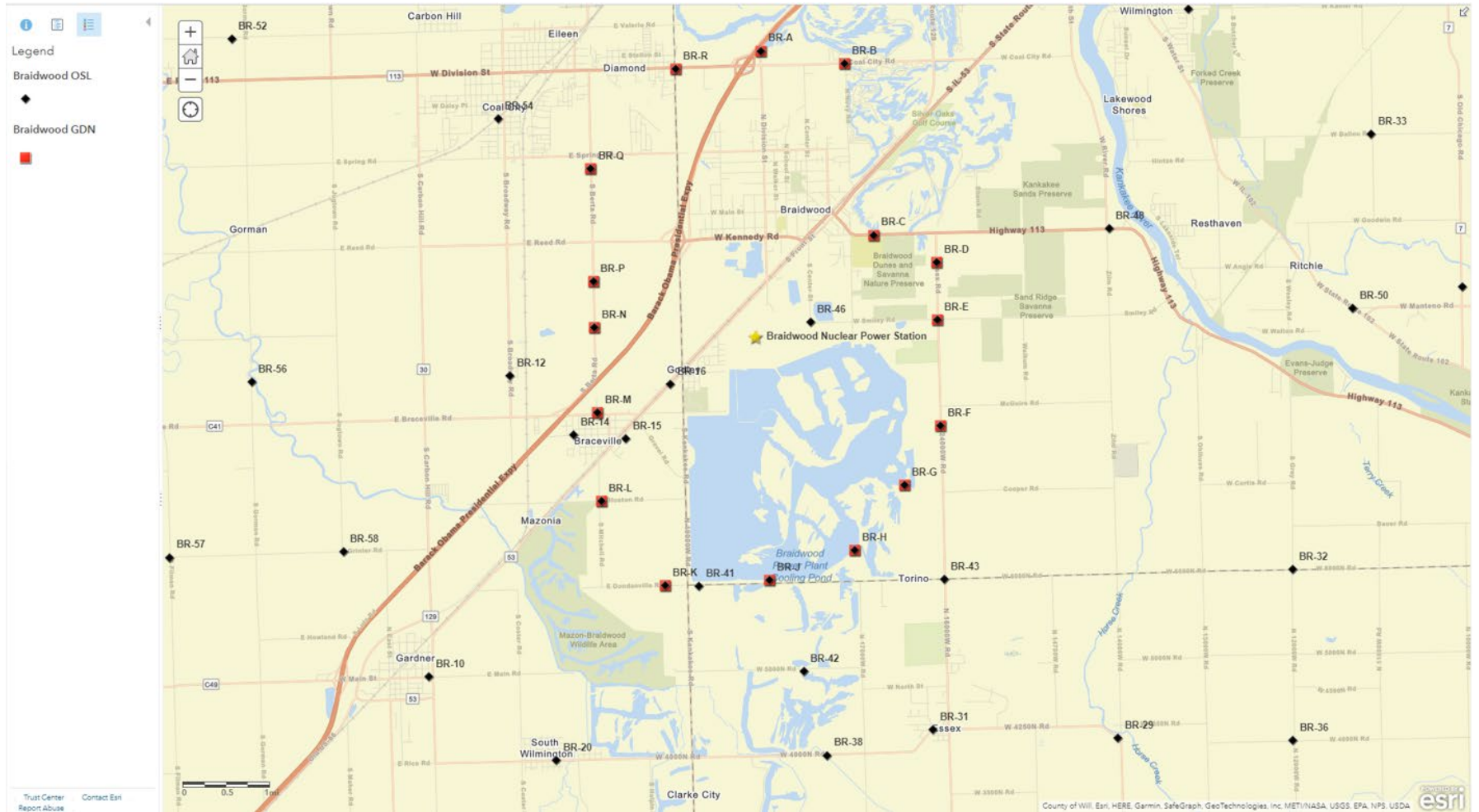


Figure 8. Environmental Sampling Locations – Braidwood

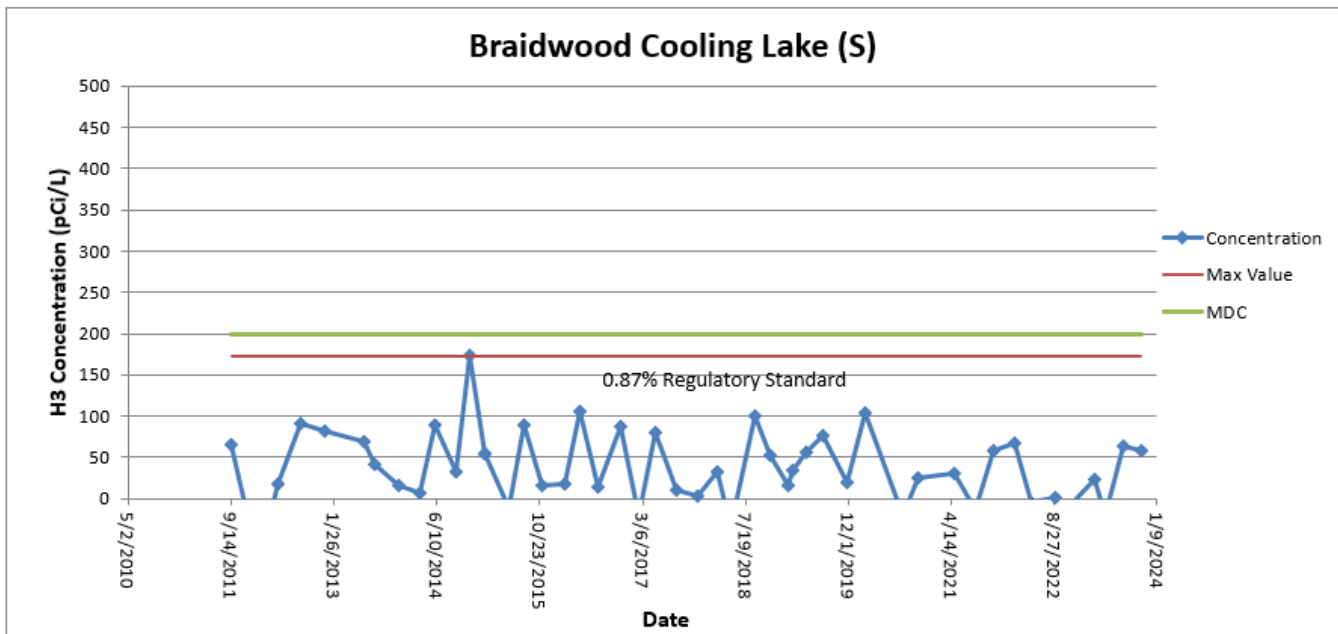
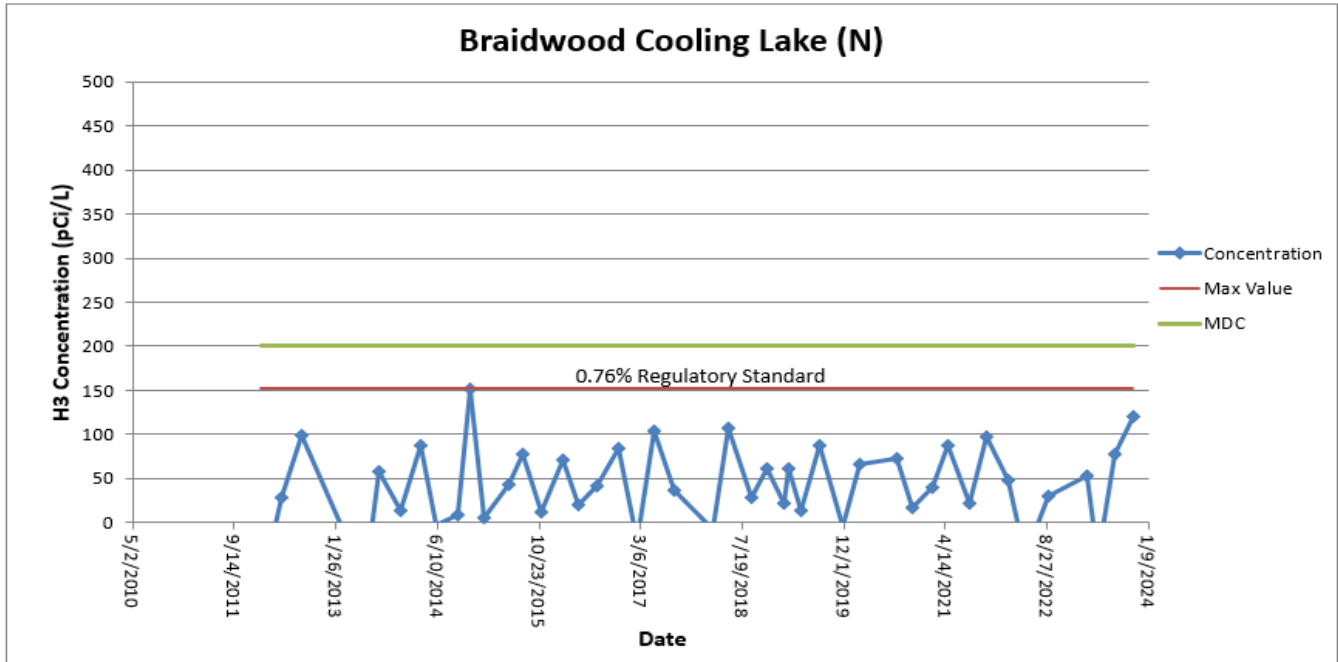


Braidwood Sample Result Tables and Graphs

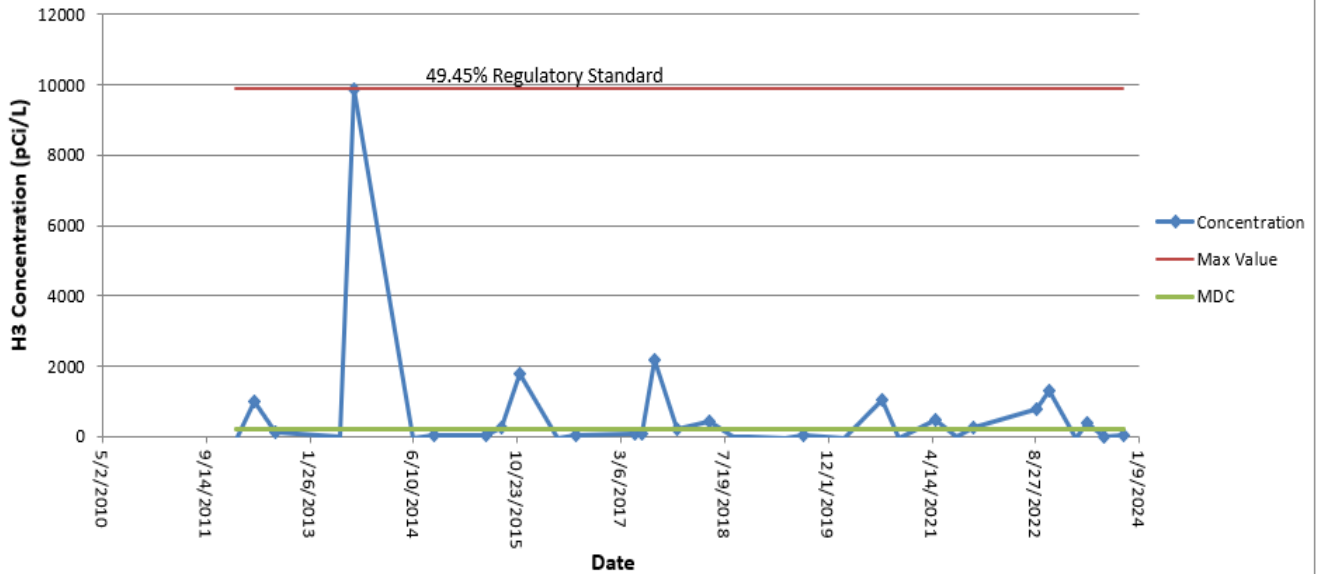
Tritium (H-3) in Water Results - Braidwood
Results are in picocuries per liter (pCi/L)

Location Date	H-3	
	Result	MDC
Braidwood Cooling Lake (N)		
3/8/2023	<MDC	126
5/3/2023	<MDC	126
7/26/2023	<MDC	126
10/24/2023	<MDC	126
Braidwood Cooling Lake (S)		
3/8/2023	<MDC	126
5/3/2023	<MDC	126
7/26/2023	<MDC	126
10/24/2023	<MDC	126
Kankakee R. at Des Plaines Conservation Area Boat Launch		
3/8/2023	<MDC	126
5/3/2023	400	126
7/26/2023	<MDC	126
10/24/2023	<MDC	126
Kankakee R. at Kankakee R. State Park Boat Launch		
5/3/2023	<MDC	126
7/26/2023	<MDC	126
10/24/2023	<MDC	126
Kankakee R. at Wilmington Island Park		
3/8/2023	<MDC	126
5/3/2023	<MDC	126
7/26/2023	<MDC	126
10/24/2023	<MDC	126

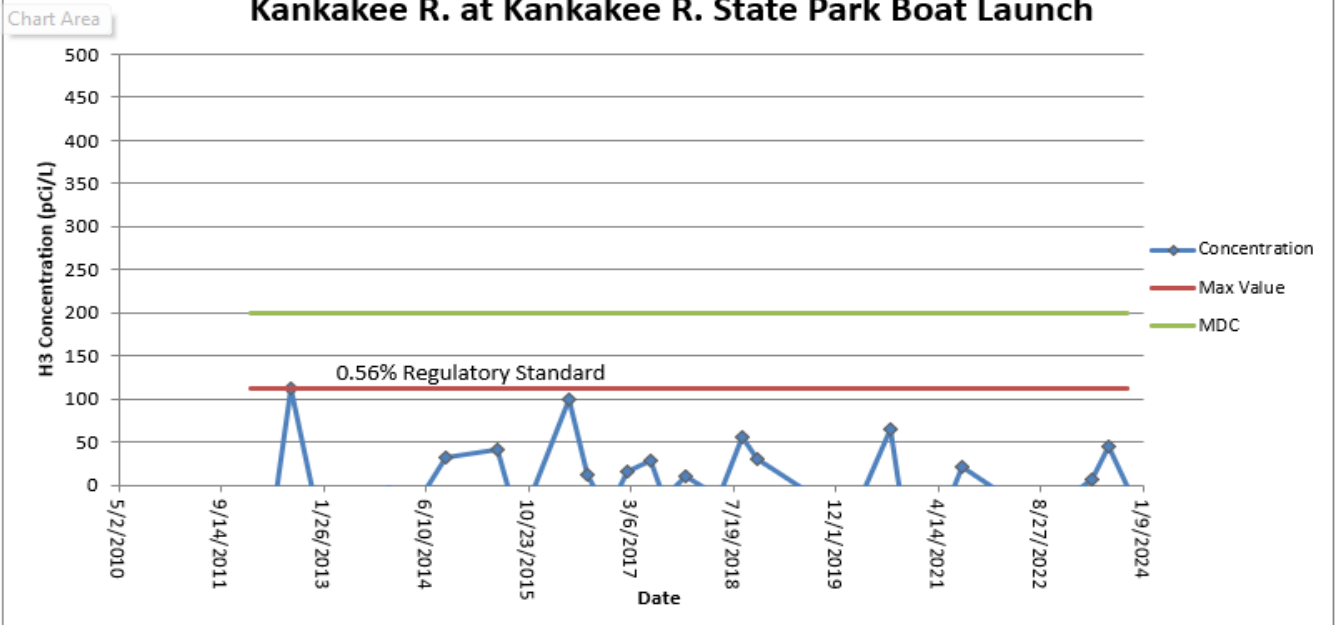
Trending Graphs for Tritium (H-3) in Water - Braidwood
 (Max value compared to IEPA and US EPA Class regulatory standard of 20,000 pCi/L; MDC represented at 200 pCi/L to account for normal fluctuations)

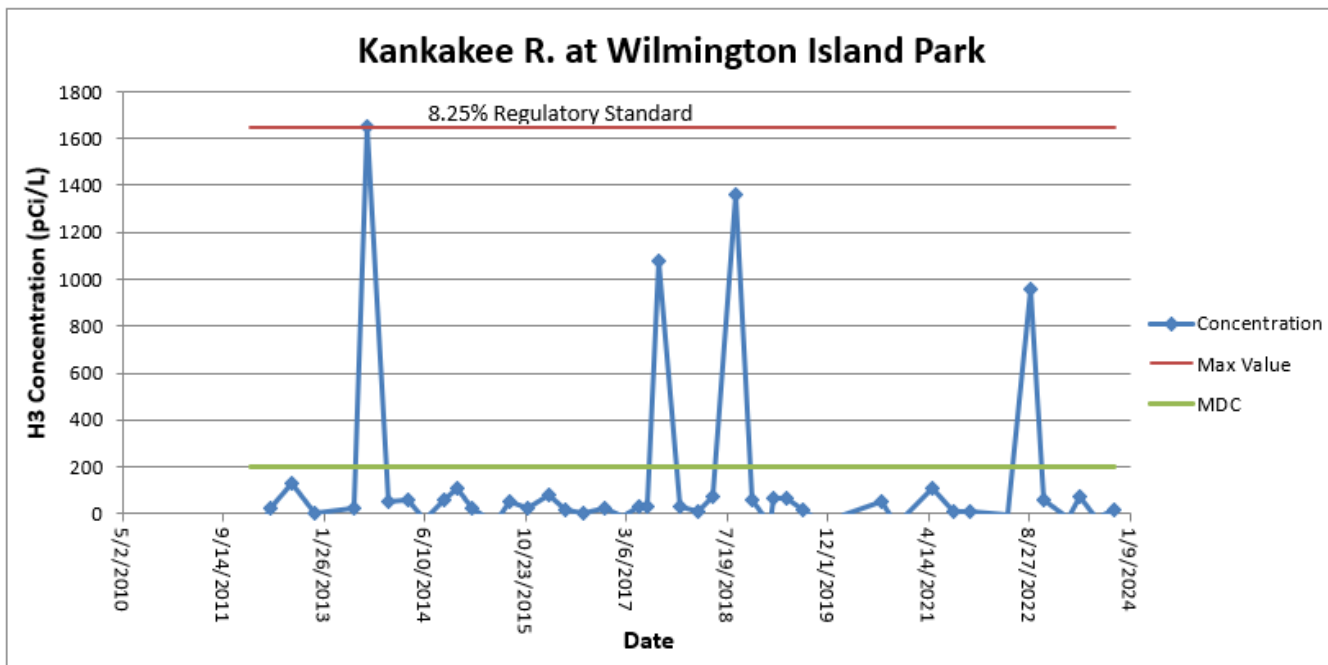


Kankakee R. at Des Plaines Conservation Area Boat Launch



Kankakee R. at Kankakee R. State Park Boat Launch





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

Location	Strontium		
	Date	Result	MDC
Braidwood Cooling Lake (N)			
	3/8/2023	<MDC	0.8
	5/3/2023	<MDC	0.8
Kankakee R. at Kankakee R. State Park Boat Launch			
	7/26/2023	1.4	0.8
Kankakee R. at Wilmington Island Park			
	10/24/2023	1.4	0.8

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

Location Date	Beta	
	Result	MDC
Braidwood Cooling Lake (N)		
3/8/2023	6.4	3.9
5/3/2023	5.3	3.9
7/26/2023	9.8	3.9
10/24/2023	<MDC	3.9
Braidwood Cooling Lake (S)		
3/8/2023	7.4	3.9
5/3/2023	5.3	3.9
7/26/2023	7.0	3.9
10/24/2023	5.7	3.9
Kankakee R. at Des Plaines Conservation Area Boat Launch		
3/8/2023	<MDC	3.9
5/3/2023	4.5	3.9
7/26/2023	<MDC	3.9
10/24/2023	<MDC	3.9
Kankakee R. at Kankakee R. State Park Boat Launch		
5/3/2023	<MDC	3.9
7/26/2023	<MDC	3.9
10/24/2023	<MDC	3.9
Kankakee R. at Wilmington Island Park		
3/8/2023	4.9	3.9
5/3/2023	3.9	3.9
7/26/2023	4.4	3.9
10/24/2023	<MDC	3.9

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)																								
3/8/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
5/3/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
7/26/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
10/24/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
Braidwood Cooling Lake (S)																								
3/8/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
5/3/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
7/26/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
10/24/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
Kankakee R. at Des Plaines Conservation Area Boat Launch																								
3/8/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
5/3/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
7/26/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
10/24/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
Kankakee R. at Kankakee R. State Park Boat Launch																								
5/3/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
7/26/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
10/24/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
Kankakee R. at Wilmington Island Park																								
3/8/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
5/3/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
7/26/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3
10/24/2023	<MDC	17.0	<MDC	17.8	<MDC	2.7	<MDC	3.5	<MDC	3.4	<MDC	3.5	<MDC	5.7	<MDC	7.9	<MDC	2.9	<MDC	3.2	<MDC	6.3	<MDC	5.3

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

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
	Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result
Braidwood Cooling Lake (S)																						
5/3/2023	<MDC	0.28	<MDC	0.18	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.05
8/1/2023	<MDC	0.28	<MDC	0.18	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.05
Kankakee R. at Kankakee R. State Park Boat Launch																						
5/3/2023	<MDC	0.28	<MDC	0.18	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.06	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.05
8/1/2023	<MDC	0.28	<MDC	0.18	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.04	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.05
Kankakee R. at Wilmington Island Park																						
5/3/2023	<MDC	0.28	<MDC	0.18	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.09	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.05
8/1/2023	<MDC	0.28	<MDC	0.18	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.04	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.05

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

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
	Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result
Braidwood Cooling Lake (S)																						
5/3/2023	<MDC	0.34	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
8/1/2023	<MDC	0.34	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
Kankakee R. at Kankakee R. State Park Boat Launch																						
5/3/2023	<MDC	0.34	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.06	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
8/1/2023	<MDC	0.34	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.05	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
Kankakee R. at Wilmington Island Park																						
5/3/2023	<MDC	0.34	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.08	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
8/1/2023	<MDC	0.34	<MDC	0.18	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.04	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06

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)																						
5/3/2023	<MDC	0.27	<MDC	0.13	<MDC	0.01	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.04	<MDC	0.06	<MDC	0.05
7/26/2023	<MDC	0.27	<MDC	0.13	<MDC	0.01	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.04	<MDC	0.06	<MDC	0.05
Kankakee R. at Kankakee R. State Park Boat Launch																						
5/3/2023	<MDC	0.27	<MDC	0.13	<MDC	0.01	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.04	<MDC	0.06	<MDC	0.05
7/26/2023	<MDC	0.27	<MDC	0.13	<MDC	0.01	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.04	<MDC	0.06	<MDC	0.05
Kankakee R. at Wilmington Island Park																						
5/3/2023	<MDC	0.27	<MDC	0.13	<MDC	0.01	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.04	<MDC	0.06	<MDC	0.05
7/26/2023	<MDC	0.27	<MDC	0.13	<MDC	0.01	<MDC	0.03	<MDC	0.02	0.04	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.04	<MDC	0.06	<MDC	0.05

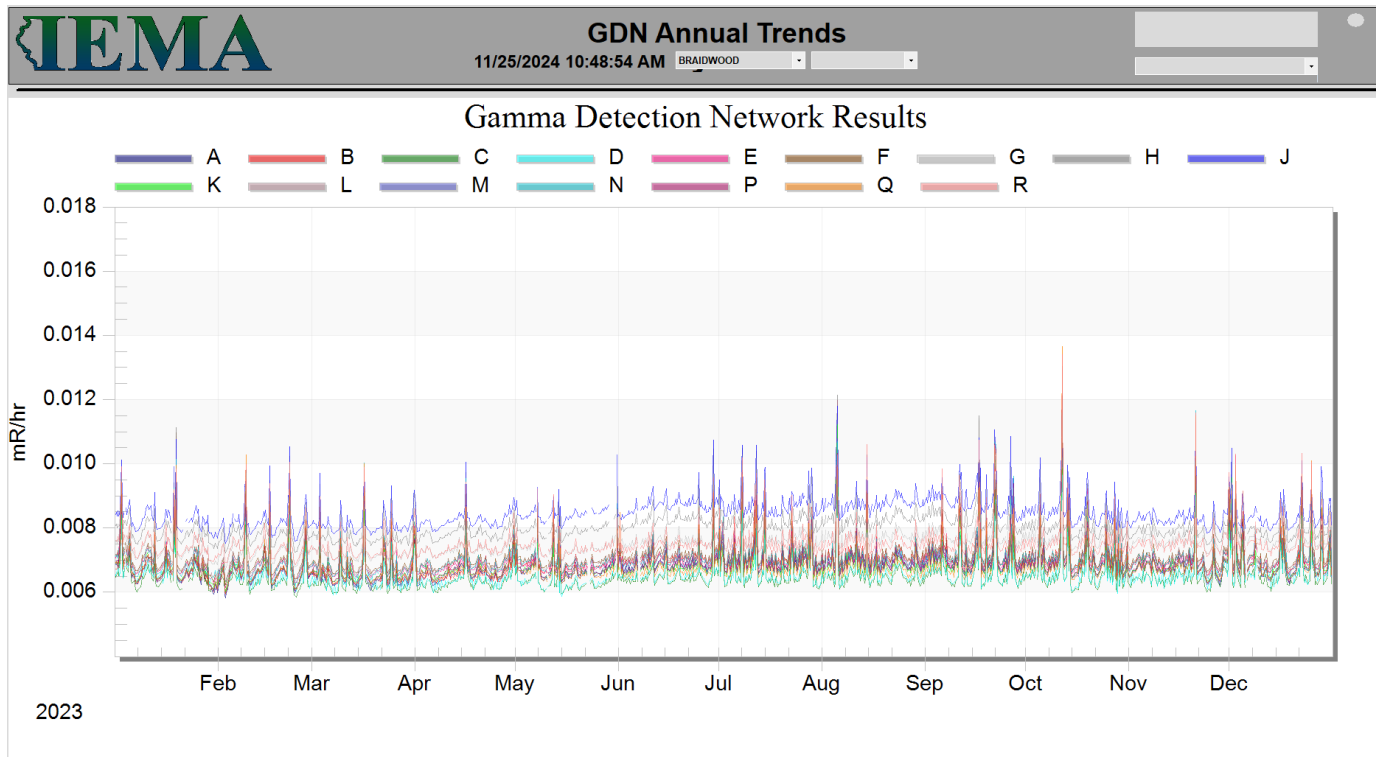
Gamma Spectroscopy Results for Radionuclides in Vegetation - Braidwood
Results are in picocuries per gram (pCi/g)

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)																								
5/3/2023	<MDC	0.41	<MDC	0.23	<MDC	0.05	<MDC	0.06	<MDC	0.06	<MDC	0.06	<MDC	0.12	<MDC	0.22	<MDC	0.05	<MDC	0.06	<MDC	0.13	<MDC	0.10
8/1/2023	<MDC	0.41	<MDC	0.23	<MDC	0.05	<MDC	0.06	<MDC	0.06	<MDC	0.06	<MDC	0.12	<MDC	0.22	<MDC	0.05	<MDC	0.06	<MDC	0.13	<MDC	0.10
Kankakee R. at Kankakee R. State Park Boat Launch																								
5/3/2023	<MDC	0.41	<MDC	0.23	<MDC	0.05	<MDC	0.06	<MDC	0.06	<MDC	0.06	<MDC	0.12	<MDC	0.22	<MDC	0.05	<MDC	0.06	<MDC	0.13	<MDC	0.10
8/1/2023	<MDC	0.41	<MDC	0.23	<MDC	0.05	<MDC	0.06	<MDC	0.06	<MDC	0.06	<MDC	0.12	<MDC	0.22	<MDC	0.05	<MDC	0.06	<MDC	0.13	<MDC	0.10
Kankakee R. at Wilmington Island Park																								
5/3/2023	<MDC	0.41	<MDC	0.23	<MDC	0.05	<MDC	0.06	<MDC	0.06	<MDC	0.06	<MDC	0.12	<MDC	0.22	<MDC	0.05	<MDC	0.06	<MDC	0.13	<MDC	0.10
8/1/2023	<MDC	0.41	<MDC	0.23	<MDC	0.05	<MDC	0.06	<MDC	0.06	<MDC	0.06	<MDC	0.12	<MDC	0.22	<MDC	0.05	<MDC	0.06	<MDC	0.13	<MDC	0.10

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)																										
8/15/2023	<MDC	6.7E+06	<MDC	233.0	<MDC	123.0	<MDC	37.0	<MDC	40.0	<MDC	34.0	<MDC	790.0	<MDC	2.0E+09	<MDC	48.0	<MDC	1040.0	<MDC	114.0	<MDC	261.0	<MDC	261.0
10/4/2023	<MDC	6.7E+06	<MDC	233.0	<MDC	123.0	<MDC	37.0	<MDC	40.0	<MDC	34.0	<MDC	790.0	<MDC	2.0E+09	<MDC	48.0	<MDC	1040.0	<MDC	114.0	<MDC	261.0	<MDC	261.0
10/20/2023	<MDC	6.7E+06	<MDC	233.0	<MDC	123.0	<MDC	37.0	<MDC	40.0	<MDC	34.0	<MDC	790.0	<MDC	2.0E+09	<MDC	48.0	<MDC	1040.0	<MDC	114.0	<MDC	261.0	<MDC	261.0
Kanakee R. (Bottom Feeder)																										
8/15/2023	<MDC	6.7E+06	<MDC	233.0	<MDC	123.0	<MDC	37.0	<MDC	40.0	<MDC	34.0	<MDC	790.0	<MDC	2.0E+09	<MDC	48.0	<MDC	1040.0	<MDC	114.0	<MDC	261.0	<MDC	261.0
10/4/2023	<MDC	6.7E+06	<MDC	233.0	<MDC	123.0	<MDC	37.0	<MDC	40.0	<MDC	34.0	<MDC	790.0	<MDC	2.0E+09	<MDC	48.0	<MDC	1040.0	<MDC	114.0	<MDC	261.0	<MDC	261.0
10/20/2023	<MDC	6.7E+06	<MDC	233.0	<MDC	123.0	<MDC	37.0	<MDC	40.0	<MDC	34.0	<MDC	790.0	<MDC	2.0E+09	<MDC	48.0	<MDC	1040.0	<MDC	114.0	<MDC	261.0	<MDC	261.0
Braidwood Cooling Lake (Bottom Feeder)																										
10/4/2023	6.8E+06	6.7E+06	<MDC	233.0	<MDC	123.0	<MDC	37.0	<MDC	40.0	<MDC	34.0	<MDC	790.0	<MDC	2.0E+09	<MDC	48.0	<MDC	1040.0	<MDC	114.0	<MDC	261.0	<MDC	261.0

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	10.4	10.3	13.0	28.0	48.5
BR-05	7.6	10.1	13.1	23.3	43.0
BR-08	10.0	10.1	9.5	17.9	44.1
BR-10	6.3	8.6	6.3	18.1	33.2
BR-12	3.5	6.9	8.2	13.6	27.8
BR-14	2.7	6.5	7.7	13.5	26.2
BR-15	3.1	4.6	6.9	16.4	21.6
BR-16			7.9	20.3	8.2
BR-20	3.2	6.0	7.6	14.8	25.2
BR-25	6.4	7.6	6.6		31.0
BR-27	5.3	7.8		15.9	27.7
BR-29	4.1	4.7	9.9	13.9	25.0
BR-31	5.3	7.9	7.8		29.2
BR-32	2.3	5.6	5.7	25.4	20.7
BR-33	4.8	7.9	7.2	22.3	26.5
BR-34	7.8	8.8	9.5	14.7	39.3
BR-35	7.6	9.3	12.2	16.2	40.5
BR-36	2.8	5.1	7.2	17.0	22.6
BR-37	6.6	6.8	6.4	20.5	28.2
BR-38	2.5	7.0	4.7	24.2	23.0
BR-39	4.2	10.6	9.9	18.8	35.3
BR-40	8.1	8.2	12.5	21.0	41.4
BR-41	4.1	4.9	6.2	14.0	24.9
BR-42	8.3	6.6	8.7	14.0	34.5
BR-43	3.5	3.6	4.5	13.6	18.9
BR-46	3.2	4.6	3.4	13.6	18.4

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	4.6	5.5	5.4	13.6	22.5
BR-49	6.9	5.1	4.5	13.6	23.6
BR-50	7.4	8.5	9.6	17.3	34.4
BR-51	4.0	4.1	6.8	15.4	22.8
BR-52	5.3	9.3	7.0	16.2	30.0
BR-53	7.9	8.0	11.0	19.9	37.2
BR-54	5.5	6.3		13.7	25.2
BR-56	2.6	8.8	9.9	18.1	30.7
BR-57	5.0	9.0	9.0	23.0	34.9
BR-58	3.1	9.8	12.5	26.5	39.2
BR-A	4.2	7.3	7.5	18.0	28.3
BR-B	1.1	3.7	6.2	15.0	18.7
BR-C	1.5	5.7	7.5	14.7	22.2
BR-D	9.8	3.8	5.1	13.2	25.5
BR-E	2.3	8.2	6.1	13.2	23.4
BR-F	3.8	4.1	7.3	14.7	22.7
BR-G	9.6	5.7	8.7	23.9	36.3
BR-H	10.9	7.8	8.2	20.4	37.5
BR-J	11.6	8.8	8.8	22.3	40.7
BR-K	4.0	6.8	8.6	16.4	27.8
BR-L	2.2	7.1	6.7	21.1	26.9
BR-M	3.1	7.2	7.4	16.8	26.4
BR-N	3.9	7.2	6.4	16.0	25.7
BR-P	3.6	3.4	5.8	14.9	20.5
BR-Q	0.9	5.8	5.4	12.3	18.4
BR-R	8.9	15.4	10.5	19.5	44.8

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 US NRC and the station's IEPA NPDES permit. In 2023, there were 81 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 2023

The "Southwest of Rockford" soil and vegetation sampling location was removed from IEMA-OHS's sampling plan after second quarter 2023 because there were two vegetation and soil sampling locations located in the Northeast quadrant of the Byron station, and that location was the furthest away from the plant.

Sampling and Monitoring Results

Water Sampling Results

Tritium at a concentration above the US EPA drinking water and the IEPA groundwater standard of 20,000 picocuries per liter (pCi/L) was found in surface water samples taken from the Rock River at Oregon Park East during first quarter sampling. This elevated concentration can be attributed to the liquid effluent releases from the Byron station. While this standard is used as a reference for tritium concentrations in this report, there are no public water systems in the immediate vicinity of the Byron station that use the Rock River as a source of drinking water. Additionally, the tritium concentration found was well below the limit established in 10 Code of Federal Regulations (CFR) 20 Appendix B and referenced in the station's Offsite Dose Calculation Manual to limit the dose to the public. The tritium concentration from the sample collected from this location in the following quarter was below the established MDC. All other tritium levels were well below the established MDC.

Results from gross beta analysis indicated that the established MDC was met at several sampling locations, however the concentrations found were consistent with historical levels found at background sampling locations.

Detectable levels of strontium were found in surface water sample taken from the Lowden State Park Boat Ramp location; however, the concentration found was consistent with historical levels found at background sampling locations. The strontium level was well below the Drinking Water Standards established by the US EPA and IEPA.

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

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

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

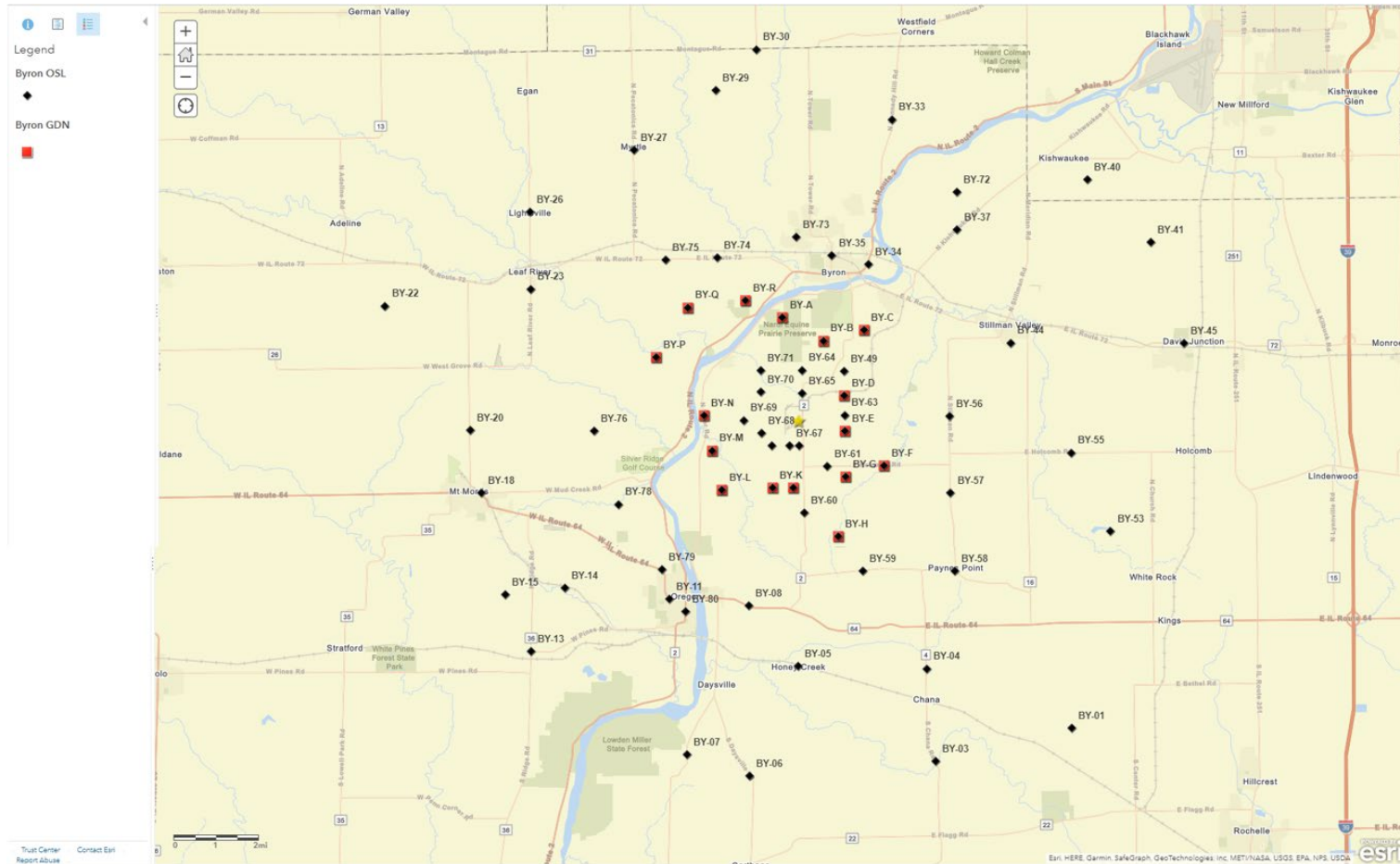


Figure 10. OSL and GDN Monitoring Locations- Byron (continued)

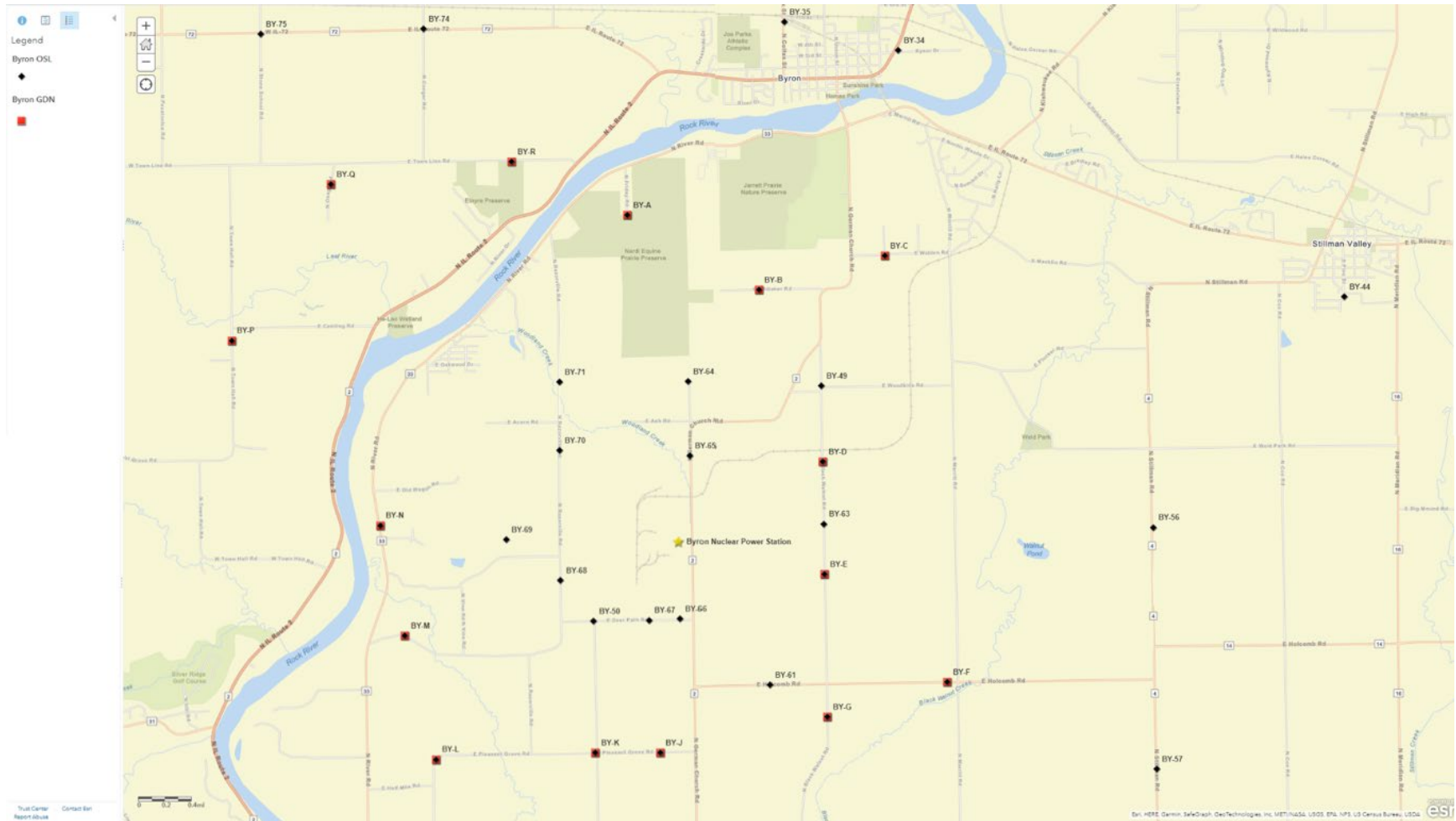
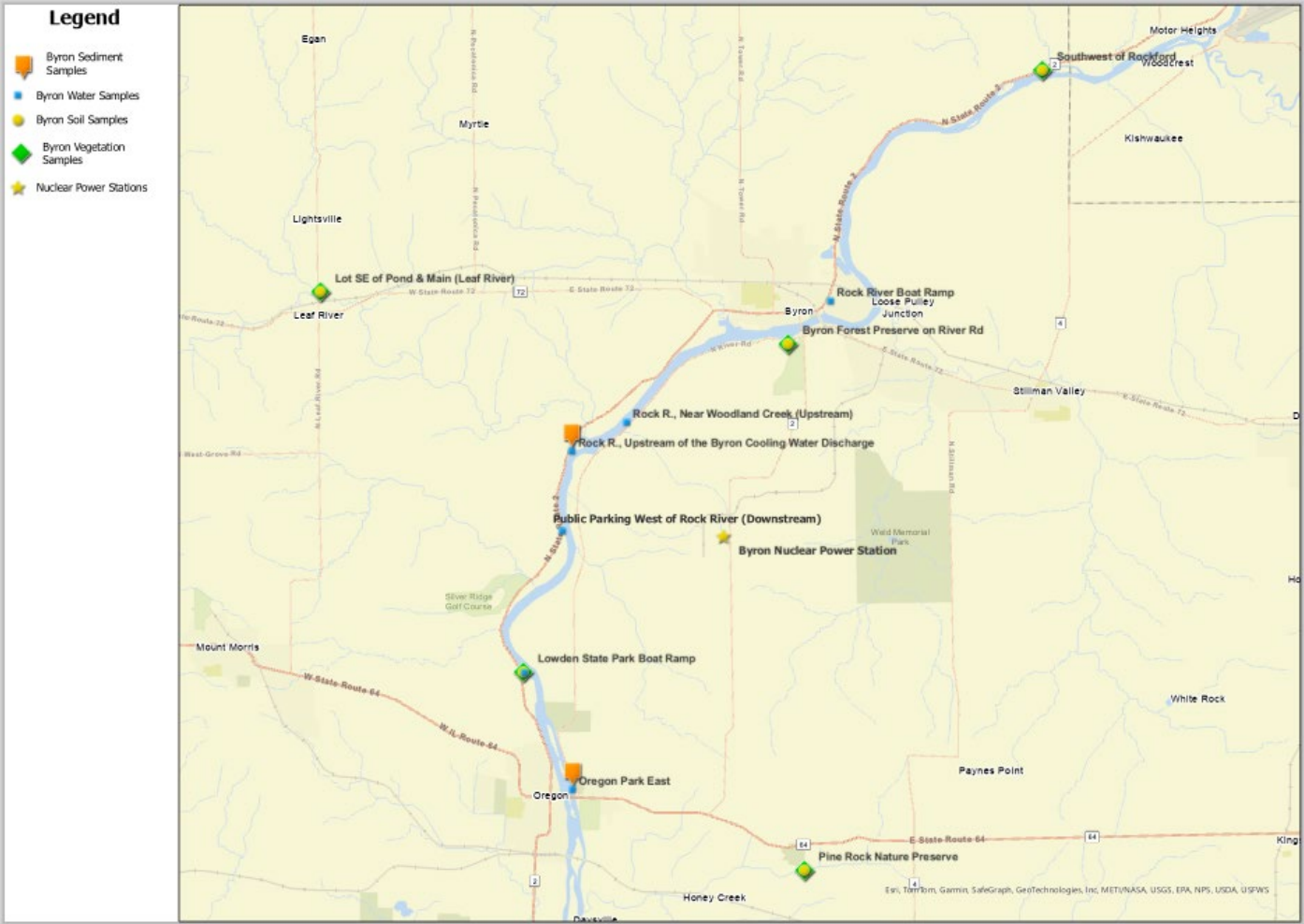


Figure 11. Environmental Sampling Locations- Byron

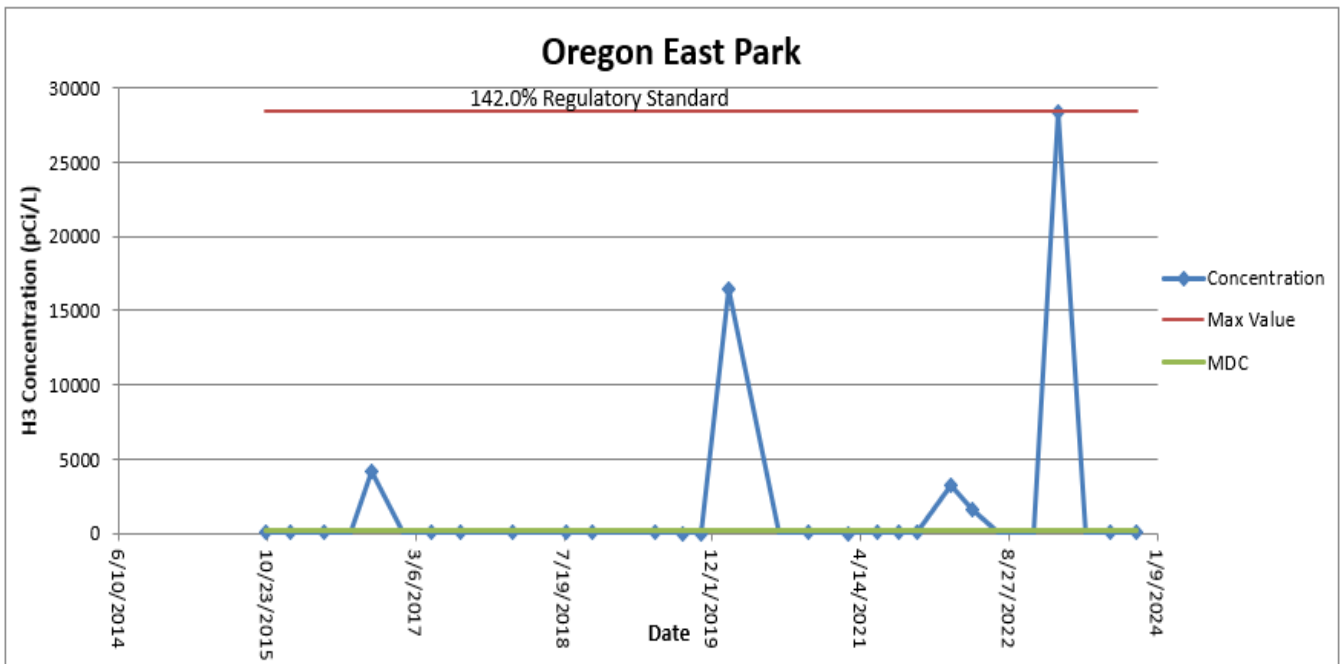
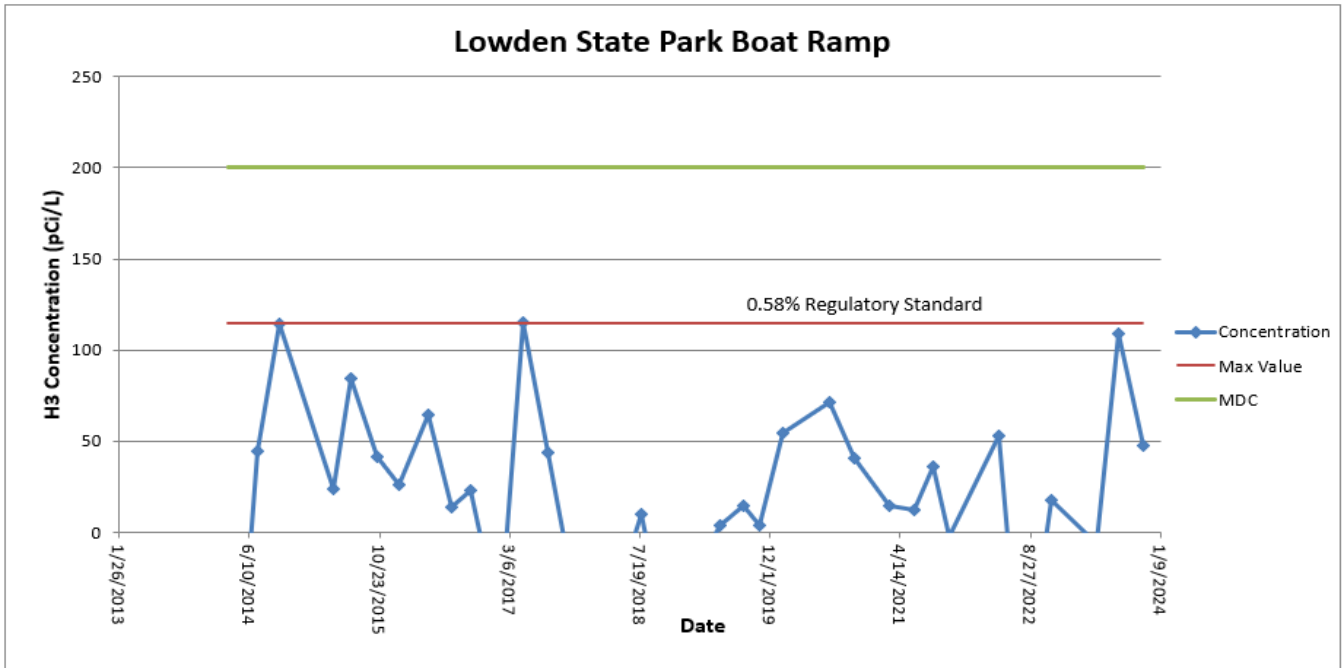


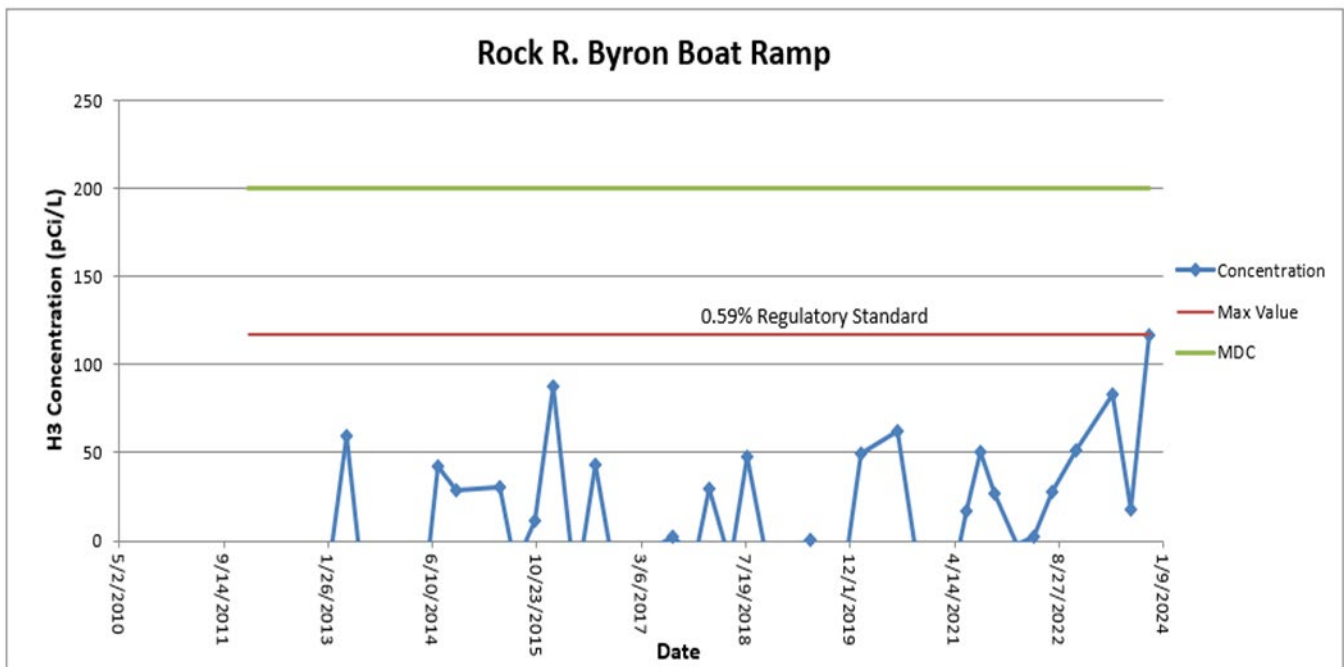
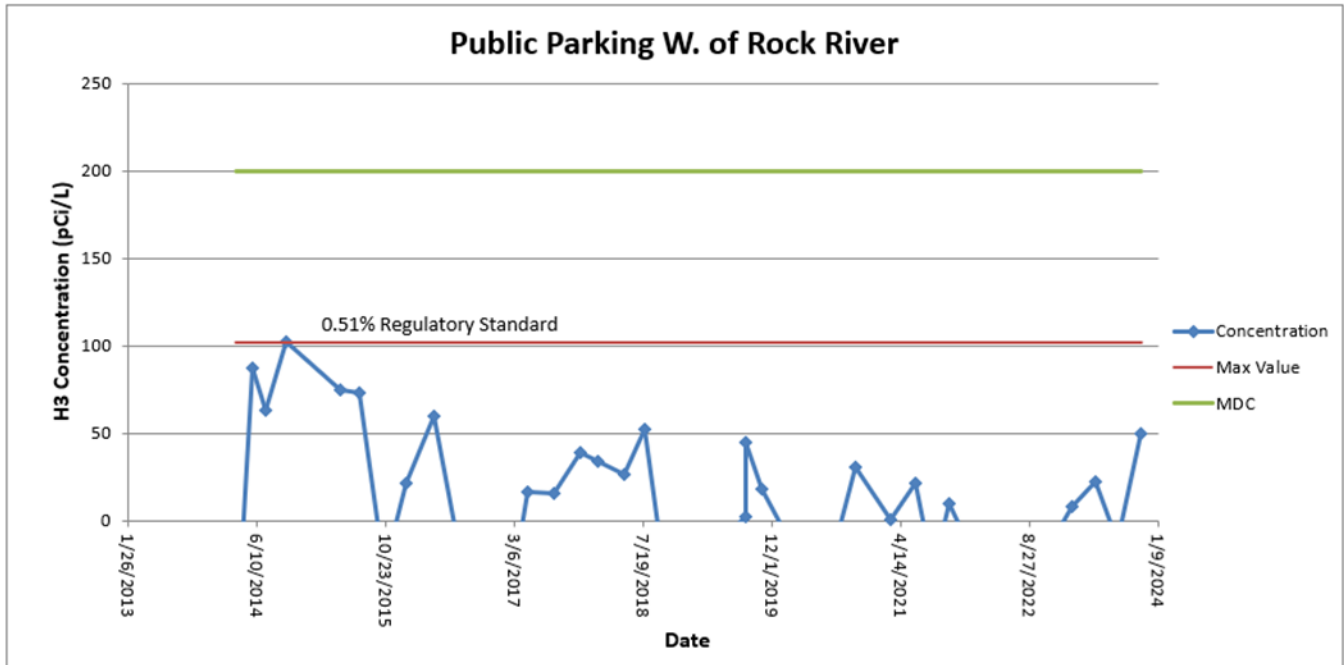
Byron Sample Result Tables and Graphs

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

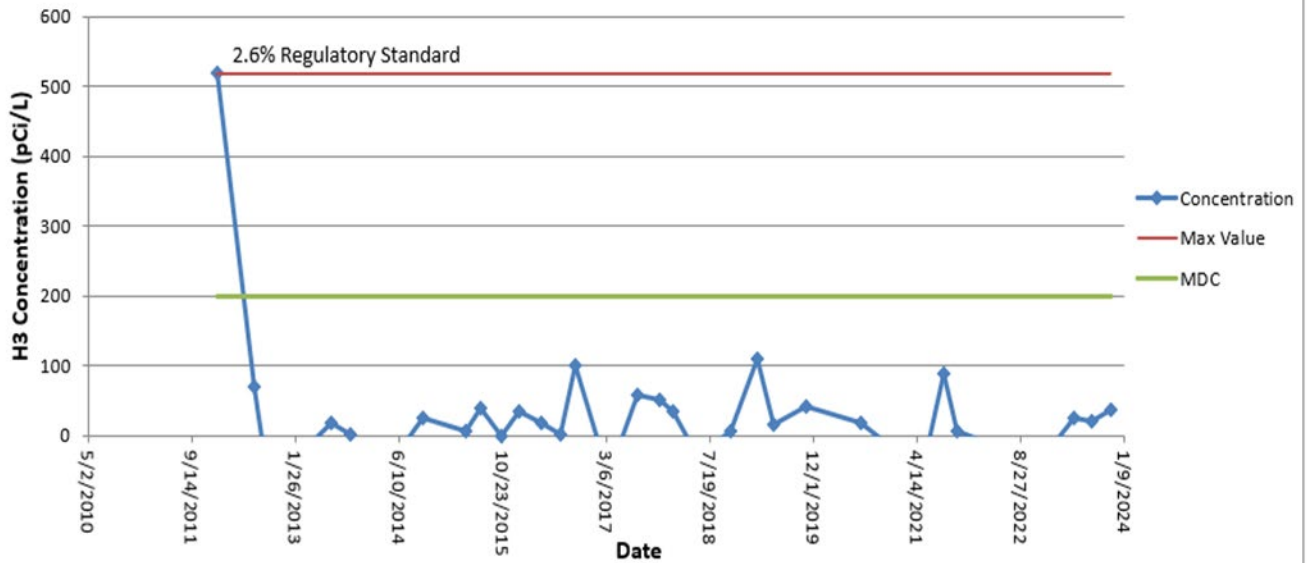
Location Date	H-3	
	Result	MDC
Lowden State Park Boat Ramp		
5/10/2023	<MDC	126
8/2/2023	<MDC	126
11/1/2023	<MDC	126
Oregon Park East		
2/8/2023	28400	126
5/10/2023	<MDC	126
8/2/2023	<MDC	126
11/1/2023	<MDC	126
Public Parking W. of Rock River		
2/8/2023	<MDC	126
5/10/2023	<MDC	126
8/2/2023	<MDC	126
11/1/2023	<MDC	126
Rock R. Byron Boat Ramp		
5/10/2023	<MDC	126
8/2/2023	<MDC	126
11/1/2023	<MDC	126
Rock R., UpS of the Byron Cooling Water Discharge		
5/10/2023	<MDC	126
8/2/2023	<MDC	126
11/1/2023	<MDC	126
Rock R., Near Woodland Creek (Upstream)		
5/10/2023	<MDC	126
8/2/2023	<MDC	126
11/1/2023	<MDC	126

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)

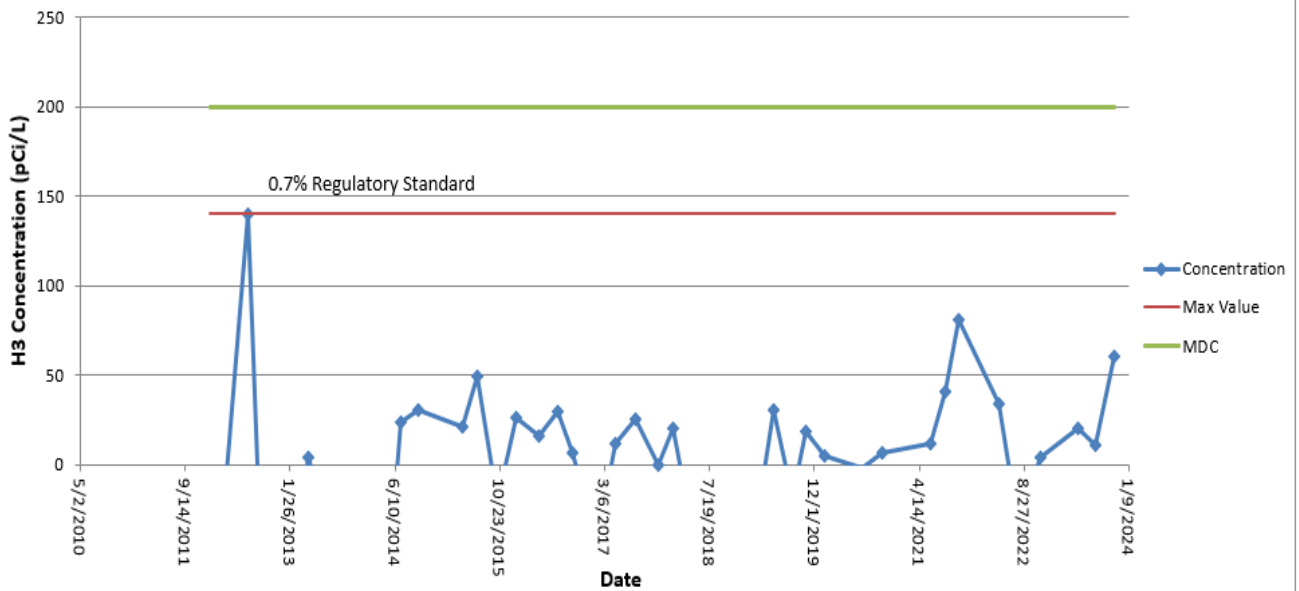




Rock R., UpS Of Byron Cooling Water Discharge



Rock R., Near Woodland Creek (Upstream)



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

Location Date	Strontium	
	Result	MDC
Public Parking W. of Rock River		
5/10/2023	<MDC	0.9
Lowden State Park Boat Ramp		
8/2/2023	<MDC	0.9
11/1/2023	1.0	0.9

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

Location Date	Beta	
	Result	MDC
Lowden State Park Boat Ramp		
5/10/2023	<MDC	3.7
8/2/2023	5.6	3.7
11/1/2023	<MDC	3.7
Oregon Park East		
2/8/2023	4.8	3.7
5/10/2023	5.9	3.7
8/2/2023	7.3	3.7
11/1/2023	<MDC	3.7
Public Parking W. of Rock River		
2/8/2023	4.7	3.7
5/10/2023	<MDC	3.7
8/2/2023	<MDC	3.7
11/1/2023	<MDC	3.7
Rock R. Byron Boat Ramp		
5/10/2023	5.3	3.7
8/2/2023	<MDC	3.7
11/1/2023	<MDC	3.7
Rock R., UpS of the Byron Cooling Water Discharge		
5/10/2023	<MDC	3.7
8/2/2023	<MDC	3.7
11/1/2023	<MDC	3.7
Rock R., Near Woodland Creek (Upstream)		
5/10/2023	4.3	3.7
8/2/2023	<MDC	3.7
11/1/2023	<MDC	3.7

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

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Lowden State Park Boat Ramp																								
5/10/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
8/2/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
11/1/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
Oregon Park East																								
2/8/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
5/10/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
8/2/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
11/1/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
Public Parking W. of Rock River																								
2/8/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
5/10/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
8/2/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
11/1/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
Rock R. Byron Boat Ramp																								
5/10/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
8/2/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
11/1/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
Rock R., UpS of the Byron Cooling Water Discharge																								
5/10/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
8/2/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
11/1/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
Rock R., Near Woodland Creek (Upstream)																								
5/10/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
8/2/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7
11/1/2023	<MDC	18.0	<MDC	17.7	<MDC	3.1	<MDC	3.4	<MDC	3.3	<MDC	3.3	<MDC	6.0	<MDC	8.7	<MDC	3.0	<MDC	4.2	<MDC	5.8	<MDC	5.7

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
Forest preserve on River Rd.																						
5/10/2023	<MDC	0.29	<MDC	0.12	<MDC	0.02	<MDC	0.02	<MDC	0.02	0.09	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.05
8/2/2023	<MDC	0.29	<MDC	0.12	<MDC	0.02	<MDC	0.02	<MDC	0.02	0.11	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.05
Lot SE of Pond & Main (Leaf River)																						
5/10/2023	<MDC	0.29	<MDC	0.12	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.05
8/2/2023	<MDC	0.29	<MDC	0.12	<MDC	0.02	<MDC	0.02	<MDC	0.02	0.07	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.05
Lowden State Park Boat Ramp																						
5/10/2023	<MDC	0.29	<MDC	0.12	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.05
8/2/2023	<MDC	0.29	<MDC	0.12	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.05
Pine Rock Nature Preserve																						
5/10/2023	<MDC	0.29	<MDC	0.12	<MDC	0.02	<MDC	0.02	<MDC	0.02	0.08	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.05
8/2/2023	<MDC	0.29	<MDC	0.12	<MDC	0.02	<MDC	0.02	<MDC	0.02	0.06	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.05
Southwest of Rockford																						
5/10/2023	<MDC	0.29	<MDC	0.12	<MDC	0.02	<MDC	0.02	<MDC	0.02	0.08	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.04	<MDC	0.05	<MDC	0.05

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.																						
5/10/2023	<MDC	0.34	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.09	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
8/2/2023	<MDC	0.34	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.10	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
Lot SE of Pond & Main (Leaf River)																						
5/10/2023	<MDC	0.34	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
8/2/2023	<MDC	0.34	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.10	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
Lowden State Park Boat Ramp																						
5/10/2023	<MDC	0.34	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
8/2/2023	<MDC	0.34	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
Pine Rock Nature Preserve																						
5/10/2023	<MDC	0.34	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.08	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
8/2/2023	<MDC	0.34	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.07	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
Southwest of Rockford																						
5/10/2023	<MDC	0.34	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.09	0.03	<MDC	0.07	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06

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																						
5/10/2023	<MDC	0.29	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.05	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04
8/2/2023	<MDC	0.29	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.05	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04
Rock R., UpS of the Byron Cooling Water Discharge																						
5/10/2023	<MDC	0.29	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	0.07	0.02	<MDC	0.05	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04
8/2/2023	<MDC	0.29	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.05	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04

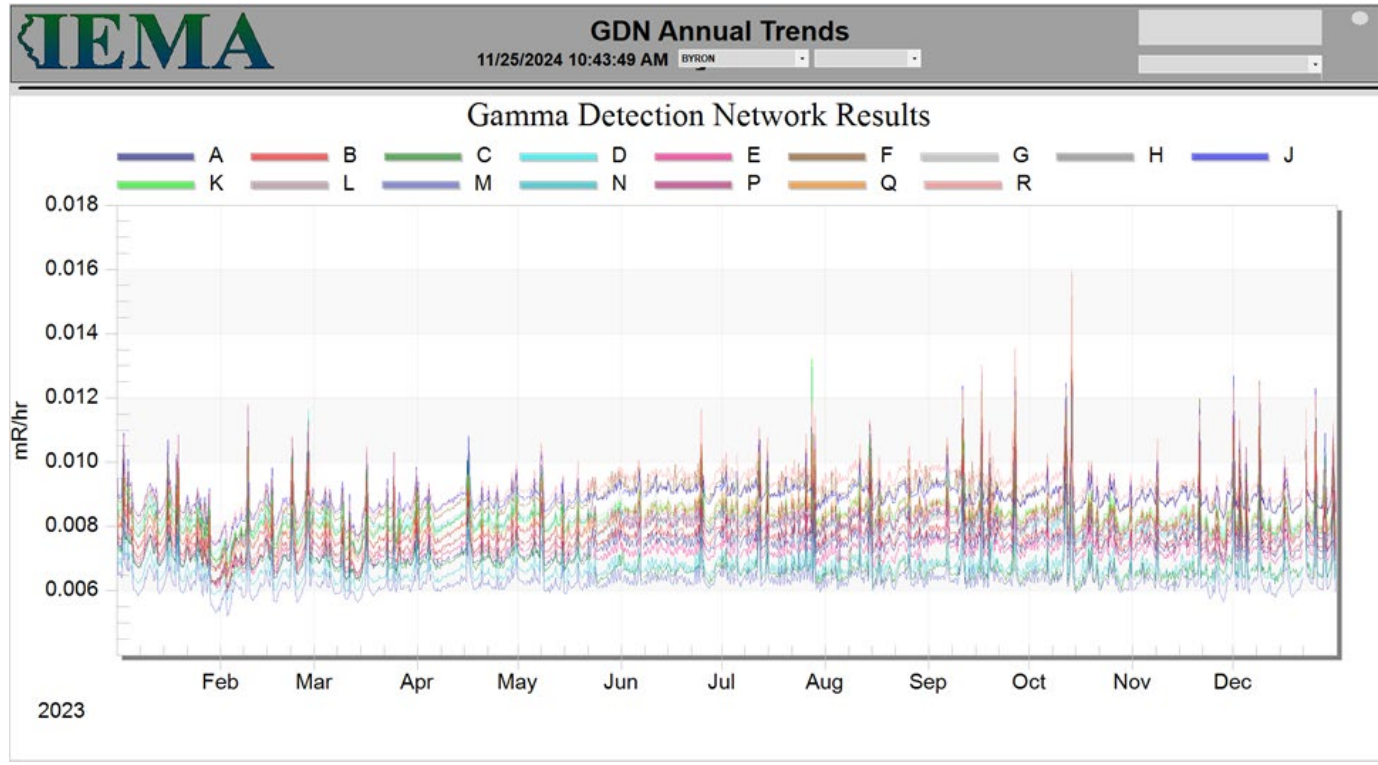
Gamma Spectroscopy Results for Radionuclides in Vegetation - Byron
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Forest preserve on River Rd.																								
5/10/2023	<MDC	1.08	<MDC	0.22	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.18	<MDC	0.82	<MDC	0.06	<MDC	0.09	<MDC	0.14	<MDC	0.12
8/2/2023	<MDC	1.08	<MDC	0.22	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.18	<MDC	0.82	<MDC	0.06	<MDC	0.09	<MDC	0.14	<MDC	0.12
Lot SE of Pond & Main (Leaf River)																								
5/10/2023	<MDC	1.08	<MDC	0.22	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.18	<MDC	0.82	<MDC	0.06	<MDC	0.09	<MDC	0.14	<MDC	0.12
8/2/2023	<MDC	1.08	<MDC	0.22	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.18	<MDC	0.82	<MDC	0.06	<MDC	0.09	<MDC	0.14	<MDC	0.12
Lowden State Park Boat Ramp																								
5/10/2023	<MDC	1.08	<MDC	0.22	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.18	<MDC	0.82	<MDC	0.06	<MDC	0.09	<MDC	0.14	<MDC	0.12
8/2/2023	<MDC	1.08	<MDC	0.22	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.18	<MDC	0.82	<MDC	0.06	<MDC	0.09	<MDC	0.14	<MDC	0.12
Pine Rock Nature Preserve																								
5/10/2023	<MDC	1.08	<MDC	0.22	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.18	<MDC	0.82	<MDC	0.06	<MDC	0.09	<MDC	0.14	<MDC	0.12
8/2/2023	<MDC	1.08	<MDC	0.22	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.18	<MDC	0.82	<MDC	0.06	<MDC	0.09	<MDC	0.14	<MDC	0.12
Southwest of Rockford																								
5/10/2023	<MDC	1.08	<MDC	0.22	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.06	<MDC	0.18	<MDC	0.82	<MDC	0.06	<MDC	0.09	<MDC	0.14	<MDC	0.12

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 River (Top Feeder)																								
10/30/2023	<MDC	540000	<MDC	205	<MDC	143	<MDC	42	<MDC	38	<MDC	37	<MDC	750	<MDC	2.E+07	<MDC	48	<MDC	750	<MDC	131	<MDC	320
Rock River (Bottom Feeder)																								
7/10/2023	<MDC	540000	<MDC	205	<MDC	143	<MDC	42	<MDC	38	<MDC	37	<MDC	750	<MDC	2.E+07	<MDC	48	<MDC	750	<MDC	131	<MDC	320
10/30/2023	<MDC	540000	<MDC	205	<MDC	143	<MDC	42	<MDC	38	<MDC	37	<MDC	750	<MDC	2.E+07	<MDC	48	<MDC	750	<MDC	131	<MDC	320

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		8.6	4.2	10.2	30.6
BY-03	3.7	7.9	4.6	6.5	22.8
BY-04	7.1	9.1	6.1	10.3	32.6
BY-05	5.7	8.1	3.4	7.7	25.0
BY-06	7.5	9.4	5.8	9.0	31.7
BY-07	8.2	6.2	1.6	6.8	22.7
BY-08	8.1	6.6	4.4	9.3	28.3
BY-11	5.7	8.8	3.7		24.2
BY-13	7.7	9.2	8.7	10.5	36.0
BY-14	6.2	6.7	4.6	8.3	25.8
BY-15	8.2	12.6	5.8	11.9	38.5
BY-18	2.0	8.9	4.7		20.8
BY-20	9.7	10.2	6.8	11.3	38.0
BY-22	7.8	9.9	4.5	10.1	32.2
BY-23	6.4	9.3	5.0	10.6	31.2
BY-26	9.7	11.5	6.5	10.0	37.7
BY-27	8.0	12.7	7.5	12.7	40.9
BY-29	9.6	10.3	3.7	9.3	32.9
BY-30	7.7	7.8	3.0	10.1	28.7
BY-33	7.2	11.4	4.7	10.6	34.0
BY-34	5.2	6.3	5.9	9.7	27.1
BY-35	5.6	6.8	0.6	6.8	19.8
BY-37	4.5	7.3	2.7	7.0	21.5
BY-40	11.7	11.9	10.3	11.5	45.4
BY-41	5.5	7.7	1.8		20.0
BY-44	6.4	6.2	4.6	7.9	25.1
BY-45	9.3	9.2	2.9	8.5	29.9
BY-49	9.2	8.0	4.5	8.6	30.4
BY-50	8.3	10.3	7.0	10.8	36.4
BY-53	6.7	10.5	5.3	10.1	32.6
BY-55	9.7	9.7	5.9	11.1	36.4
BY-56	6.8	7.2	8.7	9.7	32.3
BY-57	7.9	9.3	5.2	10.8	33.3
BY-58	9.9		8.6	11.6	40.1
BY-59	7.5	10.4	6.0	11.6	35.4

Summary of Ambient Gamma Results – Byron (Continued)

Location	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Exposure
	mR/quarter	mR/quarter	mR/quarter	mR/quarter	mr/year
BY-60	5.1	10.1	5.1	9.0	29.3
BY-61	8.0	10.2	5.5	9.2	32.8
BY-63	7.7	10.5	6.3	11.6	36.1
BY-64	7.0	10.0	9.2	13.8	39.9
BY-65	10.3	8.6	6.7	9.0	34.6
BY-66	8.6	10.2	2.3	9.5	30.7
BY-67	8.0	7.7	9.7	10.2	35.6
BY-68	6.4	8.5	3.7	10.2	28.8
BY-69	11.1	10.7		9.8	42.1
BY-70	6.1	6.6	4.2	11.2	28.1
BY-71	6.9	8.0	3.3	7.0	25.2
BY-72	9.7	10.0	5.0	14.2	38.9
BY-73	9.1	8.5	8.4	10.0	36.0
BY-74	8.8	9.1	5.6	10.4	33.9
BY-75	6.2	8.2	8.0	10.0	32.4
BY-76	7.3	8.0	4.5	9.2	29.0
BY-78	6.6	6.4	6.8	6.2	26.1
BY-79	6.8	6.5	4.9	7.3	25.5
BY-80	4.0	7.3	7.0	7.9	26.2
BY-A	9.3	7.8	4.4	7.9	29.4
BY-B	7.1	7.7	5.8	9.9	30.5
BY-C	3.6	6.0	6.6	6.7	22.8
BY-D	8.9	10.0	7.5	10.9	37.4
BY-E	6.2	7.3	5.9	9.4	28.8
BY-F	7.6	11.4	10.8	12.8	42.5
BY-G	8.8	7.1	9.8	9.6	35.3
BY-H	8.8	7.9	7.9	9.3	34.0
BY-J	8.8	7.6	8.1	8.6	33.1
BY-K	6.5	7.8	10.1	8.5	33.0
BY-L	6.3	8.2	7.9	8.9	31.3
BY-M	5.8	3.7	8.1	6.8	24.4
BY-N	6.4	3.9	6.9	6.9	24.1
BY-P	8.2	9.0	9.2	8.6	35.0
BY-Q	8.2	8.9	6.9	10.7	34.7
BY-R	8.7	8.5	6.2	10.1	33.5

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

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 US 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 2023.

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 2023

No significant events or changes for 2023.

Sampling and Monitoring Results

Water Sampling Results

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

Results from total strontium analysis indicated that the established MDC was met or exceeded at some sampling locations, however the concentrations found were consistent with historical levels found at background sampling locations. The strontium level was 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 or exceeded at some sampling locations, however the concentrations found were consistent with historical levels found at background sampling locations. All sample results for gross beta remained well below the established US EPA and IEPA Standards.

Results for gamma spectroscopy detected I-131 greater than the established MDC in samples taken at North Fork Branch of Salt Creek during the 3rd quarter. The I-131 concentration from the sample collected at this location in the following quarter was below the established MDC. Constellation reported no releases from the Clinton station during 2023, and since Salt Creek is a tributary of Clinton Lake it is unlikely that the I-131 originated from the station. I-131 is a commonly used medical isotope that could have entered the creek via medical patient excreta. All other gamma spectroscopy results for water samples were below the established MDC.

Soil Sampling Results

Cesium-137 in concentrations greater than the established MDC were detected but were 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 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

Fe-59 was detected in concentrations greater than the established MDC in samples taken at North Branch at Rte 54 Bridge and North Fork Branch of Salt Creek. The concentrations detected were consistent with historical levels found at those sites as well as background sampling locations. All other gamma spectroscopy results for vegetation were below 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.

Clinton Maps of Monitoring and Sampling Locations

Figure 12. OSL and GDN Monitoring Locations- Clinton

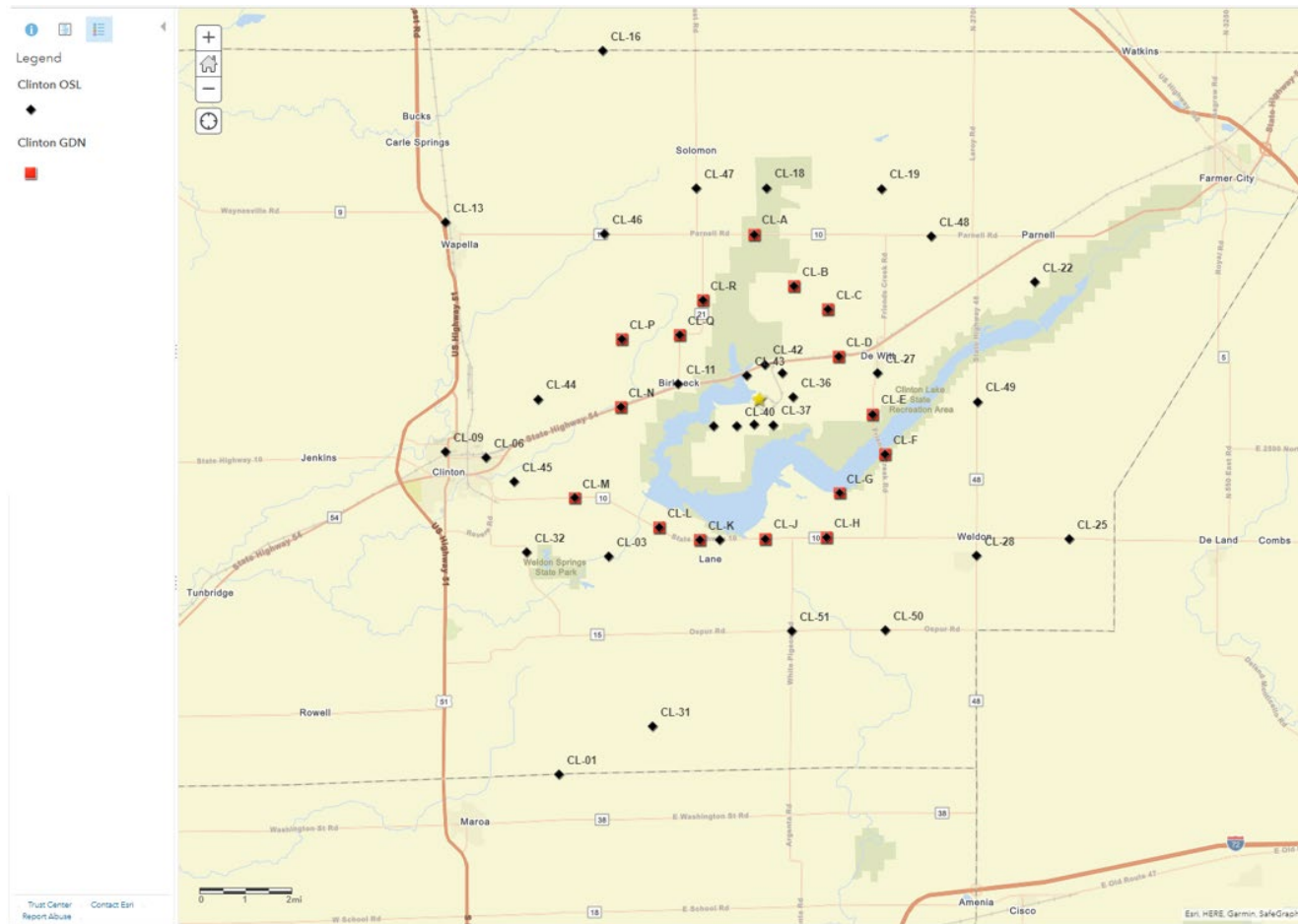


Figure 13. OSL and GDN Monitoring Locations (continued) - Clinton

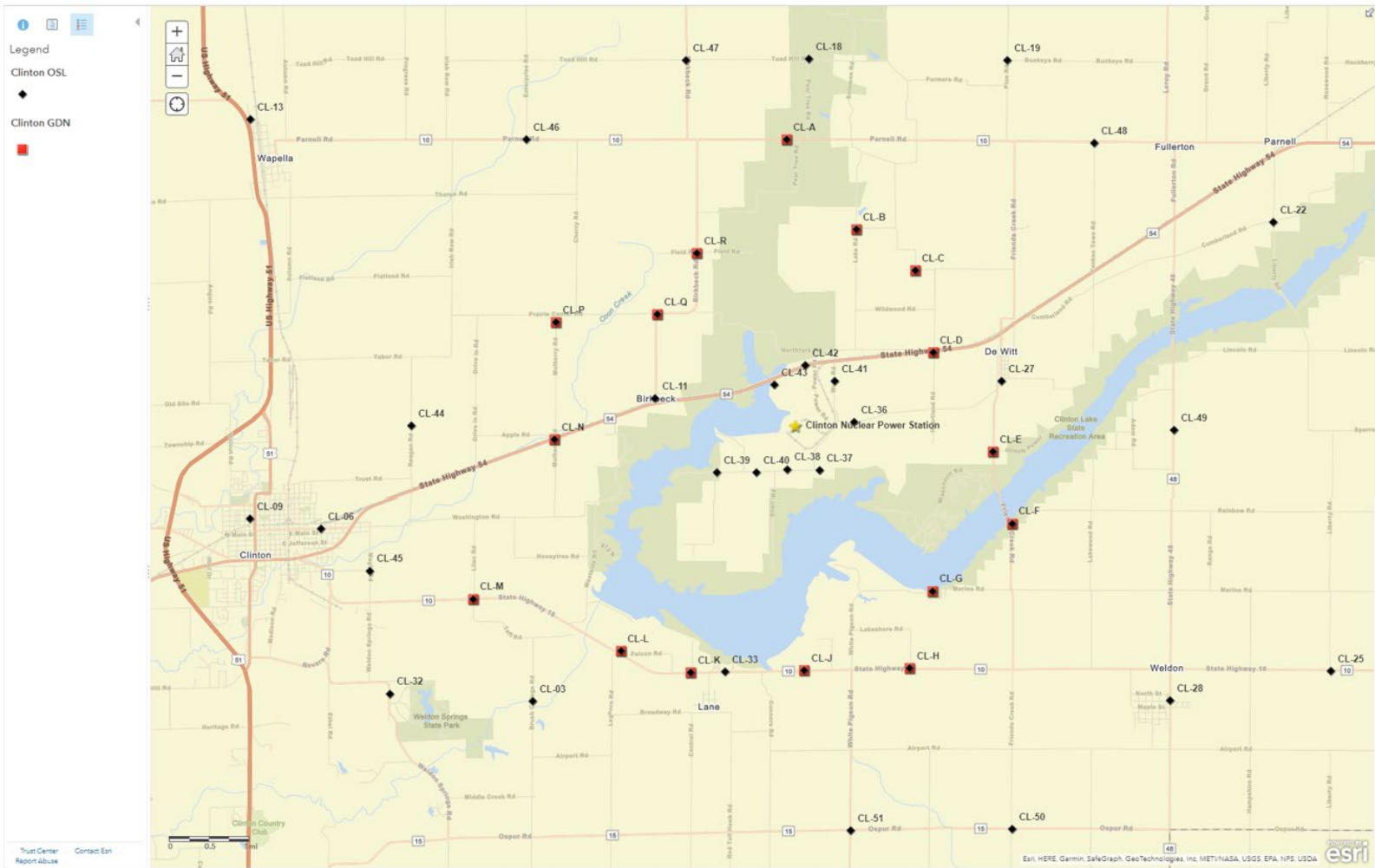


Figure 14. Environmental Sampling Locations - Clinton

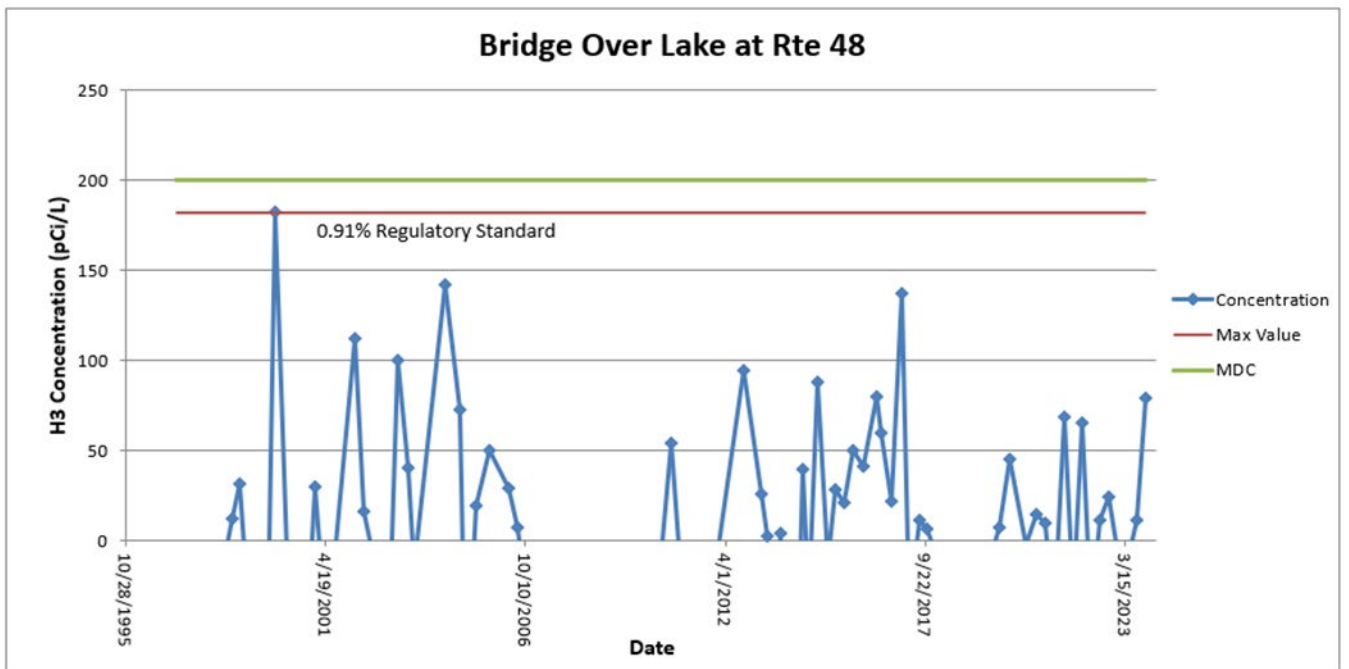
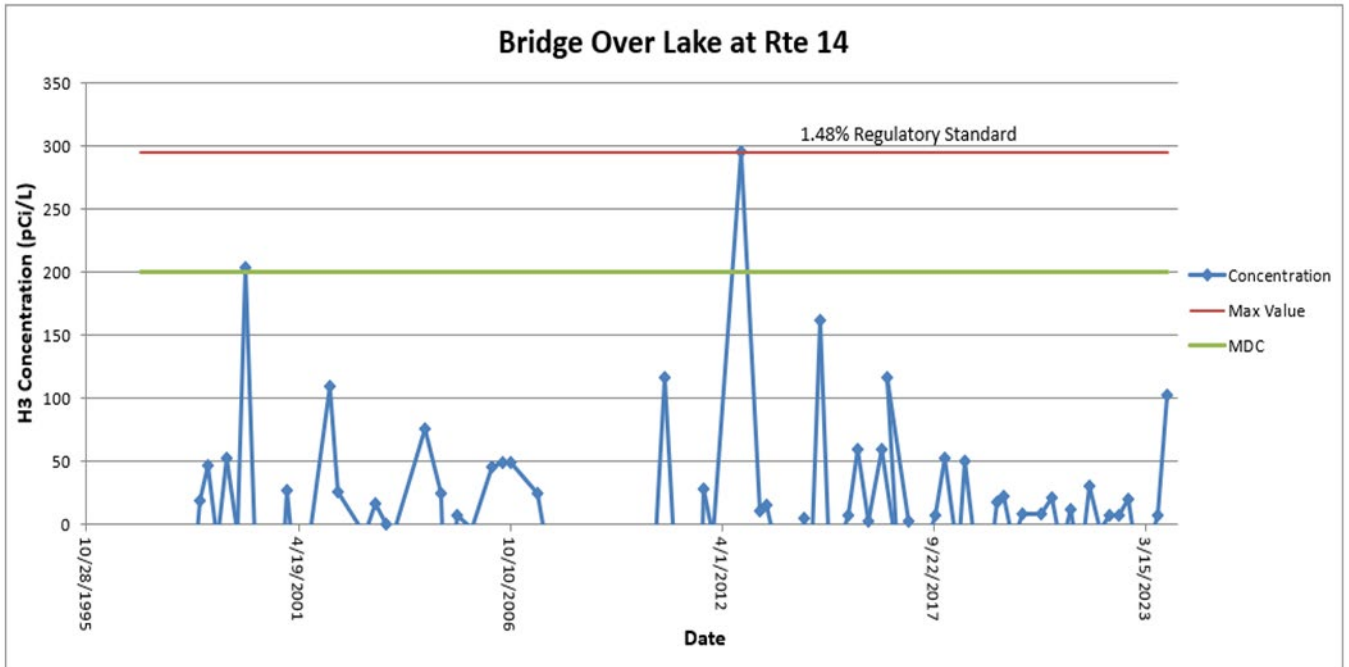


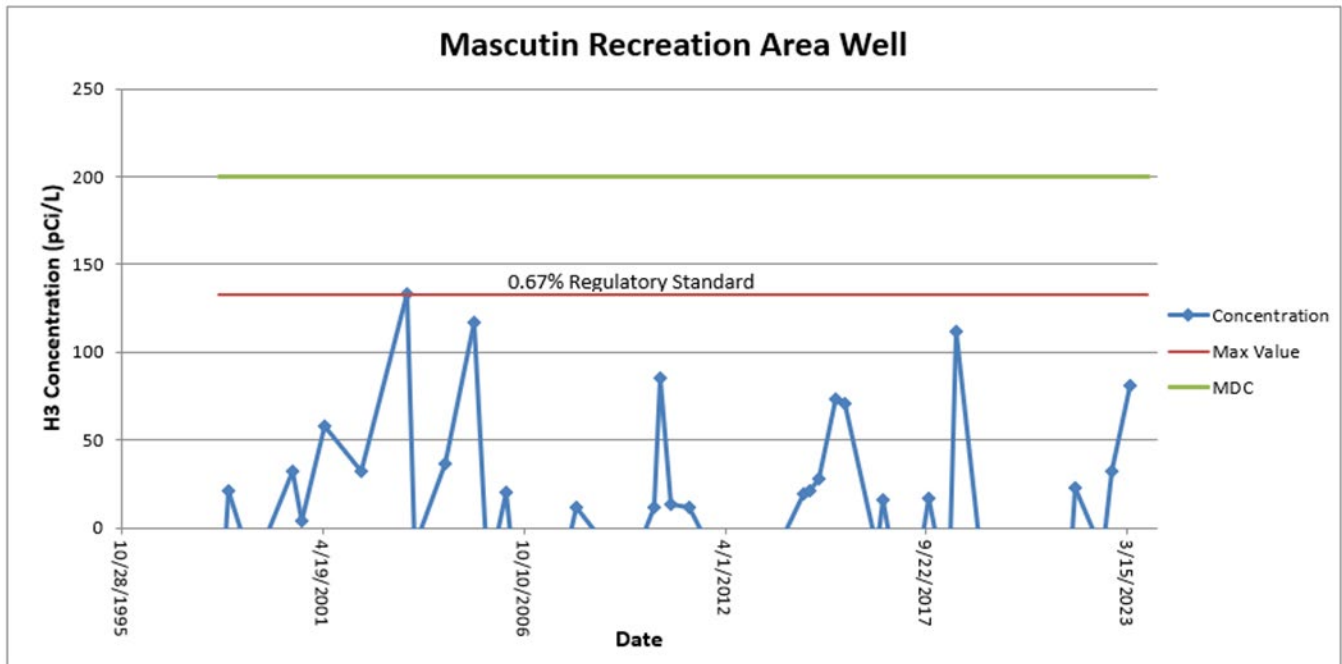
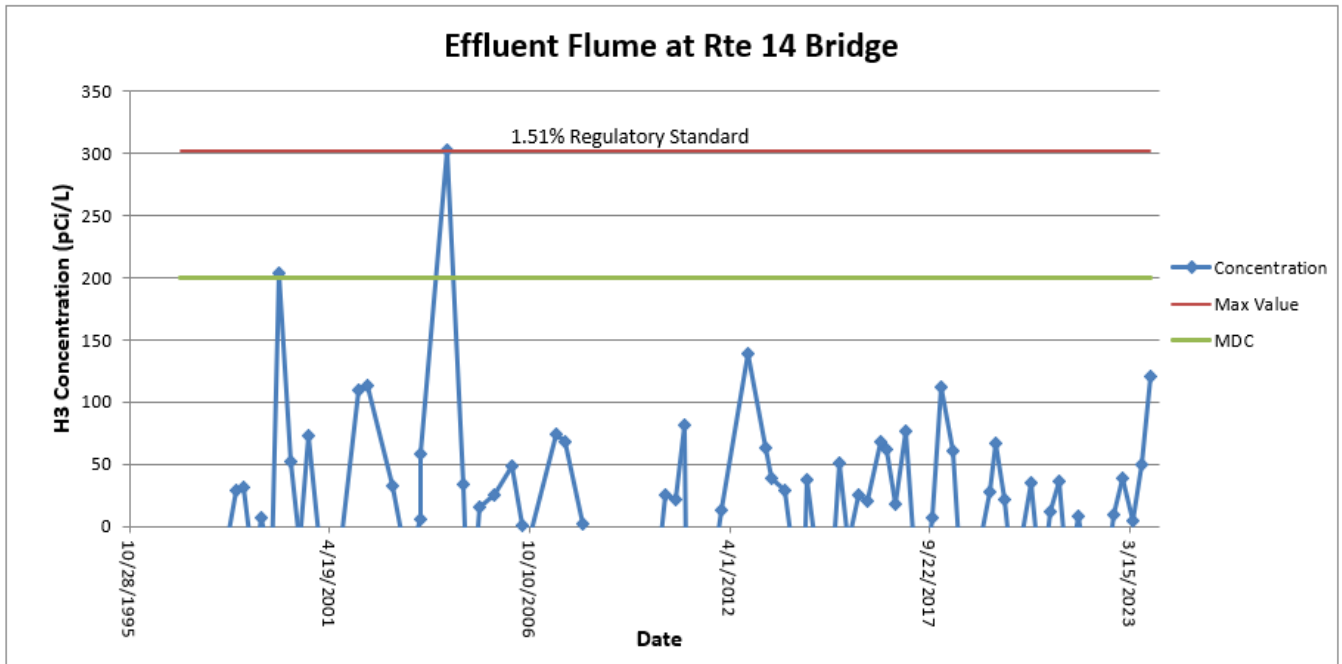
Clinton Sample Result Tables and Graphs

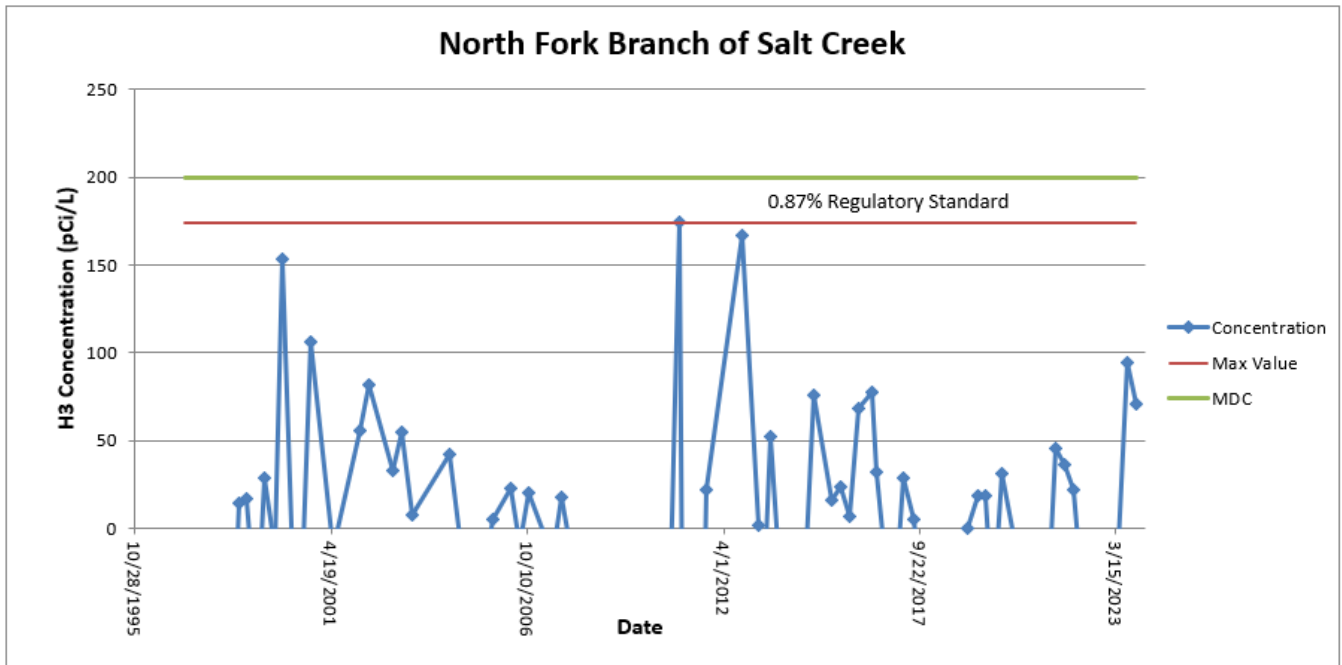
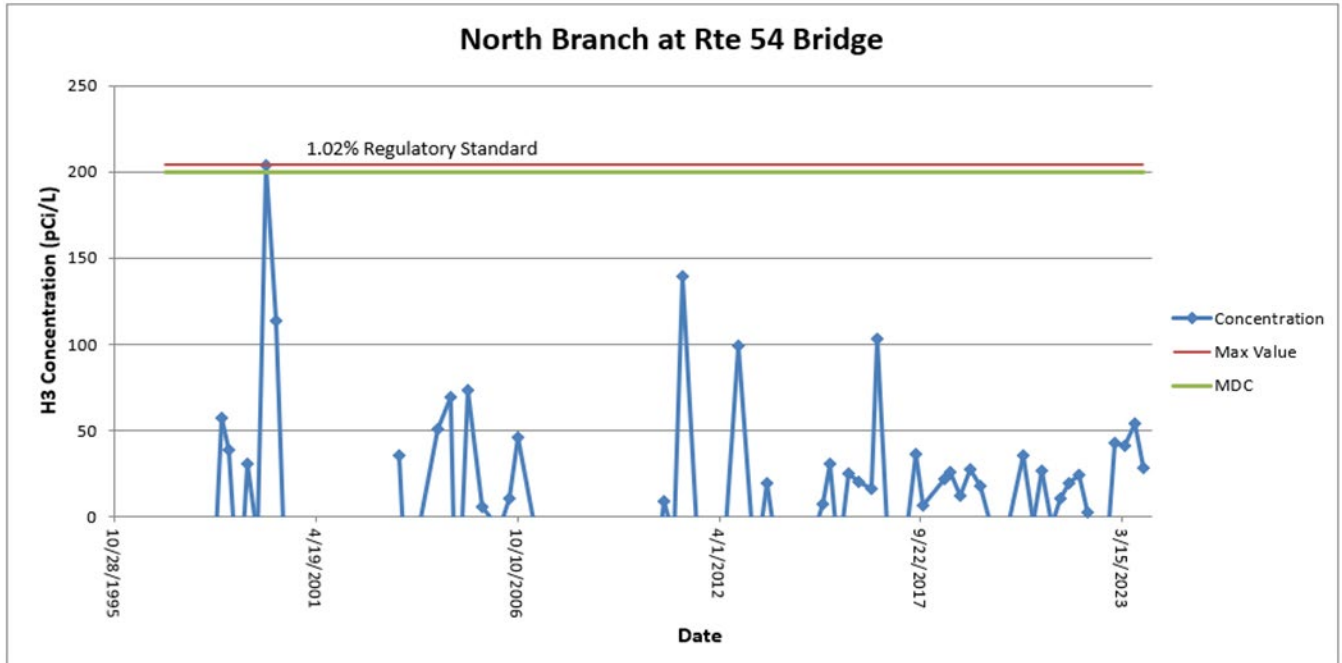
Tritium (H-3) in Water Results– Clinton
Results are in picocuries per liter (pCi/L)

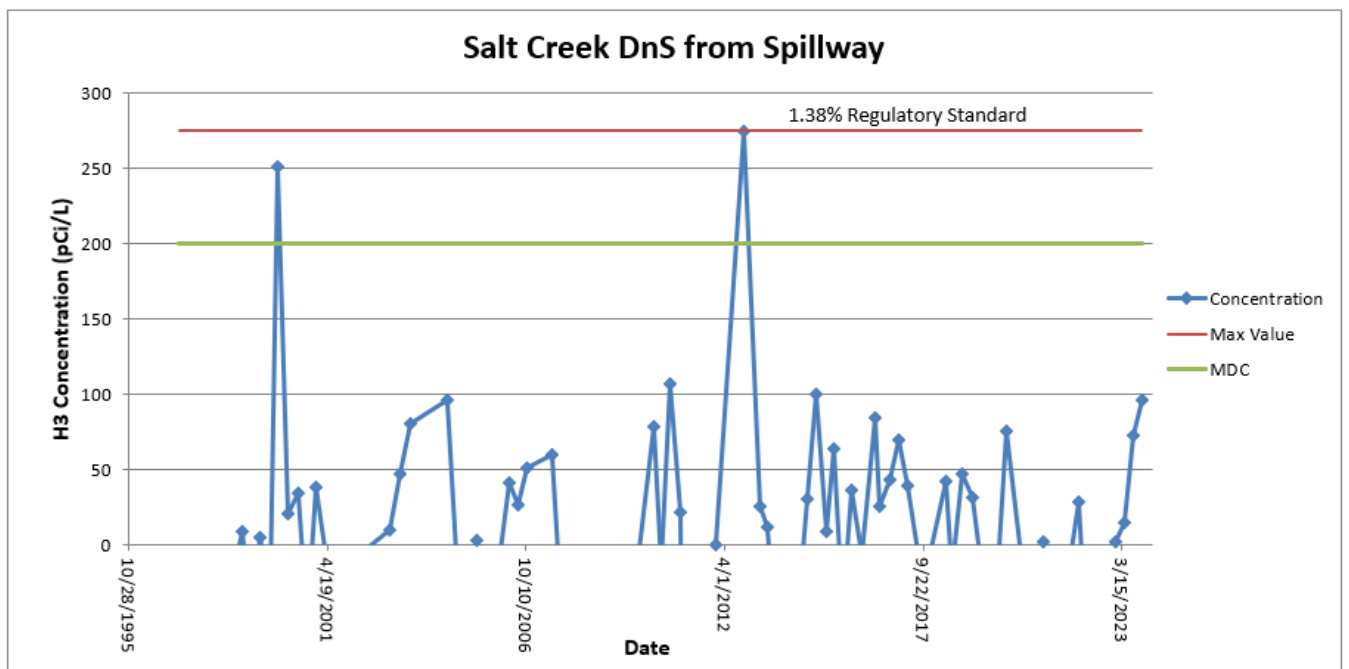
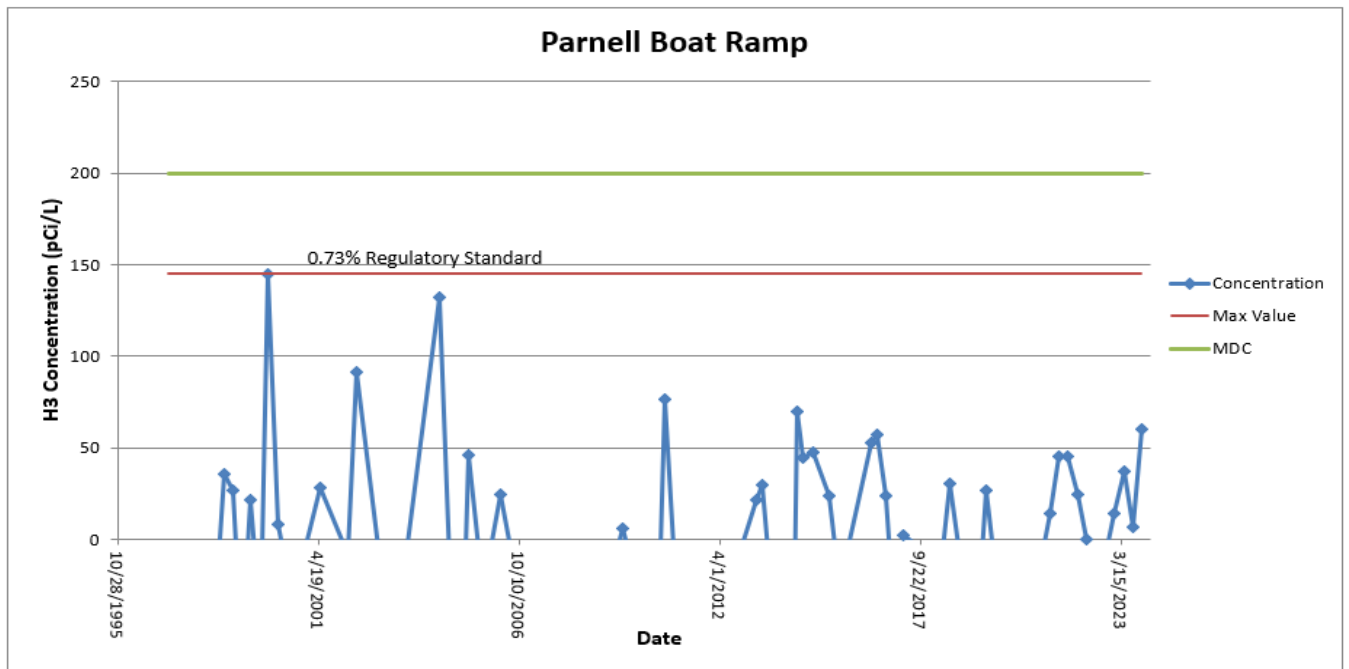
Location	H-3		Location	H-3	
Date	Result	MDC	Date	Result	MDC
Bridge Over Lake at Rte 14			North Fork Branch of Salt Creek		
1/4/2023	<MDC	127	1/4/2023	<MDC	127
4/12/2023	<MDC	127	4/12/2023	<MDC	127
7/12/2023	<MDC	127	7/12/2023	<MDC	127
10/4/2023	<MDC	127	10/4/2023	<MDC	127
Bridge Over Lake at Rte 48			Parnell Boat Ramp		
1/4/2023	<MDC	127	1/4/2023	<MDC	127
4/12/2023	<MDC	127	4/12/2023	<MDC	127
7/12/2023	<MDC	127	7/12/2023	<MDC	127
10/4/2023	<MDC	127	10/4/2023	<MDC	127
Effluent Flume at Rte 14 Bridge			Salt Creek Dn S From Spillway		
1/4/2023	<MDC	127	1/4/2023	<MDC	127
4/12/2023	<MDC	127	4/12/2023	<MDC	127
7/12/2023	<MDC	127	7/12/2023	<MDC	127
10/4/2023	<MDC	127	10/4/2023	<MDC	127
Mascoutin Recreation Area Well			Well#7 at Weldon Springs Park		
4/12/2023	<MDC	127	4/12/2023	<MDC	127
7/12/2023	<MDC	127	7/12/2023	<MDC	127
10/4/2023	<MDC	127	10/4/2023	<MDC	127
North Branch at Rte 54 Bridge					
1/4/2023	<MDC	127			
4/12/2023	<MDC	127			
7/12/2023	<MDC	127			
10/4/2023	<MDC	127			

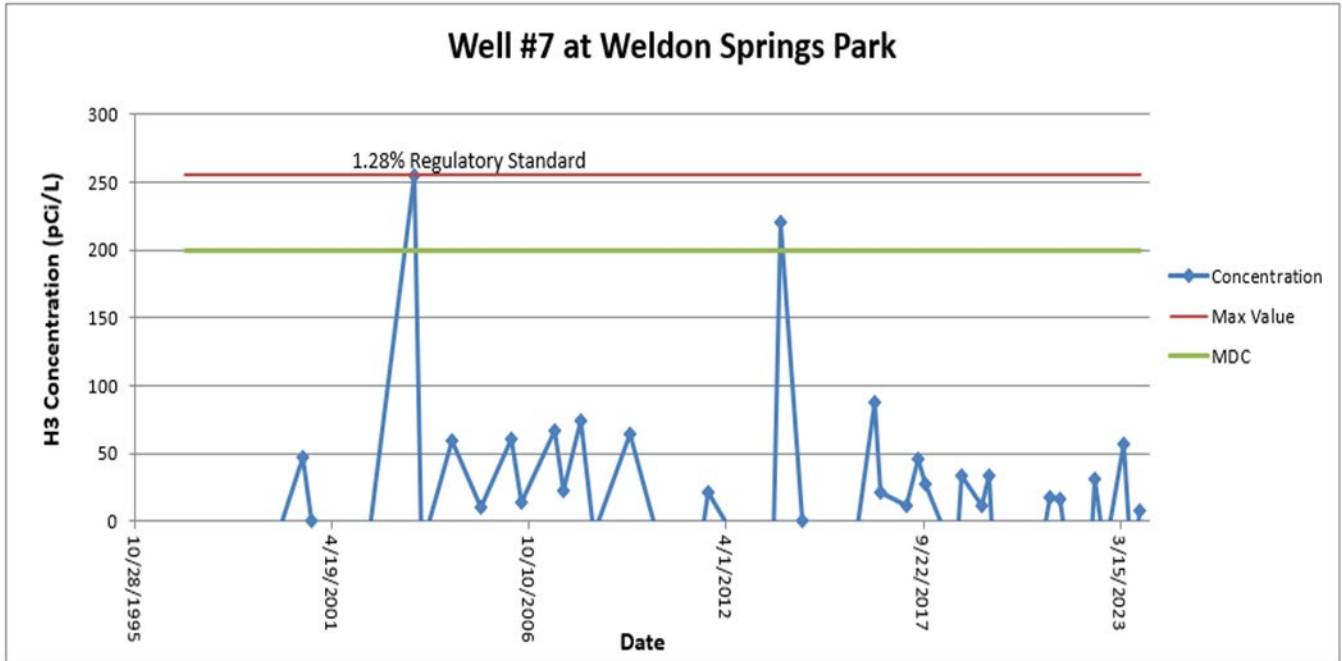
Trending Graphs for Tritium (H-3) in Water - Clinton
 (Max value compared to IEPA and US EPA Class regulatory standard of 20,000 pCi/L; MDC represented at 200 pCi/L to account for normal fluctuations)











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		
1/4/2023	<MDC	1.0
4/12/2023	<MDC	1.0
Effluent Flume at Rte 14 Bridge		
1/4/2023	<MDC	1.0
Salt Creek DnS From Spillway		
10/4/2023	2.2	1.0
Well#7 at Weldon Springs Park		
7/12/2023	1.5	1.0

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

Location	Beta	
Date	Result	MDC
Bridge Over Lake at Rte 14		
1/4/2023	<MDC	3.9
4/12/2023	<MDC	3.9
7/12/2023	4.7	3.9
10/4/2023	<MDC	3.9
Bridge Over Lake at Rte 48		
1/4/2023	<MDC	3.9
4/12/2023	<MDC	3.9
7/12/2023	<MDC	3.9
10/4/2023	<MDC	3.9
Effluent Flume at Rte 14 Bridge		
1/4/2023	<MDC	3.9
4/12/2023	<MDC	3.9
7/12/2023	<MDC	3.9
10/4/2023	<MDC	3.9
Mascoutin Recreation Area Well		
4/12/2023	<MDC	3.9
7/12/2023	<MDC	3.9
10/4/2023	<MDC	3.9
North Branch at Rte 54 Bridge		
1/4/2023	<MDC	3.9
4/12/2023	<MDC	3.9
7/12/2023	<MDC	3.9
10/4/2023	<MDC	3.9

Location	Beta	
Date	Result	MDC
North Fork Branch of Salt Creek		
1/4/2023	<MDC	3.9
4/12/2023	<MDC	3.9
7/12/2023	4.2	3.9
7/27/2023	<MDC	3.9
10/4/2023	<MDC	3.9
Parnell Boat Ramp		
1/4/2023	<MDC	3.9
4/12/2023	<MDC	3.9
7/12/2023	<MDC	3.9
10/4/2023	<MDC	3.9
Salt Creek DnS From Spillway		
1/4/2023	<MDC	3.9
4/12/2023	<MDC	3.9
7/12/2023	4.3	3.9
10/4/2023	<MDC	3.9
Well#7 at Weldon Springs Park		
4/12/2023	<MDC	3.9
7/12/2023	<MDC	3.9
10/4/2023	<MDC	3.9

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

Location	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
Bridge Over Lake at Rte 14																						
1/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
4/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
7/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
10/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
Bridge Over Lake at Rte 48																						
1/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
4/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
7/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
10/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
Effluent Flume at Rte 14 Bridge																						
1/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
4/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
7/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
10/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
Mascoutin Recreation Area Well																						
4/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
7/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
10/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
North Branch at Rte 54 Bridge																						
1/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
4/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
7/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
10/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5

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

Location	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
North Fork Branch of Salt Creek																						
1/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
4/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
7/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	4.8	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
7/27/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	5.6	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
10/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
Parnell Boat Ramp																						
1/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
4/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
7/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
10/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
Salt Creek DnS From Spillway																						
1/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
4/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
7/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
10/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
Well#7 at Weldon Springs Park																						
4/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
7/12/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5
10/4/2023	<MDC	17.9	<MDC	3.0	<MDC	3.3	<MDC	3.5	<MDC	3.5	<MDC	6.4	<MDC	4.5	<MDC	3.2	<MDC	3.2	<MDC	6.2	<MDC	5.5

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																						
4/12/2023	<MDC	0.65	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.05	0.04	<MDC	0.10	<MDC	0.04	<MDC	0.07	<MDC	0.08	<MDC	0.09
7/12/2023	<MDC	0.65	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.10	<MDC	0.04	<MDC	0.07	<MDC	0.08	<MDC	0.09
North Branch at Rte 54 Bridge																						
4/12/2023	<MDC	0.65	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.10	<MDC	0.04	<MDC	0.07	<MDC	0.08	<MDC	0.09
7/12/2023	<MDC	0.65	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.10	<MDC	0.04	<MDC	0.07	<MDC	0.08	<MDC	0.09
North Fork Branch of Salt Creek																						
4/12/2023	<MDC	0.65	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.10	<MDC	0.04	<MDC	0.07	<MDC	0.08	<MDC	0.09
7/12/2023	<MDC	0.65	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.10	<MDC	0.04	<MDC	0.07	<MDC	0.08	<MDC	0.09
Weldon Springs Entrance																						
4/12/2023	<MDC	0.65	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.20	0.04	<MDC	0.10	<MDC	0.04	<MDC	0.07	<MDC	0.08	<MDC	0.09
7/12/2023	<MDC	0.65	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.11	0.04	<MDC	0.10	<MDC	0.04	<MDC	0.07	<MDC	0.08	<MDC	0.09

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																						
4/12/2023	<MDC	0.55	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.04	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.07
7/12/2023	<MDC	0.55	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.07
North Branch at Rte 54 Bridge																						
4/12/2023	<MDC	0.55	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.04	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.07
7/12/2023	<MDC	0.55	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.07
North Fork Branch of Salt Creek																						
4/12/2023	<MDC	0.55	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.07
7/12/2023	<MDC	0.55	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.07
Weldon Springs Entrance																						
4/12/2023	<MDC	0.55	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.22	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.07
7/12/2023	<MDC	0.55	<MDC	0.19	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.12	0.04	<MDC	0.09	<MDC	0.03	<MDC	0.06	<MDC	0.07	<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 Branch of Salt Creek																						
4/12/2023	<MDC	0.52	<MDC	0.13	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.03	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
7/12/2023	<MDC	0.52	<MDC	0.13	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
Parnell Boat Ramp																						
4/12/2023	<MDC	0.52	<MDC	0.13	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06
7/12/2023	<MDC	0.52	<MDC	0.13	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.03	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.06	<MDC	0.06

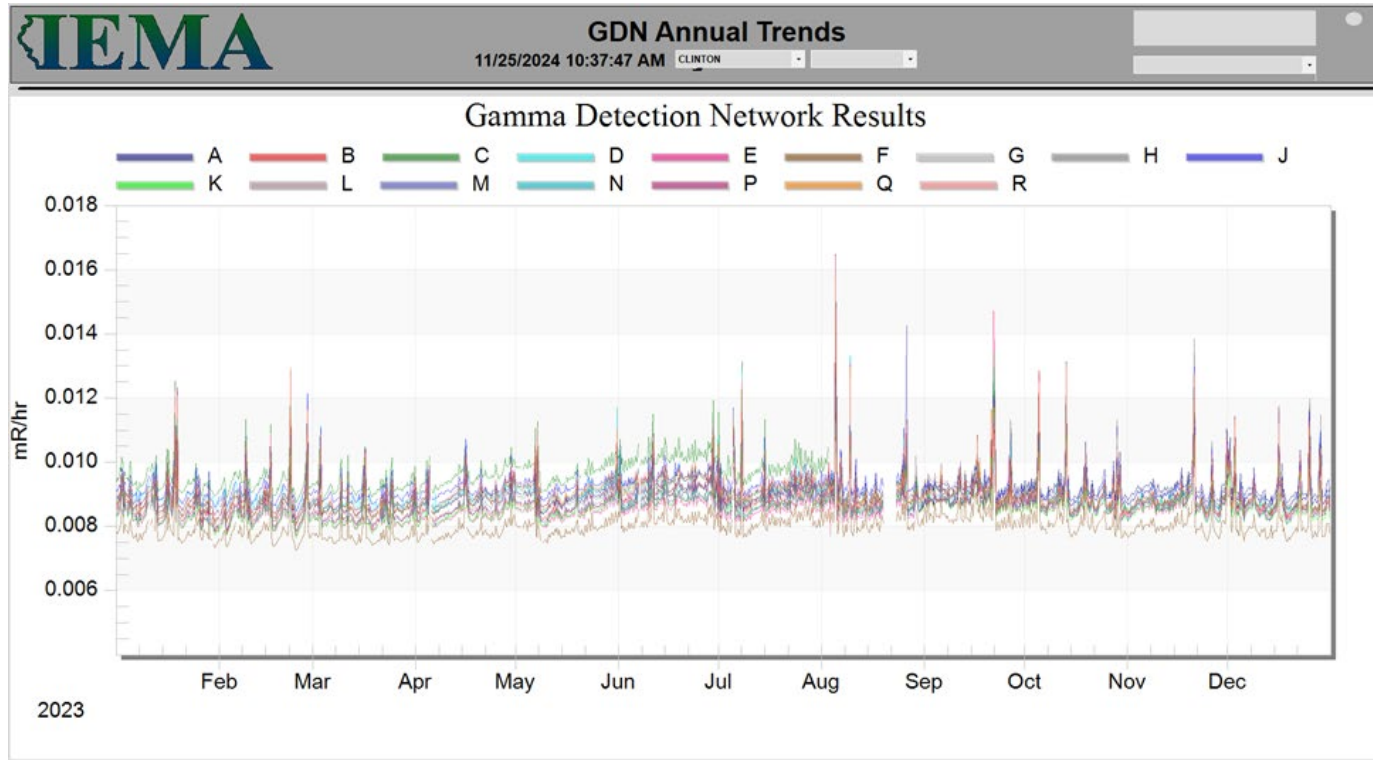
Gamma Spectroscopy Results for Radionuclides in Vegetation- Clinton
Results are in picocuries per gram (pCi/g)

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																										
4/12/2023	<MDC	2.47	<MDC	0.64	<MDC	0.16	<MDC	0.16	<MDC	0.15	<MDC	0.14	<MDC	0.04	<MDC	2.22	<MDC	0.14	<MDC	0.26	<MDC	0.27	<MDC	0.28		
7/12/2023	<MDC	2.47	<MDC	0.64	<MDC	0.16	<MDC	0.16	<MDC	0.15	<MDC	0.14	<MDC	0.04	<MDC	2.22	<MDC	0.14	<MDC	0.26	<MDC	0.27	<MDC	0.28		
North Branch at Rte 54 Bridge																										
4/12/2023	<MDC	2.47	<MDC	0.64	<MDC	0.16	<MDC	0.16	<MDC	0.15	<MDC	0.14	0.15	0.04	<MDC	2.22	<MDC	0.14	<MDC	0.26	<MDC	0.27	<MDC	0.28		
7/12/2023	<MDC	2.47	<MDC	0.64	<MDC	0.16	<MDC	0.16	<MDC	0.15	<MDC	0.14	<MDC	0.04	<MDC	2.22	<MDC	0.14	<MDC	0.26	<MDC	0.27	<MDC	0.28		
North Fork Branch of Salt Creek																										
4/12/2023	<MDC	2.47	<MDC	0.64	<MDC	0.16	<MDC	0.16	<MDC	0.15	<MDC	0.14	0.08	0.04	<MDC	2.22	<MDC	0.14	<MDC	0.26	<MDC	0.27	<MDC	0.28		
7/12/2023	<MDC	2.47	<MDC	0.64	<MDC	0.16	<MDC	0.16	<MDC	0.15	<MDC	0.14	<MDC	0.04	<MDC	2.22	<MDC	0.14	<MDC	0.26	<MDC	0.27	<MDC	0.28		
Weldon Springs Entrance																										
4/12/2023	<MDC	2.47	<MDC	0.64	<MDC	0.16	<MDC	0.16	<MDC	0.15	<MDC	0.14	<MDC	0.04	<MDC	2.22	<MDC	0.14	<MDC	0.26	<MDC	0.27	<MDC	0.28		
7/12/2023	<MDC	2.47	<MDC	0.64	<MDC	0.16	<MDC	0.16	<MDC	0.15	<MDC	0.14	<MDC	0.04	<MDC	2.22	<MDC	0.14	<MDC	0.26	<MDC	0.27	<MDC	0.28		

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

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95		
	Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Clinton Lake (fish)																									
9/18/2023	<MDC	24800	<MDC	418	<MDC	150	<MDC	70	<MDC	77	<MDC	72	<MDC	490	<MDC	104000	<MDC	82	<MDC	378	<MDC	184	<MDC	292	

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	12.7	9.7	9.3		42.3
CL-03	13.2	13.9		10.3	50.0
CL-06	11.7	9.7		7.8	39.1
CL-09	12.0	10.0	8.6	9.6	40.2
CL-11	9.5	10.7	10.1	9.8	40.1
CL-13	7.0	8.3	8.1	9.2	32.6
CL-16	10.1	12.2	14.8	11.7	48.8
CL-18	12.8	13.0	12.7	12.2	50.6
CL-19	9.0	11.2	7.9	13.0	41.1
CL-22	11.4		13.4	12.3	49.3
CL-25	10.0	10.4	11.3	10.6	42.3
CL-27	12.9	9.8	11.6	9.8	44.1
CL-28	9.9	12.7	9.2	11.6	43.4
CL-31	13.6	10.7	13.2	11.8	49.3
CL-32	10.5	10.4	11.3	11.3	43.4
CL-33	9.7	7.0	8.0	8.5	33.2
CL-36	10.8	11.1	14.4	10.4	46.7
CL-37	12.1	9.0	12.4	11.6	45.0
CL-38	11.9	0.0	6.7	8.6	36.2
CL-39	10.3	9.0	14.9	10.5	44.7
CL-40	11.5	9.3	11.4	11.5	43.7
CL-41	10.5	11.2		12.4	45.4
CL-42	7.7	11.5	13.6	10.7	43.5
CL-43	9.3	13.2	11.9	10.4	44.7

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	9.8	11.0		13.2	34.1
CL-45	9.2	11.1	12.9	10.6	43.8
CL-46	10.1	15.3	9.9	13.4	48.7
CL-47	12.2	12.8	11.2	13.8	50.0
CL-48	10.2	11.4	12.6	10.3	44.5
CL-49	12.9	11.2	14.7	11.0	49.8
CL-50	11.7	12.2	12.0	10.2	46.1
CL-51		9.4	11.8	11.8	33.1
CL-A	11.0	10.8	12.3	11.5	45.6
CL-B	12.5	10.0	10.3	10.2	43.0
CL-C	9.1	12.3	6.4	11.2	39.1
CL-D	9.5	13.3	6.3	11.8	40.9
CL-E	11.5	11.5	11.0	9.5	43.5
CL-F	7.0	8.0	9.3	10.0	34.4
CL-G	6.1	8.1	8.9	10.8	34.0
CL-H	8.8	9.4	5.3	9.5	33.0
CL-J	8.2	10.5	11.6	9.5	39.8
CL-K	11.2	11.0	8.5	10.4	41.0
CL-L	12.6	9.7	8.9	11.2	42.4
CL-M	11.9	10.7	12.2	10.2	45.0
CL-N	12.6	13.7	9.4	10.9	46.6
CL-P	8.6	9.4	9.1	12.6	39.7
CL-Q	9.9	9.9	13.3	10.5	43.5
CL-R	10.8	12.7	9.3	10.2	43.0

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.

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 US NRC and the station's IEPA NPDES permit. No liquid effluents were discharged in 2023.

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 2023

No significant events or changes for 2023.

Sampling and Monitoring Results

Water Sampling Results

Detectable levels of tritium were found in a surface water sample taken from the Illinois River at the Dresden Lock and Dam. The elevated levels are likely attributable to liquid effluent releases from the Braidwood Station. The tritium level was 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.

A detectable level of strontium were found in a surface water sample taken from the Illinois River at Morris. The concentration found was consistent with historical levels found at background sampling locations. The strontium level was well below the Drinking Water Standards established by the US EPA and IEPA.

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

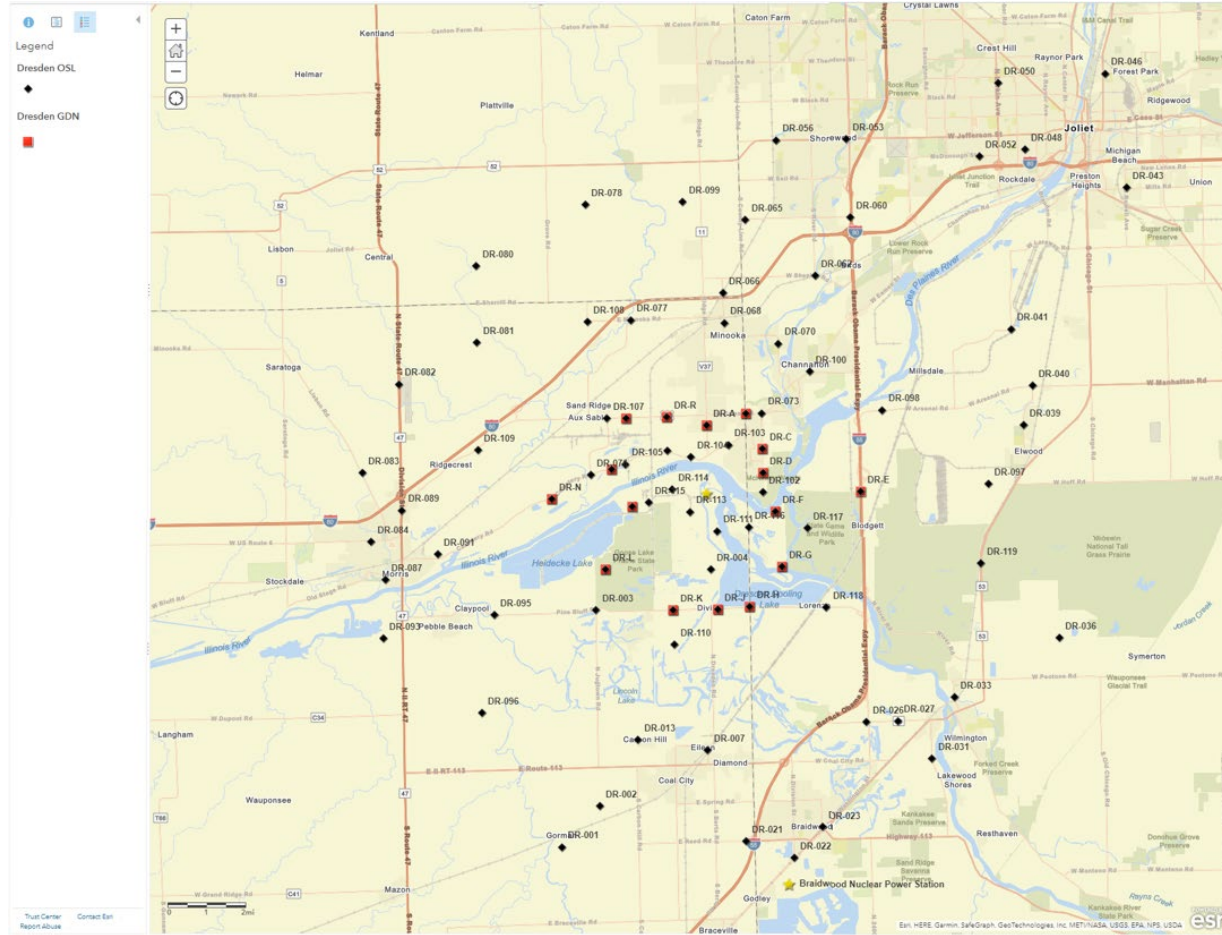


Figure 16. OSL and GDN Monitoring Locations - Dresden (continued)

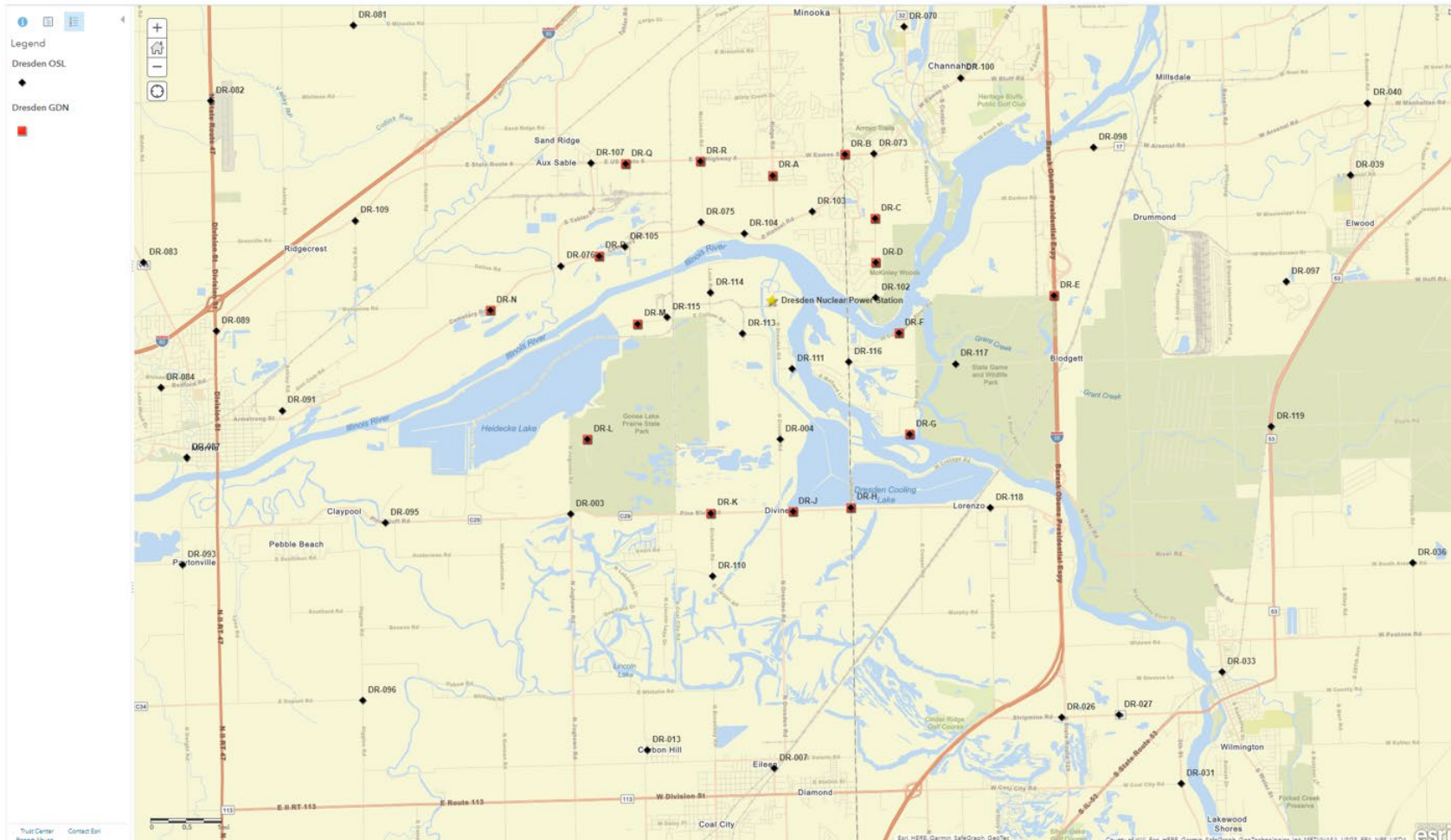
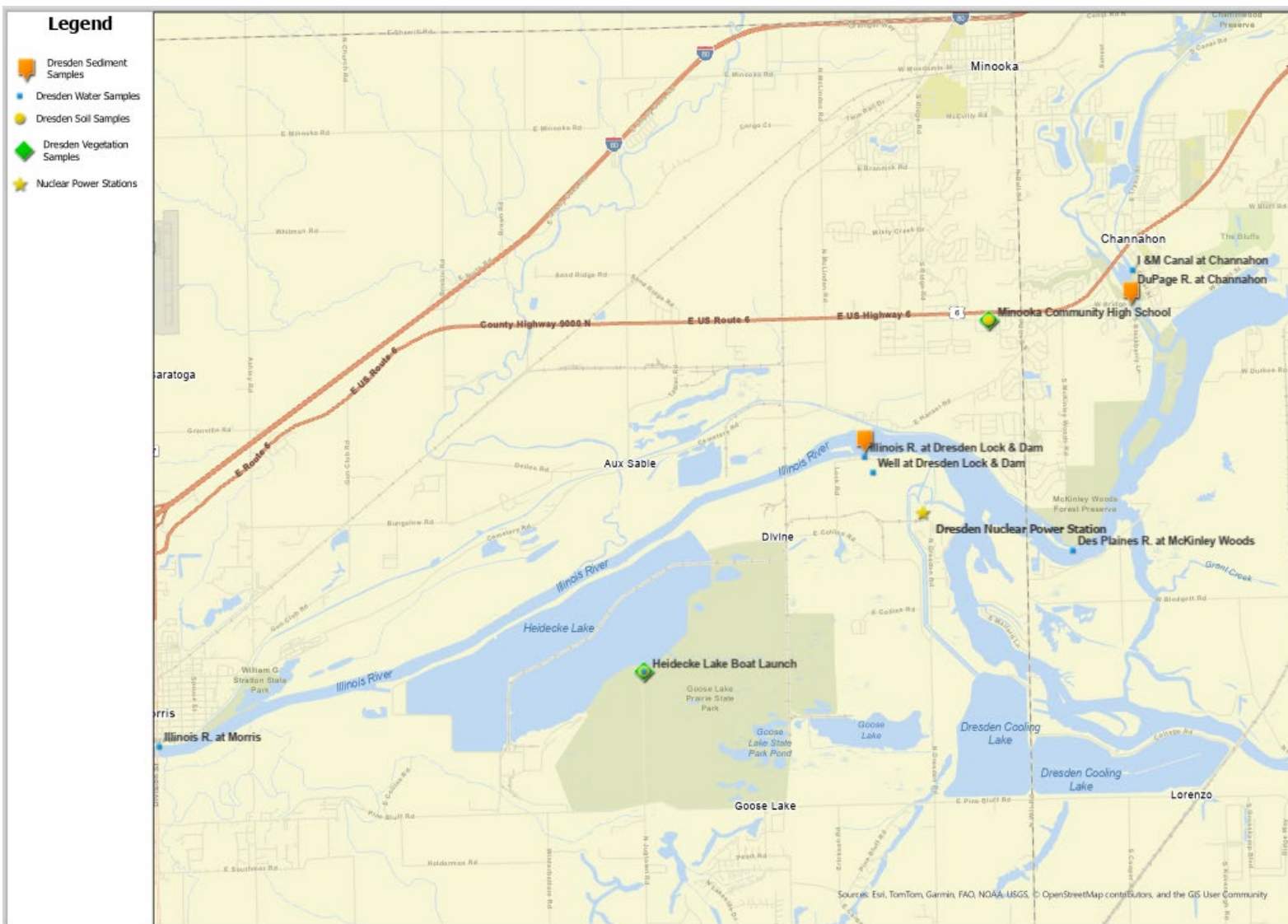


Figure 17. Environmental Sampling Locations - Dresden

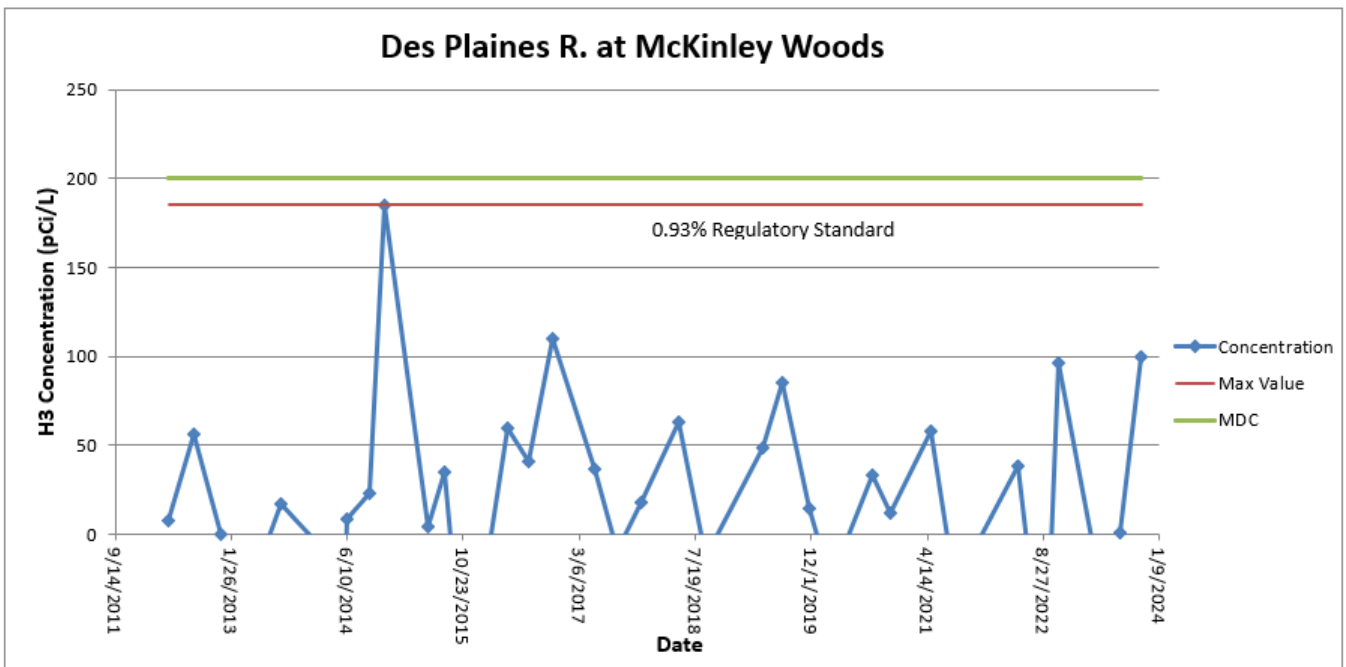
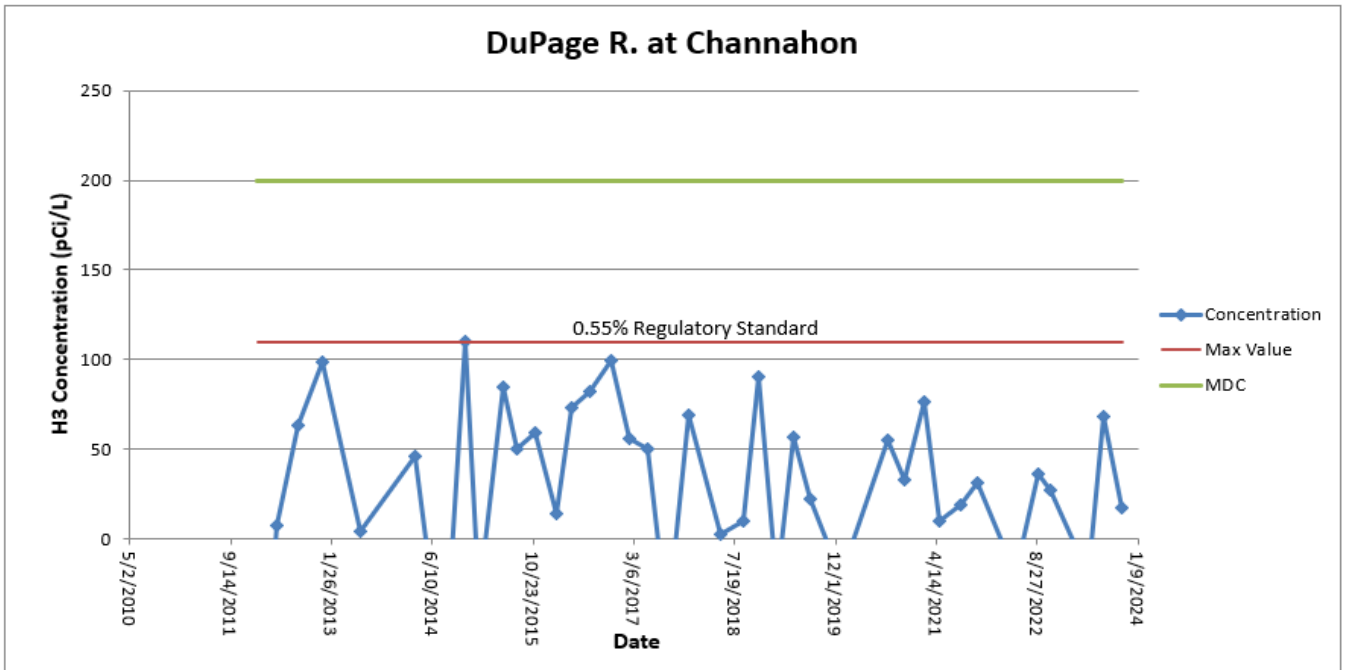


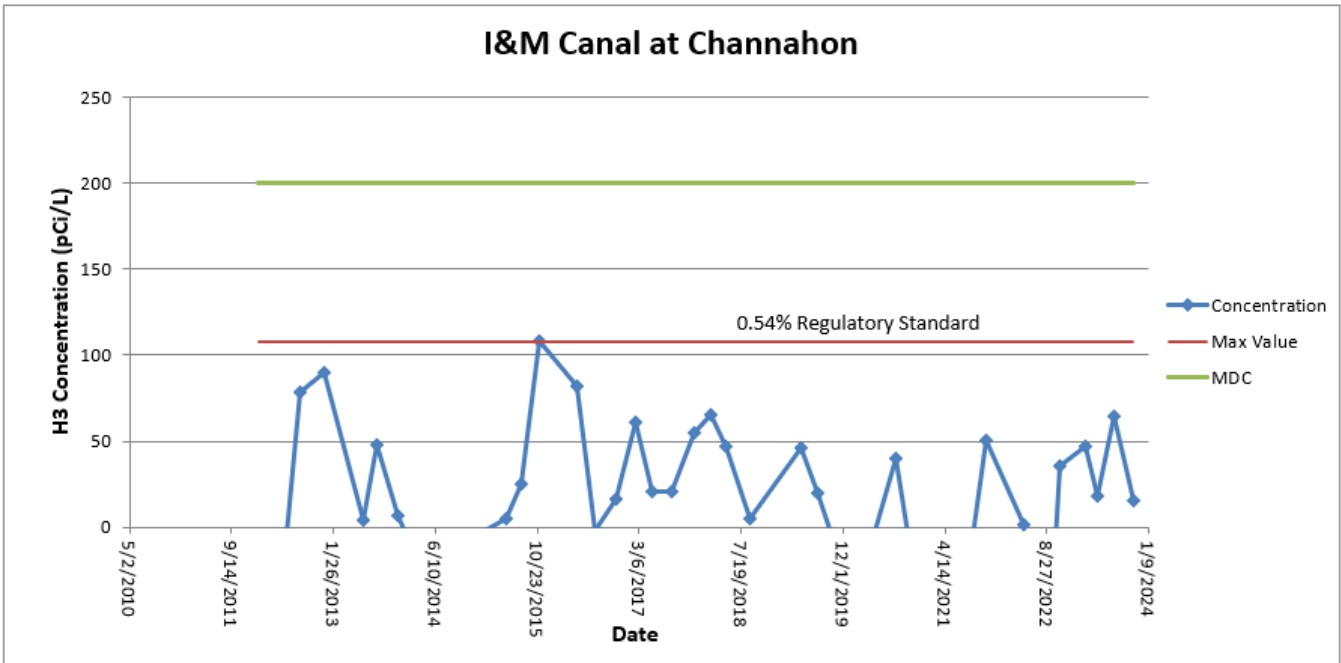
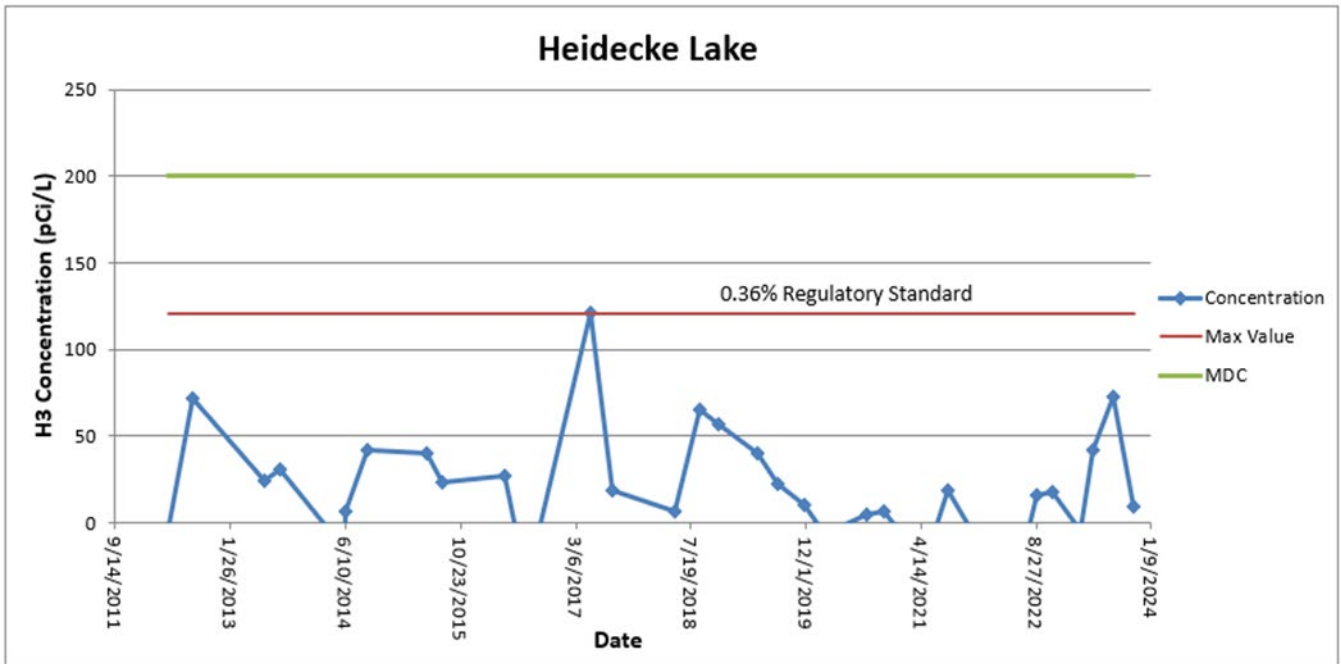
Dresden Sample Result Tables and Graphs

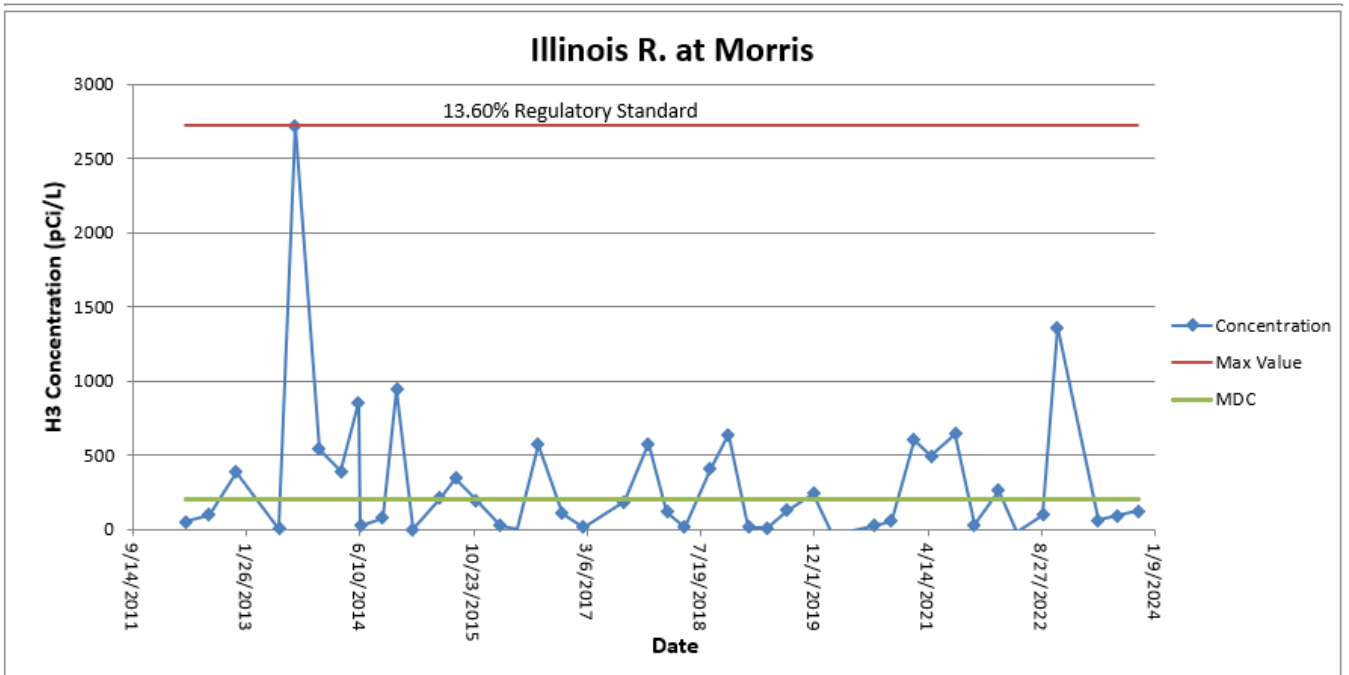
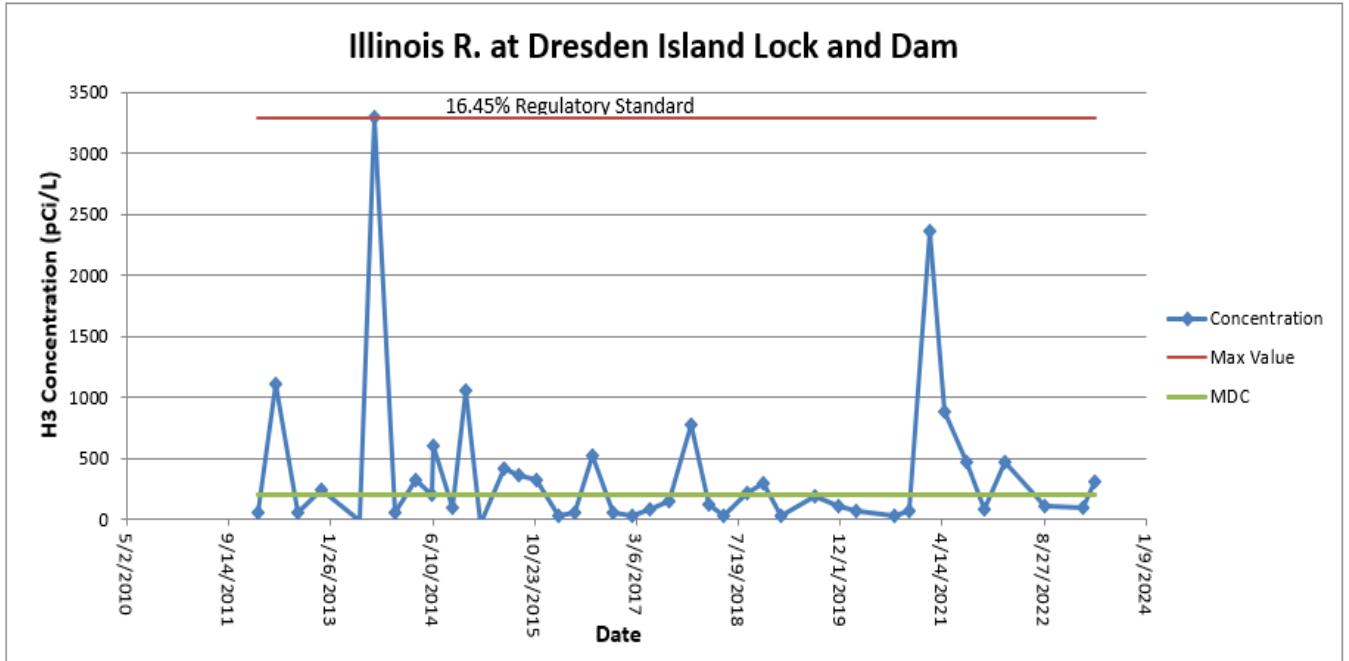
Tritium (H-3) in Water - Dresden
Results are in picocuries per liter (pCi/L)

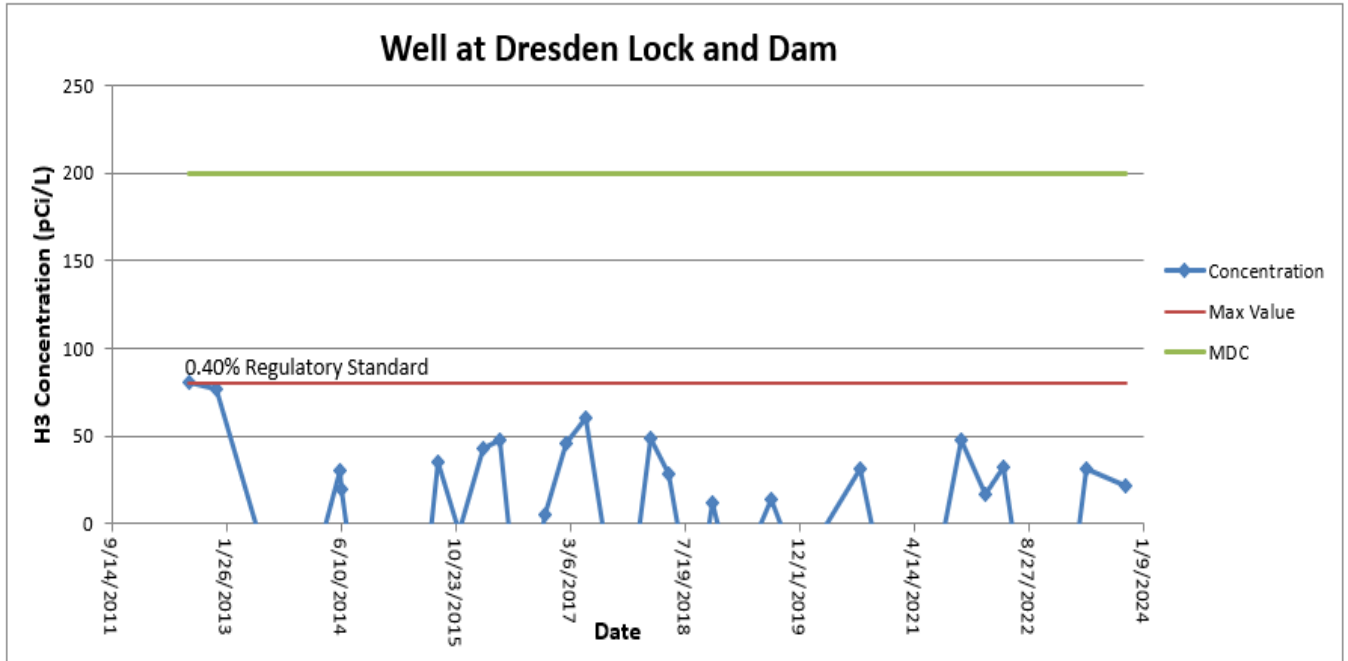
Location	H-3	
Date	Result	MDC
DuPage R. at Channahon		
3/8/2023	<MDC	127
5/3/2023	<MDC	127
7/26/2023	<MDC	127
10/24/2023	<MDC	127
Des Plaines R. at McKinley Woods		
5/3/2023	<MDC	127
7/26/2023	<MDC	127
10/24/2023	<MDC	127
Heidecke Lake		
3/8/2023	<MDC	127
5/3/2023	<MDC	127
7/26/2023	<MDC	127
10/24/2023	<MDC	173
I & M Canal at Channahon		
3/8/2023	<MDC	127
5/3/2023	<MDC	127
7/26/2023	<MDC	127
10/24/2023	<MDC	127
Illinois R. at Dresden Lock & Dam		
3/8/2023	<MDC	127
5/3/2023	312	127
Illinois R. at Morris		
5/3/2023	<MDC	127
7/26/2023	<MDC	127
10/24/2023	<MDC	127
Well at Dresden Lock & Dam		
3/8/2023	<MDC	127
5/3/2023	<MDC	127
10/24/2023	<MDC	127

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
DuPage R. at Channahon		
6/26/2023	<MDC	0.9
I & M Canal at Channahon		
3/8/2023	<MDC	0.9
Illinois R. at Dresden Lock & Dam		
5/3/2023	<MDC	0.9
Illinois R. at Morris		
10/24/2023	2.2	0.9

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

Location Date	Beta	
	Result	MDC
DuPage R. at Channahon		
3/8/2023	4.1	3.9
5/3/2023	6.9	3.9
7/26/2023	5.6	3.9
10/24/2023	4.6	3.9
Des Plaines R. at McKinley Woods		
05/03/23	8.4	3.9
07/26/23	8.5	3.9
10/24/23	4.0	3.9
Heidecke Lake		
03/08/23	4.6	3.9
05/03/23	6.9	3.9
07/26/23	5.3	3.9
10/24/23	<MDC	3.9
I & M Canal at Channahon		
03/08/23	<MDC	3.9
05/03/23	7.1	3.9
07/26/23	4.9	3.9
10/24/23	<MDC	3.9
Illinois R. at Dresden Lock & Dam		
03/08/23	5.1	3.9
05/03/23	5.0	3.9
Illinois R. at Morris		
05/03/23	6.5	3.9
07/26/23	5.5	3.9
10/24/23	<MDC	3.9
Well at Dresden Lock & Dam		
03/08/23	13.4	3.9
05/03/23	19.8	3.9
10/24/23	15.4	3.9

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
DuPage R. at Channahon																								
3/8/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
5/3/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
7/26/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
10/24/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
Des Plaines R. at McKinley Woods																								
5/3/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
7/26/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
10/24/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
Heidecke Lake																								
3/8/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
5/3/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
7/26/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
10/24/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
I & M Canal at Channahon																								
3/8/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
5/3/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
7/26/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
10/24/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
Illinois R. at Dresden Lock & Dam																								
3/8/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
5/3/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
Illinois R. at Morris																								
5/3/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
7/26/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
10/24/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
Well at Dresden Lock & Dam																								
3/8/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
5/3/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9
10/24/2023	<MDC	19.3	<MDC	17.9	<MDC	3.3	<MDC	3.4	<MDC	3.7	<MDC	3.3	<MDC	6.7	<MDC	8.8	<MDC	2.9	<MDC	3.8	<MDC	6.3	<MDC	5.9

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
Heidecke Lake																						
5/3/2023	<MDC	0.62	<MDC	0.23	<MDC	0.04	<MDC	0.04	<MDC	0.03	0.19	0.04	<MDC	0.11	<MDC	0.04	<MDC	0.07	<MDC	0.09	<MDC	0.09
8/1/2023	<MDC	0.62	<MDC	0.23	<MDC	0.04	<MDC	0.04	<MDC	0.03	0.08	0.04	<MDC	0.11	<MDC	0.04	<MDC	0.07	<MDC	0.09	<MDC	0.09
Minooka Comm HS																						
5/3/2023	<MDC	0.62	<MDC	0.23	<MDC	0.04	<MDC	0.04	<MDC	0.03	<MDC	0.04	<MDC	0.11	<MDC	0.04	<MDC	0.07	<MDC	0.09	<MDC	0.09

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
Heidecke Lake																						
5/3/2023	<MDC	0.46	<MDC	0.13	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.19	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06
8/1/2023	<MDC	0.46	<MDC	0.13	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.08	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06
Minooka Comm HS																						
5/3/2023	<MDC	0.46	<MDC	0.13	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.08	<MDC	0.02	<MDC	0.05	<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	MDC
DuPage R. at Channahon																							
5/3/2023	<MDC	0.44	<MDC	0.18	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06	
7/26/2023	<MDC	0.44	<MDC	0.18	<MDC	0.03	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06	
Illinois R. at Dresden Lock & Dam																							
5/3/2023	<MDC	0.44	<MDC	0.18	<MDC	0.03	<MDC	0.02	<MDC	0.02	0.03	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.05	<MDC	0.06	<MDC	0.06	

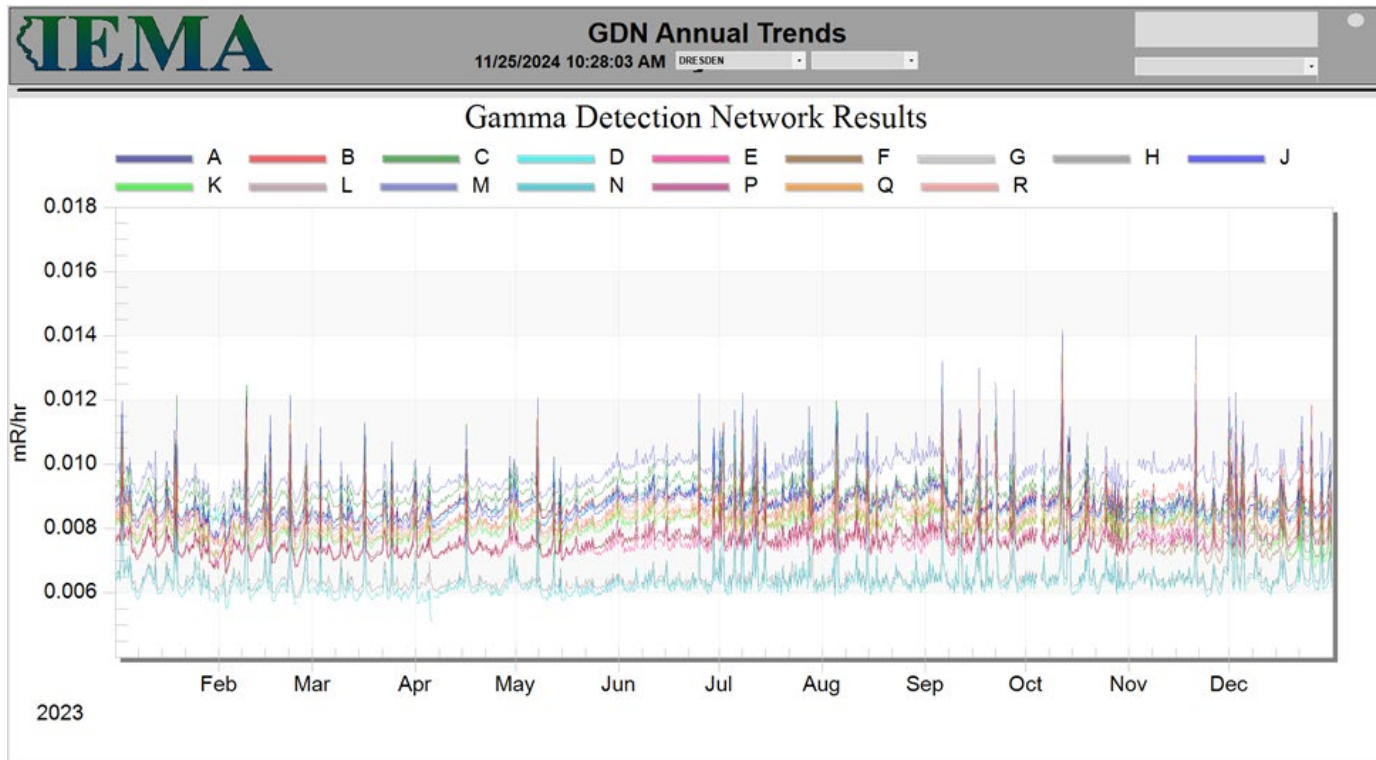
Gamma Spectroscopy Results for Radionuclides in Vegetation - Dresden
Results are in picocuries per gram (pCi/g)

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	
Heidecke Lake																								
5/3/2023	<MDC	1.29	<MDC	0.25	<MDC	0.08	<MDC	0.06	<MDC	0.06	<MDC	0.06	<MDC	0.18	<MDC	1.01	<MDC	0.07	<MDC	0.12	<MDC	0.14	<MDC	0.16
8/1/2023	<MDC	1.29	<MDC	0.25	<MDC	0.08	<MDC	0.06	<MDC	0.06	<MDC	0.06	<MDC	0.18	<MDC	1.01	<MDC	0.07	<MDC	0.12	<MDC	0.14	<MDC	0.16
Minooka Comm HS																								
5/3/2023	<MDC	1.29	<MDC	0.25	<MDC	0.08	<MDC	0.06	<MDC	0.06	<MDC	0.06	<MDC	0.18	<MDC	1.01	<MDC	0.07	<MDC	0.12	<MDC	0.14	<MDC	0.16

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)																								
10/20/2023	<MDC	92000	<MDC	117	<MDC	62	<MDC	19	<MDC	20	<MDC	19	<MDC	274	<MDC	2E+06	<MDC	23	<MDC	263	<MDC	52	<MDC	126
Illinois River (Bottom Feeder)																								
10/20/2023	<MDC	92000	<MDC	117	<MDC	62	<MDC	19	<MDC	20	<MDC	19	<MDC	274	<MDC	2E+06	<MDC	23	<MDC	263	<MDC	52	<MDC	126

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



Summary of Ambient Gamma Results - Dresden

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
DR-001	3.1	8.2	6.8	6.9	24.9
DR-002	4.4	6.3	6.8	8.0	25.5
DR-003	1.2	6.6	8.3	7.7	23.7
DR-004	6.7	6.5	8.4	7.4	29.0
DR-007	5.2	5.4	9.5	8.2	28.3
DR-013	5.1	9.2	12.8	7.9	35.0
DR-021	4.5	8.0	8.9	8.6	30.0
DR-022	8.3	7.8	6.6	8.5	31.2
DR-023	4.7	6.4	9.3	6.2	26.6
DR-026	4.8	6.5	6.6	7.6	25.5
DR-027	6.2	7.5	8.7	7.0	29.4
DR-031	5.8	7.1	7.9	9.5	30.3
DR-033	4.6	6.6	6.4		23.5
DR-036	5.6	8.7	10.8	8.1	33.2
DR-039	7.1	10.7	12.9	10.5	41.3
DR-040	7.6	8.8	12.4	9.6	38.4
DR-041	5.6	8.1	9.1		30.5
DR-043	3.9	7.6	9.9	8.4	29.8
DR-046	2.4	5.0	7.6	6.9	22.0
DR-048	8.2	6.8	8.6	9.3	33.0
DR-050	5.5	7.5	8.3	8.6	29.9
DR-052	6.6	8.0	10.5	8.8	33.9
DR-053	2.6	8.5	6.5	5.8	23.4
DR-056	8.1	11.3	12.3	11.7	43.5
DR-060	2.8	9.6	7.9	9.8	30.2
DR-062	5.9	8.7		7.6	29.6
DR-065	7.9	9.7	11.6		39.0
DR-066	6.2	6.1	5.8	6.5	24.5
DR-068	5.6	10.6	10.4	9.0	35.6
DR-070	5.9	9.1	8.3	9.6	32.8
DR-073	7.2		20.3	12.8	53.7
DR-075	8.3	13.0	11.5		43.8
DR-076	5.1	7.0	7.4	6.5	26.0

Summary of Ambient Gamma Results – Dresden (Continued)

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
DR-077	6.4	9.0	9.3	8.4	33.1
DR-078	5.0	10.1	11.6	10.2	36.9
DR-080	9.1	11.3	10.9	12.6	43.8
DR-081	10.7	9.1		10.8	40.7
DR-082	8.6	11.6	10.6	11.8	42.5
DR-083	7.3	8.6	8.1	8.8	32.8
DR-084	6.2	10.5	9.6	9.0	35.3
DR-087	3.8	7.5	11.7	10.8	33.9
DR-089	5.6	9.9	8.4	9.5	33.4
DR-091	5.3	7.3	8.1		20.7
DR-093	5.0	8.8	10.1	9.3	33.1
DR-095	5.1	8.7	10.0	7.7	31.4
DR-096	6.9	8.8	10.8	10.3	36.8
DR-097	7.7	8.4	12.3		37.8
DR-098	3.2	6.4	5.6	8.7	23.9
DR-099	9.5	9.7	9.1	10.7	38.9
DR-100	6.8	6.1	8.3	8.6	29.8
DR-102	8.6	9.2	12.9	11.1	41.8
DR-103	9.3	8.9	13.9	11.5	43.6
DR-104	10.3	10.0	13.5	12.9	46.7
DR-105	3.3	4.9	9.1	8.2	25.6
DR-107	7.0	8.4	9.6	8.9	33.9
DR-108	10.0	9.9	9.4	9.1	38.4
DR-109		8.3		14.9	46.6
DR-110	4.0	5.6	6.5	6.5	22.5
DR-111	6.6	4.8	7.1	8.0	26.4
DR-113	7.4	8.4	12.1	11.3	39.2
DR-114	9.5	10.6	13.4	12.4	45.8
DR-115	7.7	9.1	14.5	11.7	43.0
DR-116	9.9	5.3	7.5	6.9	29.6
DR-117	5.6	10.2	8.6	8.0	32.4
DR-118	1.7	8.2		9.9	26.3
DR-119	4.6	8.2	10.3	11.0	34.1

Summary of Ambient Gamma Results – Dresden (Continued)

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
DR-A	6.7	6.2	11.9	9.5	34.2
DR-B	5.6	8.0	10.8	8.0	32.4
DR-C	8.6	12.6	13.2	13.4	47.8
DR-D	7.2	10.3	11.5	9.6	38.6
DR-E	2.9	3.9	8.8	7.9	23.5
DR-F	5.1	7.9	9.0	9.0	31.0
DR-G	4.0	5.8	7.1	9.4	26.3
DR-H	4.9	5.3	6.7	5.8	22.7
DR-J	6.1	9.4	8.5	10.2	34.1
DR-K	6.6	7.3	7.8	8.2	29.9
DR-L	8.4	8.0	11.2	9.8	37.5
DR-M	6.4	9.3	11.3	11.1	38.1
DR-N	3.9	6.3	8.4	5.6	24.2
DR-P	2.5	6.6	8.2	7.4	24.6
DR-Q	4.9	9.7	9.5	7.1	31.3
DR-R	5.7	8.4	11.3	9.6	35.0

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.

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 US 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 2023.

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 2023

No significant events or changes for 2023.

Sampling and Monitoring Results

Water Sampling Results

Detectable levels of tritium were found in surface water samples taken at several locations throughout 2023. The tritium detected, is 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.

Detectable levels of strontium were found in surface water samples taken from Wolf Creek near LS-18, however the concentrations found were consistent with historical levels found at background sampling locations. The strontium level was well below the Drinking Water Standards established by the US EPA and IEPA.

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

Sediment Sampling Results

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

LaSalle Maps of Monitoring and Sampling Locations

Figure 18. OSL and GDN Monitoring Locations – LaSalle

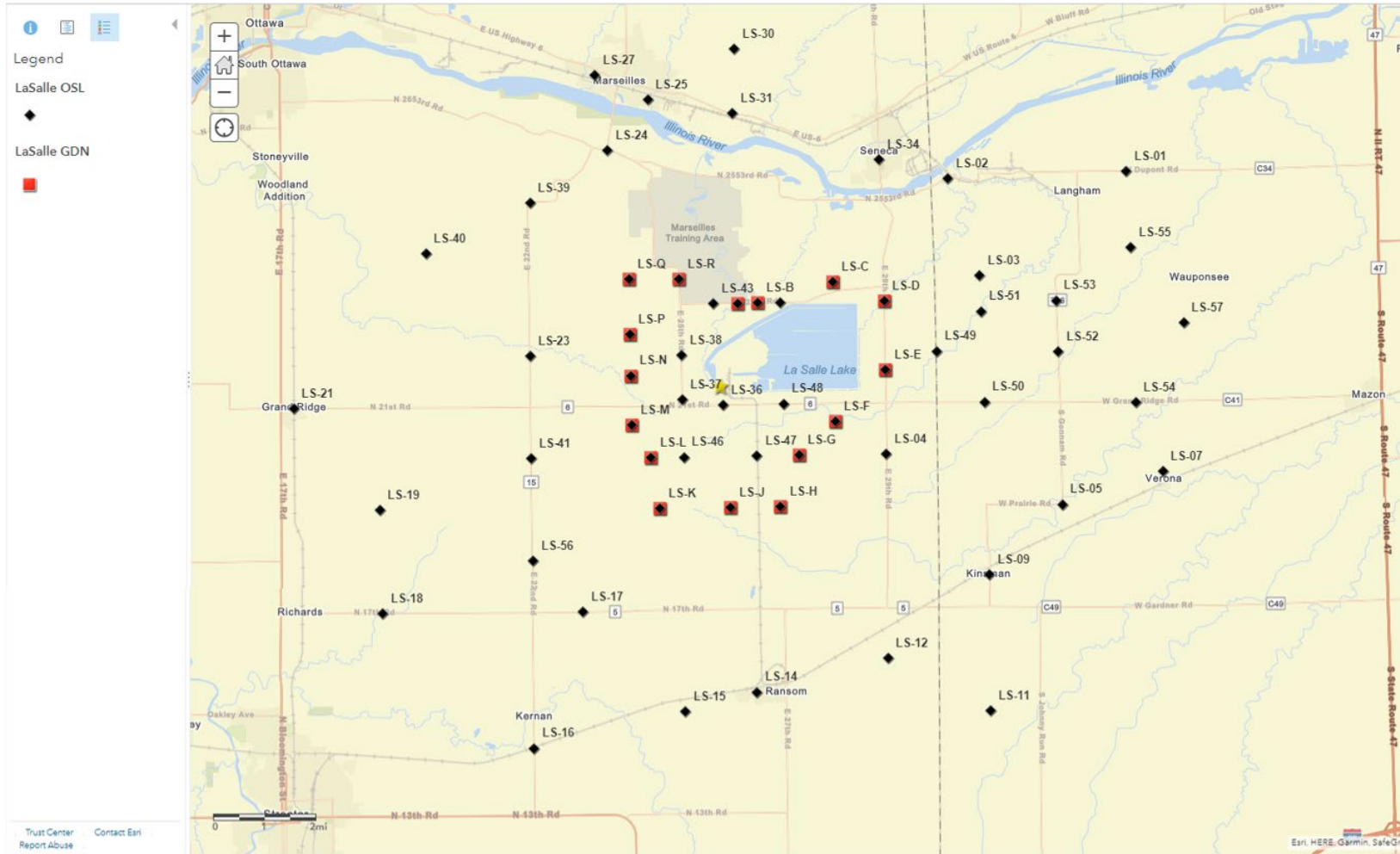


Figure 19. OSL and GDN Monitoring Locations (continued) – LaSalle

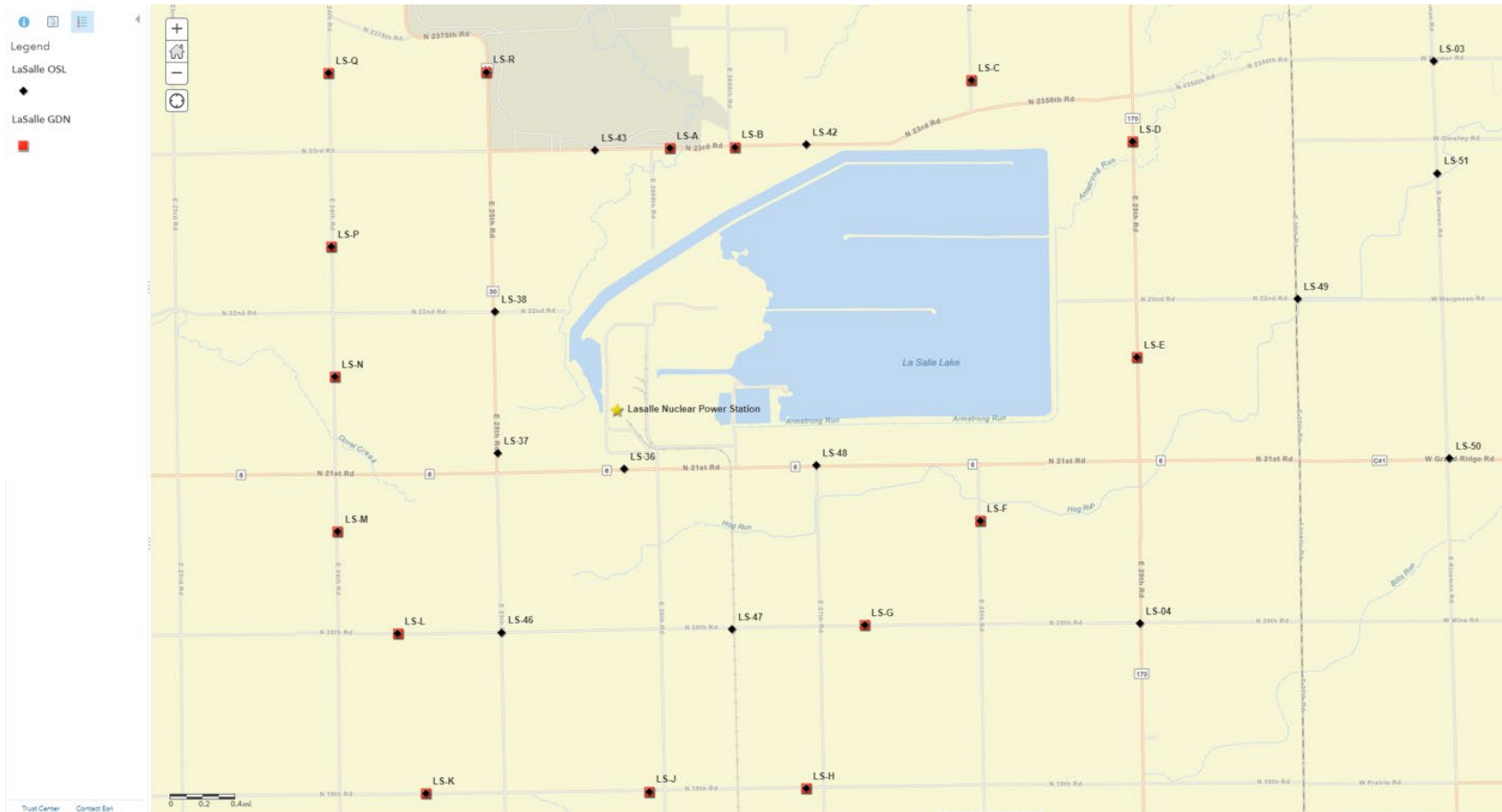
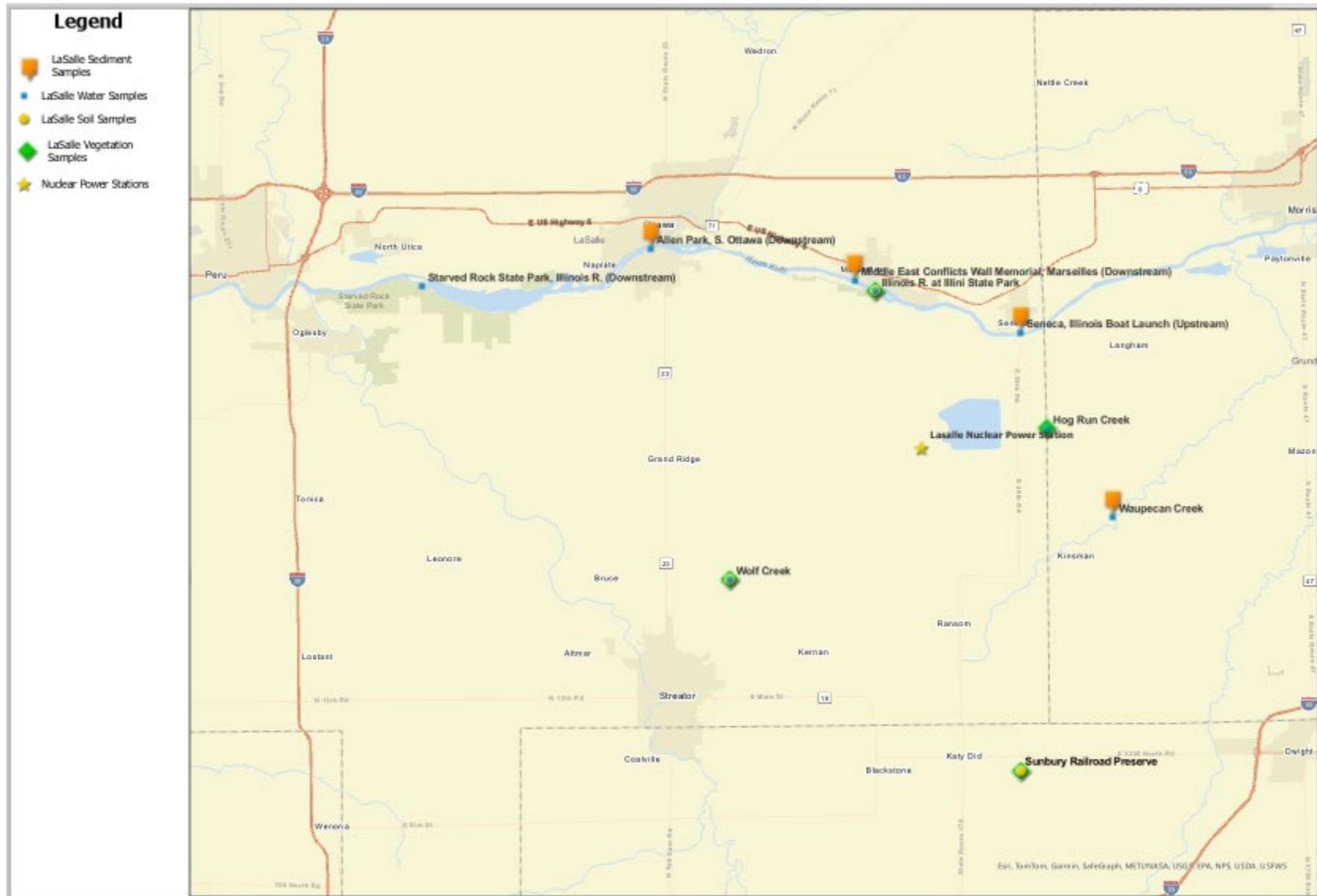


Figure 20. Environmental Sampling Locations – LaSalle

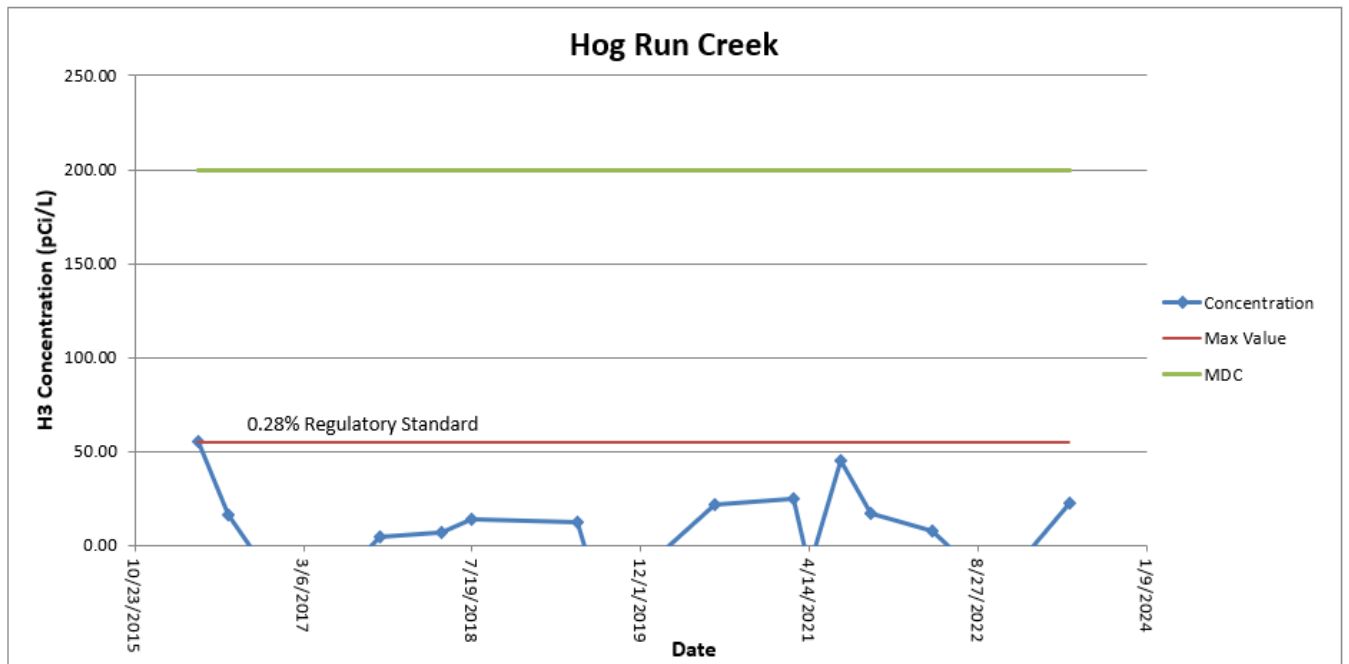
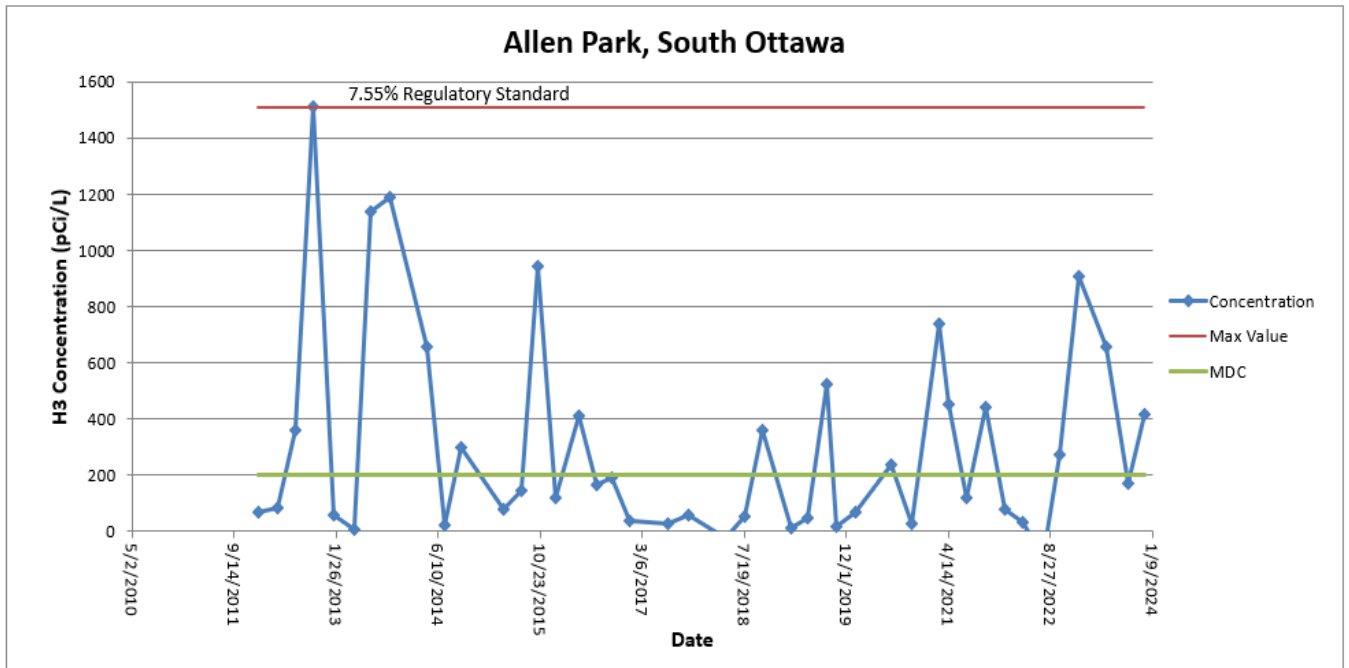


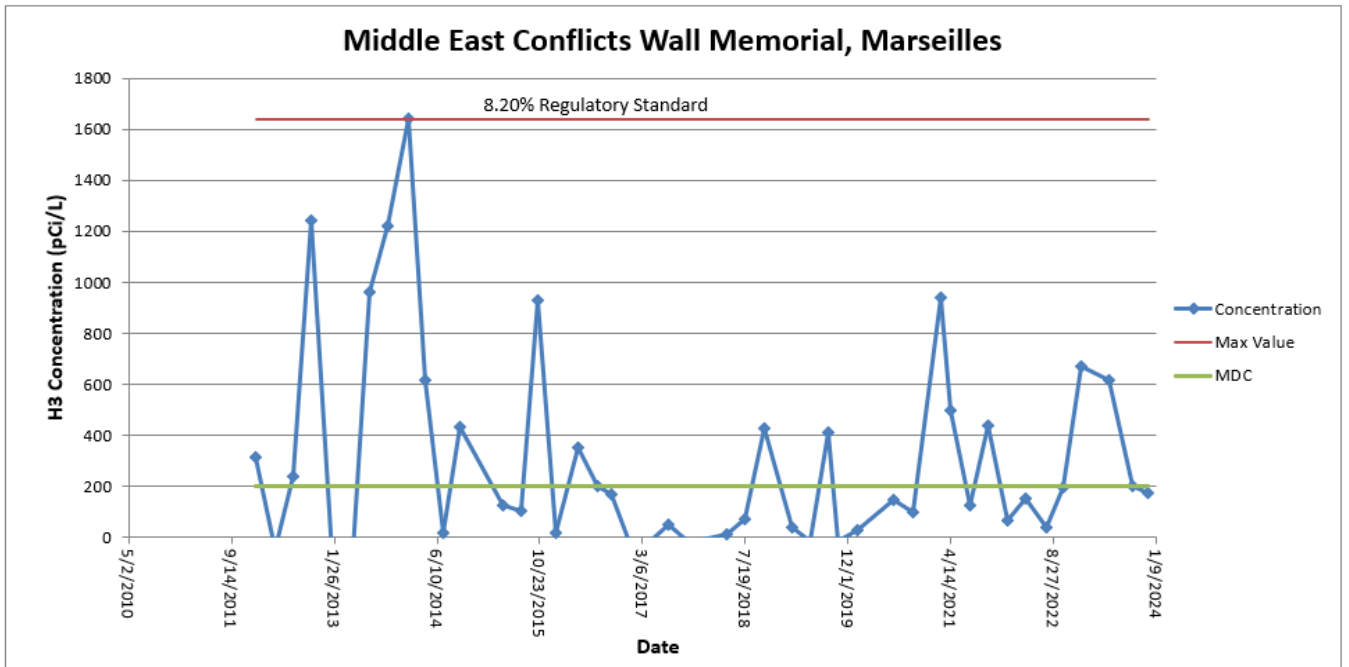
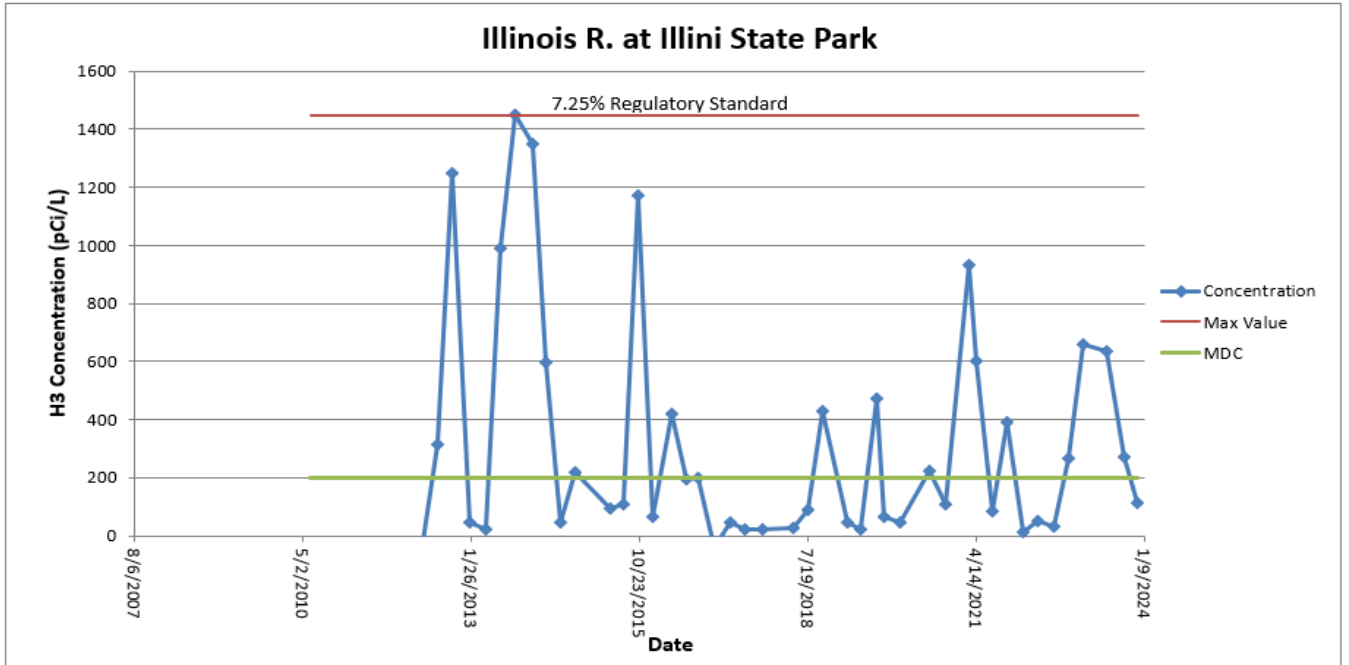
LaSalle Sample Result Tables and Graphs

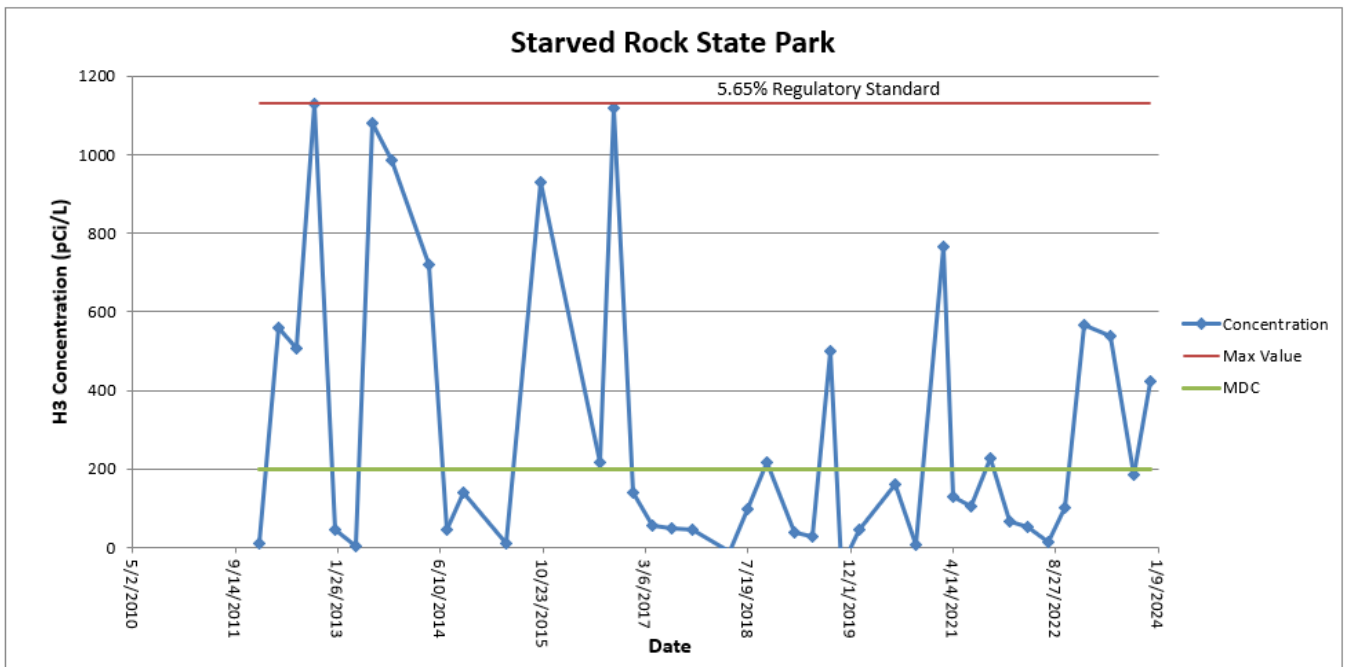
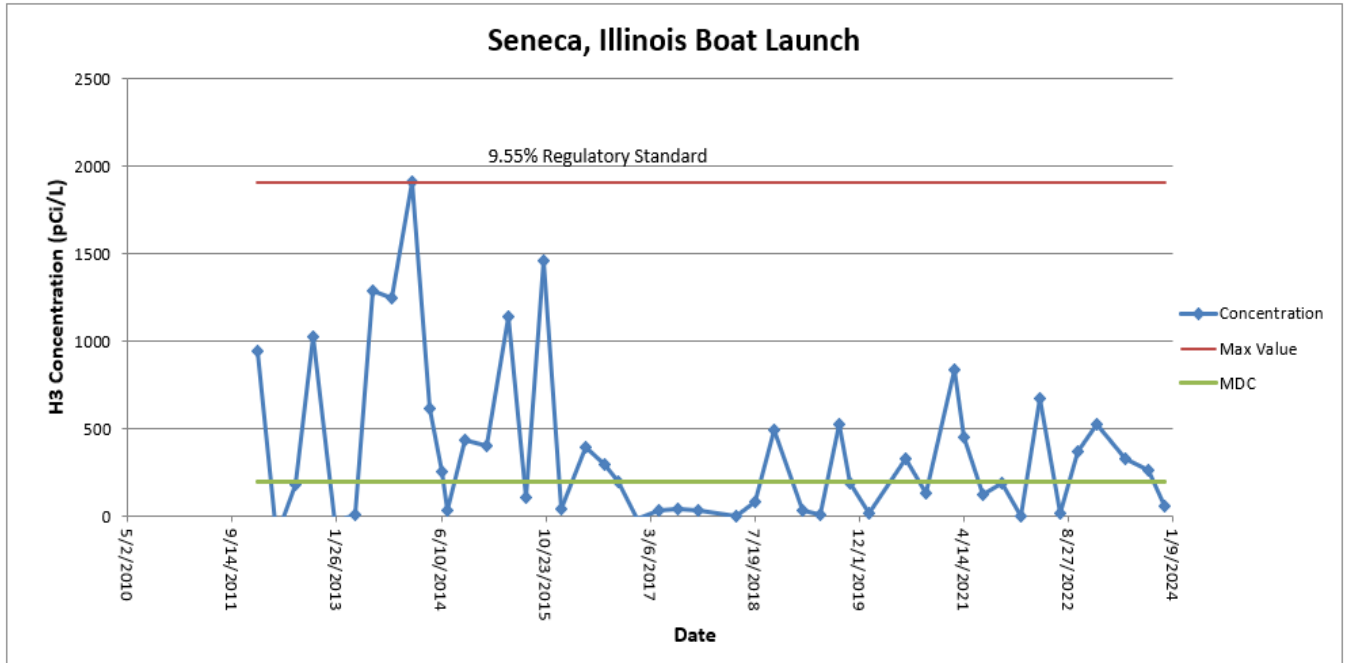
Tritium (H-3) in Water Results - LaSalle
Results are in picocuries per liter (pCi/L)

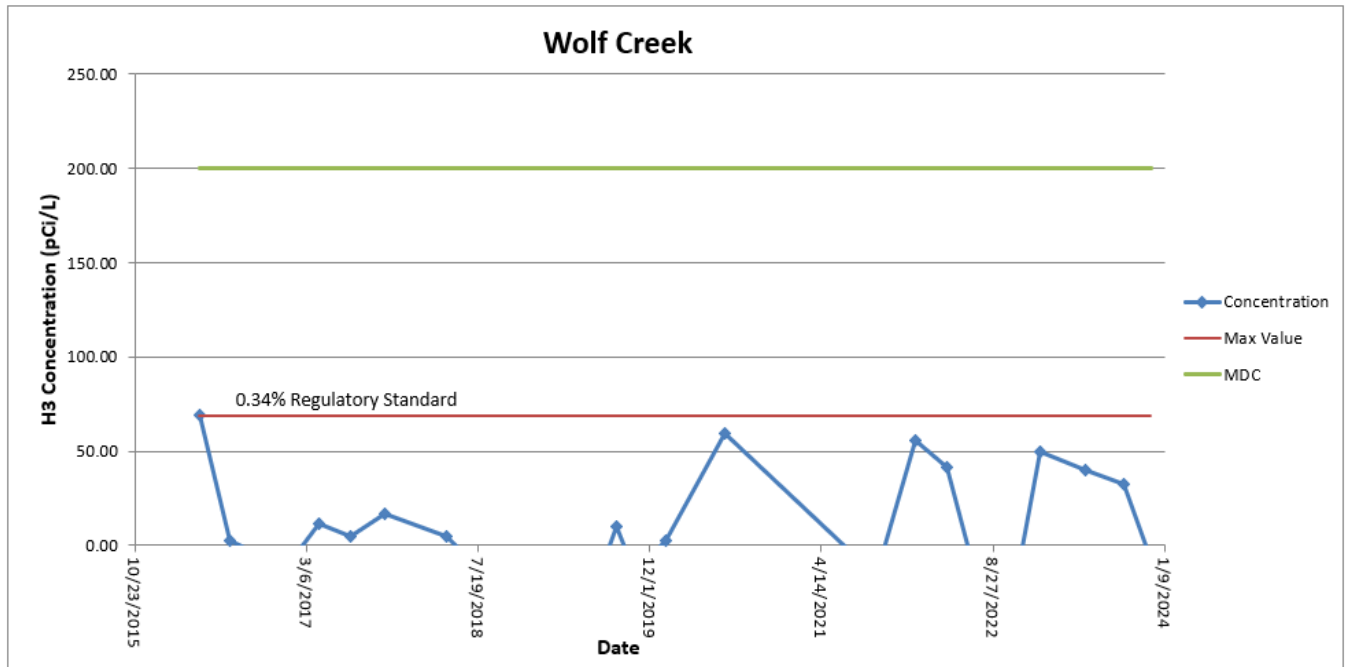
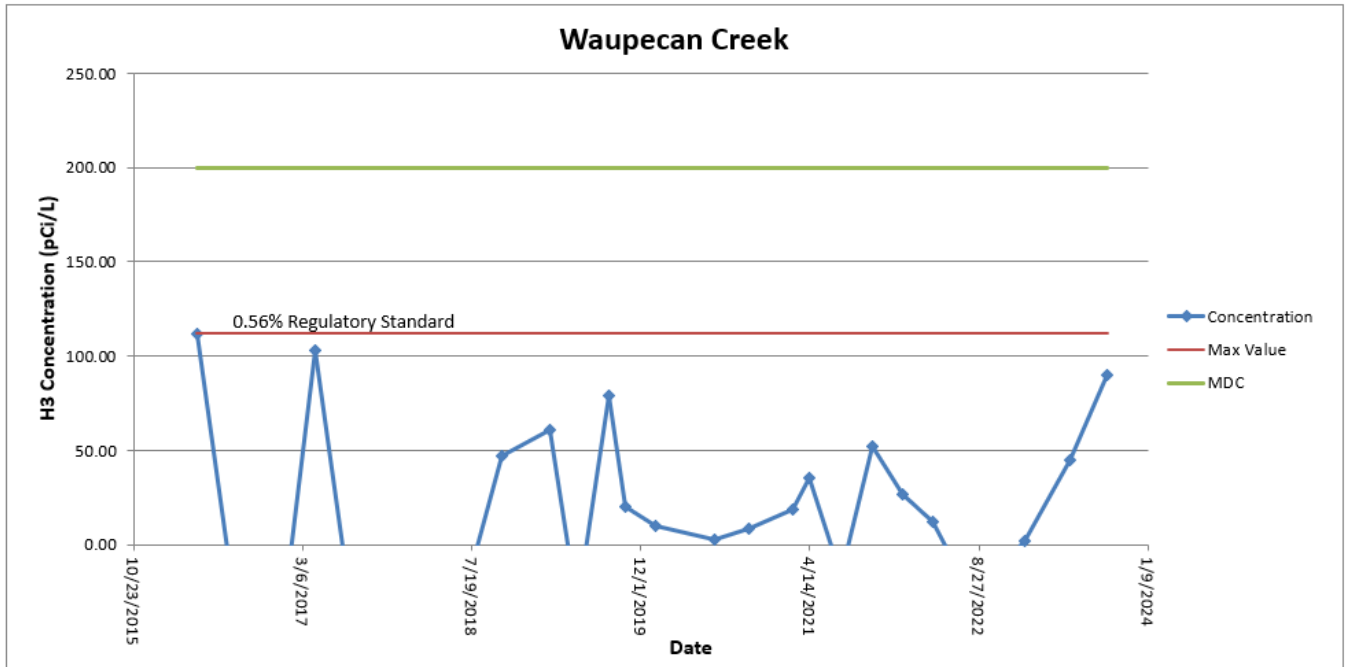
Location	H-3	
Date	Result	MDC
Allen Park, South Ottawa		
1/11/2023	909	127
5/24/2023	657	127
9/12/2023	173	127
11/29/2023	418	127
Hog Run Creek		
5/24/2023	<MDC	127
Illinois R. at Illini State Park		
1/11/2023	658	127
5/24/2023	634	127
9/12/2023	269	127
11/29/2023	<MDC	127
Middle East Conflicts Wall Memorial		
1/11/2023	671	127
5/24/2023	617	127
9/12/2023	203	127
11/29/2023	172	127
Seneca, Illinois Boat Launch		
1/11/2023	524	127
5/24/2023	331	127
9/12/2023	266	127
11/29/2023	<MDC	127
Starved Rock State Park		
1/11/2023	568	127
5/24/2023	537	127
9/12/2023	184	127
11/29/2023	424	127
Waupecan Creek		
1/11/2023	<MDC	127
5/24/2023	<MDC	127
9/12/2023	<MDC	127
Wolf Creek		
1/11/2023	<MDC	127
5/24/2023	<MDC	127
9/12/2023	<MDC	127
11/29/2023	<MDC	127

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
Allen Park, South Ottawa		
1/11/2023	<MDC	0.96
Starved Rock State Park		
5/24/2023	<MDC	0.96
Waupecan Creek		
9/12/2023	<MDC	0.96
Wolf Creek near LS-18		
11/29/2023	1.43	0.96

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		
1/11/2023	5.8	3.8	1/11/2023	<MDC	3.8
5/24/2023	4.2	3.8	5/24/2023	6.3	3.8
9/12/2023	3.9	3.8	9/12/2023	<MDC	3.8
11/29/2023	<MDC	3.8	11/29/2023	5.0	3.8
Hog Run Creek			Starved Rock State Park		
5/24/2023	<MDC	3.8	1/11/2023	4.0	3.8
Illinois R. at Illini State Park			5/24/2023	7.1	3.8
1/11/2023	5.8	3.8	9/12/2023	6.2	3.8
5/24/2023	9.1	3.8	11/29/2023	4.0	3.8
9/12/2023	5.9	3.8	Waupecan Creek		
11/29/2023	<MDC	3.8	1/11/2023	<MDC	3.8
Middle East Conflicts Wall Memorial, Marseilles			5/24/2023	<MDC	3.8
1/11/2023	4.8	3.8	9/12/2023	4.6	3.8
5/24/2023	5.2	3.8	Wolf Creek		
9/12/2023	4.9	3.8	1/11/2023	<MDC	3.8
11/29/2023	4.3	3.8	5/24/2023	<MDC	3.8
			9/12/2023	<MDC	3.8
			11/29/2023	<MDC	3.8

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

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Allen Park, South Ottawa																								
1/11/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
5/24/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
9/12/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
11/29/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
Hog Run Creek																								
5/24/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
Illinois R. at Illini State Park																								
1/11/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
5/24/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
9/12/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
11/29/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
Middle East Conflicts Wall Memorial, Marseilles																								
1/11/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
5/24/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
9/12/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
11/29/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
Seneca, Illinois Boat Launch																								
1/11/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
5/24/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
9/12/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
11/29/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
Starved Rock State Park																								
1/11/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
5/24/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
9/12/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
11/29/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
Waupecan Creek																								
1/11/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
5/24/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
9/12/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
Wolf Creek																								
1/11/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
5/24/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
9/12/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7
11/29/2023	<MDC	14.7	<MDC	18.2	<MDC	2.9	<MDC	3.5	<MDC	3.4	<MDC	3.3	<MDC	6.4	<MDC	5.5	<MDC	3.0	<MDC	3.2	<MDC	6.0	<MDC	5.7

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																					
5/24/2023	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.14	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08	
9/12/2023	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.18	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08	
Sunbury Railroad Preserve																					
5/24/2023	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.32	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08	
9/12/2023	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.32	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08	
Wolf Creek																					
5/24/2023	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.05	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08	
9/12/2023	<MDC	0.22	<MDC	0.04	<MDC	0.03	<MDC	0.03	0.10	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.06	<MDC	0.07	<MDC	0.08	

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																							
5/24/2023	<MDC	0.55	<MDC	0.21	<MDC	0.04	<MDC	0.04	<MDC	0.03	0.14	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.08	
9/12/2023	<MDC	0.55	<MDC	0.21	<MDC	0.04	<MDC	0.04	<MDC	0.03	0.15	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.08	
Sunbury Railroad Preserve																							
5/24/2023	<MDC	0.55	<MDC	0.21	<MDC	0.04	<MDC	0.04	<MDC	0.03	0.33	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.08	
9/12/2023	<MDC	0.55	<MDC	0.21	<MDC	0.04	<MDC	0.04	<MDC	0.03	0.18	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.08	
Wolf Creek																							
5/24/2023	<MDC	0.55	<MDC	0.21	<MDC	0.04	<MDC	0.04	<MDC	0.03	0.05	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.08	
9/12/2023	<MDC	0.55	<MDC	0.21	<MDC	0.04	<MDC	0.04	<MDC	0.03	0.09	0.04	<MDC	0.10	<MDC	0.03	<MDC	0.07	<MDC	0.08	<MDC	0.08	

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

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
	Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result
Allen Park, South Ottawa																						
5/24/2023	<MDC	0.31	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04
9/12/2023	<MDC	0.31	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04
Middle East Conflicts Wall Memorial, Marseilles																						
5/24/2023	<MDC	0.31	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04
9/12/2023	<MDC	0.31	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04
Seneca, Illinois Boat Launch																						
5/24/2023	<MDC	0.31	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04
9/12/2023	<MDC	0.31	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04
Waupecan Creek																						
5/24/2023	<MDC	0.31	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	0.03	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04
9/12/2023	<MDC	0.31	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04

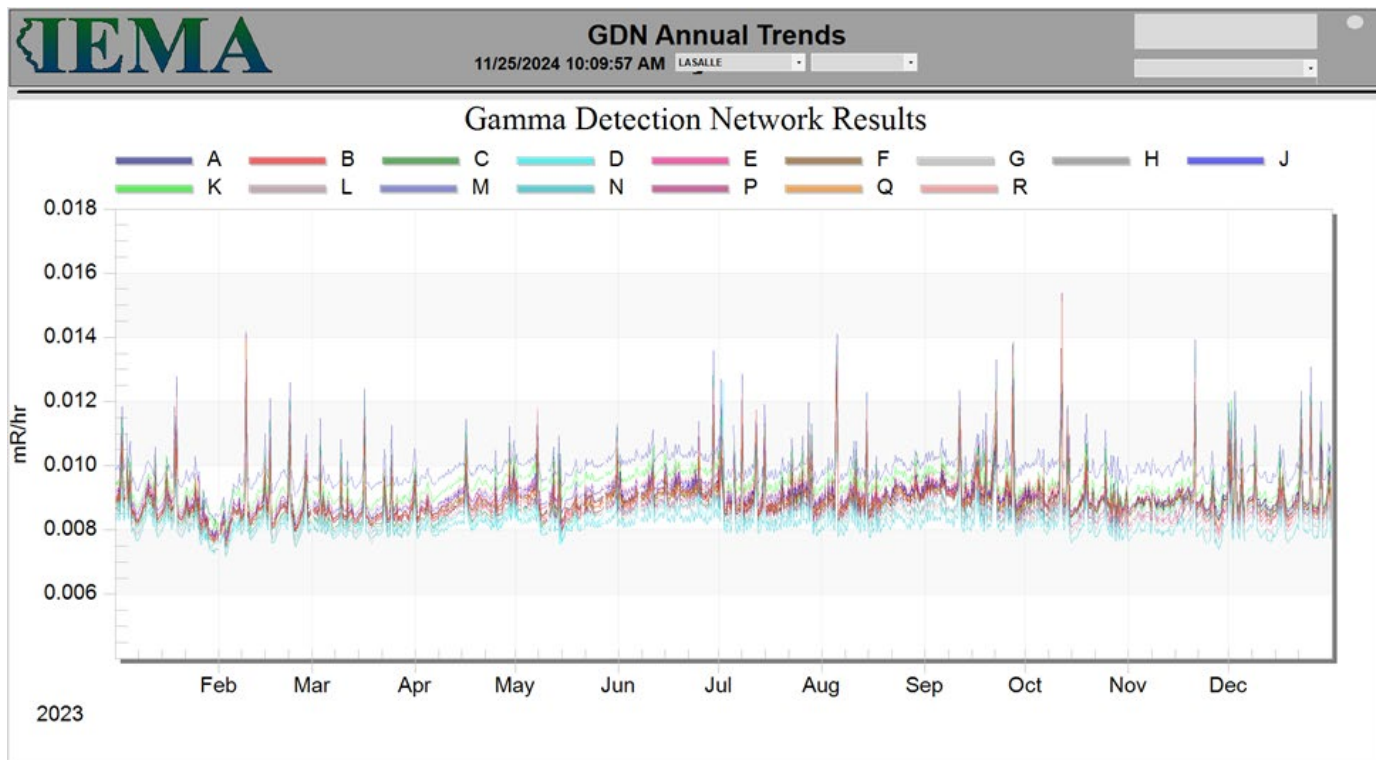
Gamma Spectroscopy Results for Radionuclides in Vegetation - LaSalle
Results are in picocuries per gram (pCi/g)

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
Hog Run Creek																								
5/24/2023	<MDC	1.45	<MDC	0.37	<MDC	0.09	<MDC	0.08	<MDC	0.08	<MDC	0.07	<MDC	0.23	<MDC	1.18	<MDC	0.07	<MDC	0.14	<MDC	0.16	<MDC	0.16
9/12/2023	<MDC	1.45	<MDC	0.37	<MDC	0.09	<MDC	0.08	<MDC	0.08	<MDC	0.07	<MDC	0.23	<MDC	1.18	<MDC	0.07	<MDC	0.14	<MDC	0.16	<MDC	0.16
Illini State Park																								
5/24/2023	<MDC	1.45	<MDC	0.37	<MDC	0.09	<MDC	0.08	<MDC	0.08	<MDC	0.07	<MDC	0.23	<MDC	1.18	<MDC	0.07	<MDC	0.14	<MDC	0.16	<MDC	0.16
9/12/2023	<MDC	1.45	<MDC	0.37	<MDC	0.09	<MDC	0.08	<MDC	0.08	<MDC	0.07	<MDC	0.23	<MDC	1.18	<MDC	0.07	<MDC	0.14	<MDC	0.16	<MDC	0.16
Sunbury Railroad Preserve																								
5/24/2023	<MDC	1.45	<MDC	0.37	<MDC	0.09	<MDC	0.08	<MDC	0.08	<MDC	0.07	<MDC	0.23	<MDC	1.18	<MDC	0.07	<MDC	0.14	<MDC	0.16	<MDC	0.16
9/12/2023	<MDC	1.45	<MDC	0.37	<MDC	0.09	<MDC	0.08	<MDC	0.08	<MDC	0.07	<MDC	0.23	<MDC	1.18	<MDC	0.07	<MDC	0.14	<MDC	0.16	<MDC	0.16
Wolf Creek																								
5/24/2023	<MDC	1.45	<MDC	0.37	<MDC	0.09	<MDC	0.08	<MDC	0.08	<MDC	0.07	<MDC	0.23	<MDC	1.18	<MDC	0.07	<MDC	0.14	<MDC	0.16	<MDC	0.16
9/12/2023	<MDC	1.45	<MDC	0.37	<MDC	0.09	<MDC	0.08	<MDC	0.08	<MDC	0.07	<MDC	0.23	<MDC	1.18	<MDC	0.07	<MDC	0.14	<MDC	0.16	<MDC	0.16

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 (Top Feeder)																										
5/24/2023	<MDC	12000	<MDC	204	<MDC	76	<MDC	33	<MDC	38	<MDC	35	<MDC	248	<MDC	46000	<MDC	41	<MDC	173	<MDC	97	<MDC	146		
LaSalle Lake (Bottom Feeder)																										
5/24/2023	<MDC	12000	<MDC	204	<MDC	76	<MDC	33	<MDC	38	<MDC	35	<MDC	248	<MDC	46000	<MDC	41	<MDC	173	<MDC	97	<MDC	146		
10/10/2023	<MDC	12000	<MDC	204	<MDC	76	<MDC	33	<MDC	38	<MDC	35	<MDC	248	<MDC	46000	<MDC	41	<MDC	173	<MDC	97	<MDC	146		

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



Summary of Ambient Gamma Results – LaSalle

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
LS-01	8.1	10.6	15.0	10.9	44.6
LS-02	8.5	8.6	13.1	10.4	40.6
LS-03	10.7	10.6	11.8	10.5	43.5
LS-04	10.1	10.1	11.9	11.0	43.1
LS-05	9.2	10.6	10.7	13.5	44.0
LS-07	10.1	9.5	11.0	12.5	43.1
LS-09	7.8	8.7	10.9	8.8	36.2
LS-11	12.4	9.8	14.0	13.4	49.6
LS-12	5.8	8.8	11.0	9.0	34.7
LS-14	5.5	7.8	9.3	10.0	32.6
LS-15	9.4	10.1		9.8	39.1
LS-16	6.8	8.2	12.5	8.5	35.9
LS-17	9.4	11.8	13.0	13.2	47.3
LS-18	10.9	8.9	11.9	9.8	41.5
LS-19	6.3	8.9	15.0	9.6	39.9
LS-21	6.1	8.1	10.6	10.0	34.8
LS-23	7.5	8.2	10.5	10.0	36.1
LS-24	8.4	9.5	13.6	11.0	42.6
LS-25	5.3	10.0	14.6	9.5	39.3
LS-27	8.2	8.5	11.7	7.9	36.3
LS-30	8.0	8.7	12.7	11.4	40.8
LS-31	9.3			9.4	37.4
LS-34	7.2	8.2	12.1	5.4	32.9
LS-36	11.2	12.3	13.2	11.9	48.5
LS-37	11.2	11.7	13.0	11.6	47.5
LS-38	8.4	9.9	14.7	9.9	42.8
LS-39	7.5	6.2	10.9	8.8	33.3
LS-40	8.8	9.9	10.0	10.2	38.9
LS-41	11.8	11.5	15.7	12.7	51.7
LS-42	12.2	9.4	13.8	12.8	48.2

Summary of Ambient Gamma Results – LaSalle (Continued)

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
LS-43	8.7	11.0	15.6	9.9	45.2
LS-46	12.2	11.8	12.0	12.5	48.4
LS-47	12.2	9.3	12.5	9.4	43.4
LS-48	9.1	9.3	11.8	12.8	43.0
LS-49	9.6	10.8	10.1	8.4	38.9
LS-50	7.5	10.4	11.3	10.4	39.5
LS-51	9.6	9.1	11.0	11.6	41.2
LS-52	7.4	9.5	10.9	9.4	37.2
LS-53	7.9	10.0	11.8	11.8	41.5
LS-54	10.3	10.6	10.0	10.9	41.7
LS-55	11.3	10.2	15.1	13.3	49.9
LS-56	8.6	8.7	11.1	9.2	37.7
LS-57	10.0	10.0	11.7	12.7	44.4
LS-A	10.8	7.8	9.8	12.9	41.3
LS-B	10.0	11.1	11.1	9.8	42.0
LS-C	9.0	11.1	12.6	12.2	44.9
LS-D	8.5		7.5	11.1	36.2
LS-E	7.6	8.2	9.7	9.6	35.2
LS-F	9.1	10.1	11.9	11.8	42.9
LS-G	7.5	8.8	8.8	11.2	36.2
LS-H	7.9	9.9	10.6	12.1	40.4
LS-J	10.0	8.6	10.0	12.5	41.1
LS-K	10.3	8.2	9.3	9.4	37.1
LS-L	9.9	9.5	12.3	13.0	44.7
LS-M	12.4	11.6	15.7	14.7	54.4
LS-N	10.8	9.4	10.5	9.5	40.2
LS-P	9.7	10.8	9.9	11.3	41.7
LS-Q	8.0	8.8	9.9	10.2	36.9
LS-R	9.6	8.9	11.9	11.6	42.1

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.

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 US NRC and the station's IEPA NPDES permit. In 2023, there was one liquid effluent batch release and two abnormal liquid 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 2023

On July 3, 2023, Quad cities NPS contacted IEMA-OHS to report a release of a radionuclide pursuant to 35 Ill. Adm. Code 1010.202. Two abnormal liquid releases occurred at the Quad Cities NPS. QC-GP-18 released a total of 4.65E-02 Ci of tritium and QC-RW-1 released a total of 3.19E-01 Ci of tritium to the Mississippi River.

Sampling and Monitoring Results

Water Sampling Results

Detectable levels of tritium were found in a surface water sample taken from the Mississippi River at Port Byron during third quarter sampling. The elevated concentration is likely attributable to the liquid 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 several sampling locations, 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

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

All other gamma spectroscopy results for soil 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.

Maps of Monitoring and Sampling Locations – Quad Cities

Figure 21. OSL and GDN Monitoring Locations - Quad Cities

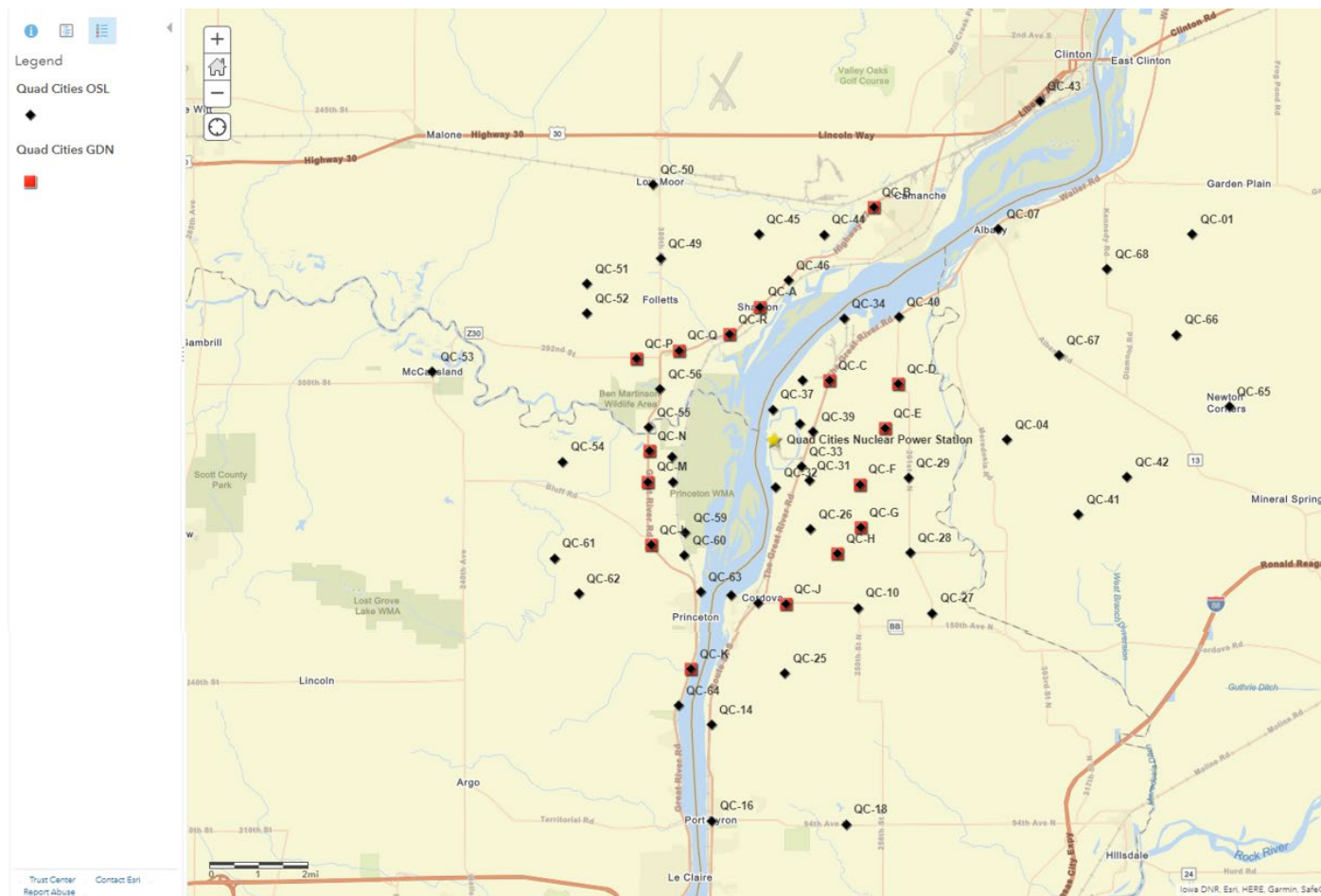


Figure 22. OSL and GDN Monitoring Locations (continued) - Quad Cities

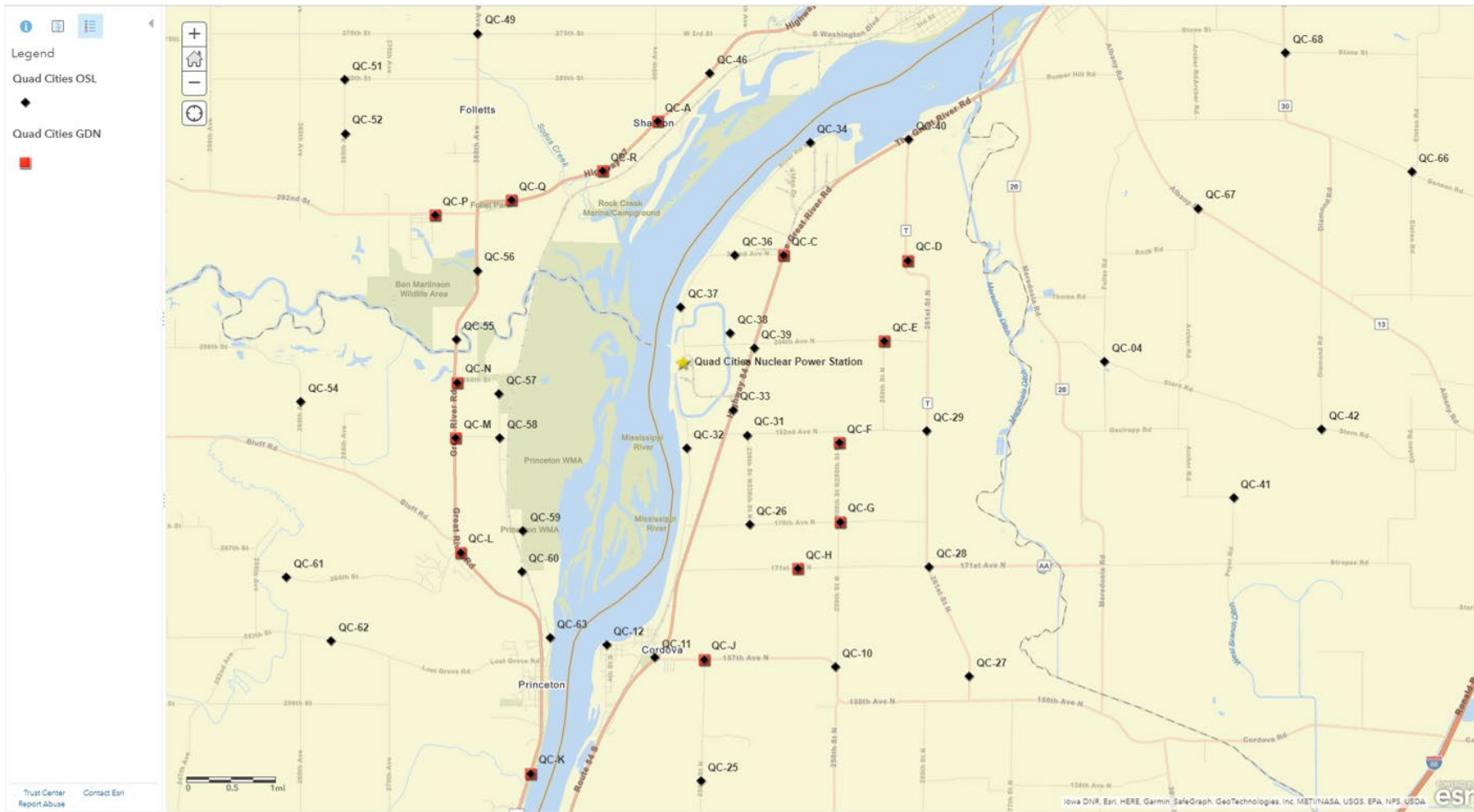
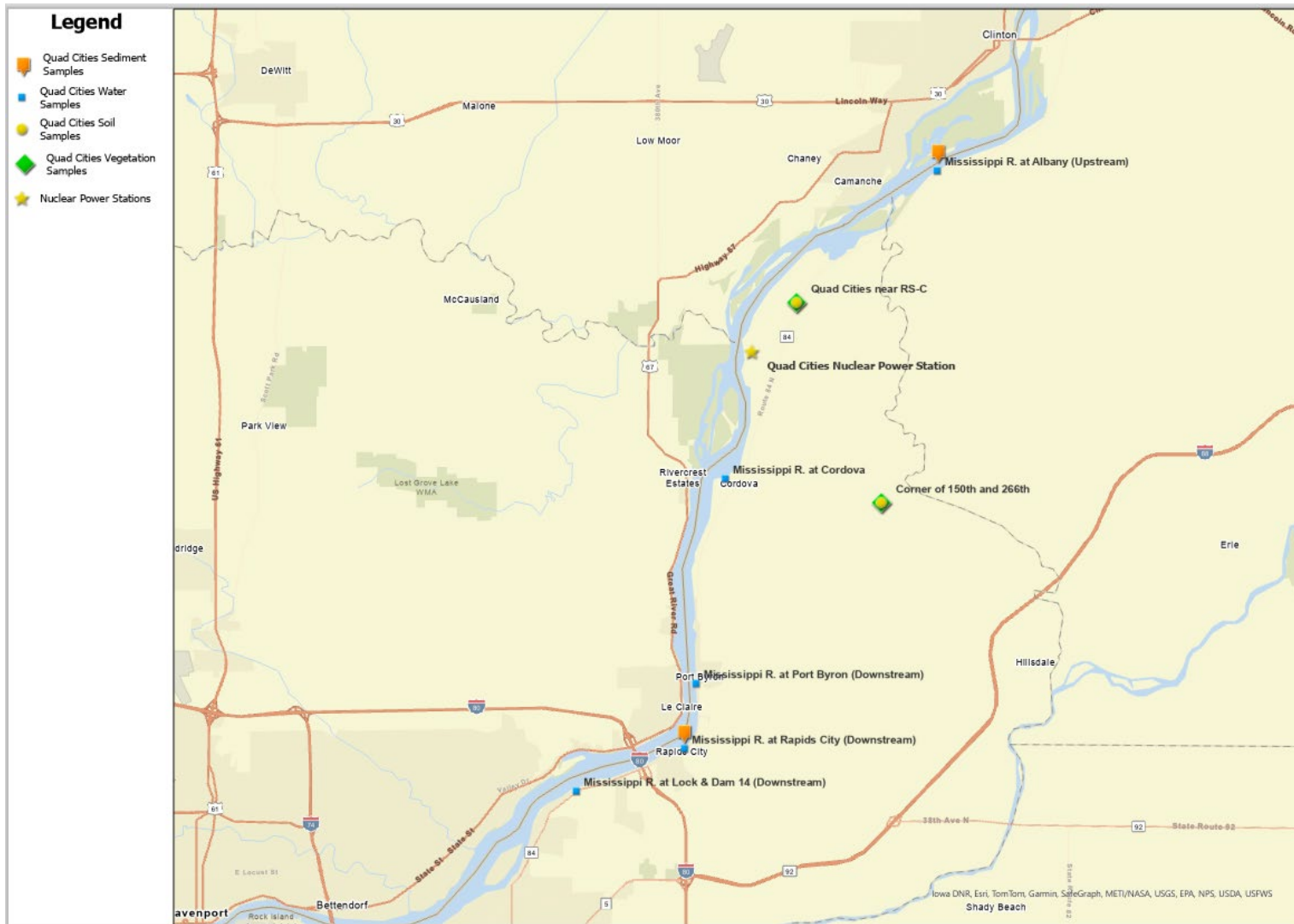


Figure 23. Environmental Sampling Locations – Quad Cities

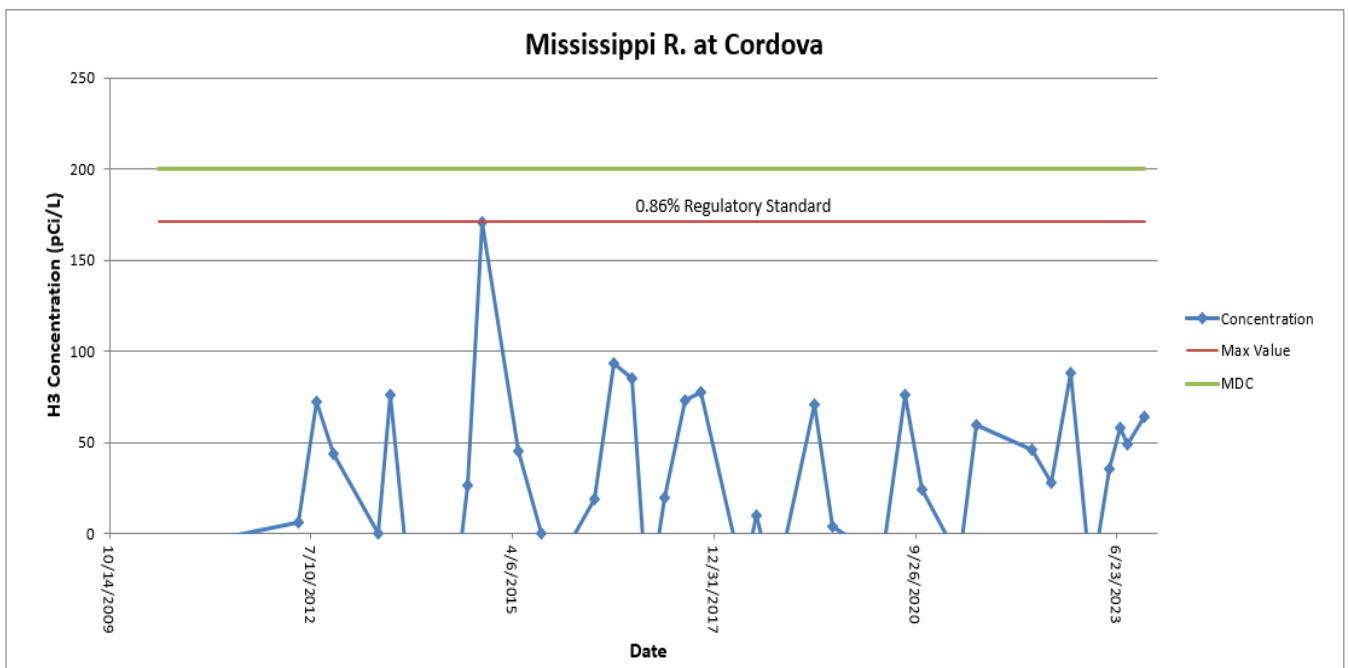
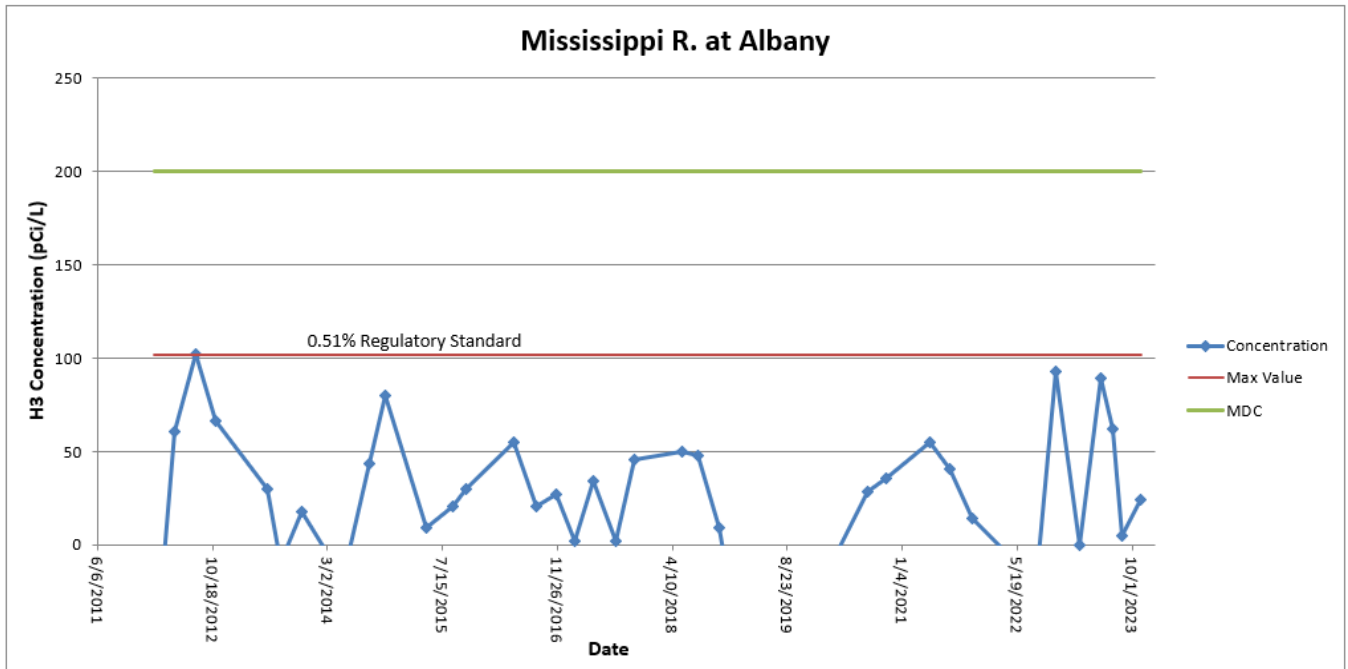


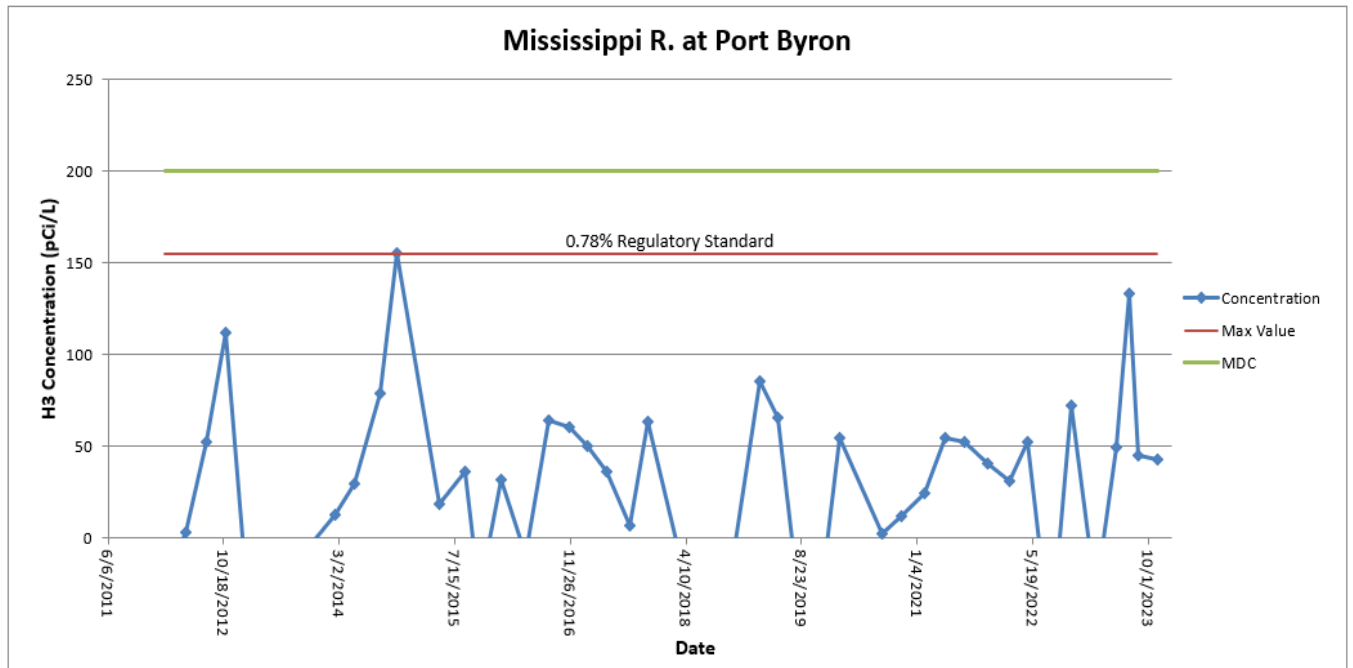
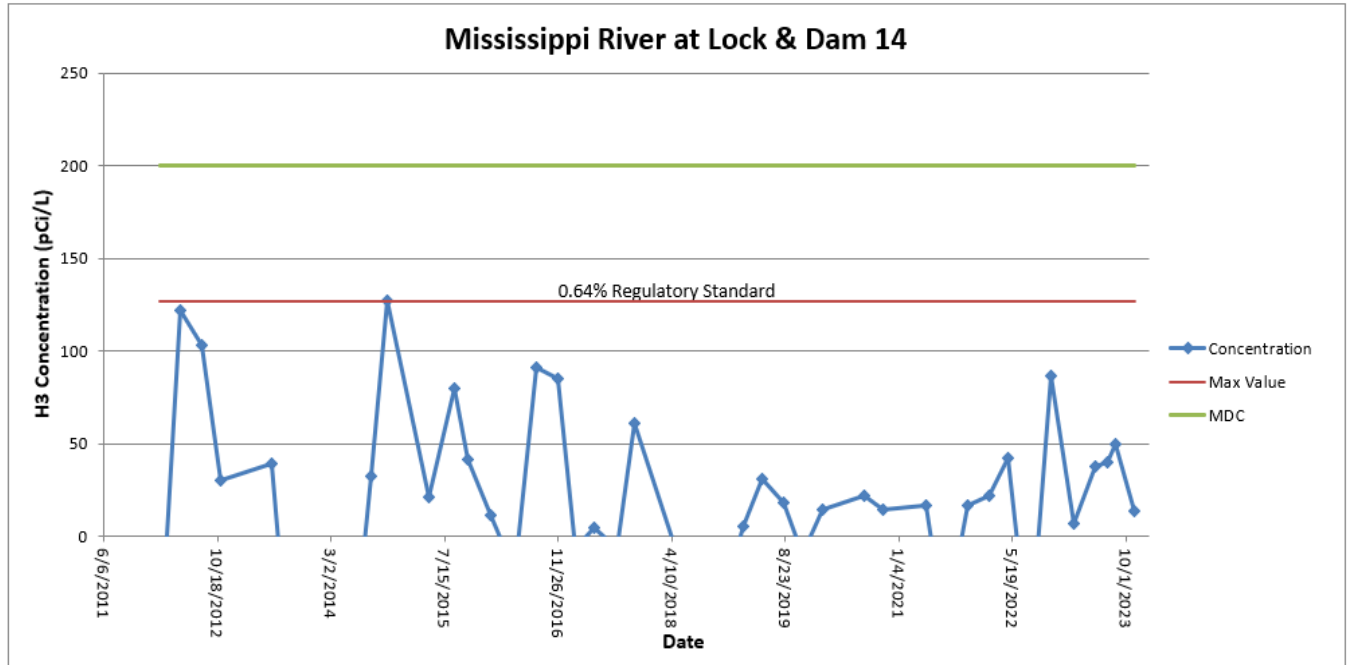
Quad Cities Sample Results

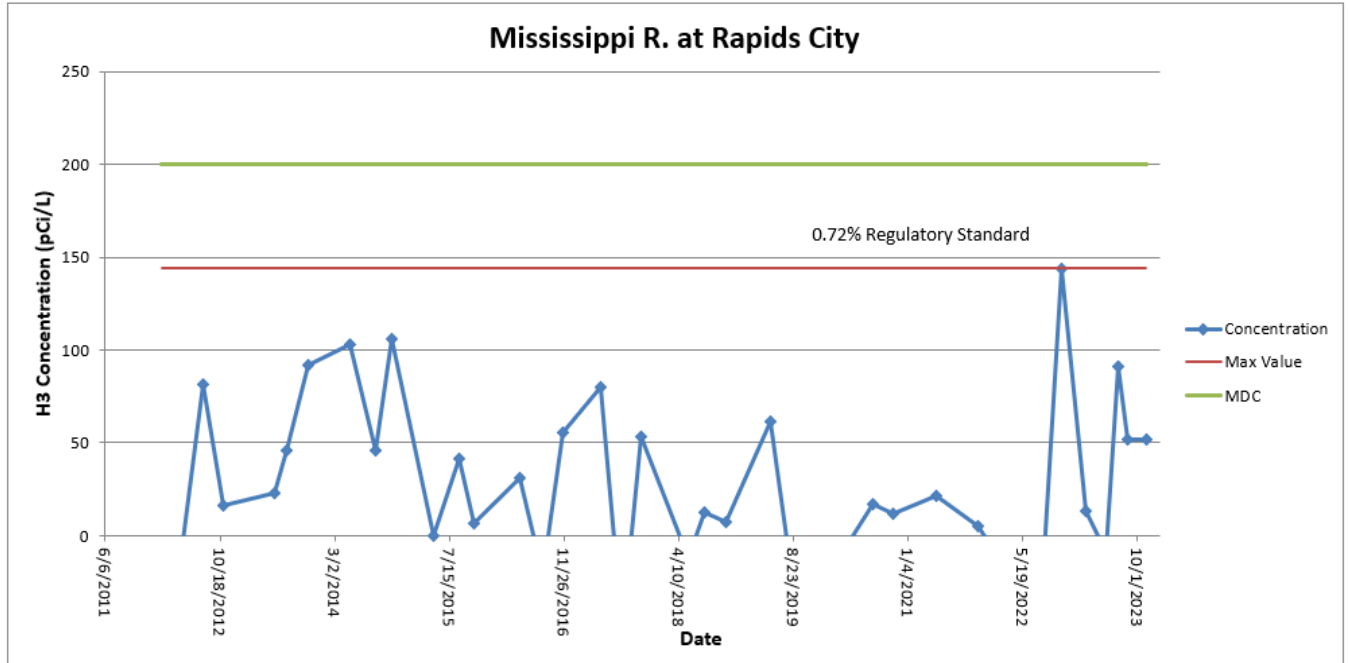
Tritium (H-3) in Water Sample Results - Quad Cities
Results are in picocuries per liter (pCi/L)

Location	H-3	
Date	Result	MDC
Mississippi R. at Albany		
2/15/2023	<MDC	127
5/17/2023	<MDC	127
7/10/2023	<MDC	127
8/16/2023	<MDC	127
11/8/2023	<MDC	127
Mississippi R. at Cordova		
2/15/2023	<MDC	127
5/17/2023	<MDC	127
7/10/2023	<MDC	127
8/16/2023	<MDC	127
11/8/2023	<MDC	127
Mississippi R. at Lock&Dam 14		
2/15/2023	<MDC	127
5/17/2023	<MDC	127
7/10/2023	<MDC	127
8/16/2023	<MDC	127
11/8/2023	<MDC	127
Mississippi R. at Port Byron		
2/15/2023	<MDC	127
5/17/2023	<MDC	127
7/10/2023	133	127
8/16/2023	<MDC	127
11/8/2023	<MDC	127
Mississippi R. at Rapid City		
2/15/2023	<MDC	127
5/17/2023	<MDC	127
7/10/2023	<MDC	127
8/16/2023	<MDC	127
11/8/2023	<MDC	127

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		
8/16/2023	<MDC	1.02
Mississippi R. at Albany		
2/15/2023	<MDC	1.02
Mississippi R. at Port Byron		
11/8/2023	<MDC	1.02
Mississippi R. at Rapid City		
5/17/2023	<MDC	1.02

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

Location Date	Beta	
	Result	MDC
Mississippi R. at Albany		
2/15/2023	4.9	3.7
5/17/2023	4.9	3.7
8/16/2023	4.6	3.7
11/8/2023	<MDC	3.7
Mississippi R. at Cordova		
2/15/2023	<MDC	3.7
5/17/2023	4.1	3.7
8/16/2023	<MDC	3.7
11/8/2023	<MDC	3.7
Mississippi R. at Lock&Dam 14		
2/15/2023	<MDC	3.7
5/17/2023	<MDC	3.7
8/16/2023	<MDC	3.7
11/8/2023	<MDC	3.7
Mississippi R. at Port Byron		
2/15/2023	<MDC	3.7
5/17/2023	4.1	3.7
8/16/2023	4.1	3.7
11/8/2023	<MDC	3.7
Mississippi R. at Rapid City		
2/15/2023	<MDC	3.7
5/17/2023	5.2	3.7
8/16/2023	5.0	3.7
11/8/2023	<MDC	3.7

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

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Mississippi R. at Albany																								
2/15/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
5/17/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
8/16/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
11/8/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
Mississippi R. at Cordova																								
2/15/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
5/17/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
8/16/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
11/8/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
Mississippi R. at Lock&Dam 14																								
2/15/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
5/17/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
8/16/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
11/8/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
Mississippi R. at Port Byron																								
2/15/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
5/17/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
8/16/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
11/8/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
Mississippi R. at Rapid City																								
2/15/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
5/17/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
8/16/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3
11/8/2023	<MDC	20.6	<MDC	18.6	<MDC	3.3	<MDC	3.6	<MDC	3.5	<MDC	3.5	<MDC	6.7	<MDC	7.9	<MDC	3.1	<MDC	4.0	<MDC	5.9	<MDC	6.3

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

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
	Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result
Corner of 150th and 266th																						
5/17/2023	<MDC	0.24	<MDC	0.16	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.22	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.04	<MDC	0.06	<MDC	0.05
8/16/2023	<MDC	0.24	<MDC	0.16	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.18	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.04	<MDC	0.06	<MDC	0.05
Near RS-C																						
5/17/2023	<MDC	0.24	<MDC	0.16	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.09	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.04	<MDC	0.06	<MDC	0.05
8/16/2023	<MDC	0.24	<MDC	0.16	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.16	0.03	<MDC	0.07	<MDC	0.02	<MDC	0.04	<MDC	0.06	<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																						
5/17/2023	<MDC	0.19	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	0.20	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.05
8/16/2023	<MDC	0.19	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.05
Near RS-C																						
5/17/2023	<MDC	0.19	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	0.07	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.05
8/16/2023	<MDC	0.19	<MDC	0.13	<MDC	0.02	<MDC	0.02	<MDC	0.02	0.19	0.03	<MDC	0.06	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.05

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

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Mississippi R. at Albany																						
5/17/2023	<MDC	0.14	<MDC	0.10	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.05	<MDC	0.01	<MDC	0.02	<MDC	0.04	<MDC	0.03
8/16/2023	<MDC	0.14	<MDC	0.10	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.05	<MDC	0.01	<MDC	0.02	<MDC	0.04	<MDC	0.03
Mississippi R. at Rapid City																						
5/17/2023	<MDC	0.14	<MDC	0.10	<MDC	0.02	<MDC	0.02	<MDC	0.01	<MDC	0.02	<MDC	0.05	<MDC	0.01	<MDC	0.02	<MDC	0.04	<MDC	0.03
8/16/2023	<MDC	0.14	<MDC	0.10	<MDC	0.02	<MDC	0.02	<MDC	0.01	0.17	0.02	<MDC	0.05	<MDC	0.01	<MDC	0.02	<MDC	0.04	<MDC	0.03

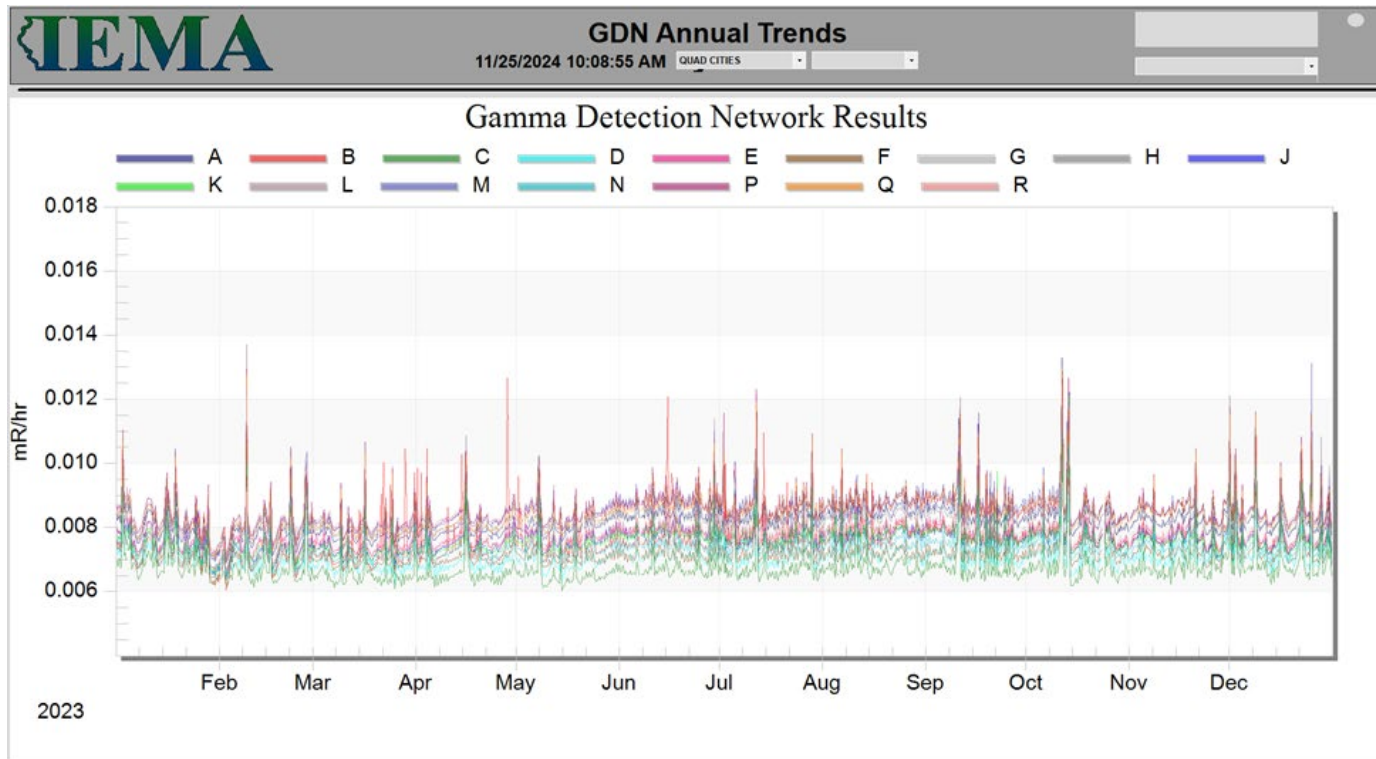
Gamma Spectroscopy Results for Radionuclides in Vegetation- Quad Cities
Results are in picocuries per gram (pCi/g)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Corner of 150th and 266th																								
5/17/2023	<MDC	0.45	<MDC	0.19	<MDC	0.04	<MDC	0.04	<MDC	0.04	<MDC	0.04	<MDC	0.12	<MDC	0.28	<MDC	0.04	<MDC	0.06	<MDC	0.10	<MDC	0.08
8/16/2023	<MDC	0.45	<MDC	0.19	<MDC	0.04	<MDC	0.04	<MDC	0.04	<MDC	0.04	<MDC	0.12	<MDC	0.28	<MDC	0.04	<MDC	0.06	<MDC	0.10	<MDC	0.08
Near RS-C																								
5/17/2023	<MDC	0.45	<MDC	0.19	<MDC	0.04	<MDC	0.04	<MDC	0.04	<MDC	0.04	<MDC	0.12	<MDC	0.28	<MDC	0.04	<MDC	0.06	<MDC	0.10	<MDC	0.08
8/16/2023	<MDC	0.45	<MDC	0.19	<MDC	0.04	<MDC	0.04	<MDC	0.04	<MDC	0.04	<MDC	0.12	<MDC	0.28	<MDC	0.04	<MDC	0.06	<MDC	0.10	<MDC	0.08

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

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Mississippi R. (Top Feeder)																								
8/10/2023	<MDC	4E+06	<MDC	123	<MDC	96	<MDC	21	<MDC	20	<MDC	19	<MDC	720	<MDC	8E+08	<MDC	22	<MDC	770	<MDC	57	<MDC	215
11/3/2023	<MDC	4E+06	<MDC	123	<MDC	96	<MDC	21	<MDC	20	<MDC	19	<MDC	720	<MDC	8E+08	<MDC	22	<MDC	770	<MDC	57	<MDC	215
Mississippi R. (Bottom Feeder)																								
8/10/2023	<MDC	4E+06	<MDC	123	<MDC	96	<MDC	21	<MDC	20	<MDC	19	<MDC	720	<MDC	8E+08	<MDC	22	<MDC	770	<MDC	57	<MDC	215
11/3/2023	<MDC	4E+06	<MDC	123	<MDC	96	<MDC	21	<MDC	20	<MDC	19	<MDC	720	<MDC	8E+08	<MDC	22	<MDC	770	<MDC	57	<MDC	215

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



Summary of Ambient Gamma Results - Quad Cities

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual Exposure mR/year
QC-01	16.1	7.8	10.0	10.4	44.2
QC-04	12.7	2.7	3.2	8.9	27.5
QC-07	15.4	5.4	6.9	8.6	36.3
QC-10	10.4	1.5	4.0	8.3	24.2
QC-11	10.9	4.2		5.3	27.3
QC-12	9.0	3.1	6.2	6.4	24.7
QC-14	11.9	3.4		5.6	27.8
QC-16	9.2	1.2	2.5	5.9	18.8
QC-18	13.8	5.6	10.6	12.6	42.5
QC-25	16.4	5.8	8.2	10.3	40.8
QC-26	16.0	6.3	7.4	9.8	39.4
QC-27	13.9	4.6	9.1	9.1	36.8
QC-28	12.6	6.1	6.4	9.1	34.2
QC-29	13.2	3.6	5.5	10.9	33.2
QC-31	13.7	7.5	7.9	8.6	37.8
QC-32	15.7	0.6	7.6	7.7	31.6
QC-33	14.0	3.4	6.2	8.7	32.2
QC-34	12.0	4.0	5.3	9.2	30.5
QC-36	12.2	4.3	7.3	10.0	33.8
QC-37	13.2	4.3	5.6	8.7	31.9
QC-38	12.0	2.2	7.0	8.2	29.4
QC-39	11.7	3.3	5.6	7.1	27.7
QC-40	11.1	6.1	7.3	8.7	33.2
QC-41	12.2	3.0	7.4	7.7	30.3
QC-42	14.5	3.2	7.2	9.1	33.9
QC-43	15.9	2.7	6.3	9.2	34.2
QC-44	13.0	3.2	8.1	9.2	33.4
QC-45	10.2	3.9	7.1	10.1	31.4
QC-46	14.7	6.0	9.7	9.6	39.9
QC-49	14.2	4.9	6.5	9.9	35.6
QC-50	10.5	4.3	6.9	6.7	28.4
QC-51	16.9	5.8	9.8	10.0	42.5
QC-52	12.3	7.4	8.9	11.7	40.3

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	11.3	2.2	5.1	6.8	25.4
QC-54	13.1	4.0	8.6	9.0	34.7
QC-55	14.7	5.2	8.3	9.8	38.0
QC-56	16.0	2.1	4.3	8.4	30.8
QC-57	9.8	2.8	4.3	7.5	24.4
QC-58	11.4	3.0	6.5	8.7	29.5
QC-59	11.0	3.0	5.1	10.4	29.4
QC-60	13.1	3.7	6.6	8.8	32.1
QC-61	12.2	6.1	8.2	7.7	34.2
QC-62	11.7	8.4	9.3	11.8	41.2
QC-63	12.2	6.5	6.6	9.9	35.0
QC-64	12.7	4.1	6.6	7.0	30.4
QC-65	10.5	3.1	8.4	10.2	32.2
QC-66	12.5	5.8	7.6	10.5	36.4
QC-67	17.0	5.6	8.6	11.8	43.1
QC-68	17.0	7.4	9.3	10.6	44.3
QC-A	15.8	5.2	8.9	8.9	38.7
QC-B	11.9	5.8	6.8	7.4	31.9
QC-C	14.1	2.2	4.5	7.6	28.3
QC-D	13.4	5.4	6.4	8.3	33.5
QC-E	14.2	0.0	7.2	8.4	39.8
QC-F	11.6	2.4	3.5	6.7	24.3
QC-G	15.1	4.3	10.1	10.0	39.4
QC-H	13.7	6.6	8.1	11.1	39.6
QC-J	17.1	4.0	6.6	8.0	35.7
QC-K	12.0	3.0	8.7	8.1	31.7
QC-L	15.0	6.6	11.2	9.8	42.7
QC-M	15.5	6.6	8.7	10.9	41.7
QC-N	16.1	2.6	3.8	8.4	31.0
QC-P	16.5	4.6	9.2	11.0	41.3
QC-Q	14.8	4.1	9.4	10.4	38.6
QC-R	11.8	5.5	10.2	8.9	36.4

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

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. Following the decommissioning process, the site was released for unrestricted public use in November 2023. 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 2023

No significant events or changes for 2023.

Sampling and Monitoring Results

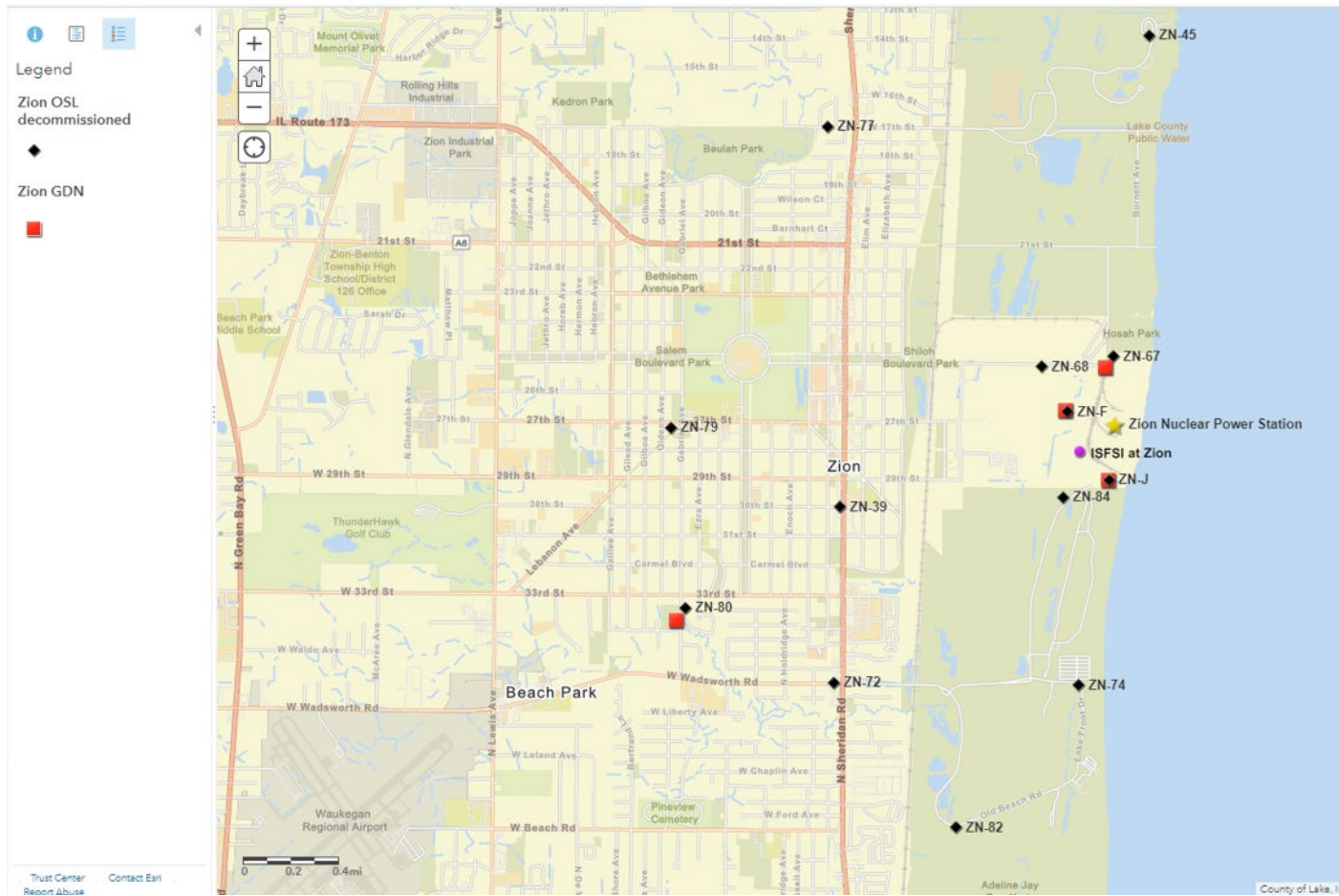
Direct Radiation Monitoring Results

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.

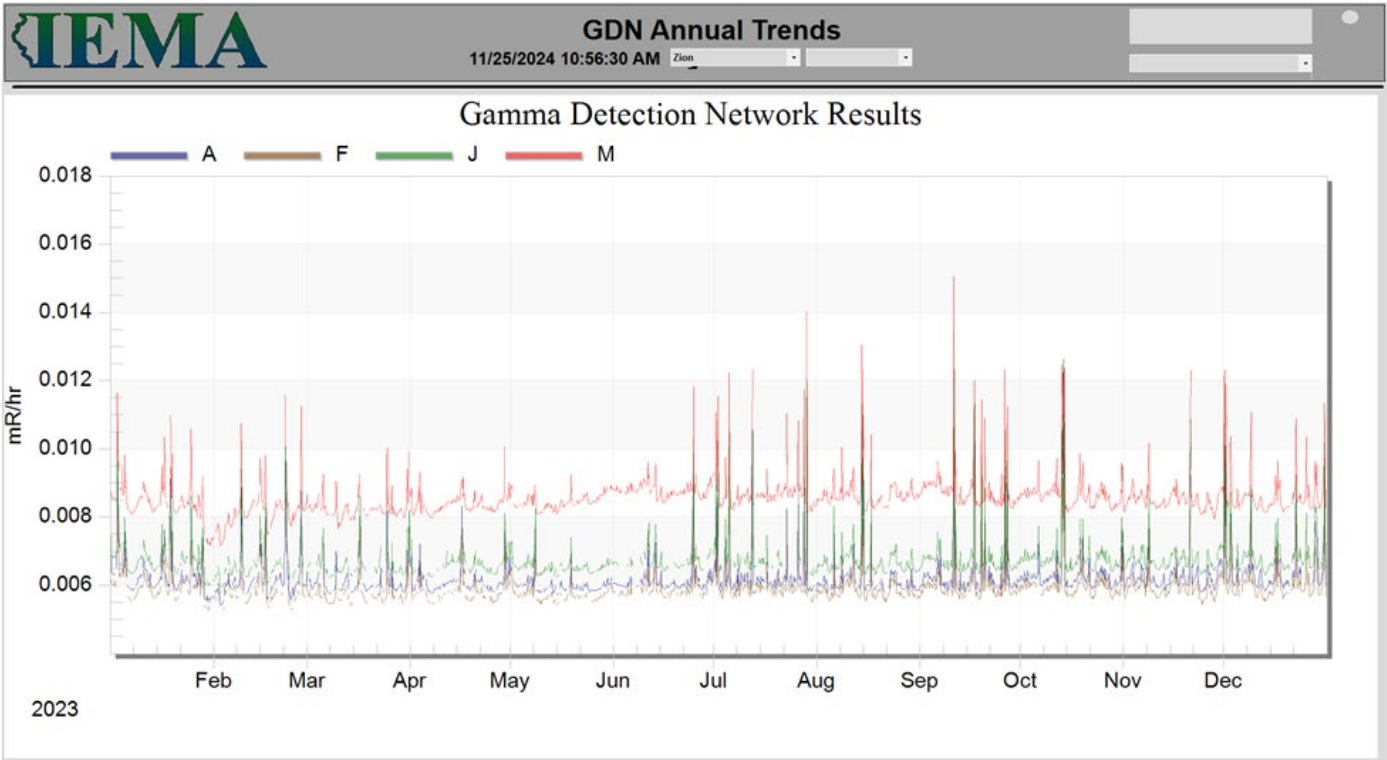
GDN network results were consistent with historical data.

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

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Exposure
Location	mR/quarter	mR/quarter	mR/quarter	mR/quarter	mR/year
ZN-39	7.9	4.9	1.6	5.7	20.0
ZN-45	6.7	5.5	2.1	5.7	19.9
ZN-67	7.3	7.3	1.1	5.1	20.7
ZN-68	8.1	6.9	3.2	7.5	25.7
ZN-72	9.2	5.8	1.0	5.9	21.8
ZN-74	7.9		3.0	5.3	21.6
ZN-77	9.2	6.8	7.1	7.8	41.2
ZN-79	8.8	9.0	5.8	9.3	43.8
ZN-80	10.6	11.8	7.9	10.6	54.4
ZN-82	6.9		3.8	5.3	21.3
ZN-84	7.8	1.9	0.4	7.1	17.3
ZN-JC	6.7	5.0	1.2	4.8	17.8
ZN-NC	6.4	4.4	2.1	4.5	17.5

Blanks in the table indicate that dosimeters were missing at the end of the quarter.

Annual Exposure column based on averages of all available data.

Quarter length is estimated to be 91.25 days.

Background Sampling Locations

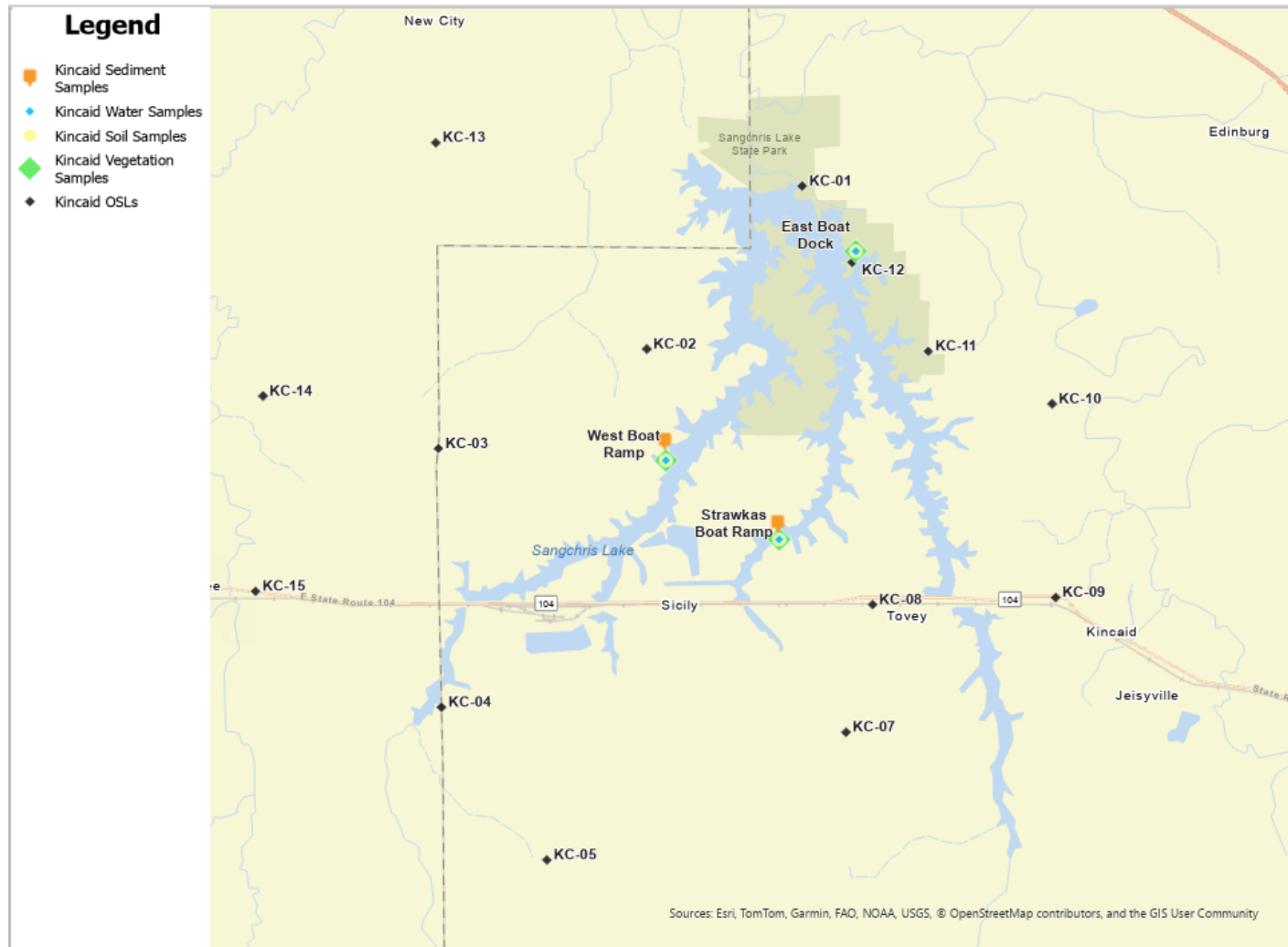
IEMA-OHS has established the environs of Sangchris Lake State Park, a cooling lake for a coal-fired power station near Kincaid, Illinois, as a background sampling location. To establish “background” radiation levels, water, soil, sediment, vegetation, and fish samples are collected and analyzed utilizing 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 2023 background environmental monitoring locations can be found on pages 132-139.



Sangchris Lake State Park Maps of Monitoring and Sampling Locations

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

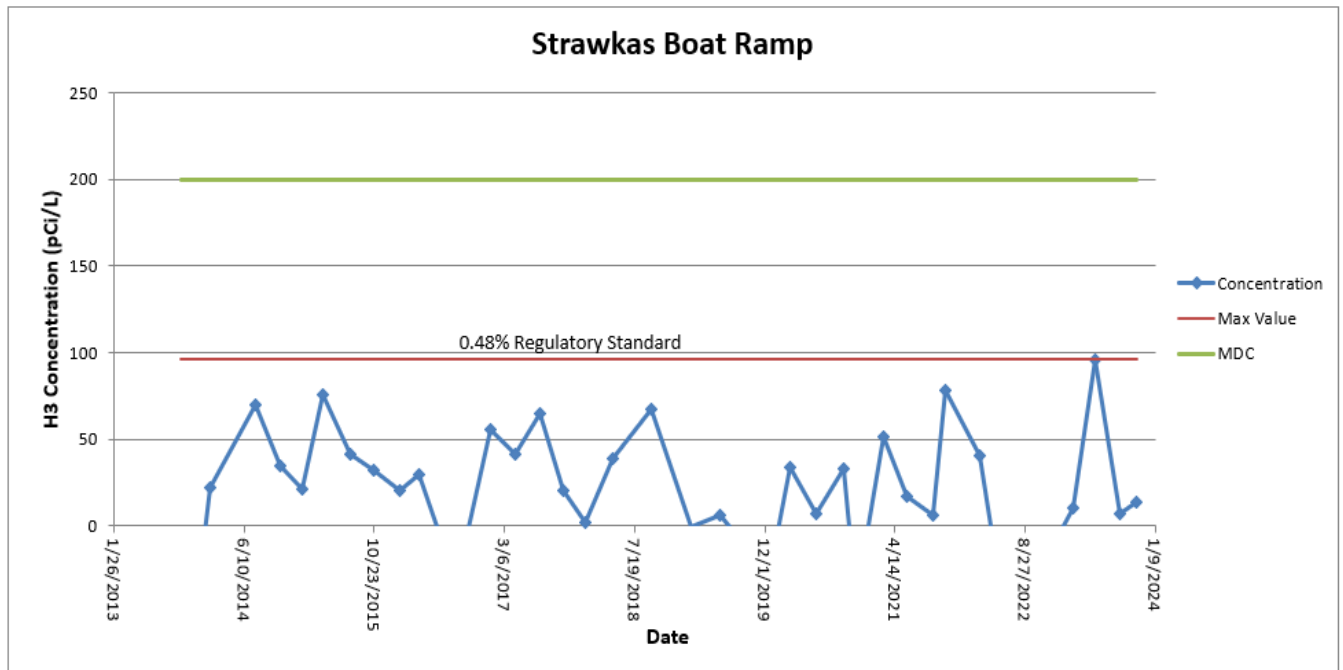
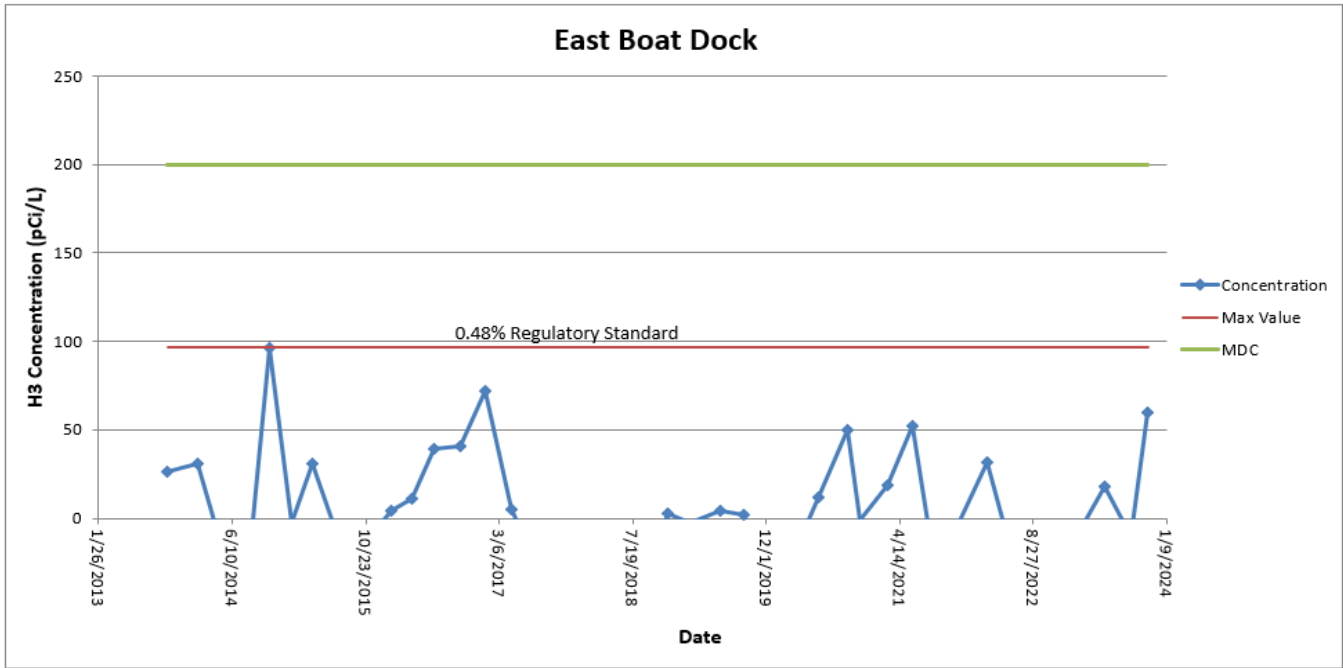


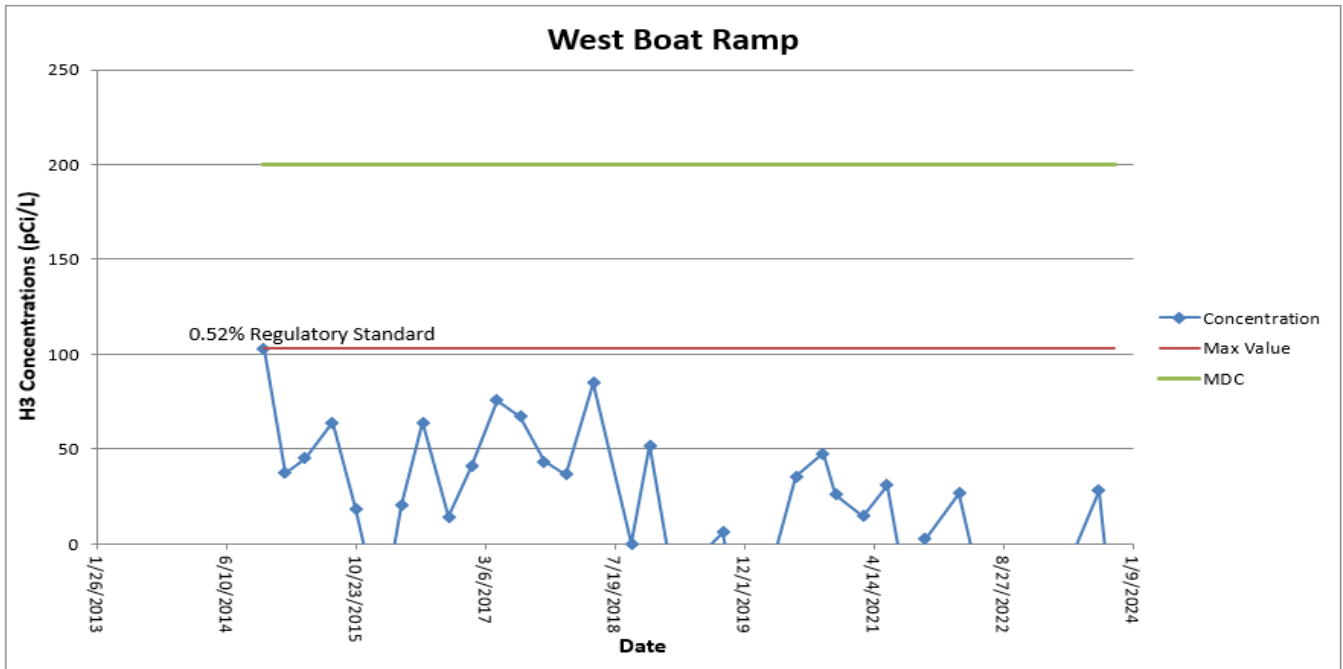
Sangchris Lake State Park Result Tables and Graphs

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

Location	H-3	
Date	Result	MDC
East Boat Dock		
3/2/2023	<MDC	126
5/23/2023	<MDC	126
8/28/2023	<MDC	126
10/30/2023	<MDC	126
Strawkas Boat Ramp		
3/2/2023	<MDC	126
5/23/2023	<MDC	126
8/28/2023	<MDC	126
10/30/2023	<MDC	126
West Boat Ramp		
3/2/2023	<MDC	126
5/23/2023	<MDC	126
8/28/2023	<MDC	126
10/30/2023	<MDC	126

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	Strontium	
Date	Result	MDC
East Boat Dock		
5/23/2023	<MDC	0.9
Strawkas Boat Ramp		
3/2/2023	<MDC	0.9
10/30/2023	1.7	0.9
West Boat Ramp		
8/28/2023	<MDC	0.9

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

Location	Beta	
Date	Result	MDC
East Boat Dock		
3/2/2023	<MDC	3.7
5/23/2023	4.5	3.7
8/28/2023	5.3	3.7
10/30/2023	<MDC	3.7
Strawkas Boat Ramp		
3/2/2023	<MDC	3.7
5/23/2023	4.2	3.7
8/28/2023	3.7	3.7
10/30/2023	<MDC	3.7
West Boat Ramp		
3/2/2023	<MDC	3.7
5/23/2023	4.3	3.7
8/28/2023	<MDC	3.7
10/30/2023	<MDC	3.7

Gamma Spectroscopy Results for Other Radionuclides in Water - Sangchris Lake State Park
Results are in picocuries per liter (pCi/L)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
	Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result
East Boat Dock																								
3/2/2023	<MDC	22.1	<MDC	18.5	<MDC	3.1	<MDC	3.4	<MDC	3.5	<MDC	3.4	<MDC	6.5	<MDC	8.7	<MDC	3.0	<MDC	3.8	<MDC	6.2	<MDC	5.8
5/23/2023	<MDC	22.1	<MDC	18.5	<MDC	3.1	<MDC	3.4	<MDC	3.5	<MDC	3.4	<MDC	6.5	<MDC	8.7	<MDC	3.0	<MDC	3.8	<MDC	6.2	<MDC	5.8
8/28/2023	<MDC	22.1	<MDC	18.5	<MDC	3.1	<MDC	3.4	<MDC	3.5	<MDC	3.4	<MDC	6.5	<MDC	8.7	<MDC	3.0	<MDC	3.8	<MDC	6.2	<MDC	5.8
10/30/2023	<MDC	22.1	<MDC	18.5	<MDC	3.1	<MDC	3.4	<MDC	3.5	<MDC	3.4	<MDC	6.5	<MDC	8.7	<MDC	3.0	<MDC	3.8	<MDC	6.2	<MDC	5.8
Strawkas Boat Ramp																								
3/2/2023	<MDC	22.1	<MDC	18.5	<MDC	3.1	<MDC	3.4	<MDC	3.5	<MDC	3.4	<MDC	6.5	<MDC	8.7	<MDC	3.0	<MDC	3.8	<MDC	6.2	<MDC	5.8
5/23/2023	<MDC	22.1	<MDC	18.5	<MDC	3.1	<MDC	3.4	<MDC	3.5	<MDC	3.4	<MDC	6.5	<MDC	8.7	<MDC	3.0	<MDC	3.8	<MDC	6.2	<MDC	5.8
8/28/2023	<MDC	22.1	<MDC	18.5	<MDC	3.1	<MDC	3.4	<MDC	3.5	<MDC	3.4	<MDC	6.5	<MDC	8.7	<MDC	3.0	<MDC	3.8	<MDC	6.2	<MDC	5.8
10/30/2023	<MDC	22.1	<MDC	18.5	<MDC	3.1	<MDC	3.4	<MDC	3.5	<MDC	3.4	<MDC	6.5	<MDC	8.7	<MDC	3.0	<MDC	3.8	<MDC	6.2	<MDC	5.8
West Boat Ramp																								
3/2/2023	<MDC	22.1	<MDC	18.5	<MDC	3.1	<MDC	3.4	<MDC	3.5	<MDC	3.4	<MDC	6.5	<MDC	8.7	<MDC	3.0	<MDC	3.8	<MDC	6.2	<MDC	5.8
5/23/2023	<MDC	22.1	<MDC	18.5	<MDC	3.1	<MDC	3.4	<MDC	3.5	<MDC	3.4	<MDC	6.5	<MDC	8.7	<MDC	3.0	<MDC	3.8	<MDC	6.2	<MDC	5.8
8/28/2023	<MDC	22.1	<MDC	18.5	<MDC	3.1	<MDC	3.4	<MDC	3.5	<MDC	3.4	<MDC	6.5	<MDC	8.7	<MDC	3.0	<MDC	3.8	<MDC	6.2	<MDC	5.8
10/30/2023	<MDC	22.1	<MDC	18.5	<MDC	3.1	<MDC	3.4	<MDC	3.5	<MDC	3.4	<MDC	6.5	<MDC	8.7	<MDC	3.0	<MDC	3.8	<MDC	6.2	<MDC	5.8

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																						
5/23/2023	<MDC	0.31	<MDC	0.21	<MDC	0.03	<MDC	0.03	<MDC	0.03	<MDC	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.08	<MDC	0.07
8/28/2023	<MDC	0.31	<MDC	0.21	<MDC	0.03	<MDC	0.03	<MDC	0.03	0.05	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.08	<MDC	0.07
Strawkas Boat Ramp																						
5/23/2023	<MDC	0.31	<MDC	0.21	<MDC	0.03	<MDC	0.03	<MDC	0.03	0.05	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.08	<MDC	0.07
8/28/2023	<MDC	0.31	<MDC	0.21	<MDC	0.03	<MDC	0.03	<MDC	0.03	0.05	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.08	<MDC	0.07
West Boat Ramp																						
5/23/2023	<MDC	0.31	<MDC	0.21	<MDC	0.03	<MDC	0.03	<MDC	0.03	0.10	0.04	<MDC	0.08	<MDC	0.03	<MDC	0.05	<MDC	0.08	<MDC	0.07
8/28/2023	<MDC	0.31	<MDC	0.21	<MDC	0.03	<MDC	0.03	<MDC	0.03	0.08	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) - 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																						
5/23/2023	<MDC	0.25	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.05	0.04	<MDC	0.07	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.05
8/28/2023	<MDC	0.25	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.07	0.04	<MDC	0.07	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.05
Strawkas Boat Ramp																						
5/23/2023	<MDC	0.25	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.07	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.05
8/28/2023	<MDC	0.25	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	<MDC	0.04	<MDC	0.07	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.05
West Boat Ramp																						
5/23/2023	<MDC	0.25	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.06	0.04	<MDC	0.07	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.05
8/28/2023	<MDC	0.25	<MDC	0.17	<MDC	0.03	<MDC	0.03	<MDC	0.02	0.07	0.04	<MDC	0.07	<MDC	0.03	<MDC	0.04	<MDC	0.06	<MDC	0.05

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	MDC
Strawkas Boat Ramp																						
5/23/2023	<MDC	0.19	<MDC	0.15	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.05	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04
8/28/2023	<MDC	0.19	<MDC	0.15	<MDC	0.02	<MDC	0.02	<MDC	0.02	0.05	0.02	<MDC	0.05	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04
West Boat Ramp																						
5/23/2023	<MDC	0.19	<MDC	0.15	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.05	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04
8/28/2023	<MDC	0.19	<MDC	0.15	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.02	<MDC	0.05	<MDC	0.02	<MDC	0.03	<MDC	0.05	<MDC	0.04

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	MDC
East Boat Dock																								
5/23/2023	<MDC	0.94	<MDC	0.30	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.05	<MDC	0.18	<MDC	0.57	<MDC	0.06	<MDC	0.10	<MDC	0.15	<MDC	0.13
8/28/2023	<MDC	0.94	<MDC	0.30	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.05	<MDC	0.18	<MDC	0.57	<MDC	0.06	<MDC	0.10	<MDC	0.15	<MDC	0.13
Strawkas Boat Ramp																								
5/23/2023	<MDC	0.94	<MDC	0.30	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.05	<MDC	0.18	<MDC	0.57	<MDC	0.06	<MDC	0.10	<MDC	0.15	<MDC	0.13
8/28/2023	<MDC	0.94	<MDC	0.30	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.05	<MDC	0.18	<MDC	0.57	<MDC	0.06	<MDC	0.10	<MDC	0.15	<MDC	0.13
West Boat Ramp																								
5/23/2023	<MDC	0.94	<MDC	0.30	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.05	<MDC	0.18	<MDC	0.57	<MDC	0.06	<MDC	0.10	<MDC	0.15	<MDC	0.13
8/28/2023	<MDC	0.94	<MDC	0.30	<MDC	0.07	<MDC	0.07	<MDC	0.06	<MDC	0.05	<MDC	0.18	<MDC	0.57	<MDC	0.06	<MDC	0.10	<MDC	0.15	<MDC	0.13

Gamma Spectroscopy Results for Radionuclides in Fish - Sangchris Lake State Park
Results are in picocuries per kilogram (pCi/kg)

Location	Ba-140		Ce-144		Co-58		Co-60		Cs-134		Cs-137		Fe-59		I-131		Mn-54		Nb-95		Zn-65		Zr-95	
Date	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC	Result	MDC
Sangchris Lake (Top Feeder)																								
10/11/2023	<MDC	1290.0	<MDC	91.0	<MDC	24.8	<MDC	15.8	<MDC	14.5	<MDC	13.2	<MDC	77.0	<MDC	2640.0	<MDC	15.2	<MDC	46.0	<MDC	38.0	<MDC	48.0
Sangchris Lake (Bottom Feeder)																								
10/11/2023	<MDC	1290.0	<MDC	91.0	<MDC	24.8	<MDC	15.8	<MDC	14.5	<MDC	13.2	<MDC	77.0	<MDC	2640.0	<MDC	15.2	<MDC	46.0	<MDC	38.0	<MDC	48.0

Summary of Ambient Gamma Results - Sangchris Lake State Park

Location	Quarter 1 mR/quarter	Quarter 2 mR/quarter	Quarter 3 mR/quarter	Quarter 4 mR/quarter	Annual exposure mR/year
KC-01	11.2	8.5	9.3	13.9	42.9
KC-02	8.6	9.2			35.5
KC-03	10.6	8.8			38.8
KC-04	7.5	9.9	15.1	13.9	46.4
KC-05	7.6	10.9	12.3	12.0	42.7
KC-06	12.0	10.7	11.8	13.0	47.5
KC-07	7.2	8.2	9.5	13.4	38.2
KC-08	11.3	10.6	9.1		41.4
KC-09	9.3	10.4	8.9	13.2	41.7
KC-10	7.5	11.9	7.0	15.6	42.0
KC-11	10.5	11.7	12.1	15.0	49.2
KC-12	11.1	10.5	9.9	14.1	45.5
KC-13		12.9	10.3	16.1	52.3
KC-14	12.0		11.0	14.8	50.4
KC-15	10.2	7.8	10.3	10.9	39.2

Blanks in the table indicate that dosimeters were missing at the end of the quarter.

Annual Exposure column based on averages of all available data.

Quarter length is estimated to be 91.25 days.

Appendix A

Radionuclide Abbreviations in this Report

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

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