

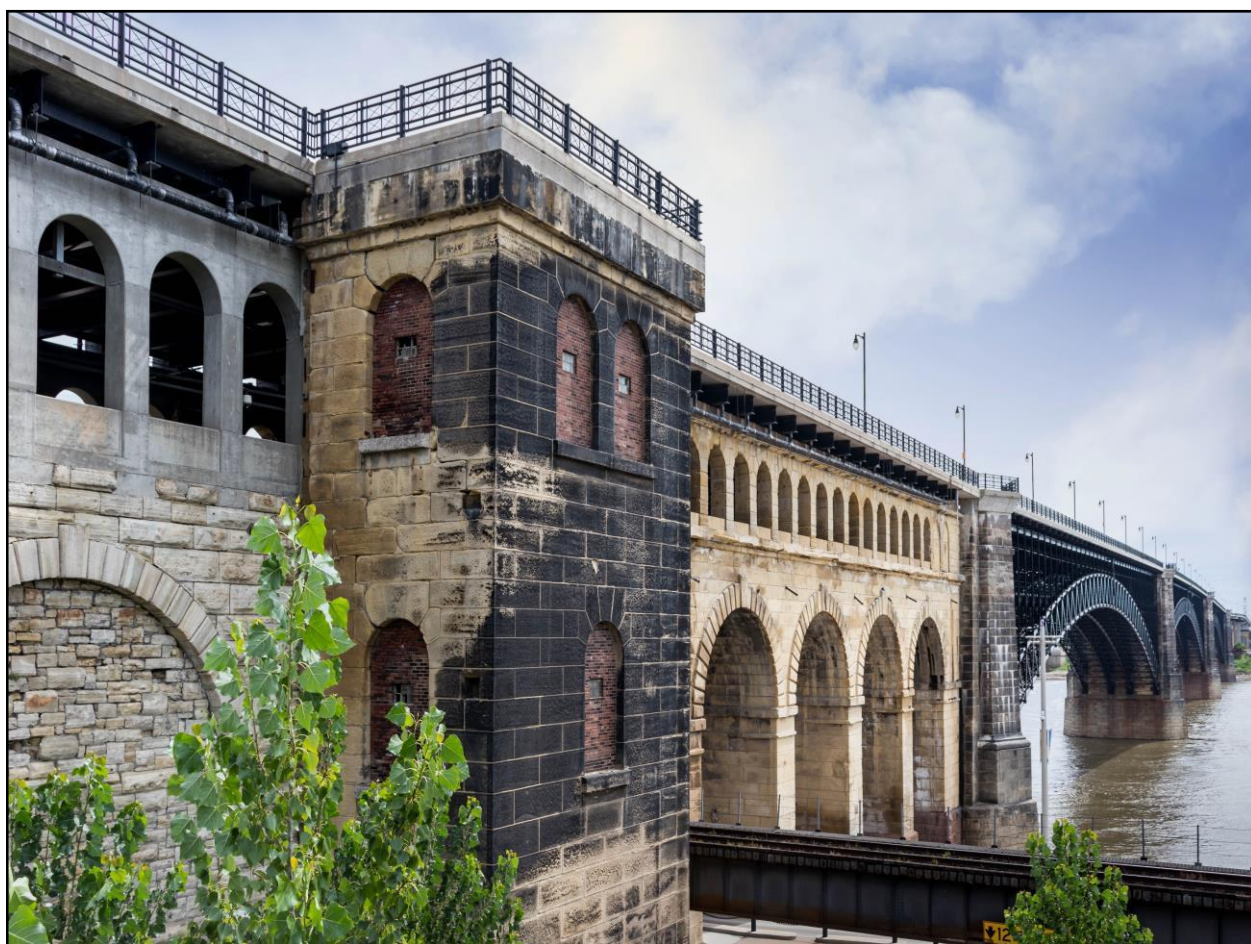


# **2022 Water Quality Monitoring Report**

**U.S. Army Corps of Engineers  
Saint Louis District**

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## **Water Quality Conditions in the Mississippi and Illinois Rivers: 2017-2022**



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**February 2023**

Water Quality Conditions in the  
Mississippi and Illinois Rivers: 2017 - 2022

Prepared for

United States Army Corps of Engineers  
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## **EXECUTIVE SUMMARY**

The United States Army Corps of Engineers (USACE) commitment to environmental compliance and protection of estuaries, rivers, lakes, and navigable waters arises from the national policy and directives expressed in Federal Statutes, Executive Orders, and internal regulations. These regulations were designed to minimize pollution, maximize recreation, protect aesthetics, preserve natural resources, and promote the comprehensive planning and use of water bodies to enhance the public interest rather than private gain; therefore, USACE, in the design, construction, management, operation, and maintenance of its facilities, will exert leadership within existing authorities and appropriations in the nationwide effort to protect, enhance, and sustain the quality of the nation's resources. It is USACE's policy to comply with requirements of the Clean Water Act (CWA) and not to degrade existing water quality conditions to the maximum extent that is practicable, consistent with project authorities, Federal legal and regulatory requirements, the public interest, and water control manuals.

The U.S. Army Corps of Engineers, St. Louis District, implemented a water quality monitoring program during the 1970s to evaluate how its civil projects may be impacting water quality. A robust water quality program serves as an invaluable tool for tracking long-term trends and ensuring Corps design and construction practices incorporate tools and methods to minimize environmental impacts on a constantly evolving and complex river system. In addition, Water quality data is provided to key stakeholders such as the Missouri Department of Natural Resources and the Illinois Environmental Protection Agency to be used as a screening mechanism for the Missouri and Illinois Water Quality Report which is required every 2 years by the CWA Sections 303(d) and 305(b).

The National Water Quality Inventory Report to Congress (305(b) report) is the primary vehicle for informing law makers and the public about general water quality conditions in the United States. This document characterizes our water quality, identifies widespread water quality problems of national significance, and describes various programs implemented to restore and protect our waters.

Under Section 303(d) of the 1972 Clean Water Act, states, territories, and authorized tribes are required to develop a list of water quality impaired areas. The law requires that these jurisdictions establish priority rankings for water on the lists and develop action plans named Total Maximum Daily Loads (TMDL), to guide water quality improvement. This EPA resource identified fish and shellfish consumption as an impaired condition in the Mississippi and Illinois rivers. Additionally, some areas were listed as having impaired conditions for swimming and boating, and aquatic life. More information can be found on the EPA's website: <https://www.epa.gov/tmdl>.

Findings in this report are consistent with information presented on EPA's TMDL information source. This report identifies 3 water quality concerns based on data collected from 2017-2022: (1) Total Suspended Solids (TSS), (2) Total Phosphorus (TP), and (3) Chlorophyll\_a (Chl\_a). High concentrations of these factors under the right conditions can contribute to the occurrence of Harmful Algal Blooms (HAB). All river segments are in the hypereutrophic state, which presents the highest risk for HAB development. High agricultural and industrial activities within our area of responsibility as well as areas upstream are key contributors to these water quality concerns.

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## INTRODUCTION

The Mississippi River is, in many ways, the nation's best known and most important river system. The river drains all or part of 31 states, two Canadian Provinces, or approximately 40% of the lower 48 states. The river serves as a migratory flyway for more than 40% of all North American waterfowl and shorebirds, while also providing habitat for 260 species of fish, 50 mammal species, 145 species of amphibians and reptiles, and 38 species of mussels (Weller and Russell, 2016). Anthropogenic services provided by the river includes food and fiber production, recreation, commercial transportation, and drinking water to 18 million Americans (Thorp et al. 2010).

Water quality is of paramount importance for sustaining ecological integrity and services provided by the Mississippi River. Water quality is influenced by a range of both point and nonpoint pollution sources, which may include natural processes, industrial and municipal effluents, and surface runoff from agricultural arenas. Additionally, channel maintenance (bank stabilization, dredging, locks and dams, etc.) may also disrupt the way in which the river processes and transports pollutants (USACE 2017).

The Saint Louis District (CEMVS) of United States Army Corps of Engineers (USACE) has implemented a Water Quality Management Plan (WQMP) as part of the operation and maintenance activities associated with managing USACE's civil works projects on the Mississippi and Illinois Rivers. The WQMP addresses surface water quality management issues and adheres to the guidance and requirements specified by Clean Water Act (CWA), as well as the self-imposed Engineering Regulation (ER) 1110-2-8154, "Water Quality and Environmental Management for USACE Civil Works Projects" (USACE, 2018). Water quality monitoring is implemented to fulfill five primary objectives that drive the CEMVS WQMP:

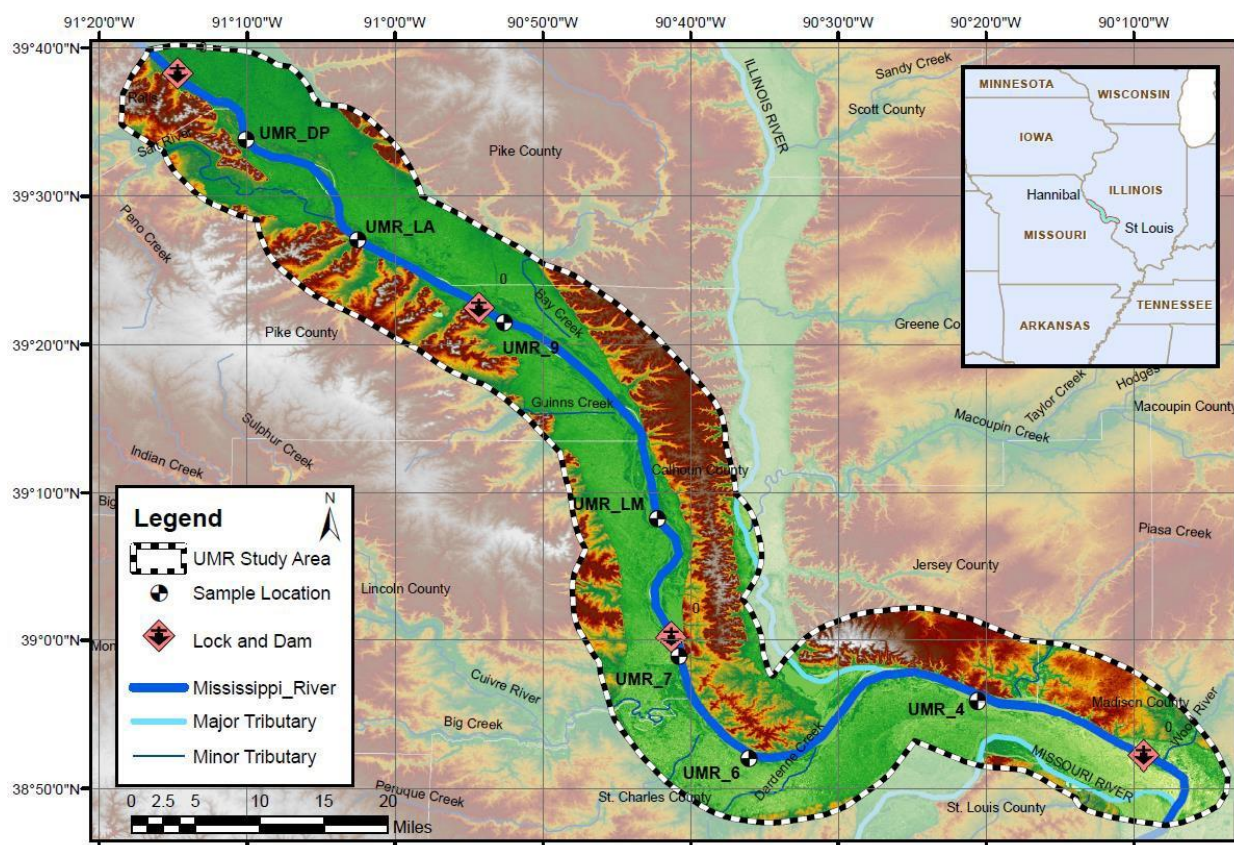
- 1) Establish baseline conditions, identify significant water quality trends, and document problems and accomplishments.
- 2) Ensure that surface water quality, as affected by CEMVS projects, is suitable for project purposes, existing water uses, public health and safety, and in compliance with applicable state and federal water quality standards.
- 3) Provide support to water control, project operations, and navigation for regulations and modifications.
- 4) Investigate special problems, design and implement modifications, and improve water management procedures.
- 5) Establish and maintain strong working partnerships and collaborations with appropriate entities within and outside USACE regarding water quality.

This report is intended to document and assess water quality conditions occurring on the Mississippi and Illinois Rivers. The report describes conditions observed in 2022, as well as reference data collected from 2017-2021. Additional historical data are available upon request.

## SAINT LOUIS DISTRICT WQMP COVERAGE

### Upper Mississippi River (RM 200 – 301)

The Saint Louis District manages the lower 100 miles of the Upper Mississippi River (UMR;), which is defined as the river reach between Locks and Dam 22 near Saverton, Missouri (RM: 301), and Melvin Price Locks and Dam in Alton, Illinois (RM: 200). Flow and depth on the UMR are regulated by two additional locks and dams near Clarksville (RM: 274) and Winfield (RM: 242), Missouri. The primary function of lock and dam projects on the UMR is navigation. The UMR is also altered by dredge maintenance, river training structures, and a confined levee system. The Illinois River is a major tributary to the UMR near Grafton, Illinois (RM: 218).

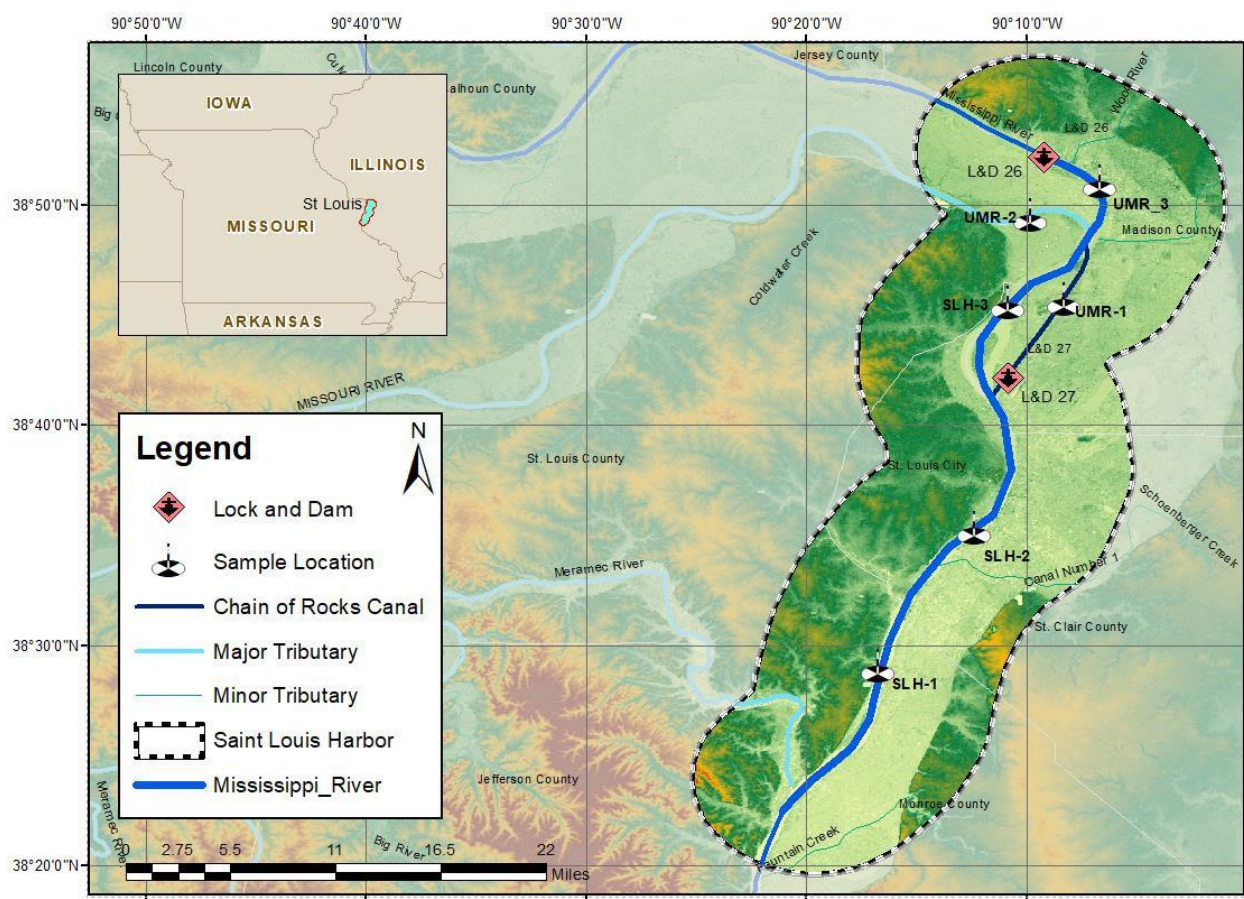


**Figure 1:** Upper Mississippi River study area. During 2022, USACE personnel monitored water quality at seven locations in the Upper Mississippi River. Chemical, biological, and physical samples were collected during three sampling events.



## Saint Louis Harbor (RM 160 – 200)

Saint Louis Harbor (SLH) is defined as the river reach of the Mississippi River between Melvin Price Locks and Dam near Alton, Illinois (RM: 200), and the confluence of the Meramec River near Arnold, Missouri (RM: 160). SLH includes Locks No. 27, situated at the southern end of the Chain of Rocks Canal. The primary mission for Locks No. 27 is navigation, and has little influence on flow and depth. Nevertheless, SLH is greatly altered by dredge maintenance, river training structures, and a confined levee system. The Missouri River is a major tributary to SLH near North Saint Louis (RM: 195).

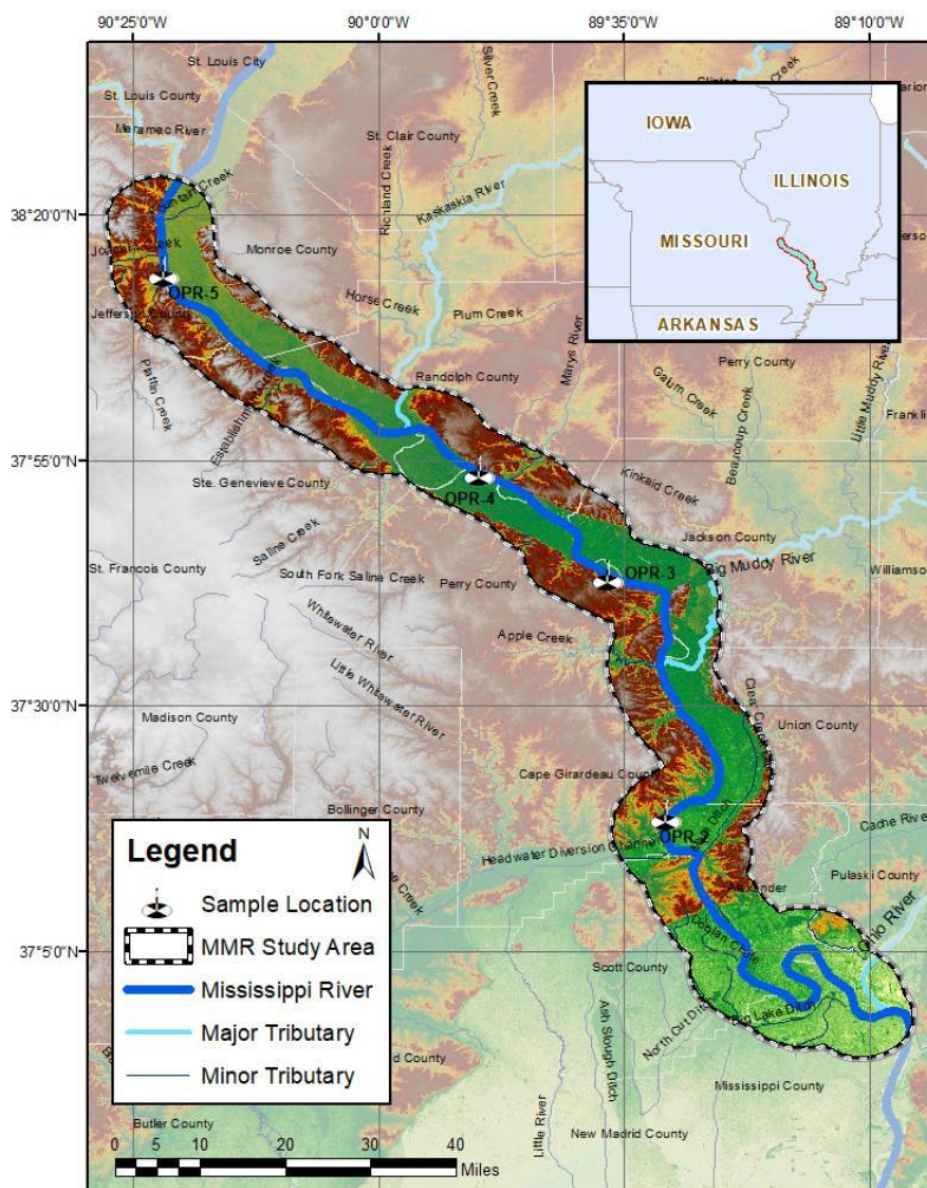


**Figure 2:** Saint Louis Harbor study area. During 2022, USACE personnel monitored water quality at six locations in Saint Louis Harbor. Chemical, biological, and physical samples were collected during three sampling events.



## Middle Mississippi River (RM 000 – 160)

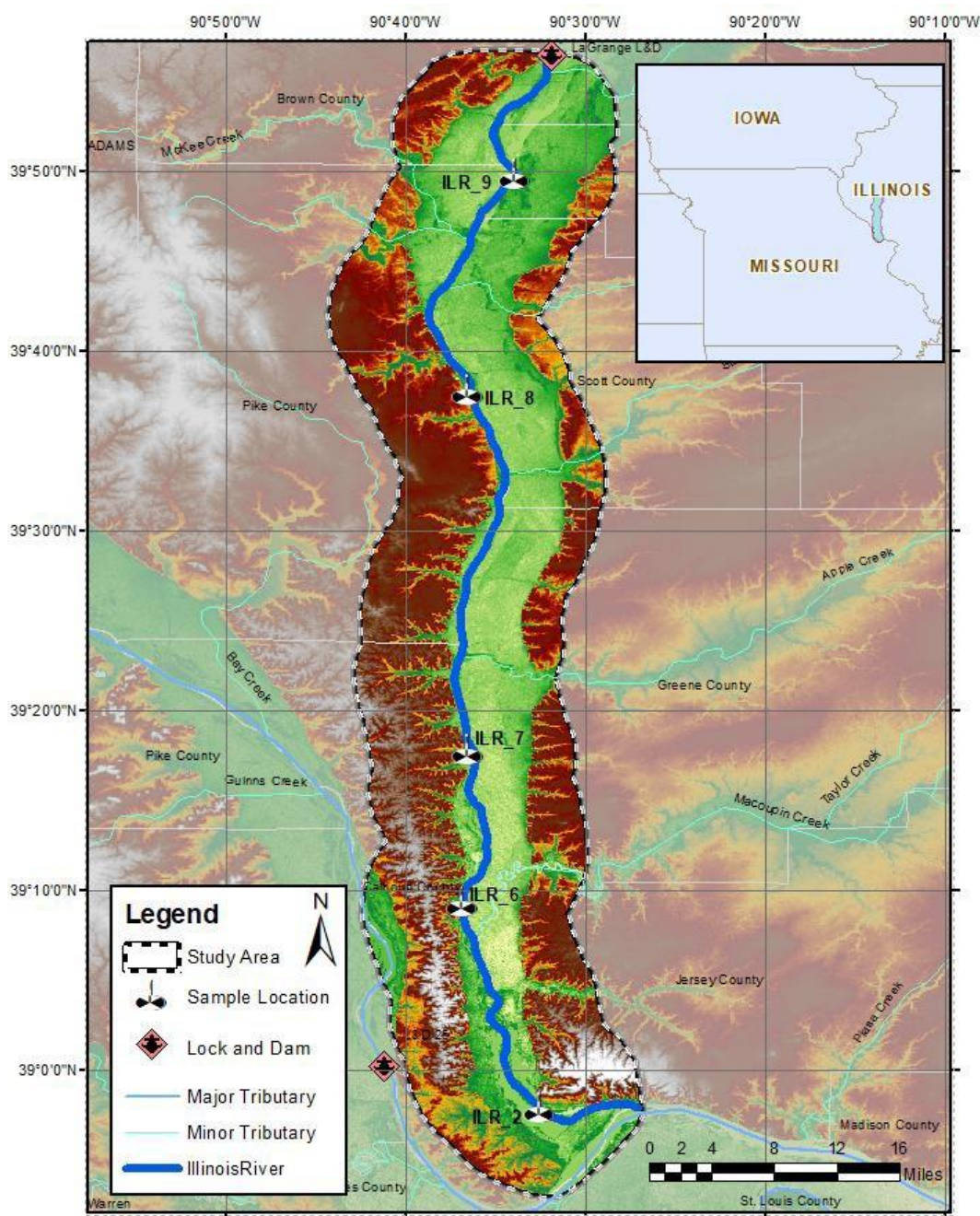
The Middle Mississippi River (MMR) is recognized as the most southern stretch of the Mississippi River managed by CEMVS. The MMR spans from the Meramec River confluence (RM: 160) to the Ohio River Confluence (RM: 0). The MMR is often referred to as the Open River (OPR), as flow is not impeded by lock and dams; although, the MMR is greatly altered by dredge maintenance, river training structures, and a confined levee system. Major tributaries include the Kaskaskia River (RM: 117) and the Big Muddy River (RM: 76).



**Figure 3:** Middle Mississippi River study area. During 2022, USACE personnel monitored water quality at four locations in the Middle Mississippi River. Chemical, biological, and physical samples were collected during three sampling events.

## Illinois River (RM 000 – 80)

The Saint Louis District is responsible for channel maintenance on the lower 80 miles of the Illinois River (ILR). This segment of the ILR runs between the La Grange Lock and Dam (RM: 80) and the confluence with the Mississippi River (RM: 0). Although there are no impeding structures within the reach, this section of the ILR is greatly altered by dredge maintenance, river training structures, and a confined levee system.



**Figure 4:** Illinois River study area. During 2022, USACE personnel monitored water quality at five locations in the Illinois River. Chemical, biological, and physical samples were collected during three sampling events.



## Major Tributaries

In addition to the ILR, major tributaries to the Mississippi River influenced by USACE Civil Works projects include the Salt River, Missouri River (MOR), Kaskaskia River (KAS), and Big Muddy River. This report includes confluence data for MOR and KAS (Appendix B). Water quality data for the Salt River (near Mark Twain Lake), Kaskaskia River (near Carlyle and Shelbyville Lakes), and the Big Muddy River (near Rend Lake) are available upon request.

## Sample Location Summary Table

*Table 1: Sample Location Summary and Geographic Coordinates (NAD 1983)*

River Segment	Sample ID	River Mile	Latitude	Longitude
Upper Mississippi River	UMR-DP	294	39.563869	-91.167790
	UMR-LA	283	39.451961	-91.042300
	UMR-9	273	39.371348	-90.898987
	UMR-LM	252	39.136591	-90.704520
	UMR-7	240	38.981771	-90.679969
	UMR-6	231	38.866632	-90.601036
	UMR-5	213	38.932151	-90.342744
Saint Louis Harbor	UMR-3	200	38.865860	-90.152529
	UMR-2*	196	38.824712	-90.163694
	UMR-1	191	38.761549	-90.138858
	SLH-3	191	38.755932	-90.171958
	SLH-2	177	38.588778	-90.206328
	SLH-1	169	38.484427	-90.279552
Middle Mississippi River	OPR-5	150	38.235914	-90.363781
	OPR-4	110	37.898308	-89.830695
	OPR-3	90	37.721974	-89.609790
	OPR-2	53	37.315170	-89.512540
Illinois River	ILR-9	71	39.830091	-90.565591
	ILR-8	55	39.630530	-90.609060
	ILR-7	32	39.297826	-90.609012
	ILR-6	19	39.156435	-90.614168
	ILR-2	5	38.965781	-90.542952

\*UMR-2 is taken from the Missouri River, two miles upstream of the Mississippi River confluence at RM 196. Data from UMR-2 were not evaluated for this report but are available in Appendix B.

## **METHODS AND ANALYSIS: SAMPLE COLLECTION, STATISTICAL ANALYSIS, & QUALITY ASSURANCE**

### **Data Collection and Historical Reference Data**

During 2022, water quality samples were collected and analyzed for 21 locations during three sampling events (n=63; Table 1). Two duplicate samples were also collected during each sampling period for quality control purposes (n=8; Appendix C). Samples were collected from the upper one meter of the water column, preserved, and transported to the Applied Research and Development Laboratory (ARDL) in Mount Vernon, Illinois for analysis. Lab packages were reviewed by USACE personnel for quality assurance. Data from all lab packages were deemed usable for this assessment. Memorandums documenting each sampling event are located in Appendix A. Memorandums highlight problems experienced in the field, issues with laboratory data, and important lessons learned during fieldwork.

For the purpose of this report, historical reference data refers to water quality data collected during the previous four years (2017-2021) on the Mississippi and Illinois Rivers. Historical reference data are assumed to represent the current condition of the Mississippi and Illinois Rivers.

### **Statistical Analysis and Comparison to Applicable Water Quality Standards**

Statistical analyses were performed on water quality monitoring data collected for 21 locations, and classified as ILR (n= 5), MMR (n=4), SLH (n=5), and UMR (n=7). Tributary data collected from the MOR (UMR-2) are not included in summary tables; however, data are available in Appendix B. Descriptive statistics were calculated to describe central tendencies and corresponding 95% confidence intervals for the geometric mean. Monitoring results were compared to applicable water quality standard criteria established by state agencies pursuant to the Federal Clean Water Act. If a state water quality standard criterion was not available, recommended criteria from the literature were considered.

### **Quality Assurance**

The United States Army Corps of Engineers, Saint Louis District quality assurance procedures considers two primary focus areas: (1) those that involve laboratory analysis of samples, and (2) those concerning the collection and processing of the water samples in the field.

Since 2012, ARDL has analyzed water quality samples for CEMVS. Their quality assurance program includes the use of quality control charts, check standards, field and

in-house matrix spikes, laboratory blanks, and performance evaluation samples. In addition, one blind duplicate sample is submitted for every 20 samples collected.

Internal checks are also used for field work. This includes adherence to operating procedures for data collection and periodic evaluation of sampling personnel. Field sampling equipment and multimeters are calibrated/serviced in accordance with factory recommendations.

## METHODS AND ANALYSIS: WATER QUALITY PARAMETERS

Parameters used to characterize water quality have been generally accepted criteria for assessing aquatic life and human health. Parameters evaluated are designated as:

1. Physical Criteria (e.g., flow, temperature, suspended sediment)
2. Chemical Criteria (e.g., dissolved oxygen, nitrogen, phosphorous)
3. Biological Criteria (e.g., E. coli bacteria, chlorophyll, pheophytin)

### Physical Criteria

**Surface Water Flow (Flow)** can be described as the continuous movement of water in runoff or open channels. For larger navigable rivers, flow is often quantified as discharge, which is the volume of water that passes through a channel cross section during a duration of time (e.g., cubic feet per second). River stage or elevation is also an important metric to consider when analyzing flow, as it describes water capacity for channels, culverts, and other structures.

Stream flow has a strong influence on flooding, stream geomorphology, and aquatic life (USEPA 2016). Common analytical functions of flow data include calculation of Total Maximum Daily Loads (TMDL) for pollutants and model calibrations. The calculation of TMDL at any point in a stream requires a parameters concentration and stream flow. Most watershed restoration efforts use TMDL as a measure of success.

**Temperature (Temp)** is important because it controls several aspects of water quality. Colder water holds more dissolved oxygen which is required by aquatic organisms. Plants grow more rapidly and use more oxygen in warmer water. Decomposition of organic matter which uses oxygen is accelerated in warmer water. Temperature can also determine the availability of toxic compounds such as ammonia. Since aquatic organisms are cold blooded, water temperature regulates their metabolism and ability to survive. The number and kinds of organisms that are found in streams or lakes is directly related to temperature. Certain organisms require a specific temperature range, such as Salmonids, which require water temperatures below 20°C. Water temperature criteria for warm water bodies in Missouri and Illinois are less than 33°C or within 2.5°C of the seasonal norm.



**Total Suspended Solids (TSS)** concentrations, which cause the photosynthetic activity to be reduced by more than 10% from the seasonably established norm, can have a detrimental effect on aquatic life. Soil particles, organic material, and other debris comprise suspended solids in the water column. **Turbidity (FNU)** measurements are inverse to suspended solid measurements. As TSS increases, the FNU or water transparency decreases. Total suspended solids can be an important indicator of the type and degree of FNU. Total Suspended Solids measurements represent a combination of **Volatile Suspended Solids (VSS)**, which consist of organic material, and **Nonvolatile Suspended Solids (NVSS)**, which is comprised of inorganic mineral particles in the water column. To accurately determine the types and quantities of suspended solids, VSS are analyzed.

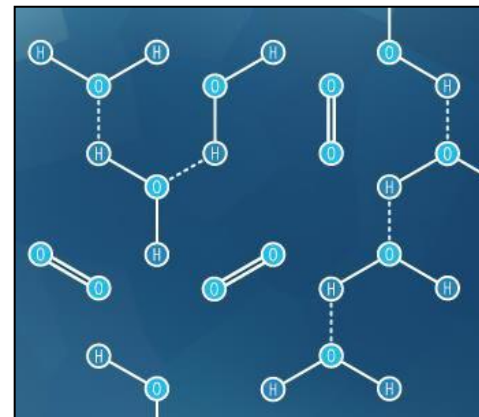


**Figure 5:** Confluence of the Missouri and Mississippi River. Historically, sediment inputs from the Missouri River result in significant TSS increases in the Mississippi River.

Volatile suspended solid concentration represents the organic portion of the total suspended solids. Organic material often includes plankton and additional plant and animal debris present in water. Total VSS indicates the presence of organics in suspension; and, therefore, show additional demand levels of oxygen. Illinois Environmental Protection Agency (EPA) recommends that TSS not exceed 116 mg/L. Neither Missouri nor Illinois currently has a standard criterion for NVSS or VSS.

## Chemical Criteria

**Dissolved Oxygen (DO)** refers to the measurement of free oxygen molecules ( $O_2$ ) that are not bonded to any other elements; thus, oxygen bonded in water ( $H_2O$ ) would not be considered in a measurement of dissolved oxygen. Oxygen is dissolved in surface waters through interactions with the atmosphere and as a waste product of photosynthesis ( $CO_2 + H_2O \rightarrow (CH_2O) + O_2$ ) from phytoplankton and aquatic vegetation. Additional factors influencing DO include temperature, pressure, and salinity.



**Figure 6:** Dissolved oxygen ( $O_2$ ) vs oxygen bonded in water ( $H_2O$ ).

Dissolved oxygen is required for most aquatic life including fish, invertebrates, bacteria, and plants. Fish and invertebrates utilize DO for respiration through gills and cutaneous breathing, and plants require dissolved oxygen for respiration when photosynthesis is not possible. Smaller microbes and bacteria utilize DO for decomposition of organic materials; a process essential for nutrient cycling. Bottom feeders such as worms and mussels can

persist when DO is  $\geq 1$  mg/L, while most inland fish species require a minimum DO of 4 mg/L. The DO water quality criterion for Missouri and Illinois is  $\geq 5$ mg/L.

**Potential of Hydrogen (pH)** is a measure of how acidic or basic water is. Potential of Hydrogen is reported on a logarithmic scale ranging from 0 – 14, with 7.0 being neutral. As pH increases from 7.0, water increases in alkalinity, whereas a decrease from 7.0 indicates an increase in acidity. Since pH is measured on a logarithmic scale, every one-unit change in pH indicates a 10-fold change in acidity; thus, a pH of 6.0 is ten times more acidic than a pH of 7.0 and a pH of 4.0 would be one-thousand times more acidic than a pH of 7.0.

The pH of water varies considerably beyond the local level. Natural variation in bedrock and soil composition through which water moves has been reported as one of the most influential factors. Additional factors include decomposition of organic materials, acidity of local precipitation, discharge of effluents and chemicals, and mining operations.

Most freshwater streams and rivers have a natural pH ranging from 6 to 8. As pH approaches 5 (acidic), less tolerant fish and aquatic invertebrate assemblages may be extirpated, and a pH below 4.5 would be without most desired aquatic life. Comparably, when pH exceeds 9.5 (alkaline), aquatic fish and invertebrate begins to rapidly decrease and beyond 10, fish become extirpated. The pH water quality criteria for Missouri and Illinois ranges from 6.5 – 9.0.

**Oxidation Reduction Potential (ORP)** is a measurement of the net status of all the oxidation and reduction reactions in a given water sample. Oxidation involves an exchange of electrons between 2 atoms. The atom that loses an electron is oxidized and the one that gains an electron is reduced. Oxidation reduction potential sensors measure the electrochemical potential between the solution and a reference electrode. Readings are expressed in millivolts (mV). Positive readings indicate increased oxidizing potential and negative readings indicate increased reduction. Oxidation reduction potential values are used much like pH values to determine water quality. While pH readings characterize the state of a system relative to the receiving or donating hydrogen ions (base or acid), ORP readings characterize the relative state of losing or gaining electrons. Generally, ORP readings above 400mV are harmful to aquatic life; however, ORP is a non-specific measurement, which is a reflection of a combination of effects of all the dissolved materials in the water. Therefore, the measurement of ORP in relatively clean water has only limited utility unless a predominant redox-active material is known to be present.

**Conductivity** is a measure of water's ability to conduct electrical current. In its purest form, water has a *near* neutral charge, indicating that it is an inefficient conductor of electrical current. Thus, the ability to carry electrical current is driven by water soluble ions (atoms and molecules with a charge) such as salts and other inorganic materials. Conductivity is also influenced by water temperature; as temperature increases, conductivity increases. For this reason, conductivity is commonly reported as Specific

Conductivity (SpCond), which is the measurement of conductivity at 25 degrees Celsius.

Conductivity in streams and rivers is affected by the geology of the area. Streams running through granite tend to have lower conductivity due to granite being composed of inert material—materials that do not ionize or dissolve into ionic compounds in water. Conversely, streams that run through areas of limestone or clay soils tend to have higher conductivity readings because of the presence of materials that ionize. Conductivity is useful as a general measure of water quality. A stream tends to have a relatively constant range of conductivity that, once established, can be used as a baseline. Significant changes, either increases or decreases, might indicate a source of pollution has been introduced into the water. The pollution source could be a treatment plant, which raises the conductivity, or an oil spill, which would lower the conductivity. In general, there are no water quality criteria for SpCond. The District threshold of 500  $\mu\text{S}/\text{cm}$  is a rule of thumb value that is often associated with some form of biological impairment.

**Total Phosphorus (TP)** is the sum of organic and inorganic phosphorus and has been monitored due to the potential for uptake by nuisance algae. Levels of phosphate can indicate the potential for rapid growth of algae (algae bloom) which can cause serious oxygen depletion during the algae decay process. Phosphorous is typically the limiting nutrient in a water body; therefore, any addition of phosphorous to the ecosystem stimulates the growth of plants and algae. Phosphorous is delivered to lakes and streams by way of runoff from agricultural fields and urban environments. Other sources of phosphorous are anaerobic decomposition of organic matter, leaking sewer systems, and point source pollution. The general standard for phosphorous in lake water is 0.05 mg/L and 0.1 mg/L in flowing waters. Dissolved phosphorous, also called **Orthophosphate ( $\text{PO}_4\text{-P}$ )** is generally found in much smaller concentrations than total phosphorous and is readily available for algal uptake. Orthophosphate concentrations in a water body vary widely over short periods of time as plants take it up and release it.

**Nitrogen** occurs naturally in water through several forms including nitrogen ( $\text{N}_2$ ), nitrite ( $\text{NO}_2\text{-N}$ ), nitrate ( $\text{NO}_3\text{-N}$ ), ammonia ( $\text{NH}_3$ ), and ammonium ( $\text{NH}_4$ ). Nitrates are the most commonly reported form of nitrogen and may have a meaningful influence on a waterbody's trophic status. Algae and other plants use  $\text{NO}_3\text{-N}$  as a food source, thus excess levels of  $\text{NO}_3\text{-N}$  can promote increases in algal production and hypereutrophic conditions.

In general,  $\text{NO}_3\text{-N}$  does not have a *direct* effect on fish or aquatic insects. Missouri and Illinois have both set criteria standards for  $\text{NO}_3\text{-N}$  to 10 mg/L to accommodate safe drinking waters for human and livestock; however, this threshold likely exceeds the concentration that is appropriate for assessing ecosystem health.

Nitrite is formed by the complete oxidation of ammonium ions by benthic and planktonic microorganisms (*Nitrosomonas*). Although elevated levels of  $\text{NO}_2\text{-N}$  can be toxic to

aquatic life, they are rarely observed in freshwater systems at undesirable levels as they are rapidly converted to NO<sub>3</sub>-N by benthic and planktonic microorganisms (*Nitrobacter*).

**Total Ammonia Nitrogen (TAN)** includes NH<sub>3</sub> and NH<sub>4</sub>. Total ammonia nitrogen is a colorless gas with a strong pungent odor. Ammonia occurs naturally and is a biological requirement for aquatic life; however, elevated concentrations can be toxic to freshwater organisms. Unnatural sources of ammonia include accidental releases of ammonia-rich fertilizer, effluent from sewage treatment plants, improper disposal of ammonia products, and livestock waste.

Toxic concentrations for freshwater organisms range from 0.53 – 22.8 mg/L and are strongly dependent on both pH and temperature. In general, an increase in pH and/or temperature corresponds with an increase in toxicity. Additional information in regard to the relationship between pH, temperature, and ammonia—as it relates to toxicity— can be reviewed in Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater (USEPA 2013).

**Nitrogen as Total Kjeldahl (TKN)** describes the amount of organic nitrogen and TAN in water. Organic nitrogen is the byproduct of living organisms, and includes natural materials such as proteins and peptides, nucleic acids and urea, and numerous synthetic organic materials. Typical organic nitrogen concentrations vary from a few milligrams per liter in the Mississippi and Illinois Rivers, to more than 20 mg/L in raw sewage. There are currently no state or federal standard criteria for TKN.

**Total Organic Carbon (TOC)** is a measure of the amount of organic carbon in a water body. In addition to natural organic substances, TOC includes insecticides and herbicides, as well as domestic and industrial waste. Industrial waste effluent may include carbon-containing compounds with various toxicity levels. Further, a high organic content means an increase in the growth of microorganisms which contribute to the depletion of oxygen supplies.

Currently, there are no state or federal water quality standard criteria set for TOC. Because carbon occurs naturally, its concentration varies based on physical and chemical attributes in a watershed; thus, this study relies on historical reference conditions to identify unfavorable conditions.

## **Biological Criteria**

**Chlorophyll a (CHL\_a)** is a measure of the amount of algae growing in a water body, and therefore can be used to classify trophic status. Although algae are a natural part of freshwater ecosystems, too much algae can cause aesthetic problems such as green scums and bad odors, and can result in decreased levels of DO. Some algae also produce toxins that can be of public health concern when found in high concentrations.

**Pheophytin a (PHEO a)** is a natural degradation product or digestion of CHL\_a. The ratio of PHEO\_a to CHL\_a can provide an indication of the decline or growth in eukaryotic algae and cyanobacteria populations.

**Trophic Status** is determined using a modified **Trophic State Index (TSI)**, as described by Carlson (1977). Trophic State Index is calculated from secchi-depth transparency (turbidity was converted to secchi depth using equation  $y = 1.0817x^{-0.398}$ ), total phosphorus, and chlorophyll-a measurements. Values for these three parameters are converted to an index number ranging from 0-100 according to the following equations:

$$\begin{aligned} \text{TSI (Secchi Depth)} &= 10(6 - (\ln \text{SD}/\ln 2)) \\ \text{TSI (Chlorophyll-a)} &= \text{TSI(Chl)} = 10(6 - ((2.04 - 0.68 \ln \text{Chl})/\ln 2)) \\ \text{TSI (Total Phosphorus)} &= \text{TSI(TP)} = 10(6 - (\ln (48/\text{TP})/\ln 2)) \end{aligned}$$

where *ln* indicates the Natural Logarithm

A TSI average value, calculated as the average of the three individually determined TSI metrics, is used as an overall indicator of a water body's trophic state. The relationship between TSI and trophic condition is defined as follows:

TSI	Trophic Condition
0-40	Oligotrophic
40-50	Mesotrophic
50-70	Eutrophic
70-100	Hypereutrophic



## Laboratory Methods and Water Quality Criteria Summary Table

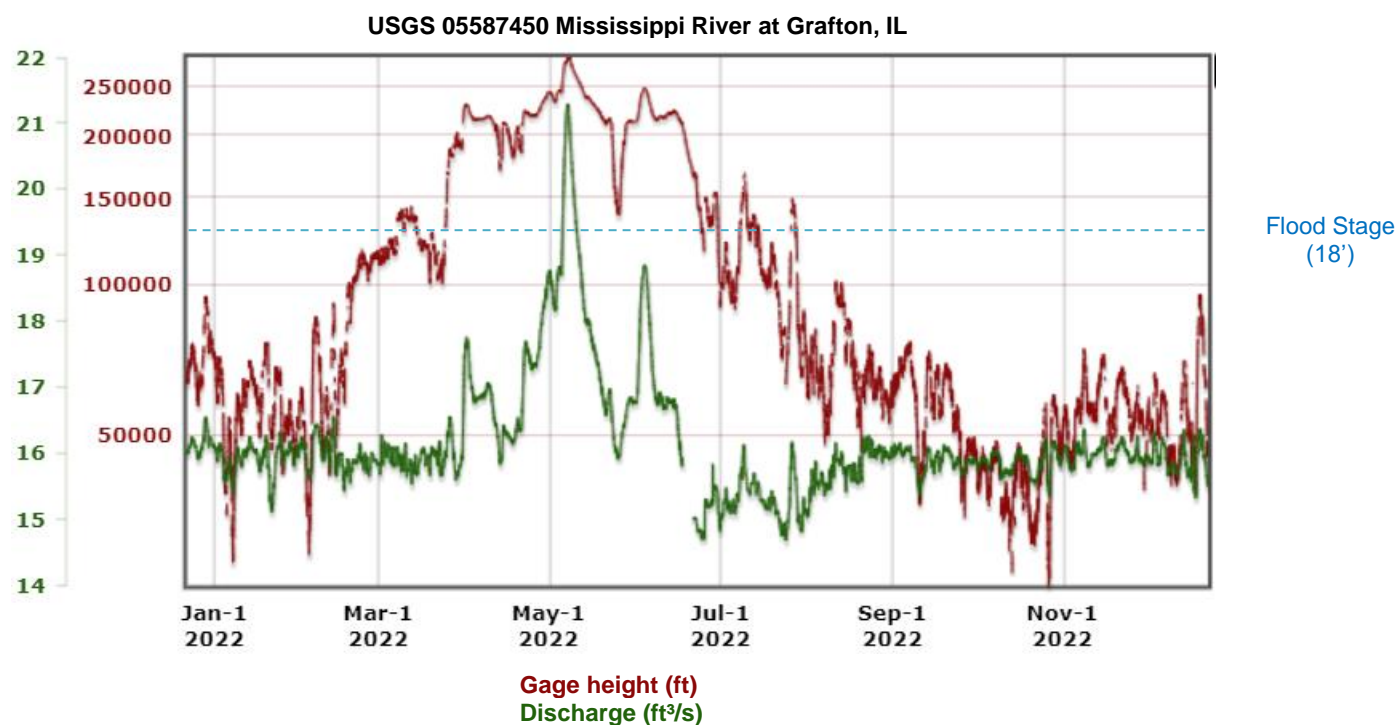
**Table 2:** Metrics, Methods, and Water Quality Criteria Used for Evaluating Water Quality

Metric	Abbreviation	Analysis Method	Water Quality Criteria	Source
Ammonia Nitrogen	NH <sub>3</sub>	EPA Method 350.1	Temp and pH dependent (Generally < 15 mg/L)	United States EPA
Chlorophyll a	Chl_a	SM Method 10200H	Less than 25mg/m <sup>3</sup> (Eutrophic Upper Limit)	Carlson 1977
Depth	Depth	Multiparameter Meter	Measurements reported at ~1 meter	-----
Dissolved Oxygen	DO	Multiparameter Meter	Greater than 5.0mg/L	Missouri DNR/Illinois EPA
Dissolved Oxygen Saturated	DO%	Multiparameter Meter	Range: 50 – 140%	Brown 1970
Nitrate as Nitrogen	NO <sub>3</sub>	Green Method	See Total Nitrogen	EPA Region 7
Nitrite as Nitrogen	NO <sub>2</sub>	EPA Method 354.1	See Total Nitrogen	EPA Region 7
Non-Volatile Suspended Solids	NVSS	TSS - VSS	See Total Suspended Solids	Illinois EPA
Orthophosphate	Ortho	EPA Method 365.2	-----	-----
Pheophytin a	Pheo_a	SM Method 10200H	-----	-----
Potential of Hydrogen	pH	Multiparameter Meter	Range: 6.5 – 9.0pH	Missouri DNR/Illinois EPA
Specific Conductivity	SpCond	Multiparameter Meter	500 uS/cm	-----
Temperature	Temp	Multiparameter Meter	Less than 32-2/9 °C	Missouri DNR
Total Dissolved Solids	TDS	Multiparameter Meter	Less than 500 mg/L	Illinois EPA
Total Kjeldahl Nitrogen	TKN	EPA Method 351.2	See Total Nitrogen	EPA Region 7
Total Nitrogen	TN	TKN+ NO <sub>2</sub> -N+NO <sub>3</sub> -N	Range: 2 mg/L to 6 mg/L	EPA Region 7
Total Organic Carbon	TOC	EPA Method 415.1	-----	-----
Total Phosphorus	TP	EPA Method 365.2	Less than 0.10 mg/L	EPA 1986 (Gold Book)
Total Solids	TS	TSS + TDS	Less than 500 mg/L	Brown 1970
Total Suspended Solids	TSS	EPA Method 160.2	-----	-----
Turbidity	Turb	Multiparameter Meter	-----	-----
Volatile Suspended Solids	VSS	EPA Method 160.4	See Total Suspended Solids	Illinois EPA

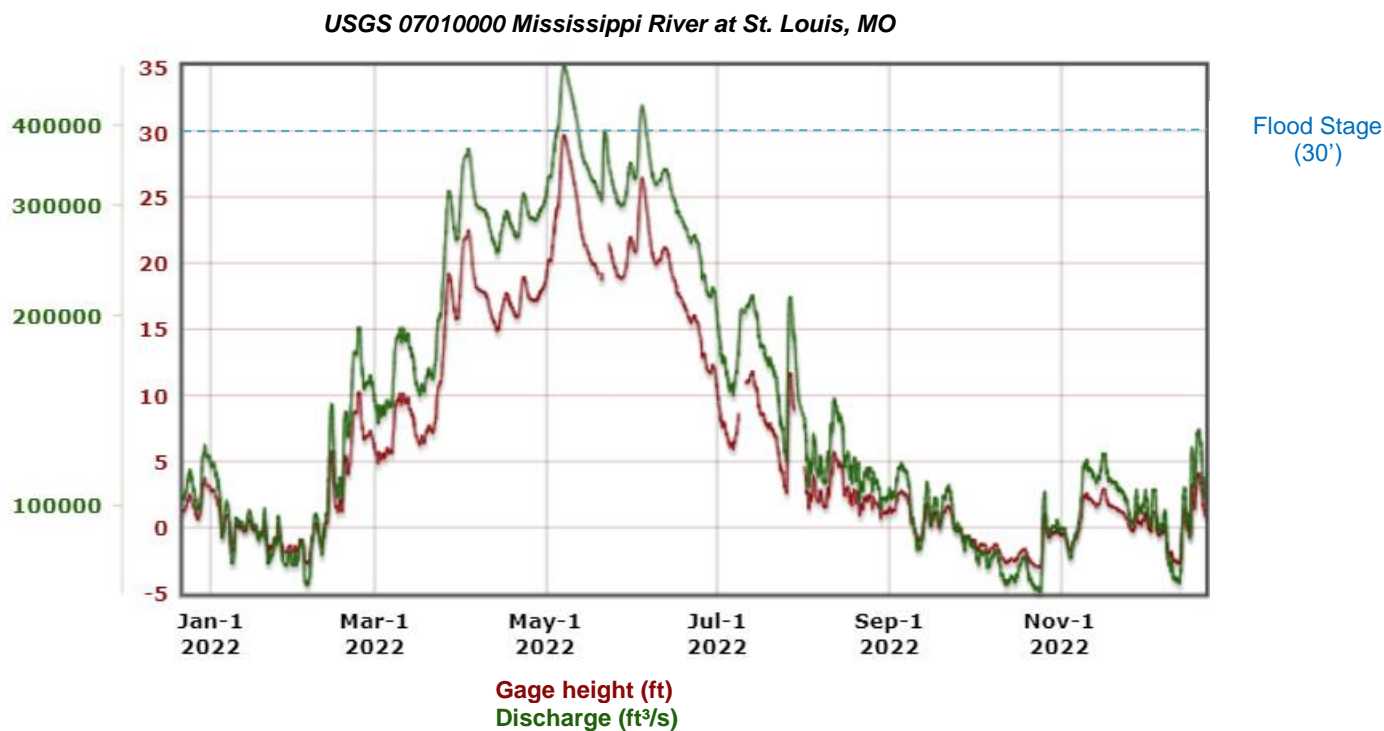
\*1 mg/L is equivalent to 1 drop in two bathtubs and 1 ug/L is equivalent to 1 drop in an Olympic size swimming pool.

## **SUMMARY RESULTS: PHYSICAL CRITERIA**

## River Discharge and Stage Summary

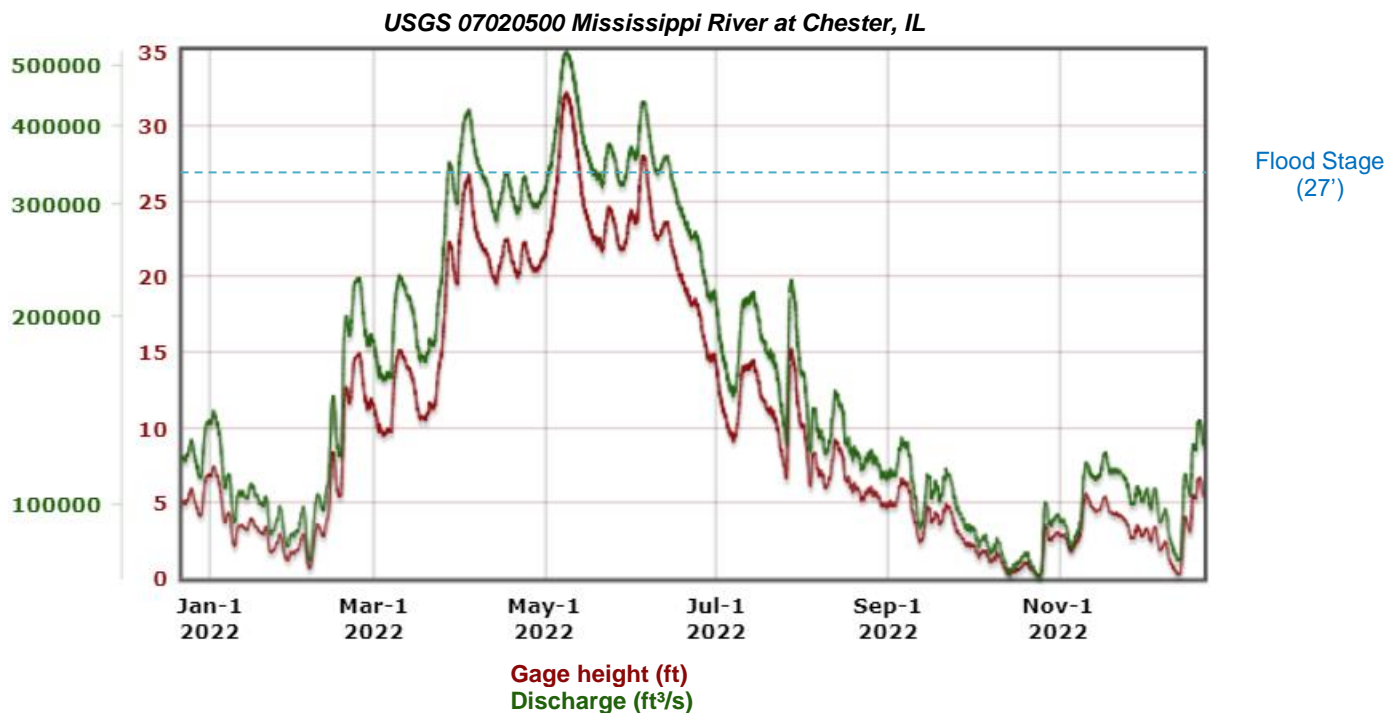


*Figure 7: Upper Mississippi River at Grafton IL (USGS 05587450). The National Weather Service recognizes river flood stage at 18'.*

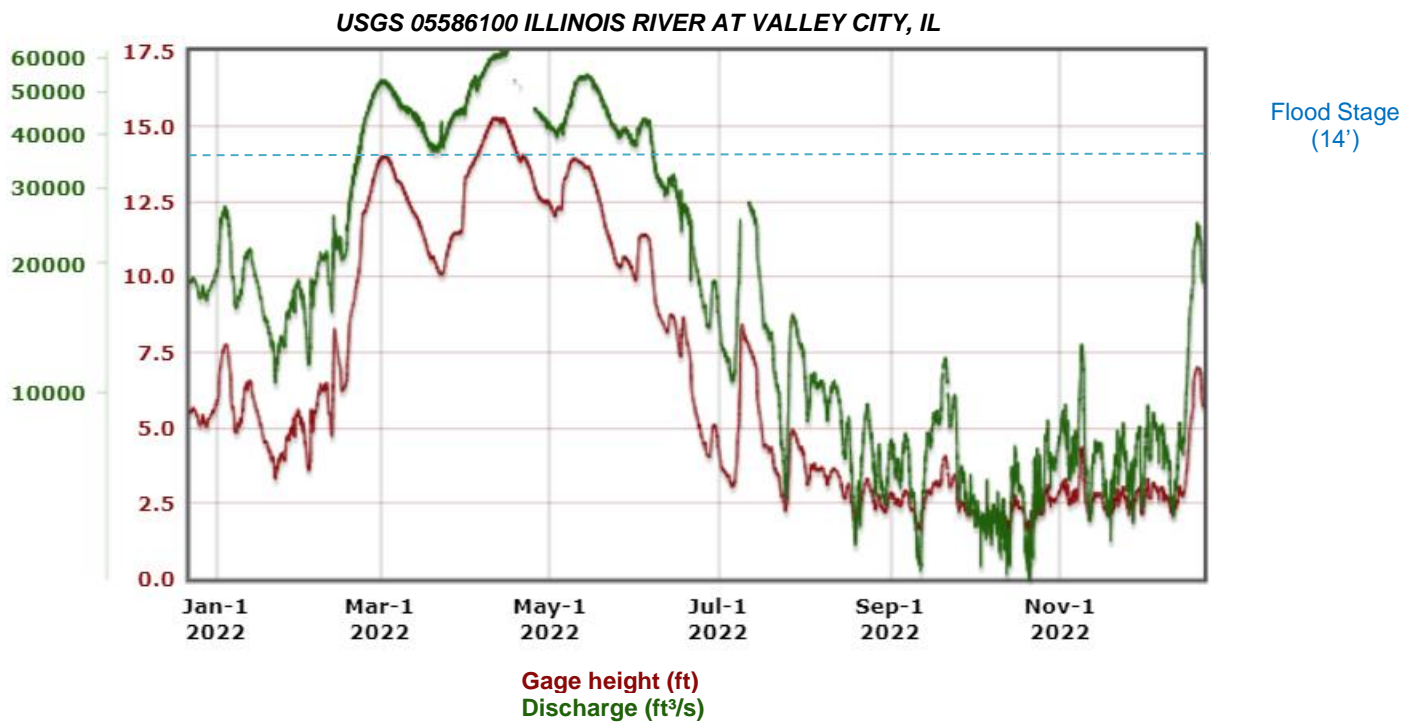


*Figure 8: Saint Louis Harbor at St Louis, MO (USGS 07010000). The National Weather Service recognizes river flood stage at 30'.*

## River Discharge and Stage Summary: *Continued*

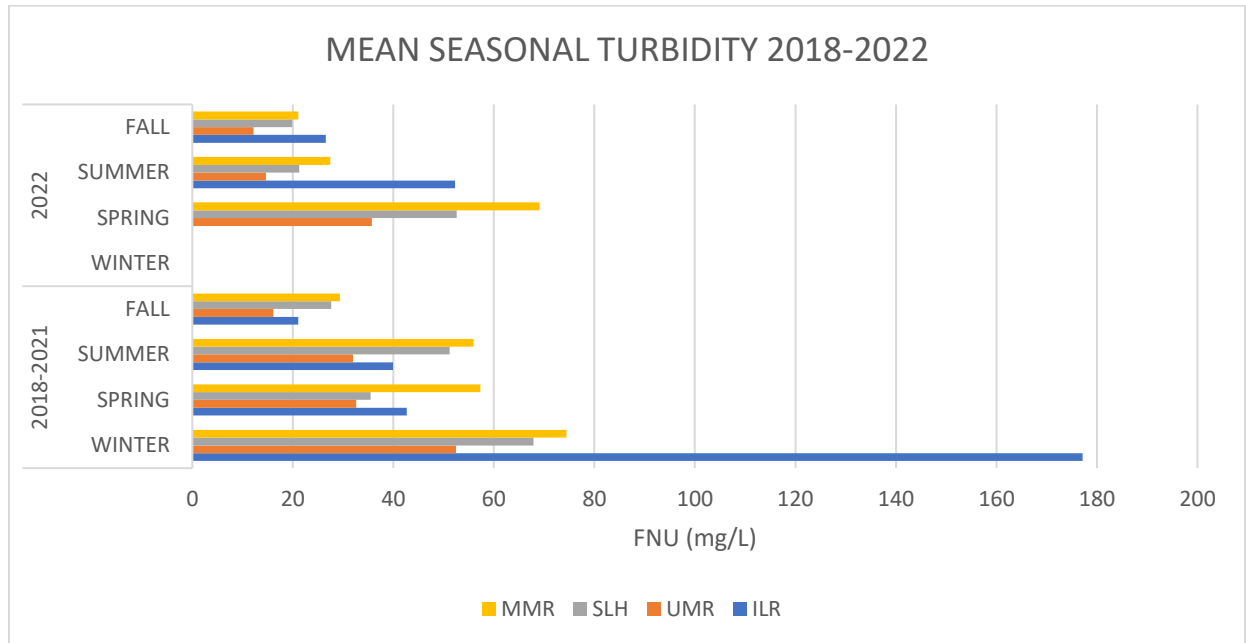


*Figure 9: Middle Mississippi River at Chester, IL (USGS 07020500). The National Weather Service recognizes river flood stage at 27'.*



*Figure 10: Illinois River at Valley City, IL (USGS 05586100). The National Weather Service recognizes river flood stage at 14'.*

## Mean Seasonal Turbidity (2018-2022)

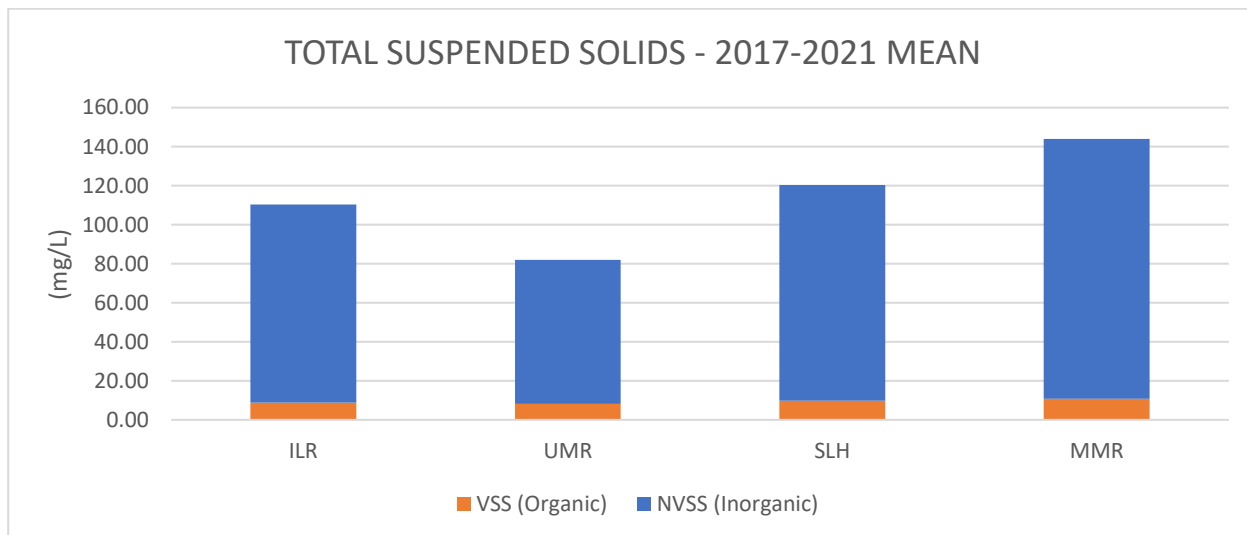
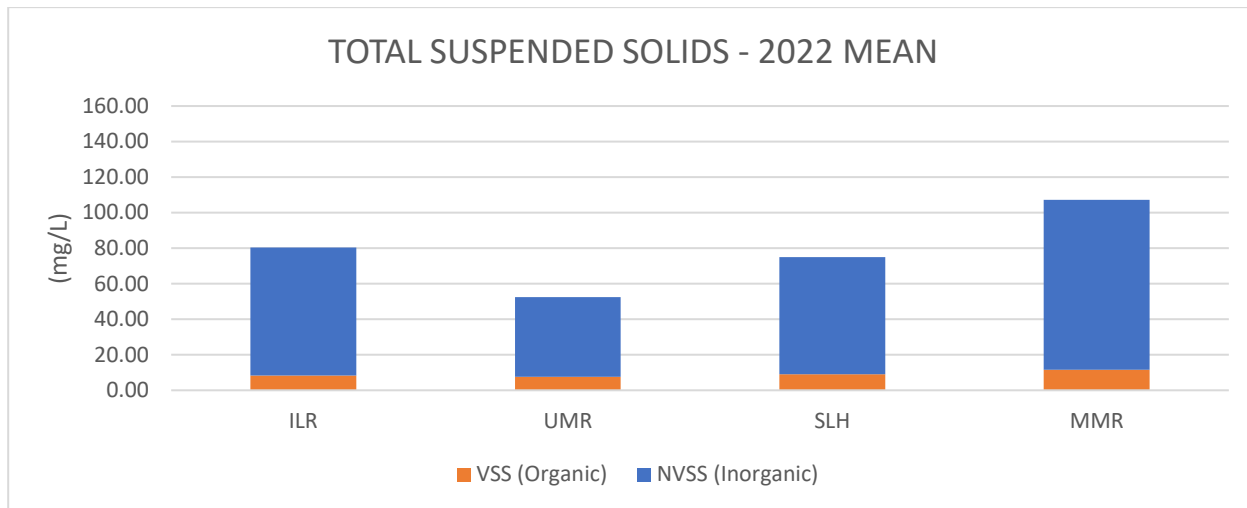


2018-2022						2022			
Metric	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
Turbidity	ILR	84	30.73	63.14	17.44	15	38.82	43.72	9.7
	UMR	98	25.97	36.37	6.38	18	14.9	20.85	5.21
	SLH	75	34.27	49.85	9.9	15	24.91	31.22	9.09
	MMR	55	39.9	56.93	9.76	12	26.89	39.2	12.09

**Figure 11: Mean Seasonal Turbidity.** MVS\_EC-EQ began collecting turbidity in 2018. This study does not acknowledge a water quality criterion for turbidity. High winter surge on ILR attributed to 2019 flood event build-up. Winter 2022 sampling event was missed.



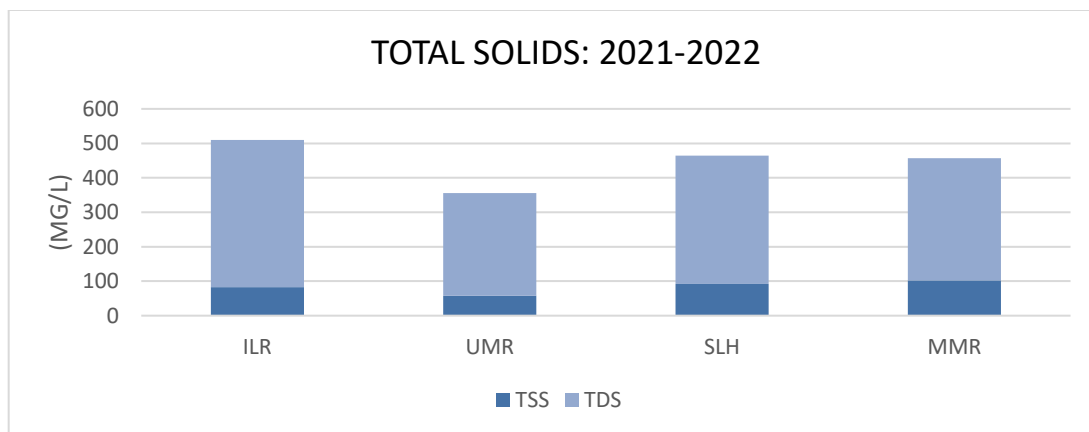
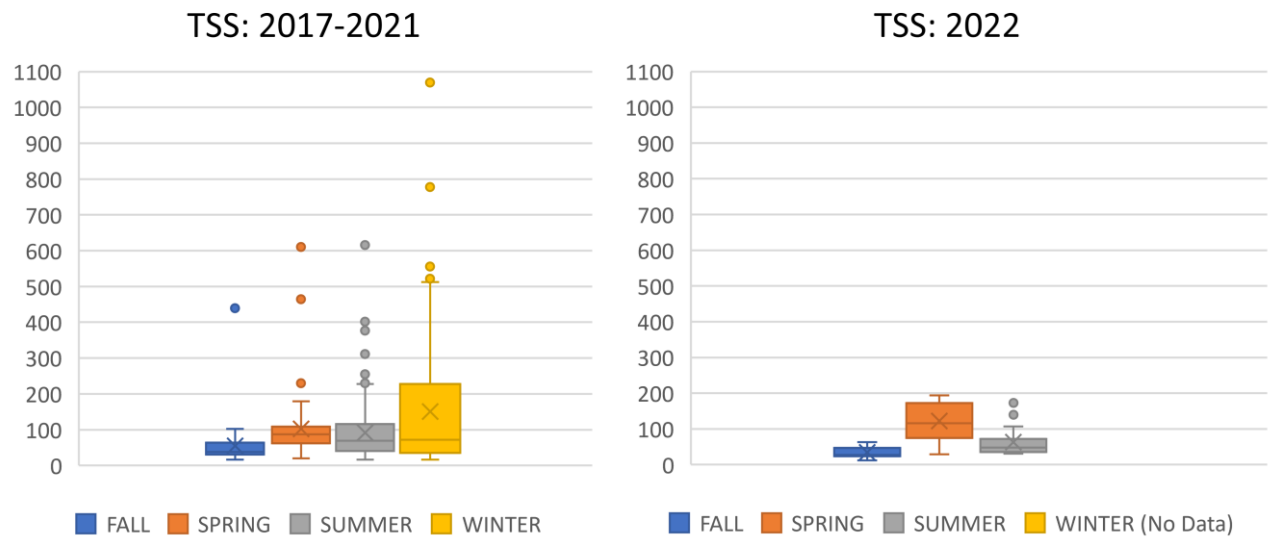
## Total Suspended Solids Summary (Organic vs Inorganic)



2017-2021						2022			
Metric	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
<b>Inorganic (NVSS)</b>	ILR	108	55.4	101.56	27.93	15	43.8	71.97	26.4
	UMR	132	56.65	73.87	11.62	18	35.3	44.75	12.46
	SLH	91	74.7	114.01	24.09	9	57.5	81.52	35.63
	MMR	63	94	133.2	24.04	12	62.75	95.65	34.24
<b>Organic (VSS)</b>	ILR	108	6.67	8.79	1.6	15	4.62	8.33	2.34
	UMR	132	7.47	8.13	0.81	18	6.66	7.64	1.05
	SLH	91	7.5	10.09	1.49	9	8.44	10.43	2.85
	MMR	63	8.7	10.77	1.48	12	8.67	11.65	2.73

**Figure 12:** Volatile (Organic) and Non-Volatile (Inorganic) Suspended Solids. This study does not acknowledge a criterion for Non-Volatile Suspended Solids or Volatile Suspended Solids. ). This report does not acknowledge a water quality criterion for TSS.

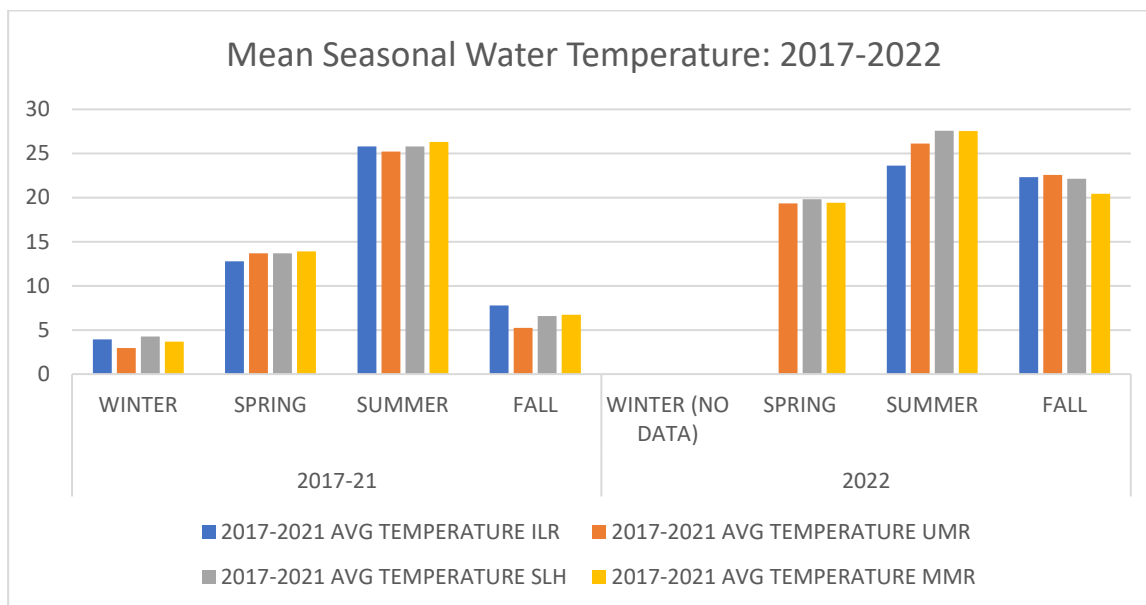
## Total Solids (TSS + TDS)



2018-2021 TSS AND TDS						2022 TSS AND TDS			
Metric	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
<b>TSS</b>	ILR	84	54.6	112.5	35.26	15	43.8	71.97	26.4
	UMR	106	54.2	75.82	14.12	18	35.3	44.75	12.46
	SLH	79	72.5	106.51	24.21	15	41.3	65.97	24.74
	MMR	50	89	128.37	35.58	12	62.75	95.65	34.24
<b>TDS</b>	ILR	84	433	431.15	13.85	15	480	481.2	8.82
	UMR	106	306	300.39	7.42	18	296	302.39	7.35
	SLH	76	349.7	360.52	13.46	15	332	354.8	29.76
	MMR	51	360	364.26	8.51	12	368	365.42	32.47

**Figure 13:** Total Suspended Solids (TSS) was particularly high on the Middle Mississippi River during the 2019 winter sampling event. This was largely due to the historic flooding event that took place in the spring of 2019. All Total Dissolved Solid values were less than the study criterion of 500 mg/L in 2022.

## Mean Seasonal Water Temperature: 2017 - 2022

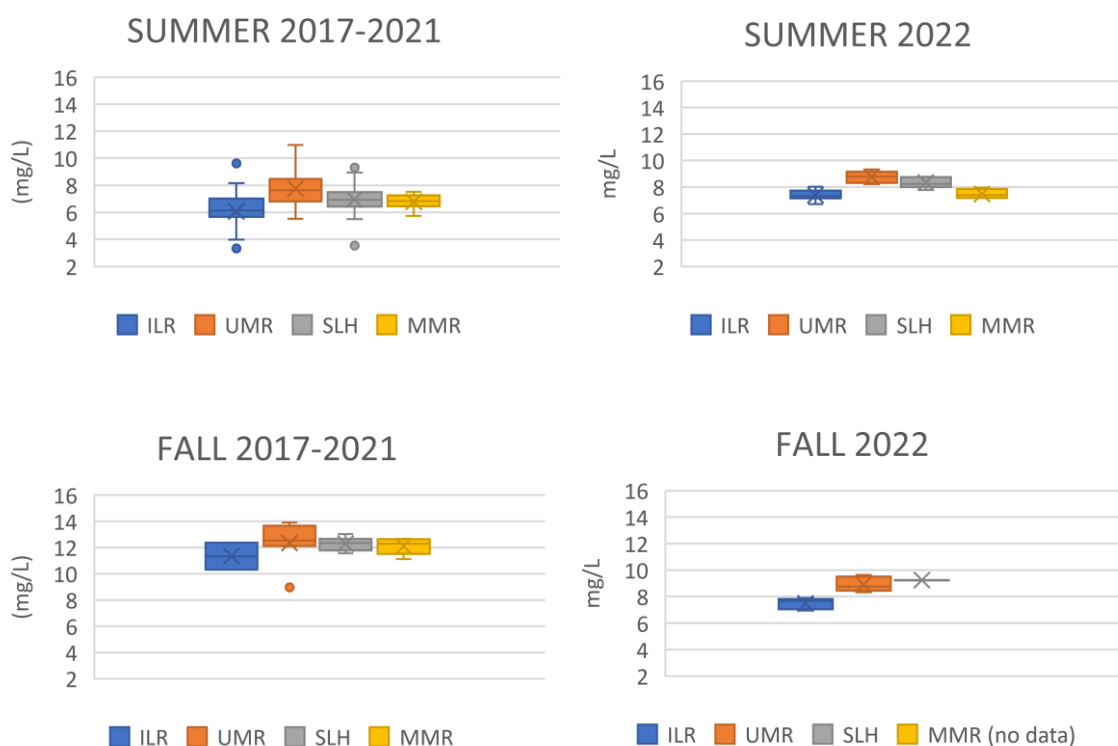


2017-2021 Seasonal Temperatures						2022 Seasonal Temperatures			
Season	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
Winter	ILR	22	3.75	3.95	0.51	-	-	-	-
	UMR	34	2.27	2.96	2.96	-	-	-	-
	SLH	25	4.1	4.27	4.27	-	-	-	-
	MMR	16	3.32	3.68	0.52	-	-	-	-
Spring	ILR	17	13.53	12.78	0.96	-	-	-	-
	UMR	21	15	13.69	1.36	6	19.34	19.33	0.2
	SLH	15	14.8	13.7	1.49	5	19.76	19.81	0.37
	MMR	08	16.65	13.92	1.93	4	19.57	19.43	0.37
Summer	ILR	59	26.4	25.82	0.58	10	23.5	23.63	1.32
	UMR	63	25.89	25.23	0.53	6	26.05	26.12	0.25
	SLH	49	26.5	25.81	0.66	5	27.5	27.56	0.43
	MMR	31	27.44	26.32	0.87	4	27.45	27.55	1.99
Fall	ILR	10	7.7	7.77	1.96	5	22.26	22.34	0.39
	UMR	14	5.2	5.22	1.73	6	22.39	22.57	0.31
	SLH	10	6.8	6.59	1.72	5	23.37	22.15	1.49
	MMR	8	6.65	6.73	1.89	4	20.39	20.42	0.38

**Figure 14:** Seasonal water temperature averages. Winter 2022 sampling event was missed. All temperature observations were classified as acceptable by criteria used for this study.

## **SUMMARY RESULTS: CHEMICAL CRITERIA**

## Dissolved Oxygen: 2017 - 2022

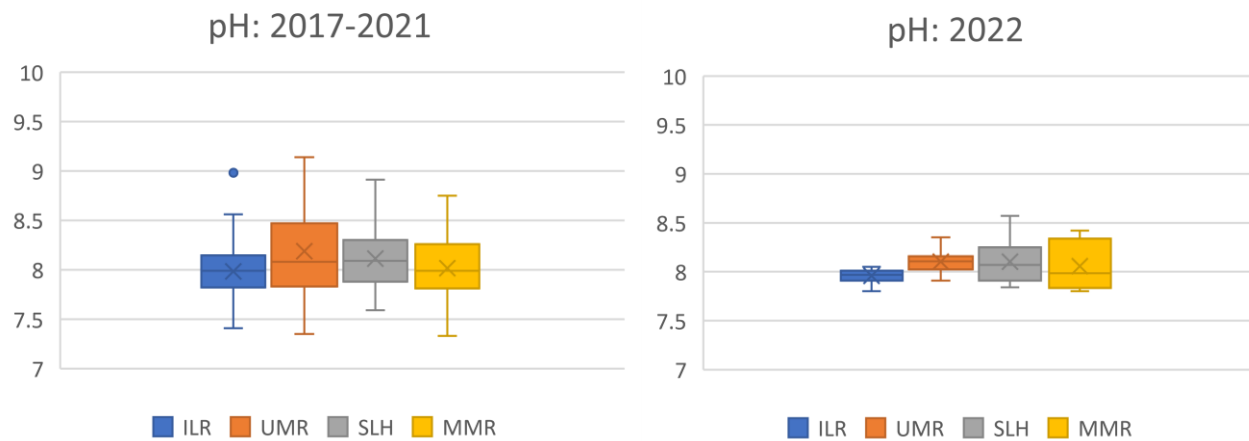


Dissolved Oxygen: 2017 - 2021						Dissolved Oxygen: 2022			
Season	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
Winter	ILR	22	13.44	12.94	0.57	-	-	-	-
	UMR	33	13.64	13.49	0.35	-	-	-	-
	SLH	25	13.08	13.14	0.38	-	-	-	-
	MMR	16	12.9	13	0.24	-	-	-	-
Spring	ILR	17	9.62	9.52	0.52	-	-	-	-
	UMR	24	10.99	10.46	0.59	6	8.28	8.17	0.21
	SLH	14	9.6	10.03	0.68	5	7.13	7.16	0.28
	MMR	8	9.45	9.42	0.61	4	6.83	6.92	0.2
Summer	ILR	59	6.14	6.07	0.33	10	7.3	7.4	0.24
	UMR	74	7.65	7.76	0.27	6	8.8	8.77	0.32
	SLH	48	6.92	6.96	0.28	5	8.24	8.35	0.32
	MMR	31	6.46	6.69	0.2	4	7.39	7.48	0.31
Fall	ILR	10	11.31	11.32	0.62	5	7.68	7.48	0.32
	UMR	17	12.53	12.33	0.76	6	8.76	8.91	0.55
	SLH	10	12.35	12.28	0.28	3	9.24	9.23	0.02
	MMR	8	12.28	12.08	0.39	-	-	-	-

**Figure 15:** All values reported for dissolved oxygen during 2022 were within the acceptable criteria used in this study (> 5 mg/L). No data for winter, 2022.



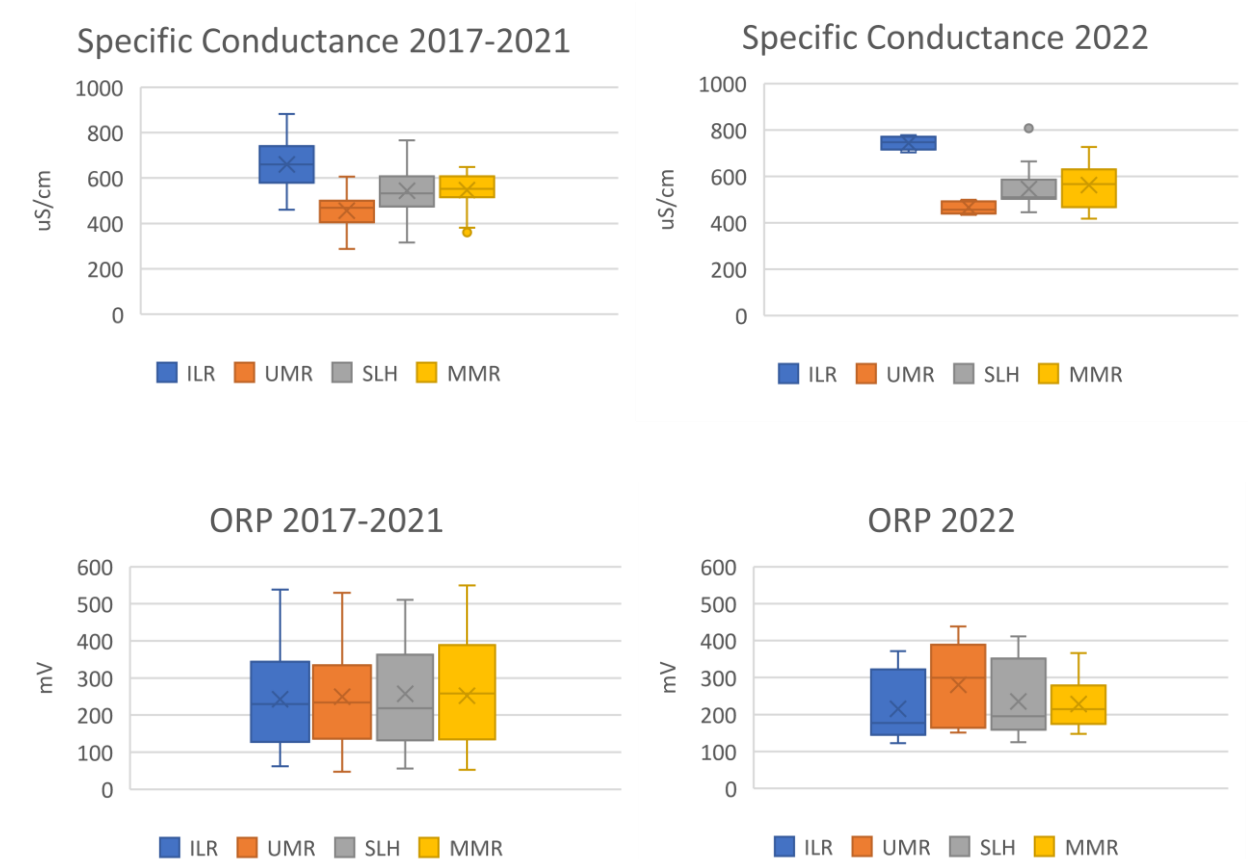
## Seasonal Potential of Hydrogen (pH): 2017 - 2022



pH: 2017-2021					pH: 2022			
Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
ILR	108	7.99	7.98	0.05	15	7.97	7.96	0.03
UMR	110	8.08	8.19	0.08	18	8.1	8.1	0.05
SLH	98	8.09	8.11	0.06	15	8.07	8.1	0.1
MMR	63	7.99	8.01	0.08	12	7.99	8.06	0.13

**Figure 16:** All values reported for pH during 2022 were within the acceptable criterion used in this study (6.5 – 9.0).

## Specific Conductance and Oxidation Reduction Potential Summary

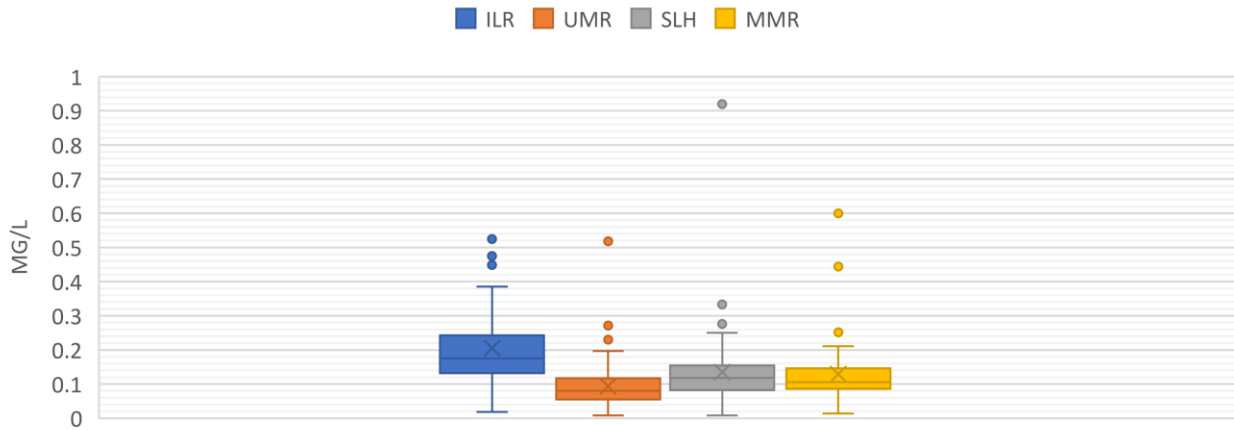


Historical Water Quality: 2017-2021						Water Quality: 2022			
Metric	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
SpCond	ILR	108	660.2	659.53	18.61	15	747.7	743.65	12.42
	UMR	132	469.2	456.01	10.41	18	455.65	465.27	11.25
	SLH	98	533	546.26	19.13	15	510.6	546.03	45.77
	MMR	63	552.6	545.9	17.54	12	566.5	562.13	49.87
ORP	ILR	108	229.3	242.44	23.38	15	177.1	215.61	40.72
	UMR	132	234.15	249.5	22.26	18	299.3	280.03	50.26
	SLH	94	218.8	257.58	26.74	15	195	235.43	47.45
	MMR	63	258.2	252.14	32.24	12	214.75	228.65	38.48

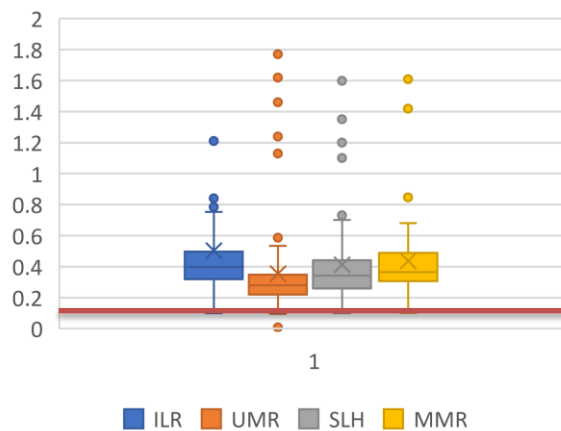
**Figure 17:** Summary data for Specific Conductance (SpCond) and Oxidation Reduction Potential (ORP). Values for SpCond are reported in microsiemens per centimeter at 25°Celsius. Values for ORP are reported in millivolts (mV). This report does not acknowledge a water quality criterion for SpCond or ORP.

## Phosphate Analysis

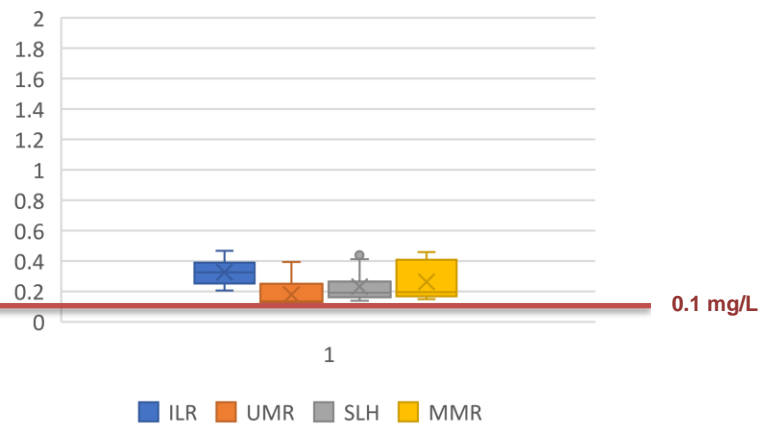
### Orthophosphate: 2017-2021



### Phosphate as Phosphorus: 2017-2021



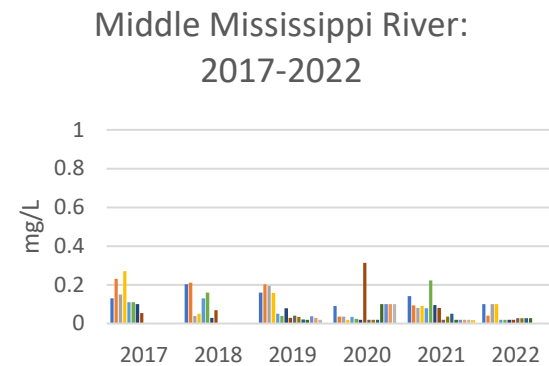
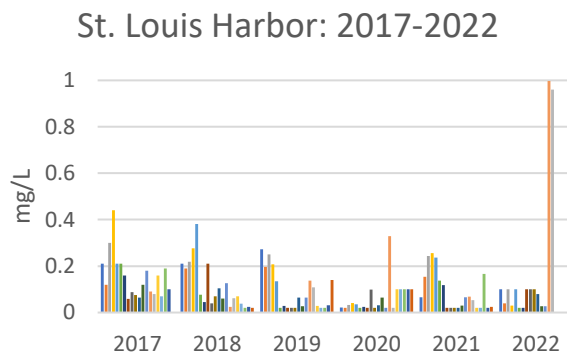
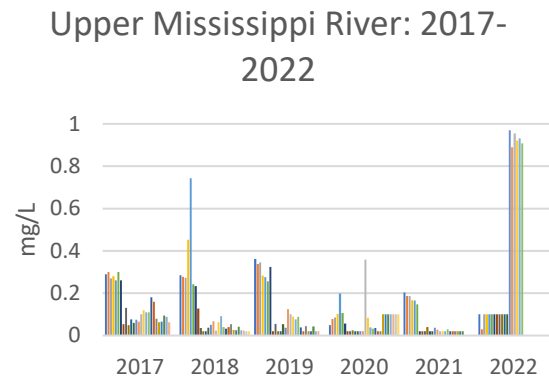
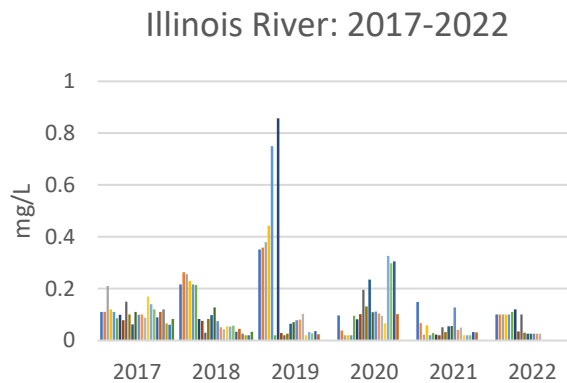
### Phosphate as Phosphorus: 2022



Water Quality Data: 2017-2021						Water Quality Data: 2022			
Metric	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
TP	ILR	108	0.4	0.5	0.09	15	0.33	0.33	0.04
	UMR	132	0.28	0.35	0.32	18	0.13	0.23	0.04
	SLH	99	0.34	0.41	0.05	15	0.19	0.23	0.05
	MMR	51	0.37	0.44	0.07	13	0.2	0.26	0.07
PO4-P	ILR	88	0.18	0.21	0.02	-	-	-	-
	UMR	114	0.08	0.09	0.01	-	-	-	-
	SLH	84	0.19	0.13	0.02	-	-	-	-
	MMR	51	0.11	0.13	0.02	-	-	-	-

**Figure 18:** The mean value for total phosphorus in 2022 exceeded the proposed criterion of 0.1 mg/L at all river segments ( $p < 0.05$ ). This study does not acknowledge a water quality criterion for orthophosphate.

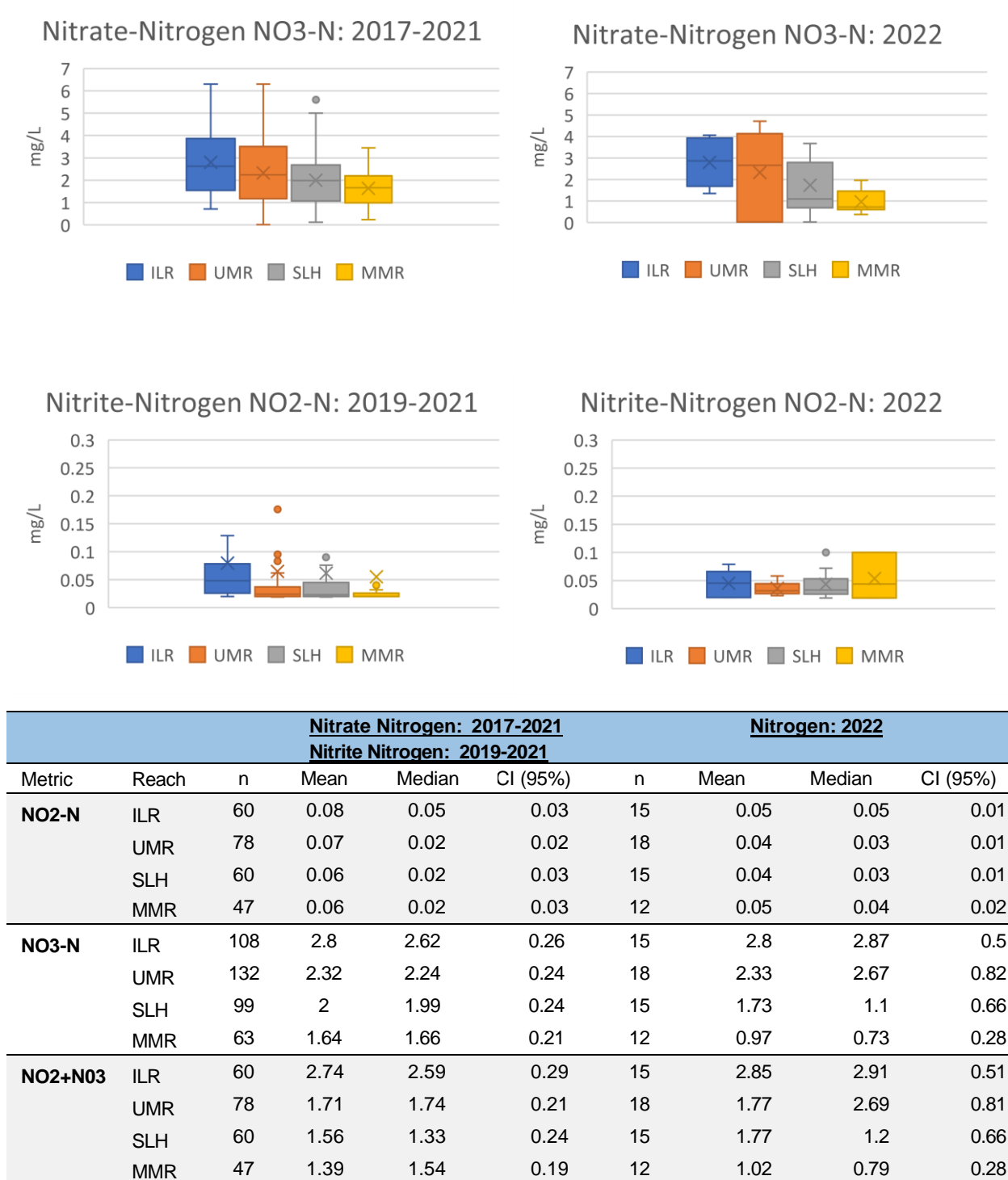
## Total Ammonia Nitrogen (NH<sub>3</sub> + NH<sub>4</sub>)



		Total Ammonia Nitrogen: 2017-2021				Total Ammonia Nitrogen: 2022			
Season	Reach	n	Mean	Median	CI (95%)	n	Mean	Median	CI (95%)
Winter	ILR	22	0.21	0.21	0.07	-	-	-	-
	UMR	27	0.24	0.23	0.05	-	-	-	-
	SLH	25	0.19	0.21	0.04	-	-	-	-
	MMR	16	0.13	0.14	0.03	-	-	-	-
Spring	ILR	17	0.1	0.1	0.02	-	-	-	-
	UMR	27	0.04	0.02	0.02	6	0.09	0.01	0.02
	SLH	15	0.08	0.04	0.03	5	0.07	0.01	0.03
	MMR	8	0.08	0.06	0.06	10	0.09	0.01	0.03
Summer	ILR	59	0.1	0.06	0.05	10	0.09	0.01	0.02
	UMR	51	0.04	0.03	0.01	6	0.1	0.1	0
	SLH	49	0.07	0.06	0.02	5	0.07	0.1	0.03
	MMR	31	0.07	0.04	0.02	4	0.02	0.02	0
Fall	ILR	10	0.12	0.05	0.08	5	0.03	0.03	0
	UMR	14	0.07	0.07	0.03	6	0.93	0.08	0.02
	SLH	10	0.07	.01	0.03	5	0.42	0.08	0.4
	MMR	8	0.06	0.07	0.03	4	0.03	0.03	0

**Figure 19:** Total Ammonia Nitrogen (TAN) is evaluated using EPA Aquatic Life Ambient Water Quality Criteria for Ammonia - Freshwater (EPA 2013). All 2022 measurements for TAN were below EPA threshold criteria.

## Nitrate and Nitrate Nitrogen Summary

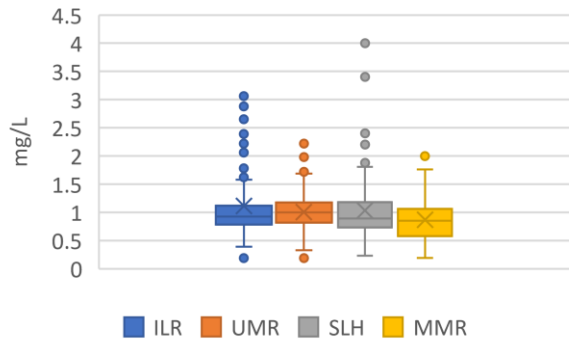


**Figure 20:** Nitrate (NO<sub>3</sub>-N) was collected at all river segments during the historical reference period. Both Illinois and Missouri recommend NO<sub>3</sub>-N not exceed 10 mg/L (human health criteria). Collection of nitrite (NO<sub>2</sub>-N) began in 2019. This study does not identify specific water quality criteria for NO<sub>2</sub>-N.

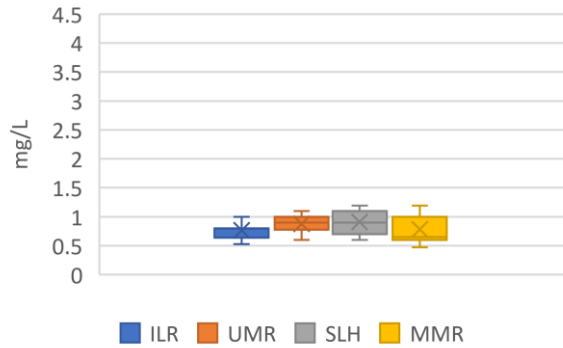


## Total Kjeldahl Nitrogen and Total Nitrogen Summary

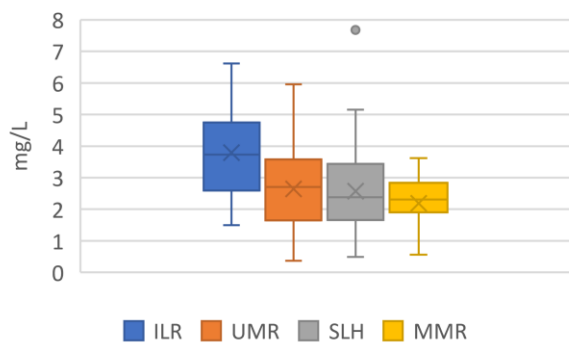
Total Kjeldahl Nitrogen: 2017-2021



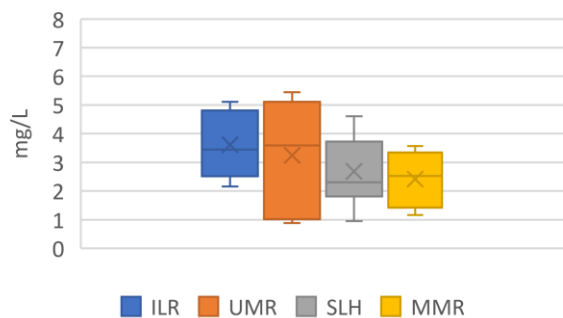
Total Kjeldahl Nitrogen: 2022



Total Nitrogen: 2019-2022



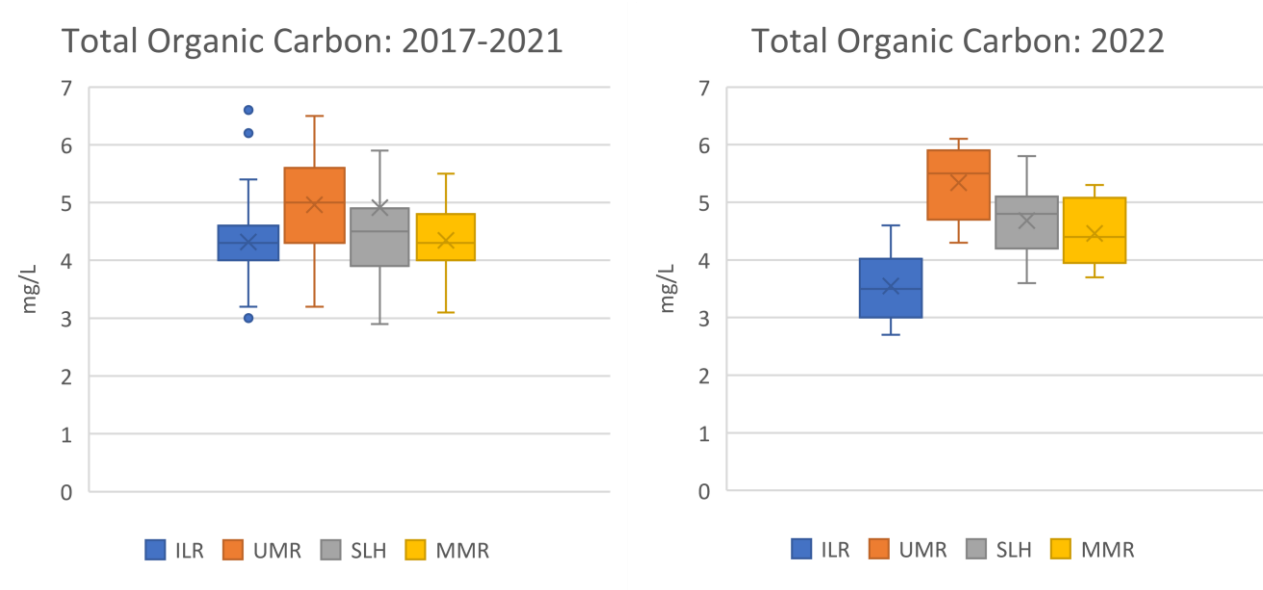
Total Nitrogen: 2022



Total Kjeldahl Nitrogen: 2017-2021						Nitrogen: 2022			
Total Nitrogen: 2019-2021									
Metric	Reach	n	Mean	Median	CI (95%)	n	Mean	Median	CI (95%)
TKN	ILR	96	1.12	0.92	0.12	15	0.77	0.79	0.07
	UMR	132	1.0	1.0	0.06	19	0.87	0.9	0.07
	SLH	99	1.03	0.89	0.11	15	0.91	0.9	0.1
	MMR	63	0.87	0.85	1.96	12	0.78	0.65	0.13
TN	ILR	60	3.78	3.73	0.35	15	3.61	3.45	0.52
	UMR	78	2.64	2.71	0.25	18	3.24	3.59	0.8
	SLH	60	2.57	2.38	0.31	15	2.68	2.3	0.6
	MMR	47	2.19	2.31	0.24	12	2.42	2.53	0.5

**Figure 21:** Total Nitrogen (TN) is derived from the sum of NO<sub>2</sub>-N, NO<sub>3</sub>-N, and TKN. Based on literature review and guidance from the USEPA. This study recognizes an acceptable range for TN as 2 mg/L to 6 mg/L (aquatic life criteria). This study does not acknowledge a criterion for Total Kjeldahl Nitrogen (TKN).

## Total Organic Carbon (TOC)

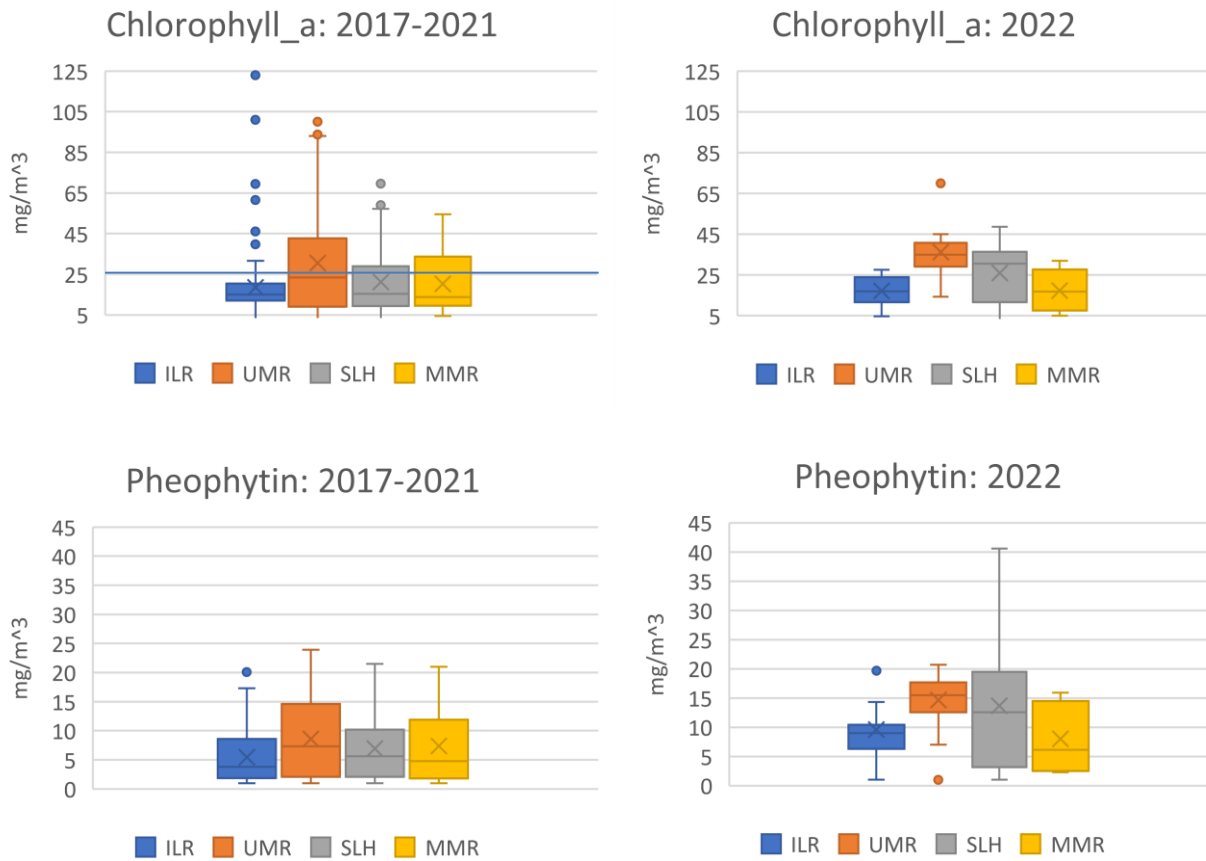


Total Organic Carbon: 2017-2021						Total Organic Carbon: 2022			
Metric	Reach	n	Mean	Median	CI (95%)	n	Mean	Median	CI (95%)
TOC	ILR	108	4.32	4.3	0.1	15	3.55	3.5	0.3
	UMR	132	4.96	5	0.12	18	5.34	5.5	0.26
	SLH	98	4.45	4.45	0.14	15	4.68	4.8	0.33
	MMR	63	4.34	4.3	0.13	12	4.46	4.4	0.29

**Figure 22:** This study does not acknowledge a criterion for Total Organic Carbon (TOC).

## **SUMMARY RESULTS: BIOLOGICAL CRITERIA**

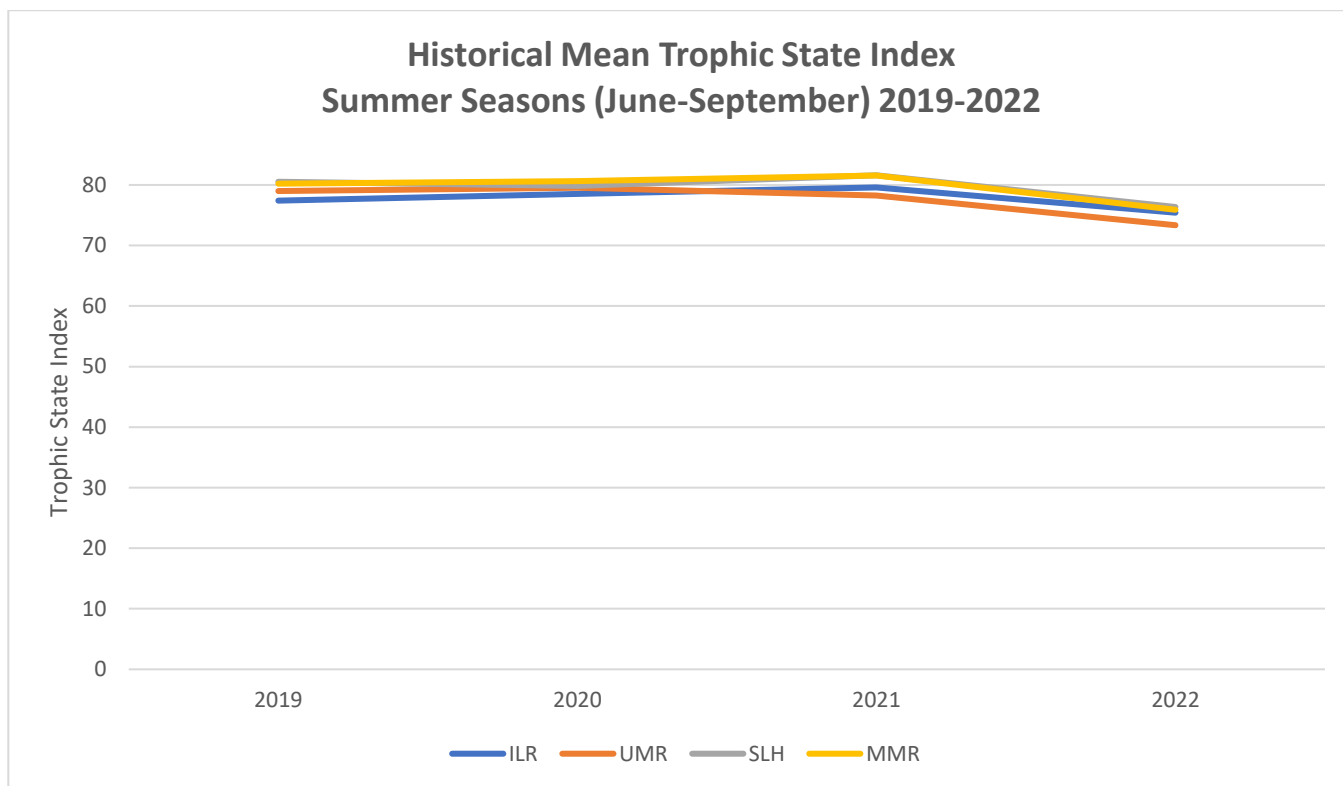
## Chlorophyll a and Pheophytin Summary



Water Quality Data: 2017-2021						Water Quality Data: 2022			
Metric	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
<b>CHLa</b>	ILR	108	15.05	18.51	3.07	15	17.1	17.12	3.32
	UMR	132	23.35	30.44	4.36	18	35	36.16	5.08
	SLH	99	15.4	21.26	3.11	12	30.5	25.93	8.29
	MMR	63	13.7	20.26	3.33	8	16.9	17.39	6.98
<b>Pheo</b>	ILR	108	3.8	5.42	0.81	15	9	9.61	2.58
	UMR	131	7.3	8.61	1.09	18	15.45	14.63	2.21
	SLH	99	5.8	6.95	1.08	12	12.55	13.64	6.37
	MMR	63	3.30	7.37	1.49	8	6.14	8.03	3.96

**Figure 23:** Chlorophyll\_a (CHLa) and Pheophytin summary data. This study recognizes an acceptable standard for CHLa as 25 mg/m<sup>3</sup>. There were no criteria used for evaluating Pheophytin.

## Trophic State Index



**Figure 24:** Historical Mean Trophic State Index, Summer Seasons 2019-2022. While TSI does decrease for 2022, substantially less samples were obtained.

Historical Mean Trophic State Index Data: 2019-2022									
	Reach	n	2019	n	2020	n	2021	n	2022
TSI	ILR	20	77.42	20	78.52	20	79.59	15	75.42
	UMR	26	78.98	28	79.54	24	78.26	18	73.35
	SLH	20	80.55	20	79.85	20	81.6	12	76.36
	MMR	15	80.21	16	80.65	16	81.56	8	75.9

TSI	Trophic Condition
0-40	Oligotrophic
46-50	Mesotrophic
50-70	Eutrophic
70-100	Hypereutrophic



## Trophic State Index

<u>State</u>	<u>Description</u>	<u>Chla</u>	<u>TP</u>	<u>Turb</u>
<i>Oligotrophic</i>	<i>Clear water and oxygenated hypolimnion throughout the year, minimal primary production.</i>	<i>Less than 2.5mg/m<sup>3</sup></i>	<i>Less than 0.01mg/L</i>	<i>Less than 1.0 FNU</i>
<i>Mesotrophic</i>	<i>Moderately clear water, but increasing probability of anoxia during the summer, increased primary production.</i>	<i>2.5-8.0mg/m<sup>3</sup></i>	<i>0.01 – 0.08mg/L</i>	<i>1.0-12 FNU</i>
<i>Eutrophic</i>	<i>Decreased transparency, anoxic summer hypolimnion, extensive macrophyte and algal production, warm water fishery.</i>	<i>8.0-25.0mg/m<sup>3</sup></i>	<i>0.08-0.10mg/L</i>	<i>12 – 25.0 FNU</i>
<i>Hypereutrophic</i>	<i>Turbid water, anoxic hypolimnion, frequent algal blooms, few macrophytes, fish kills during summer.</i>	<i>Greater than 25.0mg/m<sup>3</sup></i>	<i>Greater than 0.10mg/L</i>	<i>Greater than 25.0 FNU</i>

## DISCUSSION: WATER QUALITY

Water quality metrics assessed by CEMVS can be sporadic and highly variable from year to year, therefore long-term data collection using consistent and comparable methodology is critical to identify trends and patterns. This is particularly important for evaluating conditions in 2019 which were influenced by historical flooding at a regional scale. The Mississippi River at Saint Louis spent 126 days above flood stage (30'), which shattered the previous record of 104 days set in 1993.

Total Suspended Solids (TSS) were a concern throughout the 2018-2021 data set. Particularly high levels were observed on the Middle Mississippi River (MMR) during the 2019 winter sampling event (week of March 10; Figure 13), which took place during the buildup of the 2019 flood event. Total suspended solids did descend to ordinary levels during all three 2022 sampling events. As previously discussed, suspended solids are of high concern because they impact physical (e.g. temperature, light penetration), chemical (e.g. nutrients, trace metals, dissolved oxygen) and biological (e.g. habitat, photosynthesis) properties of aquatic ecosystems.

Total phosphorus (TP) levels were a major concern during the 2022 sampling season. The mean value for Total Phosphorus in 2022 exceeded the proposed criterion of 0.10 mg/L at all river segments during all three sampling events (n=63). High TP loads can greatly contribute to the development of Harmful Algal Blooms (HAB's) as well as cause the depletion of Dissolved Oxygen (DO) during respiration and decaying processes. Particularly high amounts of TP (greater than 0.4 mg/L) were observed in the spring sampling period on the Mississippi River and the fall sampling period on the Illinois river.

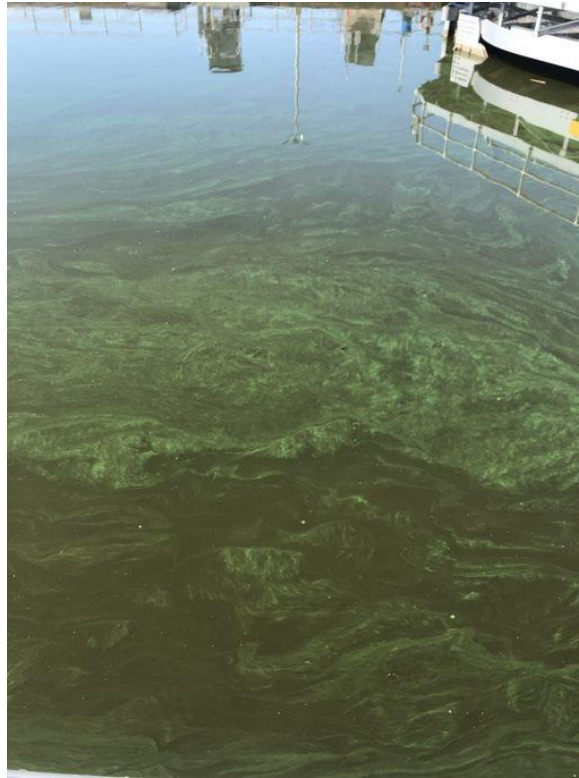
Concentrations for Chl\_a observed on the Upper Mississippi River (UMR) reach during 2022 were relatively high when compared to historical reference data. Average annual Chl\_a content increased from 23.81 mg/m<sup>3</sup> to 29.2 mg/m<sup>3</sup> from 2021 to 2022. Although neither the state of Illinois nor Missouri have numerical criteria designated for Chl\_a in streams, this study recognizes values exceeding 25 mg/m<sup>3</sup> having the potential for stimulating HAB's and decrease levels of DO.

All remaining parameters evaluated during the 2022 water quality monitoring effort were within designated criteria or within historical reference norms.

It is imperative that the United States Army Corps of Engineers Saint Louis District continues to build a reliable and robust water quality monitoring program in order to accurately evaluate how its civil projects may be affecting water resources on our rivers within our area of responsibility. This is particularly important as we enter a new era of increased frequencies and severity of Harmful Algal Blooms (HAB's) in U.S. waters.

On June 15, 2021, a large HAB occurred at Starved Rock Lock and Dam in Ottawa, IL (USGS, 2021). Ottawa, IL is approximately 150 miles north of the St. Louis District area

of responsibility on the Illinois River. When harmful algal blooms occur, they produce extremely dangerous toxins that can sicken or kill people and animals, create dead zones in the water, hinder ability to treat drinking water, increase costs for clean water as well as severely impact industries that depend on clean water (USEPA, 2022).



*Figure 25: HAB at Starved Rock Lock and Dam (#6), Illinois River (USGS, 2021)*

This report identifies 3 concerns based on the water quality data collected from 2017-2022: (1) Total Suspended Solids (TSS), (2) Total Phosphorus (TP), and (3) Chlorophyll\_a (Chl\_a). High concentrations of these factors under the right conditions can directly contribute to the occurrence of HAB's. Figure 24 displays averages for the Trophic Level Index for all rivers within the area of responsibility. All river segments are in the hypereutrophic state, which presents the highest risk for HAB development. High agricultural and industrial activities within our area of responsibility as well as areas upstream are key contributors to these water quality concerns.

Regular and recurring water quality monitoring data is necessary in order to detect early indicators of degraded river systems within our area of responsibility and mitigate potential water quality and human health risks when possible. This program continues to be a valuable asset to internal and external stakeholders that rely on this information. A robust river water quality program continues to prove vital to accomplish our mission of maintaining a proper and healthy balance of the varying uses of the heartland's waterways.

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## **APPENDIX A: 2022 DREDGE MATERIAL EVALUATION UPDATE**

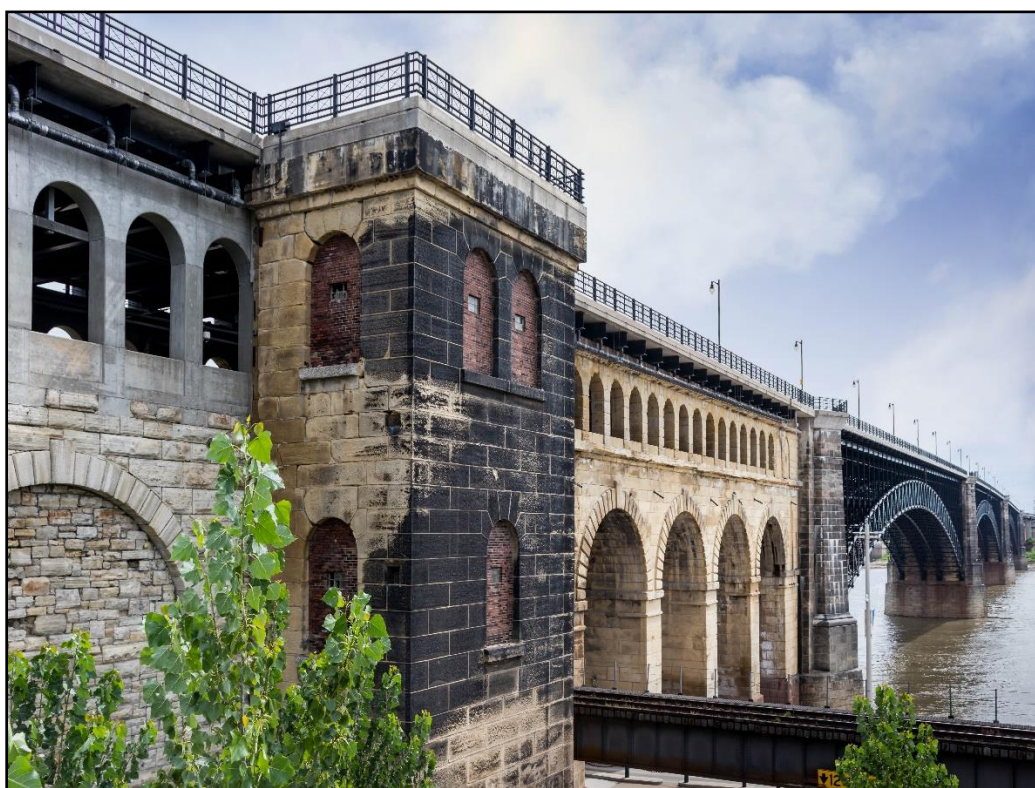


## **2022 Dredge Material Evaluation Update**

**U.S. Army Corps of Engineers  
Saint Louis District**

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### **Dredge Materials Evaluated for Channel Maintenance Mississippi and Illinois Rivers: 2017-2022**



Prepared by:  
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United States Army Corps of Engineers  
100 Arsenal Street  
Saint Louis Missouri 63118

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## **Dredge Materials Evaluated for Channel Maintenance Mississippi and Illinois Rivers: 2017-2022**

The Corps of Engineers Saint Louis Districts Environmental Quality & HTRW Section (CEMVS-EC-EQ) is responsible for ensuring dredge material discharged into waters of the United States are compliant with state and federal regulations. This effort is guided by EPA-823-B-98-004 (EPA, 1998), EM 1110-2-5025 (USACE, 2015), and Federal and State Clean Water Act 401 permitting regulations. In general, these documents describe the chemical, physical, and biological impacts of dredge material disposal on the water column and benthic aquatic life.

**Water column impacts** are commonly assessed by comparing contaminants released in a representative elutriate of sediment with applicable water quality criteria or standards. In addition, acute water column toxicity bioassays considering initial mixing may be needed. For disposal operations under the Clean Water Act, water quality and water column toxicity standards and allowances for initial mixing are specified by the state agencies as a part of the Section 401 Water-quality Certification requirements.

**Benthic impacts** from dredging are evaluated from the standpoint of toxicity and bioaccumulation, which is the accumulation of contaminants in the tissues of organisms through any route, including respiration, ingestion, or direct contact with contaminated dredged material. Both Missouri and Illinois' current 303(d) Lists are reviewed to determine what potential contaminants may occur in sediments within the geographic scope of dredging operations.

### **Grain Size Analysis**

A grain-size analysis defines the frequency distribution of particle size ranges that make up bed sediment. The general size classes of gravel, sand, and fine-silt are useful in describing the size distribution of particles in dredge-material. For consistency with other Corps districts, the Saint Louis District follows the Unified Soil Classification System to classify bed sediment.

A total of 207 sediment samples were collected from the Upper Mississippi River (UMR) and Lower Mississippi River (LMR) between 2017-2022, all of which were classified as Clean Poorly Graded Sand. A total of 88 sediment samples were collected from the Illinois River (ILR) between 2017-2022, 81 of which were classified as Clean Poorly Graded Sand or Sand-Silt mixtures, and eight were classified as Fine-Silt. Lastly, a total of 21 sediment samples were collected within Lock and Dam Projects (L&D) between 2017-2022, three of which were classified as Sand-Silt mixtures, and 18 were classified as Fine-Silt.

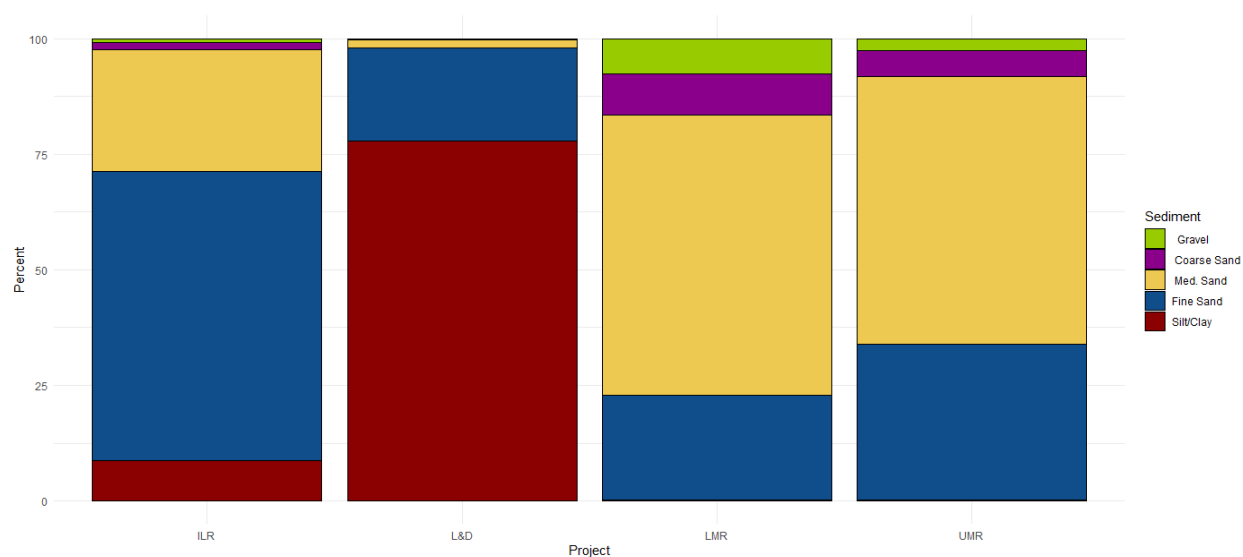


Figure 1: Grain size distribution of sediments collected from the Illinois River (ILR), Lower Mississippi River (LMR), Upper Mississippi River (UMR), and Lock and Dam Projects (L&D).

Organic and inorganic contaminants are more likely to occur in sediments classified as Fine-Silt. As such, sediments containing a high percentage of fine material are flagged for additional evaluations. If the particle size analysis shows 20% or greater passage of material through a #230 US sieve, chemical constituent testing of sediment is required to determine whether the sediment contains significant levels of material which are toxic to the environment.

### Bulk Sediment Analysis

Chemical analysis of bulk sediments is conducted at reoccurring locations and dredge cuts where Fine-Silt sediments exceed 20% of total composition. Parameters analyzed are those currently and historically registered on Missouri and Illinois 303d List. From 2017-2022 this included Lead, Zinc, Mercury, and Polychlorinated Biphenyls. A decision to classify a sediment as being contaminated based on the result of laboratory analysis was guided by USEPA Threshold Criteria for Aquatic Life.

Lead, Zinc, and Mercury were measured in 53 sediment samples between 2017-2022. All measurements for Lead were below the USEPAs Threshold Criteria for Aquatic Life (**Error! Reference source not found.**). One elevated measurement for Zinc was observed in the Chain of Rocks Canal, however, the sample collected was outside of historical dredge cuts. One elevated measurement for Mercury was observed towards the upper end of the Kaskaskia River dredge cut. Material dredged in the upper Kaskaskia dredge cut is discharged into an upland disposal facility.

Polychlorinated Biphenyls were only evaluated for 19 sediment samples, whose fraction of fine material exceeded 20%. All measurements of Polychlorinated Biphenyls were below laboratory method detection limits.

Table 1: Summary of inorganic metals observed in sediment samples collected between 2017 – 2022. Unified Soil Classification System (USCS) list the dominant sediment type for each project.

Project	USCS	Lead		Zinc		Mercury	
		Average	Max	Average	Max	Average	Max
Illinois River	SP-SM	3.75	10.40	21.19	60.90	0.05	0.10
Lock & Dams	ML	11.24	16.20	56.22	84.30	0.15	0.90
Lower Mississippi River	SP	4.18	19.00	20.95	125.00	0.05	0.09
Upper Mississippi River	SP	2.37	3.64	12.16	18.70	0.04	0.08

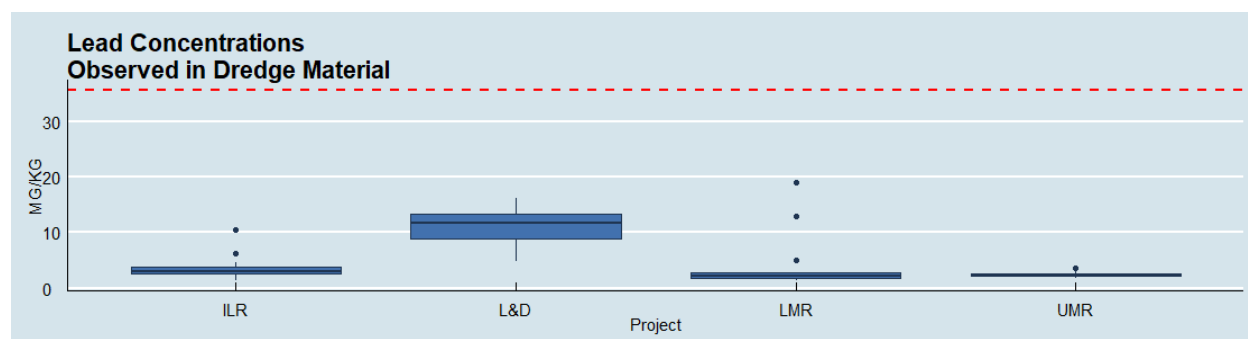


Figure 2: Lead concentrations observed in collected sediment samples. Red dashed line at 35.8 mg/kg represents USEPA Threshold Criteria for Aquatic Life.

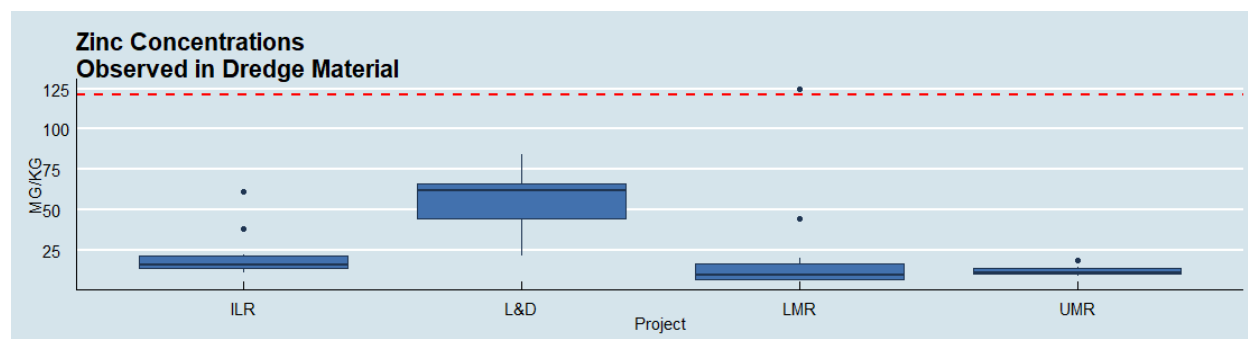


Figure 3: Zinc concentrations observed in collected sediment samples. Red dashed line at 121 mg/kg represents USEPA Threshold Criteria for Aquatic Life.

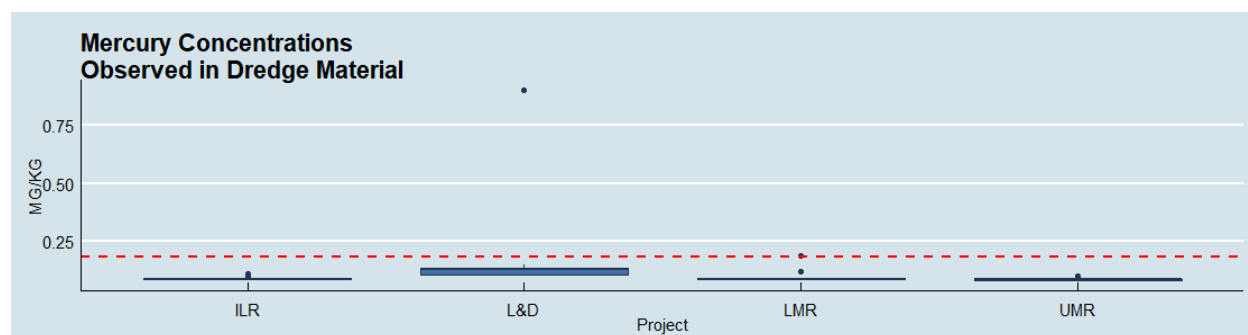


Figure 4: Mercury concentrations observed in collected sediment samples. Red dashed line at 0.18 mg/kg represents USEPA Threshold Criteria for Aquatic Life.

## Illinois Supernatant Test

The Illinois Supernatant Test for non-settleable solids (Standard Methods, 2018) is a modified elutriate test designed to simulate the release of dissolved constituents into a receiving water column during open-water disposal. In summary, the test is performed by mixing one part of sediment with four parts of water (ratio typically observed in dredge pipe discharge), the mixture is then agitated for 30 minutes, and settled in an Imhoff settling cone for four hours. Following the four-hour settling time, a supernatant is obtained by extracting a sufficient volume from the approximate mid-point between the top of the water and the sediment-water interface using a pipette.

During the 2022 dredge season, USACE identified four areas associated with Lock & Dam Projects where elutriate testing was warranted due to large volumes of fine sediments. These areas included the lower end of Lock & Dam 26, the upper and lower ends of the Chain or Rocks Canal, and a 0.5 mile stretch below the Kaskaskia Lock and Dam. Water quality parameters evaluated included Lead, Zinc, Total Ammonia as Nitrogen (TAN), Total Suspended Solids (TSS), and Volatile Suspended Solids (TVS).

Table 2: Illinois Supernatant Test results for dissolved Lead (Pb), Zinc (Zn), and Total Ammonia as Nitrogen (TAN), Total Suspended Solids (TSS), and Total Volatile Solids (TVS). All results are reported in mg/L.

Site ID	Pb	Zn	TAN	TSS	TVS
Mel Price Lower Approach (RM 200.5)	0.005	0.015	6.79	123	16
Mel Price Lower Approach (RM 200.4)	0.009	0.032	7.24	263	32
<b>Mel Price Lower Approach (AVG)</b>	<b>0.007</b>	<b>0.024</b>	<b>7.02</b>	<b>193</b>	<b>24</b>
Upper Chain of Rocks (RM 194.0)	0.010	0.030	6.99	226	27
Upper Chain of Rocks (RM 193.8)	0.011	0.038	7.29	291	35
Upper Chain of Rocks (RM 193.6)	0.007	0.020	10.30	168	22
<b>Upper Chain of Rocks (AVG)</b>	<b>0.009</b>	<b>0.029</b>	<b>8.19</b>	<b>228</b>	<b>28</b>
Lower Chain of Rocks (RM 184.4)	0.005	0.014	5.480	105	16
Lower Chain of Rocks (RM 184.2)	0.006	0.015	6.340	91	12
<b>Lower Chain of Rocks (AVG)</b>	<b>0.005</b>	<b>0.015</b>	<b>5.91</b>	<b>98</b>	<b>14</b>
Kaskaskia River (RM 0.1)	0.010	0.054	1.74	183	21
Kaskaskia River (RM 0.2)*	0.015	0.069	2.53	391	45
Kaskaskia River (RM 0.3)*	0.010	0.046	2.38	321	33
Kaskaskia River (RM 0.4)*	0.006	0.027	2.78	202	24
Kaskaskia River (RM 0.5)*	0.007	0.033	2.91	223	28
<b>Kaskaskia River (AVG)</b>	<b>0.01</b>	<b>0.05</b>	<b>2.47</b>	<b>264</b>	<b>30</b>

\*Dredged sediments between Kaskaskia River Miles 0.2 -0.5 are discharged into an upland disposal facility.

The toxicity of lead and zinc, as it relates to aquatic life, is dependent on water hardness. In general, water hardness for the study area is 162.2 ppm (CaCO<sub>3</sub>). Using the USEPA's Criterion Maximum Concentration equations for dissolved metals, it was determined that concentrations for lead and zinc should not exceed 0.11 mg/L and 0.18



mg/L respectively. Therefore, it is concluded that impacts to water quality caused by lead and zinc would be of low risk.

The toxicity of TAN, as it relates to aquatic life, is dependent on water pH, temperature, and presence of unionid mussels. In general, water pH for the study area is 7.8 (USACE unpublished data). Water temperature varies vastly by season, however reported averages are approximately 15 degrees Celsius (USACE unpublished data). Lastly, presence of unionid mussels is relatively sparse for the areas being evaluated. Using the general information for pH, temperature, sparse presence of unionid mussels, and the USEPAs Criterion Maximum Concentration table for TAN, it was determined that TAN concentrations should not exceed 13 mg/L. Therefore, it is concluded that impacts to water quality caused by TAN would be of low risk.

There are no Federal or local numerical criteria published for TSS or TVS as it relates to aquatic life. A conservative measure of comparison would be to compare results from the Supernatant Test with concentrations commonly observed within the study area. The average TSS and TVS values reported by USACE between 2012 – 2018 within the Middle Mississippi River were 135 mg/L and 11.94 mg/L respectively (USACE unpublished data). Therefore, we conclude that TSS and TVS concentrations discharged during dredging activities likely exceed natural flowing concentrations.

### **Summary and Conclusions**

Over 90% of sediments dredged by CEMVS for navigable servitude are classified as Clean Poorly Graded Sand. Sediments of this classification are associated with rapid settling times and have a lessor reactivity with inorganic contaminants. The later statement is supported by bulk sediment samples evaluated for metals commonly reported within the region (MODNR and ILEPA 303d List published between 2000-2022). Polychlorinated Biphenyl's are the only organic contaminants routinely analyzed, however, there have been no measurements which have exceeded laboratory detection limits.

Isolated concentrations of fine sediments frequently occur near Lock & Dam projects and sporadically within the Illinois River where flow is minimal. To better understand the impacts fine sediment cause while dredging, CEMVS performs a Supernatant Test to characterize discharged material. Based on a limited number of tests, suspended solids pose a risk to aquatic life within the discharge's immediate vicinity. It should be recognized that the Supernatant Test was designed to characterize material at the point of discharge and does not project dilution once sediments begin to mix in open water.

Dredge monitoring has been recommended as a tool for developing a better understanding of how dredged sediments interact in open water following discharge (National Research Council, 2011). CEMVS began to incorporate dredge monitoring in their dredge management plan during a low water event in 2021. Results indicated that water quality criteria could be met when dredging sediments using mechanical equipment. CEMVS-EC-EQ is currently working on a multi-year dredge monitoring study for the lower 0.5 miles of the Kaskaskia River. It is anticipated that results from

dredge monitoring will allow resource managers to recommend best management practices, which may include, upland disposal, adjustment of sediment to water ratio, decrease rate of discharge, injection of a polymer flocculant, or no additional actions.

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## **APPENDIX B: WATER QUALITY SAMPLING EVENT MEMORANDUMS**

CEMVS-EC-EQ

15 March 2019

MEMORANDUM FOR RECORD

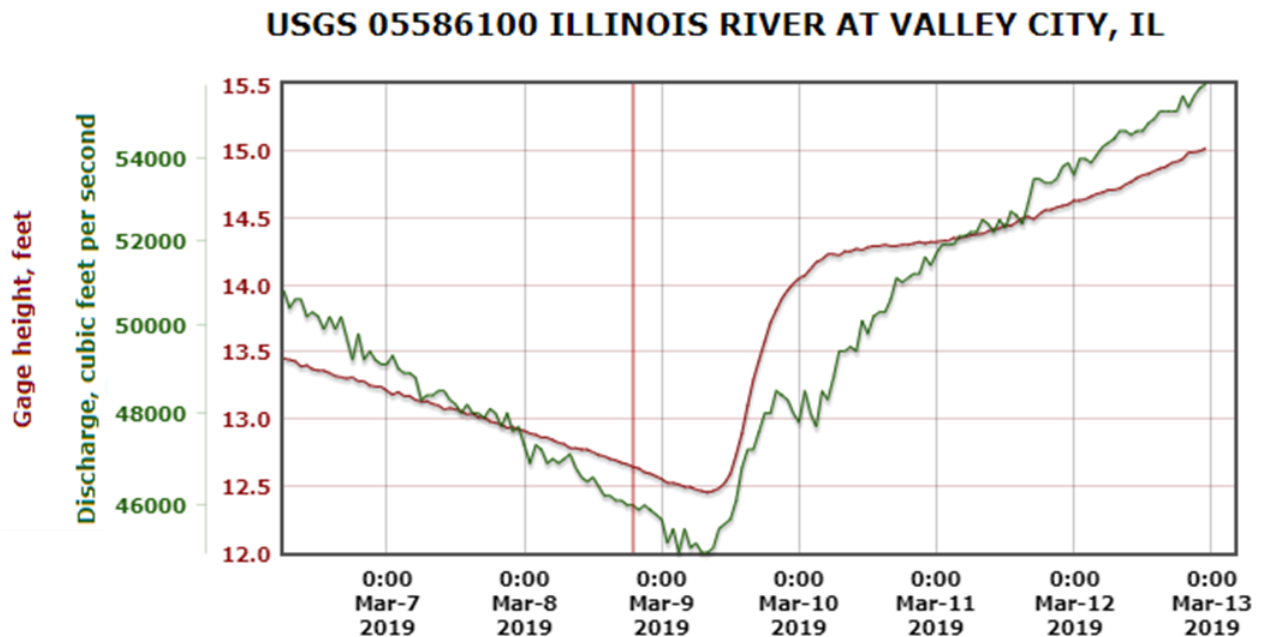
SUBJECT: River Water Quality Sampling (Winter Event 1/4)

**RIVERS WINTER SAMPLING EVENT 1/4**

The first of four 2019 sampling events for the Mississippi and Illinois Rivers took place from 03/11/2019 – 03/13/2019. Rising river levels impeded boat ramp access for several sites, thus those samples were collected from the shoreline. There was a significant rain event leading up to the winter sampling event (03/09/2019) that dropped over an inch of rain across most of the study area.

**ILLINOIS RIVER (RM 0-80)**

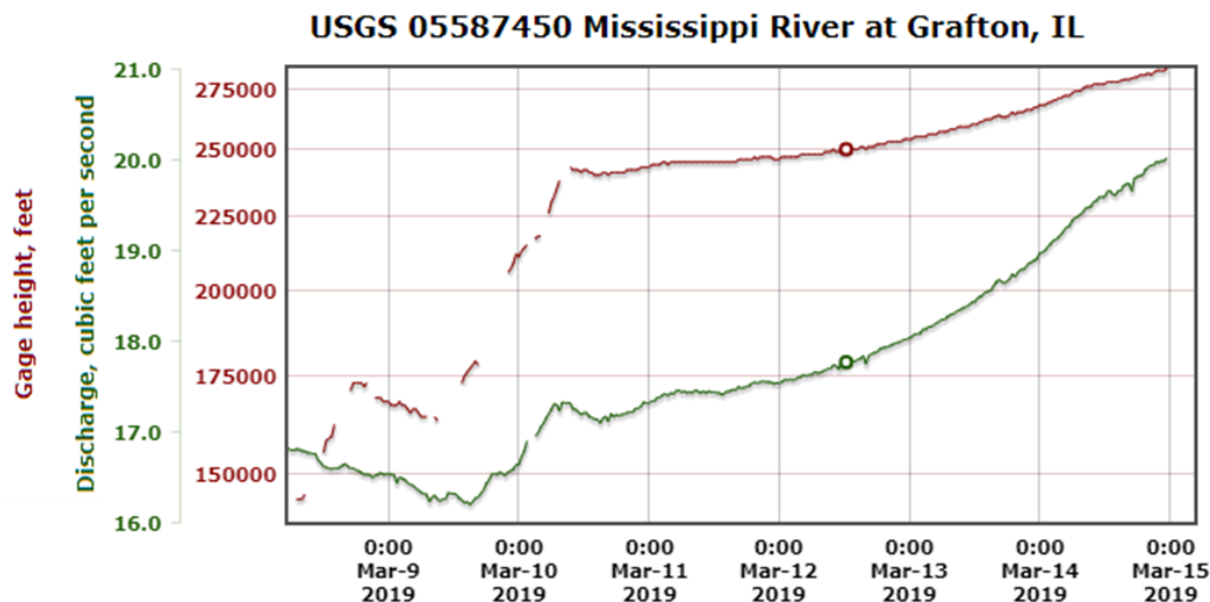
Samples for the ILR were collected on 3/11/2019 by Ben Greeling and Rick Archeski. Samples IL-07 and IL-08 were collected from shore due to flooding on boat ramps.



- IL-02: Date\_3/11/2019 Time\_14:10:00 PM Seechi\_3 inches Depth\_23 feet
- IL-06: Date\_3/11/2019 Time\_13:30:00 PM Seechi\_5 inches Depth\_25 feet
- IL-07: Date\_3/11/2019 Time\_12:50:00 PM Seechi\_ NA inches in Depth\_ NA
- IL-08: Date\_3/11/2019 Time\_12:00:00 PM Seechi\_ NA inches Depth\_ NA
- IL-09: Date\_3/11/2019 Time\_10:50:00 AM Seechi\_5 inches Depth\_32 feet

## UPPER MISSISSIPPI RIVER (RM: 201 – 301)

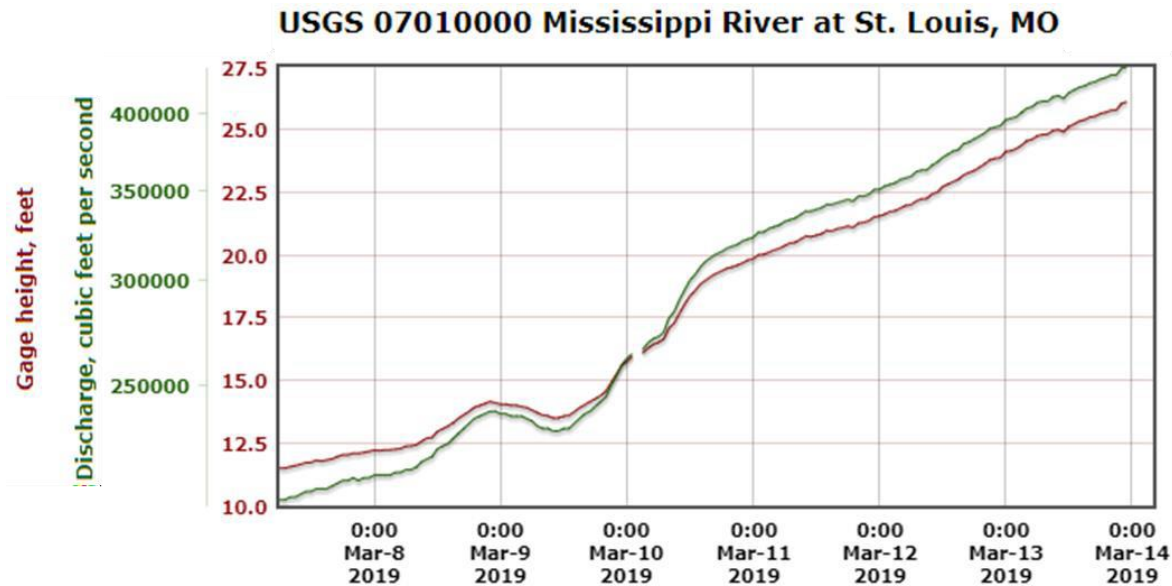
Samples from the Upper Mississippi River were collected on 13 March 2019 by Ben Greeling, Rick Archeski, and Travis Schepker. Samples UMR-5 and UMR-7 were collected from shore due to debris on boat ramps. The remaining UMR sites were collected from the navigation channel. Duplicate sample UMR-15 was collected with UMR-9.



- UMR-5: Date\_3/13/2019 Time\_16:00:00 PM Seechi\_NA inches Depth\_NA feet
- UMR-6: Date\_3/13/2019 Time\_16:45:00 PM Seechi\_6 inches Depth\_35 feet
- UMR-7: Date\_3/13/2019 Time\_15:15:00 PM Seechi\_NA inches Depth\_NA feet
- UMR-LM: Date\_3/13/2019 Time\_14:30:00 PM Seechi\_NA inches Depth\_NA feet
- UMR-9: Date\_3/13/2019 Time\_12:50:00 PM Seechi\_6 inches Depth\_25 feet
  - UMR-15: Duplicate collected with UMR-9
- UMR-LA: Date\_3/13/2019 Time\_12:00:00 PM Seechi\_6 inches Depth\_22 feet
- UMR-DP: Date\_3/13/2019 Time\_10:30:00 AM Seechi\_6 inches Depth\_25 feet

**SAINT LOUIS HARBOR (RM: 161 – 200)**

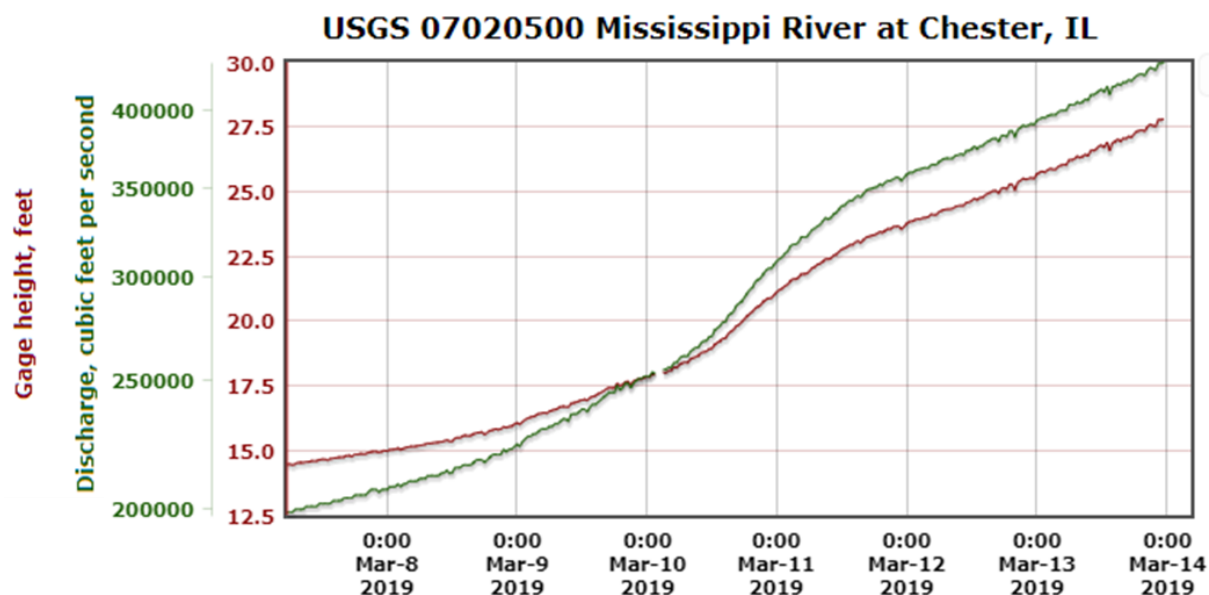
Samples from Saint Louis Harbor were collected on 11 March and 12 March 2019 by Ben Greeling and Travis Schepker. All samples were collected from the navigation channel except UMR-2, which was collected from the service base dredging dock. Duplicate sample SLH-15 was collected with SLH-1.



- UMR-1: Date\_3/11/2019 Time\_17:16:00 PM Seechi\_6 inches Depth\_25 feet
- UMR-2: Date\_3/11/2019 Time\_17:42:00 PM Seechi\_4 inches Depth\_20 feet
- UMR-3: Date\_3/11/2019 Time\_16:30:00 PM Seechi\_6 inches Depth\_47 feet
- SLH-1: Date\_3/12/2019 Time\_15:30:00 PM Seechi\_5 inches Depth\_45 feet
  - SLH-15: Duplicate collected with SLH-1
- SLH-2: Date\_3/12/2019 Time\_16:30:00 PM Seechi\_NA inches Depth\_NA feet
- SLH-3: Date\_3/11/2019 Time\_16:54:00 PM Seechi\_4 inches Depth\_27 feet

**MIDDLE MISSISSIPPI RIVER (RM 0 – 161)**

Samples from the Middle Mississippi River were collected on 12 March 2019 by Ben Greeling and Travis Schepker. Location OPR-3 was collected from the shore line as a result of the boat ramp being covered by large wood debris. The remaining OPR sites were collected from the navigation channel.



- OPR-2: Date\_3/12/2019 Time\_10:46:00 AM Seechi\_4 inches Depth\_40 feet
- OPR-3: Date\_3/12/2019 Time\_09:15:00 AM Seechi\_4 inches Depth\_8 feet
- OPR-4: Date\_3/12/2019 Time\_13:30:00 PM Seechi\_4 inches Depth\_45 feet
- OPR-5: Date\_3/12/2019 Time\_14:30:00 PM Seechi\_4 inches Depth\_45 feet



CEMVS-EC-EQ

11 July 2019

**MEMORANDUM FOR RECORD**

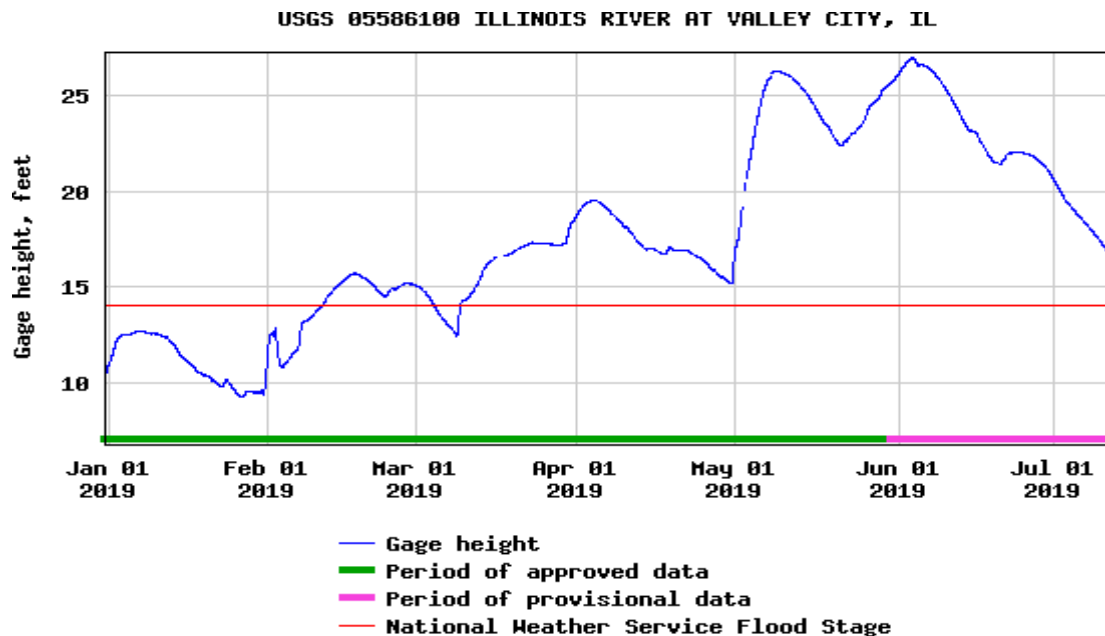
**SUBJECT:** River Water Quality Sampling (Summer Event 2/4)

**RIVERS SUMMER SAMPLING EVENT 2/4**

Historical high water levels have made 2019 water quality sampling in MVS Rivers problematic thus far (See Supplemental Figures). Winter sampling was completed as water levels approached flood stages, and spring samples were not collected resulting from record flooding throughout the region. All samples during this sampling event were collected from land, opposed to a boat in the navigation channel. A goal for this sampling period was to sample near the routine sample locations in areas with adequate flow/current. UMR-7, UMR-LM, and OPR-5 were not sampled since there were not accessible locations to the river that had adequate current/flow.

**ILLINOIS RIVER**

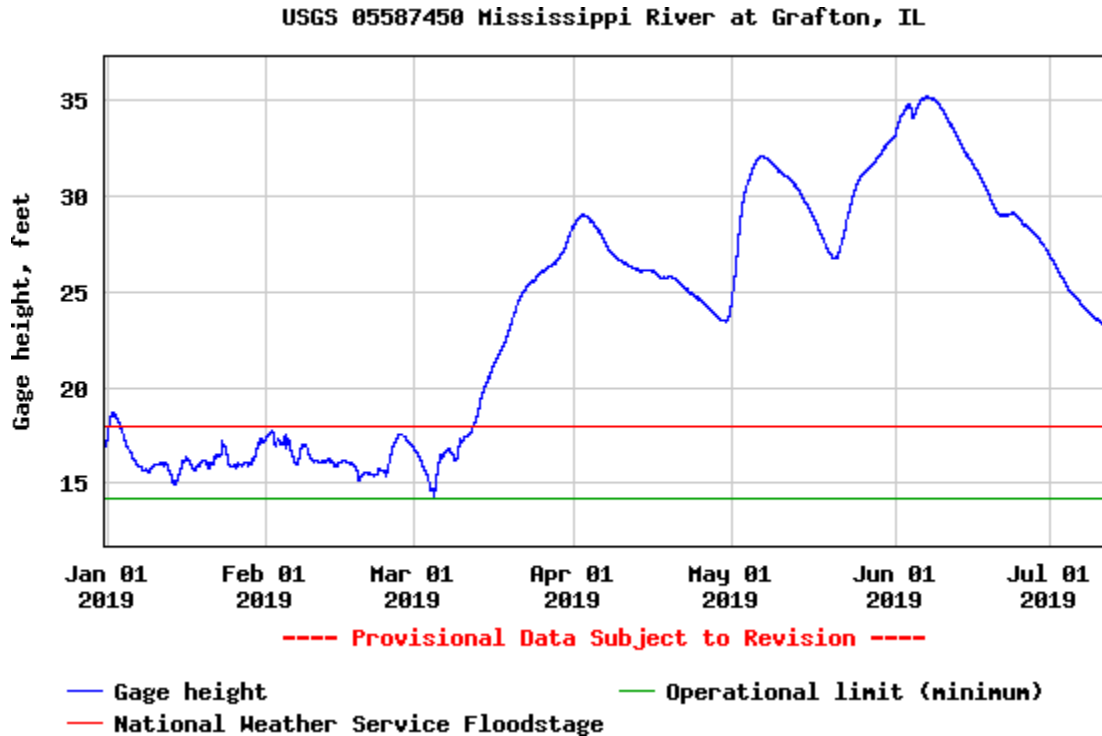
Samples for the ILR were collected on 07/01/2019 by Travis Schepker and Andy Patton. All samples were collected by land in areas with adequate flow. Exact locations are listed below:



- Valley City Station at 1200: Gauge Height 20.65 ft and Discharge 70,000 cfs
  - ILR-2 Time: 1500 Date: 7/01/2019 Collected at Brussels Ferry (38.966983, -90.495172)
  - ILR-6 Time: 1655 Date: 7/01/2019 Collected in Hardin (39.156066, -90.616210)
  - ILR-7 Time: 1736 Date: 7/01/2019 Collected near Kampville (39.306558, -90.611839)
  - ILR-8 Time: 1830 Date: 7/01/2019 Collected above Florence Bridge (39.63271, -90.60918)
  - ILR-9 Time: 1915 Date: 7/01/2019 Collected at regular location

## UPPER MISSISSIPPI RIVER

Samples for UMR were collected on 07/01/2019 and 07/02/2019 by Travis Schepker and Andy Patton. All samples were collected by land in areas with adequate flow. However, UMR-7 and UMR-LM were not collected since there were not accessible locations to the river that had adequate current/flow. Exact locations are listed below:

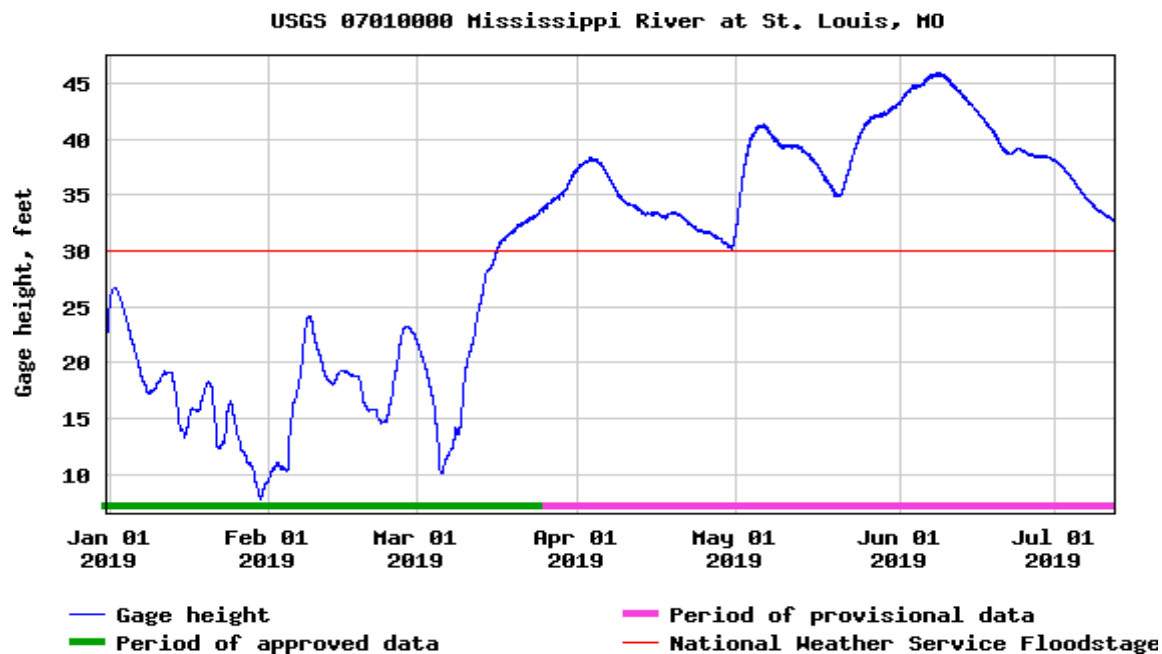


- Grafton Gauge Station at 1200: Gauge Height 26.40 ft and Discharge 345,000 cfs
  - UMR-5 Time: 1230 Date: 7/01/2019 Collected near Lockhaven (38.939567, -90.334676)
  - UMR-6 Time: 1215 Date: 7/02/2019 Collected near South Shore (38.867272, -90.52420)
  - UMR-7 NOT COLLECTED
  - UMR-LM NOT COLLECTED
  - UMR-9 Time: 0940 Date: 7/02/2019 Collected at regular location
  - UMR-LA Time: 0911 Date: 7/02/2019 Collected at regular location
  - UMR-DP Time: 0815 Date: 7/02/2019 Collected near Saverton (39.639680, -91.253515)

## SAINT LOUIS HARBOR

## RIVERS WINTER SAMPLING EVENT 2/4

Samples for SLH were collected on 07/01/2019 by Travis Schepker and Andy Patton. All samples were collected by land in areas with adequate flow. Exact locations are listed below:

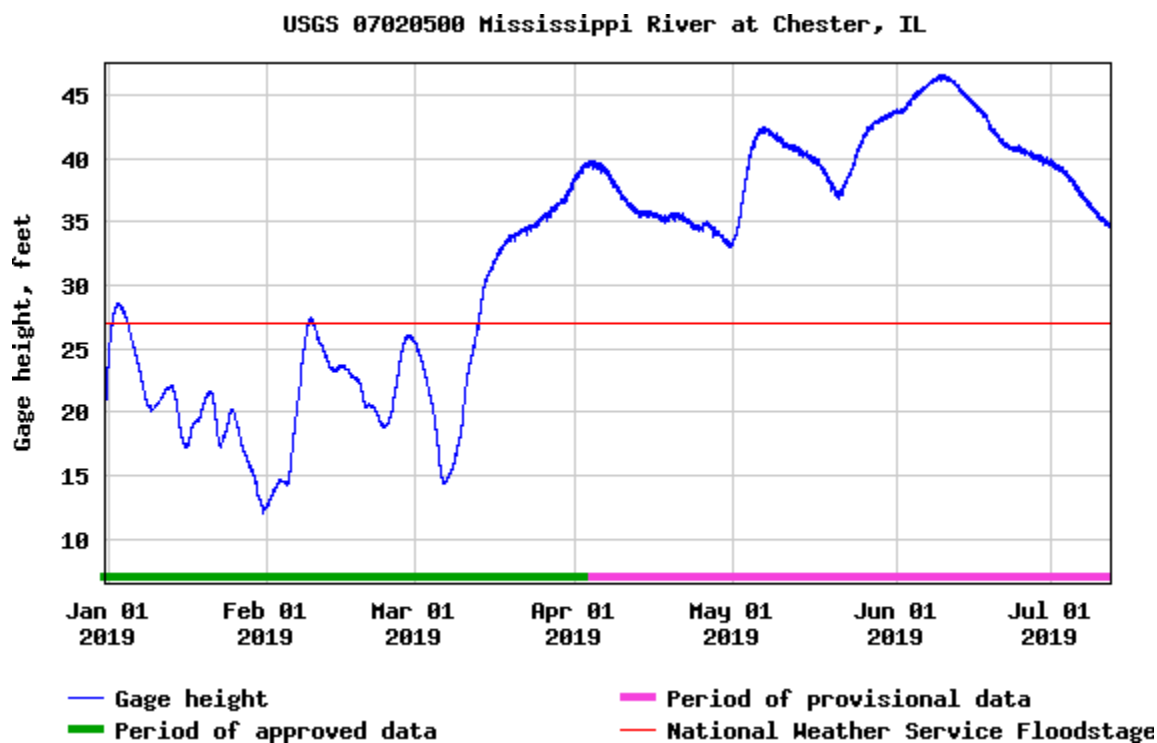


- Saint Louis Gauge Station at 1200: Gauge Height 38.12 ft and Discharge 710,000 cfs
  - SLH-1 Time: 0800 Date: 7/01/2019 Collected above JB Bridge (38.486178, -90.279331)
  - SLH-2 Time: 0715 Date: 7/01/2019 Collected at regular location
  - SLH-3 Time: 1015 Date: 7/01/2019 Collected above 270 bridge (38.775070, -90.173439)
  - UMR-1 Time: 0915 Date: 7/01/2019 Collected at regular location
  - UMR-2 Time: 1234 Date: 7/02/2019 Collected in St Charles (38.780517, -90.479677)
    - UMR-15 collected with UMR-2
  - UMR-3 Time: 1100 Date: 7/01/2019 Collected at NGRREC (38.866641, -90.142933)
    - SLH-15 collected with UMR-3

## MIDDLE MISSISSIPPI RIVER

## RIVERS WINTER SAMPLING EVENT 2/4

Samples for the MMR were collected on 07/11/2019 by Ben Greeling and Grace Rodgers. All samples were collected from land. OPR-5 was not collected since there were not accessible locations to the river that had adequate current/flow. Exact locations are listed below:



- Chester Gauge Station at 1200: Gauge Height 35.02 ft and discharge 605,000 cfs
  - OPR-2 Time:1045 Date: 7/11/2019 Collected above Cape bridge (37.29558, -89.519564)
  - OPR-3 Time:1313 Date: 7/11/2019 Collected at Grand Tower (37.630132, -89.505696)
  - OPR-4 Time:1415 Date: 7/11/2019 Collected at regular location
  - OPR-5 Not Collected

Travis J Schepker

## Environmental Specialist

CEMVS-EC-EQ

13 September 2019

MEMORANDUM FOR RECORD

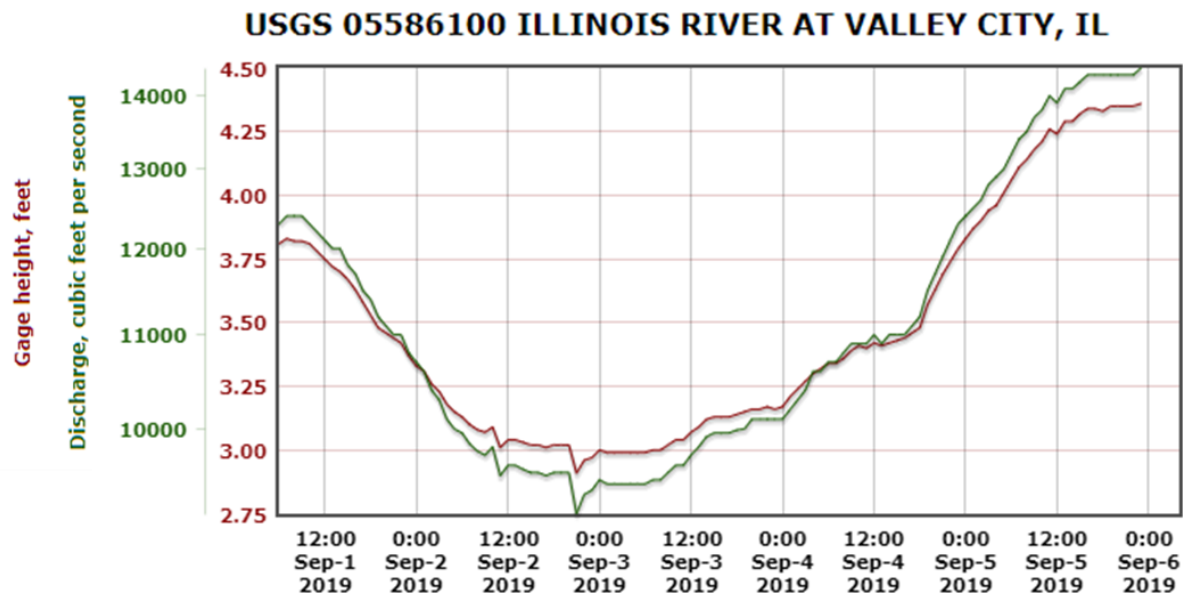
SUBJECT: River Water Quality Sampling (Summer Event 3/4)

RIVERS SUMMER SAMPLING EVENT 3/4

Sampling conducted on the Illinois and Mississippi rivers during September of 2019 was completed with minimal problems. All samples were taken within or near the navigation channel by boat with exception to SLH-2 (taken from USACE Port). Laboratory and *insitu* samples were collected from the upper meter. Flow was relatively high in the open river, thus profile samples were difficult to obtain for some locations.

ILLINOIS RIVER (RM 0-80)

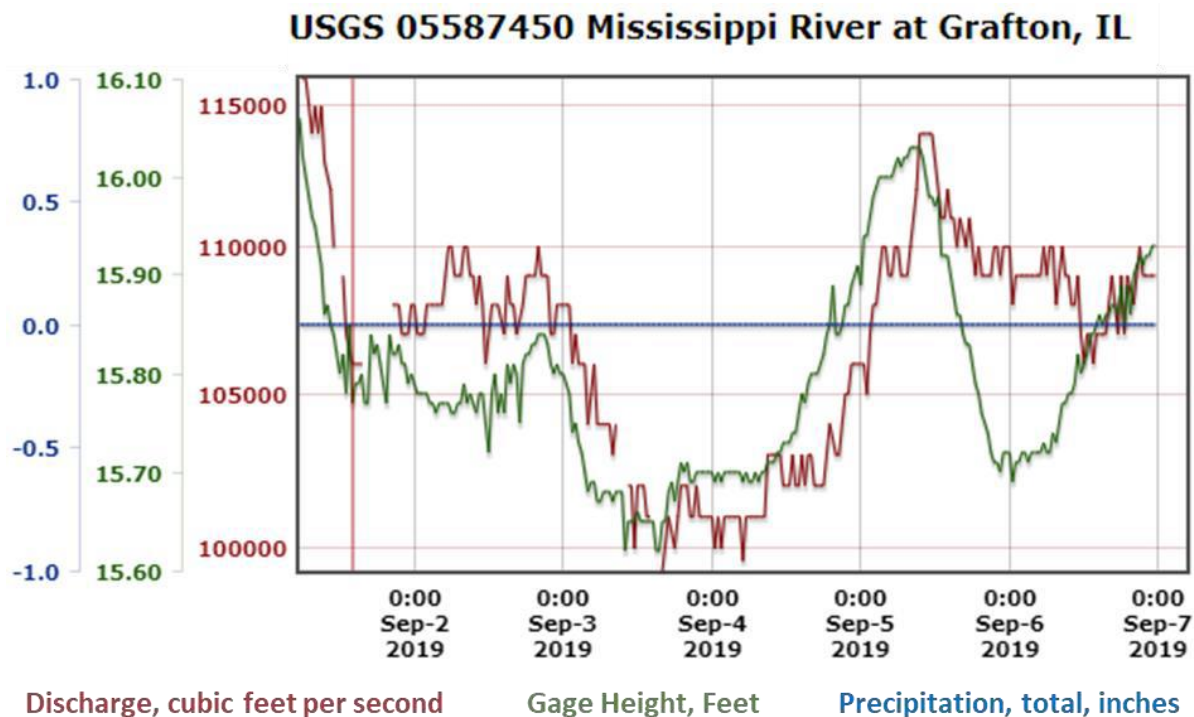
Samples for the ILR were collected on 09/04/2019 by Travis Schepker and Ben Greeling. All samples were collected from the navigation channel. No reported issues.



- ILR-2: Date\_ 9/4/2019 Time\_ 12:43:10 PM Seechi\_ 14 in Depth\_ 15 ft
- ILR-6: Date\_ 9/4/2019 Time\_ 11:51:24 AM Seechi\_ 12 in Depth\_ 13 ft
- ILR-7: Date\_ 9/4/2019 Time\_ 11:06:16 AM Seechi\_ 12 in Depth\_ 14 ft
- ILR-8: Date\_ 9/4/2019 Time\_ 10:06:10 AM Seechi\_ 12 in Depth\_ 14 ft
- ILR-9: Date\_ 9/4/2019 Time\_ 8:59:49 AM Seechi\_ 12 in Depth\_ 12 ft

### UPPER MISSISSIPPI RIVER (RM: 201 – 301)

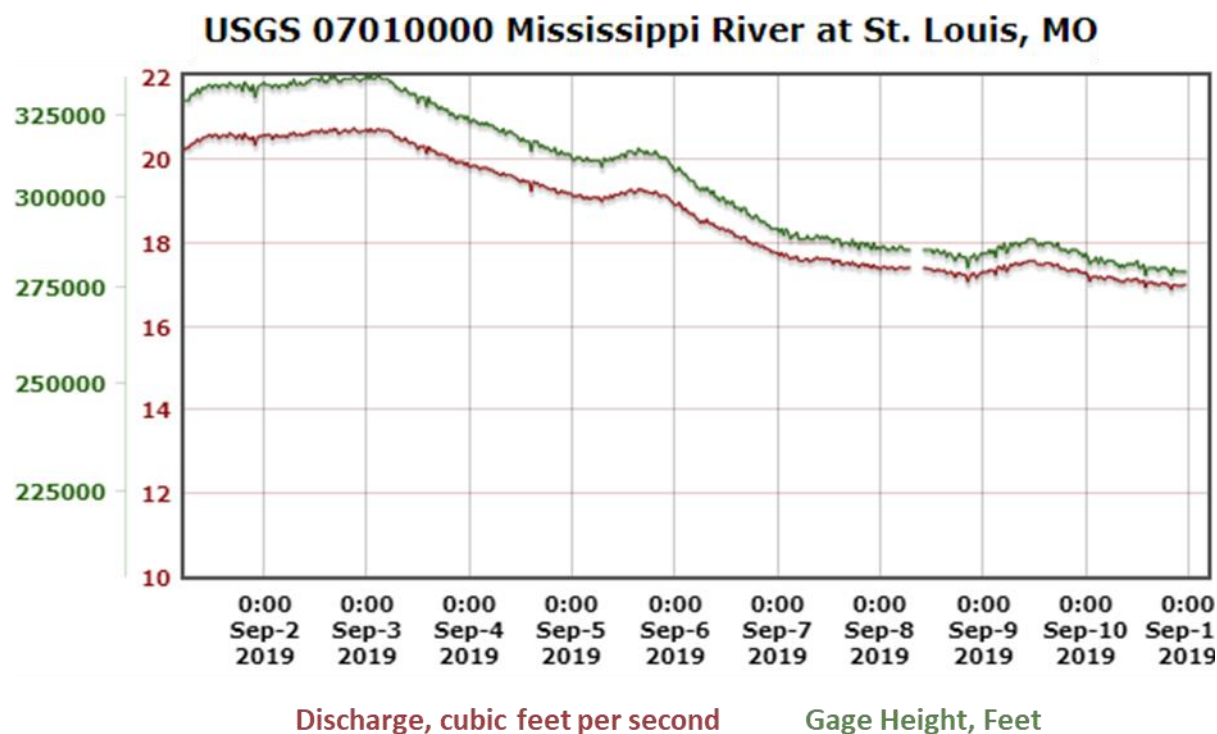
Samples for UMR were collected on 09/05/2019 by Travis Schepker and Ben Greeling. All samples were collected by boat within the navigation channel. No reported issues.



- UMR-5: Date\_ 9/5/2019 Time\_ 4:02:22 PM Seechi\_ 18 in Depth\_ NA ft
- UMR-6: Date\_ 9/5/2019 Time\_ 3:00:41 PM Seechi\_ 18 in Depth\_ NA ft
- UMR-7: Date\_ 9/5/2019 Time\_ 1:46:25 PM Seechi\_ 16 in Depth\_ NA ft
- UMR-LM: Date\_ 9/5/2019 Time\_ 12:47:00 PM Seechi\_ 17 in Depth\_ NA ft
- UMR-9: Date\_ 9/5/2019 Time\_ 9:03:45 AM Seechi\_ 16 in Depth\_ NA ft
- UMR-LA: Date\_ 9/5/2019 Time\_ 9:43:24 AM Seechi\_ 16 in Depth\_ NA ft
- UMR-DP: Date\_ 9/5/2019 Time\_ 10:40:53 AM Seechi\_ 14 in Depth\_ NA ft
  - UMR-15: Duplicate collected with UMR-DP

**SAINT LOUIS HARBOR (RM: 161 – 200)**

Samples from SLH were collected on 09/03/2019 and 09/09/2019 by Travis Schepker, Ben Greeling, and Grace Rodgers. All samples were collected from the navigation channel, with exception to SLH 2 which was collected from the USACE port. No major issues to report.

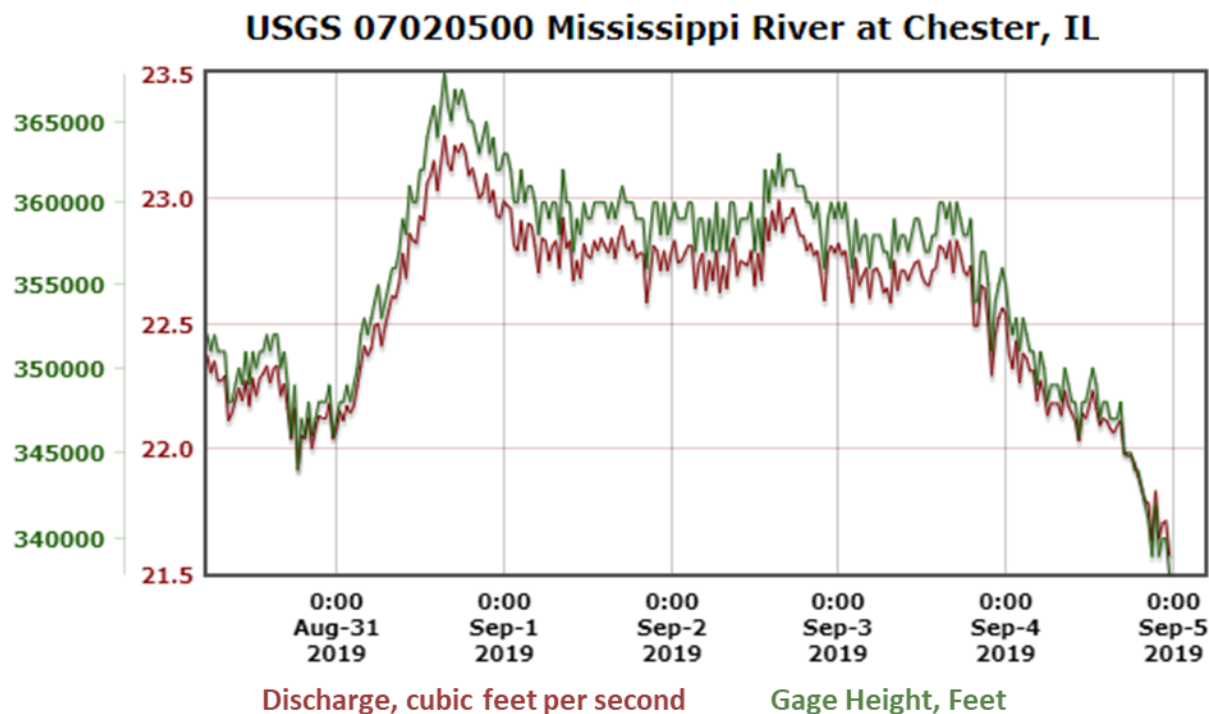


- SLH-1: Date\_9/3/2019 Time\_ 3:24:23 PM Seechi:\_ 8 in Depth\_ NA
- SLH-2: Date\_9/3/2019 Time\_ 1:13:02 PM Seechi:\_ NA in Depth\_ NA
  - SLH-15: Collected with SLH-2
- SLH-3: Date\_9/9/2019 Time\_ 8:46:10 AM Seechi:\_ 8 in Depth\_ 26 ft
- UMR-1: Date\_ 9/9/2019 Time\_ 9:09:51 AM Seechi\_ 13 in Depth\_28 ft
- UMR-2: Date\_ 9/9/2019 Time\_ 9:35:06 AM Seechi\_ 6 in Depth\_ NA ft
- UMR-3: Date\_ 9/9/2019 Time\_ 9:58:56 AM Seechi\_ 14 in Depth\_ NA ft



**MIDDLE MISSISSIPPI RIVER (RM 0 – 161)**

Samples for the MMR were collected on 09/3/2019 by Travis Schepker and Grace Rodgers. All samples were collected from the navigation channel. No issues were reported.



- OPR-2: Date\_ 9/3/2019 Time\_ 10:34:40 AM Seechi\_ 8 inches Depth\_ ft
- OPR-3: Date\_ 9/3/2019 Time\_ 8:55:33 AM Seechi\_ 8 inches Depth\_ ft
- OPR-4: Date\_ 9/3/2019 Time\_ 12:34:54 PM Seechi\_ 8 inches Depth\_ ft
- OPR-5: Date\_ 9/3/2019 Time\_ 2:13:04 PM Seechi\_ 8 inches Depth\_ ft

Travis J Schepker  
Environmental Specialist

CEMVS-EC-EQ

5 December 2019

## MEMORANDUM FOR RECORD

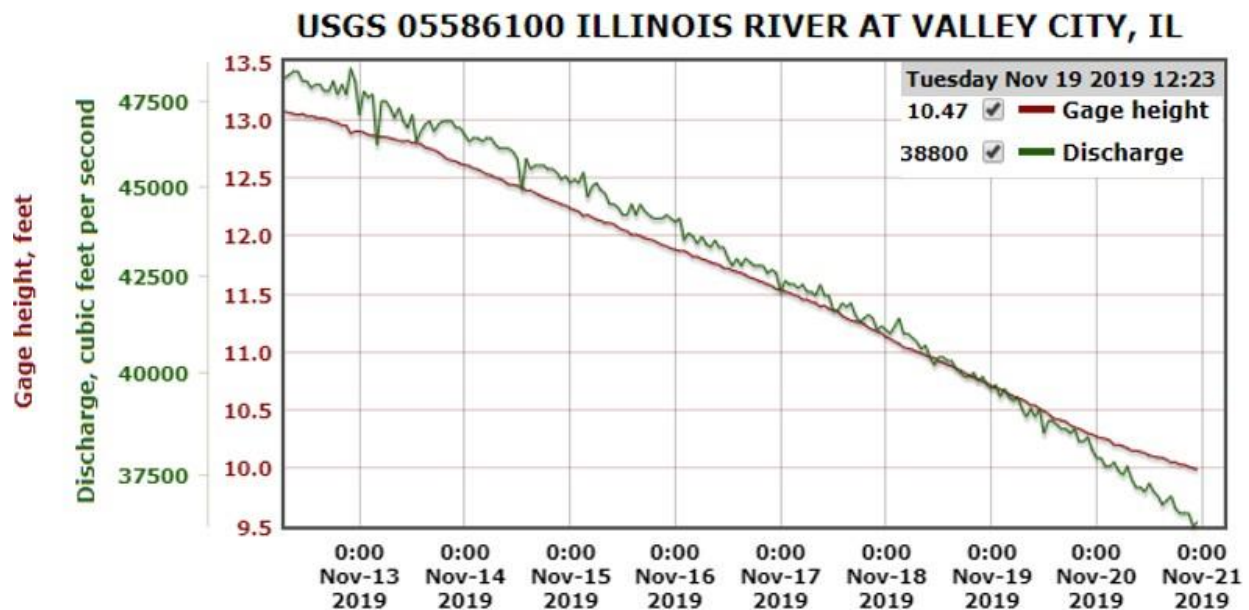
SUBJECT: River Water Quality Sampling (Fall Event 4/4)

**RIVERS SUMMER SAMPLING EVENT 4/4**

Sampling conducted on the Illinois and Mississippi rivers during November of 2019 was completed with minimal issues. The turbidity sensor was not functioning properly on 11/18/2019 (UMR day). Laboratory and *insitu* samples were collected from the upper meter. Flow was relatively high in the open river, thus profile samples were difficult to obtain for some locations. Several boat launches were silted in from summer flooding, and therefore several samples were collected from the shoreline. Samples collected from the thalweg and shoreline are documented below.

**ILLINOIS RIVER (RM 0-80)**

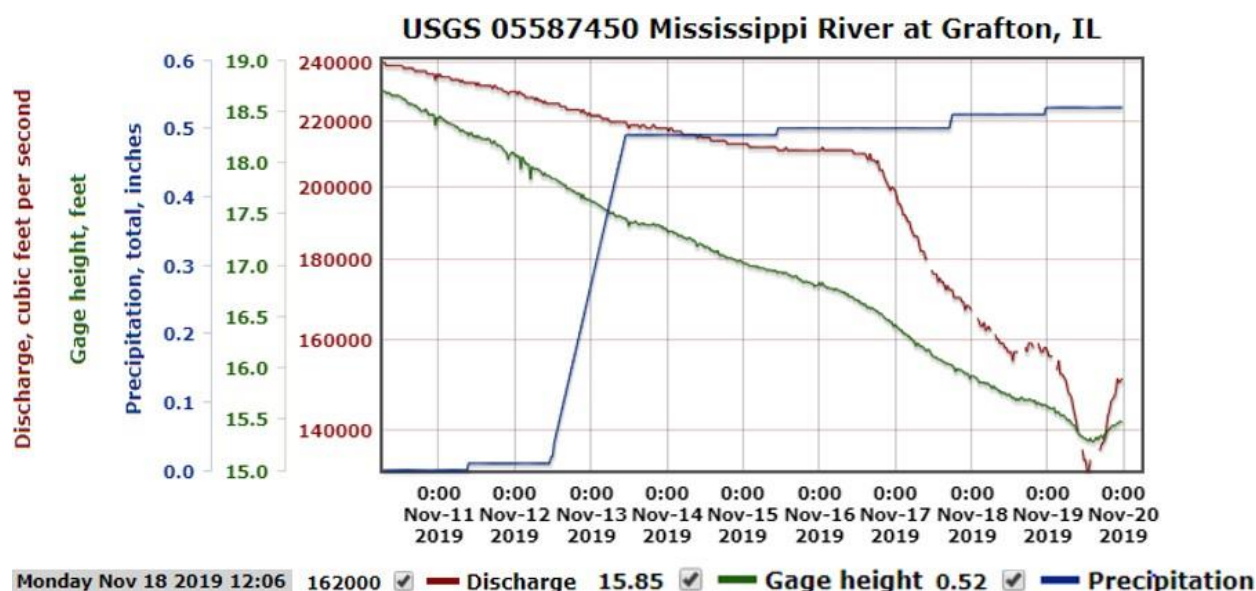
Samples for the ILR were collected on 11/19/2019 by Travis Schepker and Grace Rodgers. All samples were collected from the navigation channel. Weather was cloudy/sunny with 16mph winds and 50 degrees F at noon. No reported issues.



- ILR-2: Date\_ 11/19/2019 Time\_ 14:15:00 Seechi\_ 12 in Depth\_ 20 ft\_ Nav Channel
- ILR-6: Date\_ 11/19/2019 Time\_ 13:15:00 Seechi\_ 12 in Depth\_ 20 ft\_ Nav Channel
- ILR-7: Date\_ 11/19/2019 Time\_ 12:22:00 Seechi\_ 12 in Depth\_ 19 ft\_ Nav Channel
- ILR-8: Date\_ 11/19/2019 Time\_ 11:00:00 Seechi\_ 17 in Depth\_ 20 ft\_ Nav Channel
- ILR-9: Date\_ 11/19/2019 Time\_ 09:30:00 Seechi\_ 17 in Depth\_ 26 ft\_ Nav Channel

## UPPER MISSISSIPPI RIVER (RM: 201 – 301)

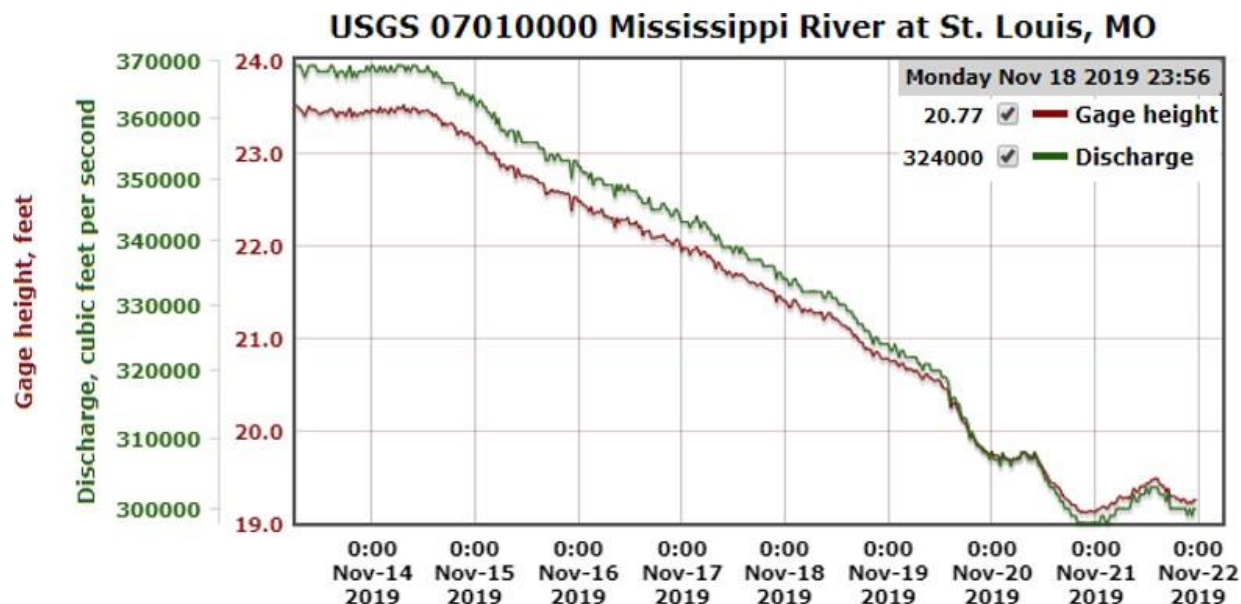
Samples for UMR were collected on 11/18/2019 by Travis Schepker and Ben Greeling. Some boat ramps were silted in, thus several samples were collected from the shoreline. The YSI turbidity sensor was not functioning properly, therefore turbidity samples are not available. Weather was partly cloudy, wind speed 5 mph, and 42 degrees F at noon. No additional meaningful issues to report.



- UMR-5: Date\_ 11/18/2019 Time\_ 15:46:00 Seechi\_ 18 in Depth\_ 20 ft\_ Nav Channel
- UMR-6: Date\_ 11/18/2019 Time\_ 14:30:00 Seechi\_ NA in Depth\_ NA ft\_ Shoreline
- UMR-7: Date\_ 11/18/2019 Time\_ 13:40:00 Seechi\_ NA in Depth\_ NA ft\_ Boat Dock
- UMR-LM: Date\_ 11/18/2019 Time\_ 13:17:00 Seechi\_ NA in Depth\_ NA ft\_ Shoreline
- UMR-9: Date\_ 11/18/2019 Time\_ 11:51:00 Seechi\_ 17 in Depth\_ 23 ft\_ Nav Channel
  - UMR-15: Duplicate collected with UMR-9
- UMR-LA: Date\_ 11/18/2019 Time\_ 11:00:00 Seechi\_ 18 in Depth\_ 30 ft\_ Nav Channel
- UMR-DP: Date\_ 11/18/2019 Time\_ 10:00:00 Seechi\_ 15 in Depth\_ 23 ft\_ Nav Channel

**SAINT LOUIS HARBOR (RM: 161 – 200)**

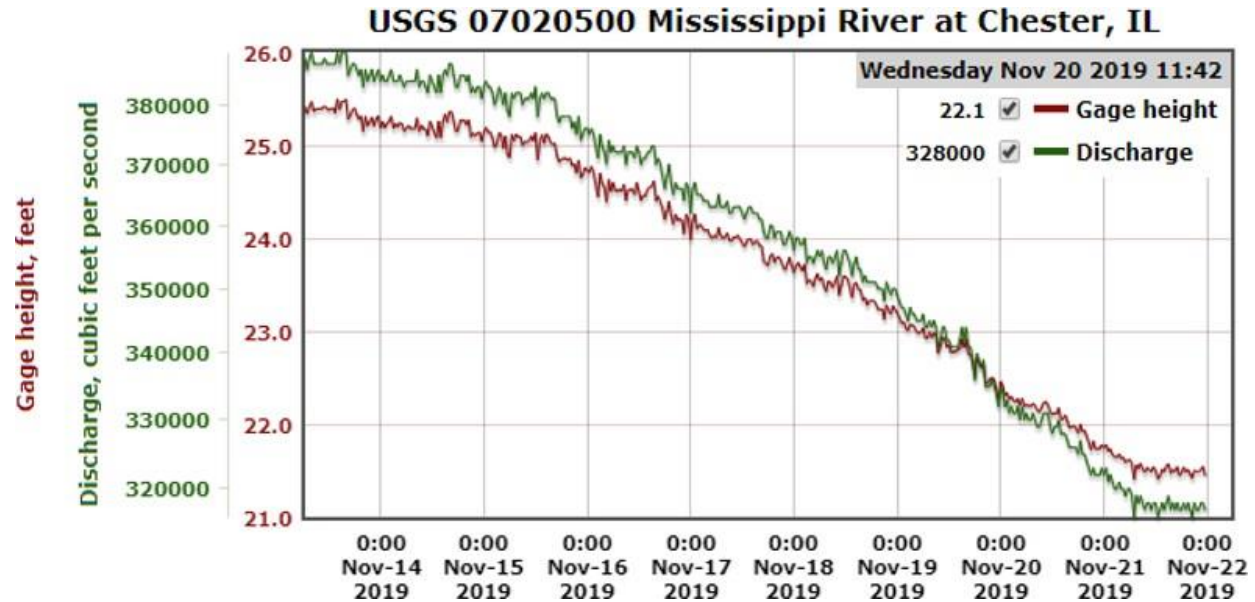
Samples from SLH were collected on 11/19/2019 and 11/20/2019 by Travis Schepker, Ben Greeling, and Grace Rodgers. Weather during both days were fair skies, average temperatures in the mid-40s, and wind speeds of 8 mph. Some boat ramps were silted in, thus several samples were collected from the shoreline. There were no additional meaningful issues to report.



- SLH-1: Date\_ 11/19/2019 Time\_ 13:45:00 Seechi\_ 10 in Depth\_ 45 ft\_ Nav Channel
  - SLH-15 Collected with SLH-1
- SLH-2: Date\_ 11/20/2019 Time\_ 17:00:00 Seechi\_ NA in Depth\_ NA ft\_ Service Base
- SLH-3: Date\_ 11/19/2019 Time\_ 14:20:00 Seechi\_ NA in Depth\_ NA ft\_ Shoreline
- UMR-1: Date\_ 11/19/2019 Time\_ 16:20:00 Seechi\_ NA in Depth\_ NA ft\_ Shoreline
- UMR-2: Date\_ 11/19/2019 Time\_ 17:00:00 Seechi\_ NA in Depth\_ NA ft\_ Shoreline
- UMR-3: Date\_ 11/19/2019 Time\_ 16:00:00 Seechi\_ NA in Depth\_ NA ft\_ Shoreline

## MIDDLE MISSISSIPPI RIVER (RM 0 – 161)

Samples for the MMR were collected on 11/20/2019 by Travis Schepker and Ben Greeling. The weather was partly cloudy, temperature 56 degrees, and wind speed 15 mph at noon. All samples were collected from the navigation channel. OPR-3 was collected from the shoreline at Grand Tower. No additional meaningful issues were reported.



- OPR-2: Date\_ 11/20/2019 Time\_ 10:20:00 Seechi\_ 10 inches Depth\_ 33ft\_ Nav Channel
- OPR-3: Date\_ 11/20/2019 Time\_ 11:20:00 Seechi\_ NA inches Depth\_ NA ft\_ Shoreline
- OPR-4: Date\_ 11/20/2019 Time\_ 13:40:00 Seechi\_ 10 inches Depth\_ 40 ft\_ Nav Channel
- OPR-5: Date\_ 11/20/2019 Time\_ 14:40:00 Seechi\_ 10 inches Depth\_ 45 ft\_ Nav Channel

Travis J Schepker  
Environmental Specialist

## **APPENDIX C: FIELD DATA**

Date	Location	Depth	Temp	Redox	Cond	DO	DOmgL	pH	TDSmgL	FNU
3/11/2019	IL-2	1.13	2.33	472.30	557.30	89.00	12.17	7.84	362.00	420.95
3/11/2019	IL-6	1.16	2.17	503.00	572.60	88.70	12.18	7.81	372.00	395.64
3/11/2019	IL-7	1.28	2.61	498.30	601.50	90.20	12.24	7.65	391.00	340.53
3/11/2019	IL-8	1.41	2.11	515.70	632.60	89.30	12.28	7.51	411.00	251.62
3/11/2019	IL-9	1.07	1.78	538.30	649.80	102.70	14.26	7.41	422.00	247.01
3/11/2019	SLH-3	0.99	1.89	482.50	518.00	91.90	12.73	7.91	337.00	213.42
3/11/2019	UMR-1	1.01	2.44	467.50	608.70	94.20	12.84	7.94	396.00	79.95
3/11/2019	UMR-3	1.08	1.83	507.00	500.20	93.00	12.91	7.78	325.00	165.56
3/11/2019	UMR-2	0.99	4.06	411.50	517.30	93.40	12.20	7.96	336.00	153.30
3/12/2019	OPR-2	1.09	2.50	347.90	572.90	93.30	12.72	7.85	372.00	122.99
3/12/2019	OPR-3	1.10	2.67	453.80	554.30	93.10	12.62	7.55	360.00	131.62
3/12/2019	OPR-4	1.22	2.72	321.30	525.20	92.50	12.53	7.92	341.00	171.20
3/12/2019	OPR-5	0.96	3.33	288.50	490.10	92.00	12.27	7.93	319.00	169.02
3/12/2019	SLH-1	1.10	2.67	345.70	498.40	92.10	12.49	7.96	324.00	187.31
3/12/2019	SLH-2	1.30	3.61	500.90	531.40	92.00	12.17	7.87	345.00	186.82
3/13/2019	UMR-5	1.34	2.44	334.40	389.00	90.20	12.32	7.76	253.00	189.09
3/13/2019	UMR-6	1.17	1.17	285.00	421.70	90.30	12.76	7.89	274.00	146.52
3/13/2019	UMR-7	1.12	1.39	154.10	394.50	89.70	12.59	7.81	256.00	147.44
3/13/2019	UMR-9	1.02	1.06	240.10	424.90	88.00	12.48	8.03	276.00	140.57
3/13/2019	UMR-DP	1.01	0.78	241.80	442.60	91.60	13.09	7.64	288.00	128.58
3/13/2019	UMR-LA	1.16	0.94	206.90	461.00	91.30	12.98	7.91	300.00	116.64
3/13/2019	UMR-LM	1.05	1.67	311.30	381.20	89.10	12.42	7.82	248.00	854.84
7/1/2019	IL-2	0.21	26.10	215.40	522.80	76.50	6.19	7.65	340.00	18.60
7/1/2019	IL-6	1.08	25.90	225.40	536.80	76.20	6.18	7.70	349.00	15.84
7/1/2019	IL-7	1.13	26.20	228.50	540.70	84.70	6.83	7.70	351.00	14.22
7/1/2019	IL-8	1.00	26.40	220.40	551.50	90.70	7.30	7.85	358.00	13.07
7/1/2019	IL-9	0.19	26.00	238.80	521.70	76.10	6.17	7.66	339.00	12.45
7/1/2019	SLH-1	1.07	26.40	251.20	462.90	69.50	5.59	7.75	301.00	98.27
7/1/2019	SLH-2	1.17	26.50	203.70	461.60	68.50	5.50	7.77	300.00	97.48
7/1/2019	SLH-3	0.27	26.50	215.20	458.00	69.40	5.58	7.59	298.00	66.47
7/1/2019	UMR-1	0.09	25.70	163.70	511.70	68.80	5.60	7.76	333.00	12.53
7/1/2019	UMR-3	0.55	25.90	219.70	518.70	80.80	6.56	7.65	337.00	17.81
7/1/2019	UMR-5	1.05	25.70	221.20	523.10	74.30	6.05	7.73	340.00	17.82



Date	Location	Depth	Temp	Redox	Cond	DO	DOmgL	pH	TDSmgL	FNU
7/2/2019	UMR-6	1.12	27.20	192.80	456.30	69.80	5.53	7.81	297.00	39.35
7/2/2019	UMR-9	1.18	26.10	228.20	470.80	78.10	6.31	7.78	306.00	81.27
7/2/2019	UMR-DP	1.16	26.10	161.60	499.30	81.30	6.58	8.06	325.00	71.16
7/2/2019	UMR-LA	0.97	26.50	219.20	363.90	72.50	5.83	7.62	237.00	67.40
7/2/2019	UMR-2	0.69	27.50	244.00	492.00	69.90	5.51	7.54	320.00	87.75
7/11/2019	OPR-2	0.28	28.20	230.10	530.60	73.70	5.74	7.70	345.00	51.35
7/11/2019	OPR-3	0.26	28.80	224.80	524.40	74.60	5.75	7.70	341.00	54.35
7/11/2019	OPR-4	0.34	29.00	219.00	523.30	78.20	6.00	7.81	340.00	50.69
9/3/2019	OPR-2	0.98	24.90	146.70	537.50	78.10	6.46	8.06	349.00	90.79
9/3/2019	OPR-3	1.10	24.60	139.20	530.10	77.30	6.43	8.05	345.00	97.48
9/3/2019	OPR-4	1.15	24.80	179.30	515.00	78.00	6.46	7.86	335.00	93.18
9/3/2019	OPR-5	1.36	24.40	135.90	519.10	77.00	6.43	7.87	337.00	138.63
9/3/2019	SLH-1	1.37	24.50	188.00	519.90	78.50	6.54	7.84	338.00	130.41
9/3/2019	SLH-2	0.99	24.10	510.60	521.30	76.20	6.39	7.76	339.00	159.20
9/4/2019	IL-2	1.27	25.40	126.50	745.80	72.40	5.93	7.86	485.00	22.75
9/4/2019	IL-6	1.19	24.90	95.80	750.60	76.80	6.34	8.06	488.00	27.31
9/4/2019	IL-7	1.28	24.80	115.40	746.80	81.80	6.77	8.09	485.00	27.59
9/4/2019	IL-8	1.10	24.60	111.20	740.80	89.30	7.42	8.15	482.00	30.73
9/4/2019	IL-9	0.85	24.50	125.10	689.60	84.30	7.02	8.17	448.00	36.17
9/5/2019	UMR-5	1.27	24.80	123.80	543.20	110.80	9.18	8.47	353.00	17.95
9/5/2019	UMR-6	1.28	24.60	112.30	470.00	132.00	10.98	8.73	305.00	17.86
9/5/2019	UMR-7	1.02	24.40	119.00	470.50	129.40	10.79	8.74	306.00	18.40
9/5/2019	UMR-9	1.02	24.00	102.80	473.80	114.50	9.63	8.86	308.00	19.16
9/5/2019	UMR-DP	1.32	23.90	104.40	474.00	113.70	9.58	8.88	308.00	20.17
9/5/2019	UMR-LA	1.26	24.00	112.00	468.10	112.30	9.44	8.86	304.00	17.41
9/5/2019	UMR-LM	1.10	24.10	119.90	470.00	123.80	10.38	8.75	306.00	19.23
9/9/2019	SLH-3	1.10	24.90	106.10	550.80	92.10	7.61	8.51	358.00	49.89
9/9/2019	UMR-1	1.11	24.60	112.70	544.80	71.70	5.96	8.20	354.00	20.16
9/9/2019	UMR-3	1.05	24.50	99.10	472.40	102.70	8.55	8.77	307.00	16.56
9/9/2019	UMR-2	1.16	25.30	133.90	605.90	81.80	6.71	8.04	394.00	86.78
11/18/2019	UMR-5	1.08	2.00	220.70	506.20	98.90	13.65	7.72	329.00	
11/18/2019	UMR-6	0.94	2.30	317.30	509.90	97.90	13.42	7.72	331.00	
11/18/2019	UMR-7	1.04	2.10	282.00	508.90	98.90	13.63	7.48	331.00	

Date	Location	Depth	Temp	Redox	Cond	DO	DOmgL	pH	TDSmgL	FNU
11/18/2019	UMR-9	1.07	1.70	301.80	517.60	99.70	13.89	7.74	336.00	
11/18/2019	UMR-DP	1.03	1.60	276.70	519.30	99.70	13.90	7.35	338.00	
11/18/2019	UMR-LA	1.00	1.70	261.00	520.90	99.20	13.80	7.55	339.00	
11/18/2019	UMR-LM	1.20	2.10	282.20	510.00	99.00	13.63	7.67	331.00	
11/19/2019	IL-2	1.06	3.40	198.30	671.30	92.70	12.34	7.60	436.00	29.89
11/19/2019	IL-6	1.09	3.40	202.10	676.40	92.30	12.26	7.59	440.00	30.72
11/19/2019	IL-7	1.00	3.40	217.30	680.60	93.00	12.37	7.57	442.00	20.41
11/19/2019	IL-8	1.08	3.30	220.50	684.30	92.70	12.37	7.50	445.00	15.06
11/19/2019	IL-9	1.14	3.40	259.50	692.70	92.30	12.27	7.73	450.00	13.75
11/19/2019	SLH-3	1.05	2.90	182.50	574.60	96.60	13.02	7.71	373.00	29.74
11/19/2019	UMR-1	1.08	4.70	183.40	544.90	89.80	11.55	7.75	354.00	18.46
11/19/2019	UMR-3	0.81	3.20	210.80	617.00	94.80	12.66	7.78	401.00	47.93
11/19/2019	UMR-2	1.01	5.00	182.80	733.20	95.60	12.17	7.80	477.00	39.41
11/20/2019	OPR-2	1.01	4.00	162.80	620.90	95.30	12.47	7.88	404.00	39.01
11/20/2019	OPR-3	0.42	4.10	156.60	618.40	96.20	12.56	7.90	402.00	40.30
11/20/2019	OPR-4	1.10	3.90	161.90	625.30	96.30	12.64	7.71	406.00	32.91
11/20/2019	OPR-5	1.12	4.00	185.30	641.30	96.70	12.65	7.65	417.00	36.09
11/20/2019	SLH-1	0.99	4.00	176.30	637.80	96.80	12.67	7.76	415.00	30.55
11/20/2019	SLH-2	1.39	4.60	217.90	684.20	96.30	12.40	7.81	445.00	35.07

## **APPENDIX D: LABORATORY DATA**



Environmental | Analytical | Management | Safety

PO Box 1566  
400 Aviation Drive  
Mt. Vernon, IL 62864  
618-244-3235

[www.ardlinc.com](http://www.ardlinc.com)

**Customer Name: SLCOE**

**Date: 4/9/19**

**Project Name: Illinois & Mississippi Rivers**

**Lab Name: ARDL, Inc.**

**Samples Received at ARDL: 3/12/19**

**ARDL Report No.: 8462**

### CASE NARRATIVE

Customer Sample No.	Date Collected	Lab ID Number	Anal ses Requested
IL-2	3/11/19	8462-01	Inorganics(1)
IL-6	3/11/19	8462-02	Inorganics(1)
IL-7	3/11/19	8462-03	Inorganics(1)
IL-8	3/11/19	8462-04	Inorganics(1)
IL-9	3/11/19	8462-05	Inorganics(1)
UMR-1	3/11/19	8462-06	Inorganics(1)
UMR-2	3/11/19	8462-07	Inorganics(1)
UMR-3	3/11/19	8462-08	Inorganics(1)
SLH-3	3/11/19	8462-09	Inorganics(1)

(1) Including ammonia, chlorophyll/pheophytin, nitrate, nitrite, TKN, TOC, orthophosphate, total phosphorus, TSS, and TVSS.

The quality control data are summarized as follows:

TOC were analyzed by an accredited outside laboratory due to instrument status.

#### PREPARATION BLANK

Results of the preparation blanks were within acceptable limits.

#### LABORATORY CONTROL SAMPLE

Percent recoveries of all LCS analyses were within control limits.

#### MATRIX SPIKE

Percent recoveries of all matrix spikes and matrix spike duplicates were within control limits.

#### DUPLICATE

Duplicate analyses are reported as MS/MSD, except chlorophyll/pheophytin, TSS, and TVSS. RPO of the duplicate analyses met criteria.

**CASE NARRATIVE (Continued)**

**DATA REPORTING QUALIFIERS**

The following data reporting qualifiers are used as required:


ND - Indicates parameter was analyzed for but not detected. The sample quantitation limit has been corrected for weight, dilution and/or percent moisture.

Release of the data contained in this package has been authorized by the Technical Services Manager or his designee as verified by the following signature.



---

Dean S. Dickerson  
Technical Services Manager



# Sample & QC Results

Including as appropriate:

Field Sample Results

Batch QC

Prep Blank

LCS/Spike Blank

Matrix QC

MS/MSD

Sample Duplicate

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008462

Report Date: 04/02/2019

Project Name: ILLINOIS RIVER/MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008462-01  
Field ID: IL-2  
Received: 03/12/2019

Sampling Loc'n: ILLINOIS RIVER  
Sampling Date: 03/11/2019  
Sampling Time: 1410

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.351	MG/L	NONE	350.1	NA	03/13/19	03144408
Chlorophyll-a, Correcte	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Kjeldahl Nitrogen	0.950	1.00		3.16	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0570	0.0600		2.51	MG/L	NONE	GREEN	NA	03/18/19	03204419
Nitrite as Nitrogen	0.0200	0.0200		0.025	MG/L	NONE	354.1	NA	03/12/19	03134405
Pheophytin-a	1.0	1.00		3.6	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Phosphorus	0.0160	0.0200		3.07	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.332	MG/L	NONE	365.2	NA	03/12/19	03154409
Solids, Total Suspended	20.0	20.0		1070	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	20.0	20.0		60.0	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		5.2	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008462-01, Inorganic Analyses

Page 1 of 1



**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008462

Report Date: 04/02/2019

Project Name: ILLINOIS RIVER/MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008462-02  
Field ID: IL-6  
Received: 03/12/2019

Sampling Loc'n: ILLINOIS RIVER  
Sampling Date: 03/11/2019  
Sampling Time: 1330

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.359	MG/L	NONE	350.1	NA	03/13/19	03144408
Chlorophyll-a, Correcte	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Kjeldahl Nitrogen	0.380	0.400		3.06	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0570	0.0600		2.19	MG/L	NONE	GREEN	NA	03/18/19	03204419
Nitrite as Nitrogen	0.0200	0.0200		0.026	MG/L	NONE	354.1	NA	03/12/19	03134405
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Phosphorus	0.0160	0.0200		2.43	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.376	MG/L	NONE	365.2	NA	03/12/19	03154409
Solids, Total Suspended	20.0	20.0		778	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	20.0	20.0		48.0	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		5.2	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008462-02, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008462

Report Date: 04/02/2019

Project Name: ILLINOIS RIVER/MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008462-03      Sampling Loc'n: ILLINOIS RIVER  
Field ID: IL-7      Sampling Date: 03/11/2019  
Received: 03/12/2019      Sampling Time: 1250

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.38	MG/L	NONE	350.1	NA	03/13/19	03144408
Chlorophyll-a, Correcte	1.0	1.00		5.1	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Kjeldahl Nitrogen	0.380	0.400		2.65	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0570	0.0600		2.56	MG/L	NONE	GREEN	NA	03/18/19	03204419
Nitrite as Nitrogen	0.0200	0.0200		0.032	MG/L	NONE	354.1	NA	03/12/19	03134405
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Phosphorus	0.0240	0.0300		2.74	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.385	MG/L	NONE	365.2	NA	03/12/19	03154409
Solids, Total Suspended	20.0	20.0		522	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	20.0	20.0		34.0	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		4.6	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008462-03, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008462

Report Date: 04/02/2019

Project Name: ILLINOIS RIVER/MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008462-04  
Field ID: IL-8  
Received: 03/12/2019

Sampling Loc'n: ILLINOIS RIVER  
Sampling Date: 03/11/2019  
Sampling Time: 1200

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.443	MG/L	NONE	350.1	NA	03/13/19	03144408
Chlorophyll-a, Correcte	1.0	1.00		6.8	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Kjeldahl Nitrogen	0.190	0.200		2.22	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0570	0.0600		2.5	MG/L	NONE	GREEN	NA	03/18/19	03204419
Nitrite as Nitrogen	0.0200	0.0200		0.032	MG/L	NONE	354.1	NA	03/12/19	03134405
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Phosphorus	0.00800	0.0100		1.21	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.465	MG/L	NONE	365.2	NA	03/12/19	03154409
Solids, Total Suspended	7.69	7.69		162	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	7.69	7.69		12.3	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		4.3	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008462-04, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008462

Report Date: 04/02/2019

Project Name: ILLINOIS RIVER/MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008462-05  
 Field ID: IL-9  
 Received: 03/12/2019

Sampling Loc'n: ILLINOIS RIVER  
 Sampling Date: 03/11/2019  
 Sampling Time: 1050

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.75	MG/L	NONE	350.1	NA	03/13/19	03144408
Chlorophyll-a, Correcte	1.0	1.00		2.5	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Kjeldahl Nitrogen	0.380	0.400		2.88	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0570	0.0600		2.46	MG/L	NONE	GREEN	NA	03/18/19	03204419
Nitrite as Nitrogen	0.0200	0.0200		0.028	MG/L	NONE	354.1	NA	03/12/19	03134405
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Phosphorus	0.0160	0.0200		2.17	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.543	MG/L	NONE	365.2	NA	03/12/19	03154409
Solids, Total Suspended	11.1	11.1		556	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	11.1	11.1		35.6	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		4.9	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008462-05, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008462

Report Date: 04/02/2019

Project Name: ILLINOIS RIVER/MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008462-06  
Field ID: UMR-1  
Received: 03/12/2019

Sampling Loc'n: MISSISSIPPI RIVER  
Sampling Date: 03/11/2019  
Sampling Time: 1716

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.196	MG/L	NONE	350.1	NA	03/13/19	03144408
Chlorophyll-a, Correcte	1.0	1.00		3.4	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Kjeldahl Nitrogen	0.190	0.200		1.18	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0570	0.0600		2.63	MG/L	NONE	GREEN	NA	03/18/19	03204419
Nitrite as Nitrogen	0.0200	0.0200		0.022	MG/L	NONE	354.1	NA	03/12/19	03134405
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Phosphorus	0.00800	0.0100		0.548	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.179	MG/L	NONE	365.2	NA	03/12/19	03154409
Solids, Total Suspended	5.0	5.00		62.5	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	5.0	5.00		5.0	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		3.4	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008462-06, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008462

Report Date: 04/02/2019

Project Name: ILLINOIS RIVER/MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008462-07  
 Field ID: UMR-2  
 Received: 03/12/2019

Sampling Loc'n: MISSISSIPPI RIVER  
 Sampling Date: 03/11/2019  
 Sampling Time: 1742

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.079	MG/L	NONE	350.1	NA	03/13/19	03144408
Chlorophyll-a, Correcte	1.0	1.00		10.1	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Kjeldahl Nitrogen	0.190	0.200		1.42	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0570	0.0600		1.12	MG/L	NONE	GREEN	NA	03/18/19	03204419
Nitrite as Nitrogen	0.0200	0.0200		0.020	MG/L	NONE	354.1	NA	03/12/19	03134405
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Phosphorus	0.00800	0.0100		1.06	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.0929	MG/L	NONE	365.2	NA	03/12/19	03154409
Solids, Total Suspended	11.1	11.1		339	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	11.1	11.1		20.0	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		4.0	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008462-07, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008462

Report Date: 04/02/2019

Project Name: ILLINOIS RIVER/MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008462-08  
Field ID: UMR-3  
Received: 03/12/2019

Sampling Loc'n: MISSISSIPPI RIVER  
Sampling Date: 03/11/2019  
Sampling Time: 1630

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.251	MG/L	NONE	350.1	NA	03/13/19	03144408
Chlorophyll-a, Correcte	1.0	1.00		5.1	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Kjeldahl Nitrogen	0.190	0.200		1.98	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0570	0.0600		2.35	MG/L	NONE	GREEN	NA	03/18/19	03204419
Nitrite as Nitrogen	0.0200	0.0200		0.025	MG/L	NONE	354.1	NA	03/12/19	03134405
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Phosphorus	0.00800	0.0100		1.35	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.229	MG/L	NONE	365.2	NA	03/12/19	03154409
Solids, Total Suspended	20.0	20.0		576	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	20.0	20.0		28.0	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		3.6	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008462-08, Inorganic Analyses

Page 1 of 1



**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008462

Report Date: 04/02/2019

Project Name: ILLINOIS RIVER/MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008462-09  
 Field ID: SLH-3  
 Received: 03/12/2019

Sampling Loc'n: MISSISSIPPI RIVER  
 Sampling Date: 03/11/2019  
 Sampling Time: 1654

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.272	MG/L	NONE	350.1	NA	03/13/19	03144408
Chlorophyll-a, Correcte	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Kjeldahl Nitrogen	0.190	0.200		2.3	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0570	0.0600		2.83	MG/L	NONE	GREEN	NA	03/18/19	03204419
Nitrite as Nitrogen	0.0200	0.0200		0.024	MG/L	NONE	354.1	NA	03/12/19	03134405
Pheophytin-a	1.0	1.00		1.8	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439
Phosphorus	0.0160	0.0200		1.6	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.232	MG/L	NONE	365.2	NA	03/12/19	03154409
Solids, Total Suspended	20.0	20.0		478	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	20.0	20.0		26.0	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		3.9	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008462-09, Inorganic Analyses

Page 1 of 1

**BLANK SUMMARY REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566      Mt. Vernon, IL    62864**

Lab Report No: 008462

Report Date: 04/02/2019

Project Name: ILLINOIS RIVER/MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	LOD	LOQ	Blank Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run	QC Lab Number
Ammonia Nitrogen	0.020	0.030	ND	MG/L	NONE	350.1	NA	03/13/19	03144408	008462-01B1
Chlorophyll-a, Corre	1.0	1.0	ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439	008462-01B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	03/20/19	03/21/19	03254428	008462-01B1
Nitrate as Nitrogen	0.019	0.020	ND	MG/L	NONE	GREEN	NA	03/18/19	03204419	008462-03B1
Nitrite as Nitrogen	0.020	0.020	ND	MG/L	NONE	354.1	NA	03/12/19	03134405	008462-06B1
Pheophytin-a	1.0	1.0	ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274439	008462-01B1
Phosphorus	0.008	0.010	ND	MG/L	365.2	365.2	03/26/19	03/27/19	03294448	008462-04B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	NA	03/12/19	03154409	008462-04B1
Solids, Total Suspen	1.0	1.0	ND	MG/L	NONE	160.2	NA	03/14/19	03184416	008462-01B1
Solids, Volatile Sus	1.0	1.0	ND	MG/L	NONE	160.4	NA	03/14/19	03184417	008462-01B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	03/20/19	03294444	008462-01B1

(a) DOD and/or NELAC Accredited Analyte  
Inorganic Method Blanks for 008462

Page 1 of 1

**LABORATORY CONTROL SAMPLE REPORT**  
**ARDL, INC.    400 Aviation Drive; P.O. Box 1566    Mt. Vernon, IL    62864**

Lab Report No: 008462

Report Date: 04/02/2019

Project Name: ILLINOIS RIVER/MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	LCS 1 Result	LCS 1 Level	LCS 1 % Rec	LCS 2 Result	LCS 2 Level	LCS 2 % Rec	% Rec Limits	Mean % Rec	Analytical Run	QC Lab Number
Ammonia Nitrogen	0.98	1.0	98				80-120		03144408	008462-01C1
Kjeldahl Nitrogen	0.81	1.0	81				80-120		03254428	008462-01C1
Nitrate as Nitrogen	0.98	1.0	98				80-120		03204419	008462-03C1
Nitrite as Nitrogen	0.95	1.0	95				80-120		03134405	008462-06C1
Phosphorus	0.75	0.67	112				80-120		03294448	008462-04C1
Phosphorus, -ortho	0.10	0.10	101				80-120		03154409	008462-04C1
Total Organic Carbon	9.4	10.0	94				76-120		03294444	008462-01C1

NOTE: Any values tabulated above marked with an asterisk are outside of acceptable limits.

(a) DOD and/or NELAC Accredited Analyte

Inorganic LCS Results for 008462

Page 1 of 1

**MATRIX SPIKE/SPIKE DUPLICATE REPORT**  
**ARDL, INC. 400 Aviation Drive; P.O. Box 1566 Mt. Vernon, IL 62864**

Lab Report No: 008462

Report Date: 04/02/2019

Project Name: ILLINOIS RIVER/MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	Sample Matrix	Sample Result	MS Result	MS Level	MS % Rec	MSD Result	MSD Level	MSD % Rec	% Rec Limits	RPO	RPO Limit	Run	QC Lab Number
Ammonia Nitrogen	WATER	0.35	2.4	2.0	102	2.4	2.0	103	75-125	1	20	03144408	008462-01MS
Kjeldahl Nitrogen	WATER	3.2	3.9	0.80	86	3.8	0.80	80	75-125	1	20	03254428	008462-01MS
Nitrate as Nitrogen	WATER	2.6	3.3	1.0	79	3.4	1.0	83	75-125	1	20	03204419	008462-03MS
Nitrite as Nitrogen	WATER	0.022	1.0	1.0	100	1.1	1.0	105	75-125	5	20	03134405	008462-06MS
Phosphorus	WATER	1.2	2.2	0.83	114	2.2	0.83	119	75-125	2	20	03294448	008462-04MS
Phosphorus, -ortho	WATER	0.47	0.57	0.10	108	0.56	0.10	99	75-125	2	20	03154409	008462-04MS
Total Organic Carbon	WATER	5.2	10.2	5.0	100	10.3	5.0	102	76-120	1	20	03294444	008462-01MS

NOTE: Values tabulated above marked with an asterisk are explained in the associated narrative.

(a) DOD and/or NELAC Accredited Analyte.

Inorganic Matrix Spikes for 008462

Page 1 of 1

**SAMPLE DUPLICATE REPORT**  
**ARDL, INC.    400 Aviation Drive; P.O. Box 1566    Mt. Vernon, IL    62864**

Lab Report No: 008462

Report Date: 04/02/2019

Project Name: ILLINOIS RIVER/MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	Sample Conc'n	First Duplicate	Second Duplicate	Units	Percent Diff	Mean (Smp, D1, D2)	Analytical Run	QC Lab Number
Chlorophyll-a, Corrected	<b>ND</b>	<b>10.1</b>	--	MG/CU.M.	NC	--	03274439	008462-01D1
Pheophytin-a	3.6	0	--	MG/CU.M.	0	--	03274439	008462-01D1
Solids, Total Suspended	1070	1070	--	MG/L	0	--	03184416	008462-01D1
Solids, Volatile Suspend	60.0	62.0	--	MG/L	3	--	03184417	008462-01D1

(a) DOD and/or NELAC Accredited Analyte  
Sample Duplicates for 008462

Page 1 of 1



# Sample Receipt Information

Including as appropriate:

- COCs
- Cooler Receipts
- Airbills
- Email Communication/ Instructions from Customer

# ARDL, Inc.

P.O. Box 1566, 400 Aviation Drive, Mt. Vernon, IL 62864

(618) 244-3235 Phone

(618) 244-1149 Fax

## CHAIN OF CUSTODY RECORD

PROJECT Illinois River				SAMPLERS: (Signature)  [Signature]	REMARKS OR SAMPLE LOCATION	PRESERVATION
SAMPLE NUMBER						
DATE	TIME					
IL-2	3.1J,9	i-111-	X	X	X	X
IL-6		i'336	X	X	X	X
IL-7		l)>D	X	X	X	X
IL-8		l-dOD	X	X	X	X
		lo.SO	X	X	X	X
IL-9						
u /vu - 1	11/, c	\ 7/(p	> (	'k: x'	X	x' ) /
U1 1/2/"Z.-		17'-tJ	y	X	x	X r
LmfZ->		\ '3o		X	X	X X
SL 1.li-3		j(.,.5'1	) (	X	X	x v X X X
	/11/19					
Relinquished by: (Signature) 6/-/4 -		Time er.SO	REMARKS/SPECIAL INSTRUCTIONS: *Preserved with H2SO4			
1 el, (ui dby: (Sig/4l re) tj P!uorli NJ ,it, ...	2/11/q	Time er.SO				
received tor-«,aboratory by: 151:!!	Date 7 q	Time l(J.5.3'0				

PURCHASE ORDER NO: \_\_\_\_\_



## ARDL Report 8462 - Page 19 of 20

# COOLER RECEIPT REPORT ARDL INC.

ARDL #: -4.fJ /- :::au. J. .

Cooler# e? C;J 2

Number of Coolers in Shipment:       

Project: I:/: /110: s fi-: rJ Cr/ & , ? - v/

Date Received: .,J-// 19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: J'-J:?'-19 (Signature) u u

1. Did cooler come with a shipping slip (airbill, etc.)?.....YES

If YES, enter carrier name and airbill number here: /4'-"...Lkd==-" ..'" .d!"AAAA"/"-

2. Were custody seals on outside of cooler?.....YES N/A

How many and where?.....,SealDate:.....,Seal Name:.....

3. Were custody seals unbroken and intact at the date and time of arrival?.....YES NO

4. Did you screen samples for radioactivity using a Geiger Counter?.....NO

5. Were custody papers sealed in a plastic bag?.....YES (NQ)

6. Were custody papers filled out properly (ink, signed, etc.)?.....NO N/A

7. Were custody papers signed in appropriate place by ARDL personnel?.....YESi NO N/A

8. Was project identifiable from custody papers? If YES, enter project name at the top of this for ?-&."-0.E.?4.-'.....YES @ N/A

9. Was a separate container provided for measuring temperature? YES\_\_ NO Observed Cooler Temp. 0.7 C Correction factor C.1 C

B. **LOG-IN PHASE:** Date samples were logged-in: ..f-/-19 (Signature) uc,d

10. Describe type of packing in cooler: A=-4."-b."Z-...EL..... (m) f'...g ?=

11. Were all samples sealed in separate plastic bags?.....YES N/A

12. Did all containers arrive unbroken and were labels in good condition?.....(R)' NO

13. Were sample labels complete?.....NO

14. Did all sample labels agree with custody papers?.....D:-:7.1.....YES NO

15. Were correct containers used for the tests indicated?.....YES! NO

16. Was pH correct on preserved water samples?.....NO N/A

17. Was a sufficient amount of sample sent for tests indicated?.....Q NO

18. Were bubbles absent in VOA samples? If NO, list by sample#:.....YES NO UUA'

19. Was the ARDL project coordinator notified of any deficiencies?.....NO N/A

Comments and/or Corrective Action:
<p>0 S ,::J,-Te LE).s Mact Containers</p> <p>Manana was fu: vo:..s River.</p> <p>Last 4 Site ID's had Containers</p> <p>marked as Mississippi River</p> <p>Cof C indicate msl/msd for SLH-3 [No 11/e..</p> <p>Received] and No msl/msd for 7117R-1</p> <p>[Received 1 CONTAINER]. Noted on</p> <p>Cof C,</p> <p>(By: Signature) <u>dlc</u> Date: <u>3 1/2/19</u></p>

Sample Transfer	
Fraction	Fraction
<u>all</u>	
Area #	Area#
<u>Walhin</u>	
By	By
On	On
<u>-5-/2.....1 Cj'</u>	

Chain-of-Custody# 1/1.4



Environmental | Analytical | Management | Safety

PO Box 1566  
400 Aviation Drive  
Mt. Vernon, IL 62864  
618-244-3235

[www.ardlinc.com](http://www.ardlinc.com)

**Customer Name: SLCOE**

**Date: 4/9/19**

**Project Name: Lower River**

**Lab Name: ARDL, Inc.**

**Samples Received at ARDL: 3/13/19**

**ARDL Report No.: 8463**

### CASE NARRATIVE

Customer Sample No.	Date Collected	Lab ID Number	Anal ses Requested
OPR-2 RM 44	3/12/19	8463-01	Inorganics(1)
OPR-3 RM 80	3/12/19	8463-02	Inorganics(1)
OPR-4 RM 110	3/12/19	8463-03	Inorganics(1)
OPR-5 RM 150	3/12/19	8463-04	Inorganics(1)
SLH-2 RM 177	3/12/19	8463-05	Inorganics(1)
SLH-1 RM 162	3/12/19	8463-06	Inorganics(1)
SLH-15 RM 120	3/12/19	8463-07	Inorganics(I)

(1) Including ammonia, chlorophyll/pheophytin, nitrate, nitrite, TKN, TOC, orthophosphate, total phosphorus, TSS, and TVSS.

The quality control data are summarized as follows:

TOC were analyzed by an accredited outside laboratory due to instrument status.

#### PREPARATION BLANK

Results of the preparation blanks were within acceptable limits.

#### LABORATORY CONTROL SAMPLE

Percent recoveries of all LCS analyses were within control limits.

#### MATRIX SPIKE

Only an MS sample data evaluation was performed for the TOC analysis. Percent recoveries of all matrix spikes and matrix spike duplicates were within control limits, except 1 of 2 for TKN.

#### DUPLICATE

Duplicate analyses are reported as MS/MSD, except chlorophyll/pheophytin, TSS, and TVSS. RPO of the duplicate analyses met criteria, with exception of chlorophyll.

**CASE NARRATIVE (Continued)**

**DATA REPORTING QUALIFIERS**

The following data reporting qualifiers are used as required:

ND - Indicates parameter was analyzed for but not detected. The sample quantitation limit has been corrected for weight, dilution and/or percent moisture.

Release of the data contained in this package has been authorized by the Technical Services Manager or his designee as verified by the following signature.



---

Dean S. Dickerson  
Technical Services Manager



# Sample & QC Results

Including as appropriate:

Field Sample Results

Batch QC

Prep Blank

LCS/Spike Blank

Matrix QC

MS/MSD

Sample Duplicate

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008463

Report Date: 04/02/2019

Project Name: LOWER RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008463-01  
Field ID: OPR-2 RM 44  
Received: 03/13/2019

Sampling Loc'n: LOWER RIVER  
Sampling Date: 03/12/2019  
Sampling Time: 0946

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.159	MG/L	NONE	350.1	NA	03/13/19	03144407
Chlorophyll-a, Correcte	1.0	1.00		7.8	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Kjeldahl Nitrogen	0.190	0.200		1.15	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0380	0.0400		2.11	MG/L	NONE	GREEN	NA	03/19/19	03204421
Nitrite as Nitrogen	0.0200	0.0200		0.026	MG/L	NONE	354.1	NA	03/13/19	03154411
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Phosphorus	0.00800	0.0100		0.847	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.106	MG/L	NONE	365.2	NA	03/13/19	03154410
Solids, Total Suspended	10.0	10.0		295	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	10.0	10.0		20.0	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		3.1	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008463-01, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008463

Report Date: 04/02/2019

Project Name: LOWER RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008463-02  
Field ID: OPR-3 RM 80  
Received: 03/13/2019

Sampling Loc'n: LOWER RIVER  
Sampling Date: 03/12/2019  
Sampling Time: 0915

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.202	MG/L	NONE	350.1	NA	03/13/19	03144407
Chlorophyll-a, Correcte	1.0	1.00		7.6	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Kjeldahl Nitrogen	0.190	0.200		0.932	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0380	0.0400		1.89	MG/L	NONE	GREEN	NA	03/19/19	03204421
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	03/13/19	03154411
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Phosphorus	0.00800	0.0100		0.877	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.0135	MG/L	NONE	365.2	NA	03/13/19	03154410
Solids, Total Suspended	11.1	11.1		288	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	11.1	11.1		17.8	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		3.2	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008463-02, Inorganic Analyses

Page 1 of 1



**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008463

Report Date: 04/02/2019

Project Name: LOWER RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008463-03  
 Field ID: OPR-4 RM 110  
 Received: 03/13/2019

Sampling Loc'n: LOWER RIVER  
 Sampling Date: 03/12/2019  
 Sampling Time: 1330

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.194	MG/L	NONE	350.1	NA	03/13/19	03144407
Chlorophyll-a, Correcte	1.0	1.00		5.1	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Kjeldahl Nitrogen	0.190	0.200		1.59	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0380	0.0400		2.01	MG/L	NONE	GREEN	NA	03/19/19	03204421
Nitrite as Nitrogen	0.0200	0.0200		0.021	MG/L	NONE	354.1	NA	03/13/19	03154411
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Phosphorus	0.00800	0.0100		1.42	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.444	MG/L	NONE	365.2	NA	03/13/19	03154410
Solids, Total Suspended	14.3	14.3		454	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	14.3	14.3		28.6	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		3.8	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008463-03, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008463

Report Date: 04/02/2019

Project Name: LOWER RIVER

Project No:

Analysis: Inorganics

NELAC Certified - IL100308

ARDL No: 008463-04

Sampling Loc'n: LOWER RIVER

Matrix: WATER

Field ID: OPR-5 RM 150

Sampling Date: 03/12/2019

Moisture: NA

Received: 03/13/2019

Sampling Time: 1430

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.158	MG/L	NONE	350.1	NA	03/13/19	03144407
Chlorophyll-a, Correcte	1.0	1.00		5.1	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Kjeldahl Nitrogen	0.190	0.200		1.34	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0190	0.0200		1.51	MG/L	NONE	GREEN	NA	03/19/19	03204421
Nitrite as Nitrogen	0.0200	0.0200		0.028	MG/L	NONE	354.1	NA	03/13/19	03154411
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Phosphorus	0.00800	0.0100		1.61	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.146	MG/L	NONE	365.2	NA	03/13/19	03154410
Solids, Total Suspended	20.0	20.0		410	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	20.0	20.0		26.0	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		4.0	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008463-04, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008463

Report Date: 04/02/2019

Project Name: LOWER RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008463-05  
Field ID: SLH-2 RM 177  
Received: 03/13/2019

Sampling Loc'n: LOWER RIVER  
Sampling Date: 03/12/2019  
Sampling Time: 1630

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.135	MG/L	NONE	350.1	NA	03/13/19	03144407
Chlorophyll-a, Correcte	1.0	1.00		5.1	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Kjeldahl Nitrogen	0.190	0.200		1.81	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0190	0.0200		1.27	MG/L	NONE	GREEN	NA	03/19/19	03204421
Nitrite as Nitrogen	0.0200	0.0200		0.021	MG/L	NONE	354.1	NA	03/13/19	03154411
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Phosphorus	0.00800	0.0100		1.36	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.143	MG/L	NONE	365.2	NA	03/13/19	03154410
Solids, Total Suspended	12.5	12.5		385	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	12.5	12.5		27.5	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		4.1	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008463-05, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008463

Report Date: 04/02/2019

Project Name: LOWER RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008463-06  
 Field ID: SLH-1 RM 162  
 Received: 03/13/2019

Sampling Loc'n: LOWER RIVER  
 Sampling Date: 03/12/2019  
 Sampling Time: 1530

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.207	MG/L	NONE	350.1	NA	03/13/19	03144407
Chlorophyll-a, Correcte	1.0	1.00		5.1	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Kjeldahl Nitrogen	0.190	0.200		1.29	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0190	0.0200		1.73	MG/L	NONE	GREEN	NA	03/19/19	03204421
Nitrite as Nitrogen	0.0200	0.0200		0.027	MG/L	NONE	354.1	NA	03/13/19	03154411
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Phosphorus	0.00800	0.0100		1.24	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.143	MG/L	NONE	365.2	NA	03/13/19	03154410
Solids, Total Suspended	20.0	20.0		492	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	20.0	20.0		28.0	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		4.1	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008463-06, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008463

Report Date: 04/02/2019

Project Name: LOWER RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008463-07	Sampling Loc'n: LOWER RIVER	Matrix: WATER
Field ID: SLH-15 RM 120	Sampling Date: 03/12/2019	Moisture: NA
Received: 03/13/2019	Sampling Time: 0830	

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.183	MG/L	NONE	350.1	NA	03/13/19	03144407
Chlorophyll-a, Correcte	1.0	1.00		2.5	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Kjeldahl Nitrogen	0.190	0.200		1.62	MG/L	351.2	351.2	03/20/19	03/21/19	03254428
Nitrate as Nitrogen	0.0190	0.0200		1.8	MG/L	NONE	GREEN	NA	03/19/19	03204421
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	03/13/19	03154411
Pheophytin-a	1.0	1.00		2.8	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440
Phosphorus	0.00800	0.0100		1.52	MG/L	365.2	365.2	03/26/19	03/27/19	03294448
Phosphorus, -ortho	0.00800	0.0100		0.135	MG/L	NONE	365.2	NA	03/13/19	03154410
Solids, Total Suspended	14.3	14.3		476	MG/L	NONE	160.2	NA	03/14/19	03184416
Solids, Volatile Suspen	14.3	14.3		28.6	MG/L	NONE	160.4	NA	03/14/19	03184417
Total Organic Carbon	0.500	1.00		4.0	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008463-07, Inorganic Analyses

Page 1 of 1

**BLANK SUMMARY REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566      Mt. Vernon, IL    62864**

Lab Report No: 008463

Report Date: 04/02/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	LOD	LOQ	Blank Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run	QC Lab Number
Ammonia Nitrogen	0.020	0.030	ND	MG/L	NONE	350.1	NA	03/13/19	03144407	008463-01B1
Chlorophyll-a, Corre	1.0	1.0	ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440	008463-01B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	03/20/19	03/21/19	03254428	008462-01B1
Nitrate as Nitrogen	0.019	0.020	ND	MG/L	NONE	GREEN	NA	03/19/19	03204421	008463-02B1
Nitrite as Nitrogen	0.020	0.020	ND	MG/L	NONE	354.1	NA	03/13/19	03154411	008463-02B1
Pheophytin-a	1.0	1.0	ND	MG/CU.M.	10200H	10200H	03/12/19	03/25/19	03274440	008463-01B1
Phosphorus	0.008	0.010	ND	MG/L	365.2	365.2	03/26/19	03/27/19	03294448	008462-04B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	NA	03/13/19	03154410	008463-03B1
Solids, Total Suspen	1.0	1.0	ND	MG/L	NONE	160.2	NA	03/14/19	03184416	008462-01B1
Solids, Volatile Sus	1.0	1.0	ND	MG/L	NONE	160.4	NA	03/14/19	03184417	008462-01B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	03/20/19	03294444	008462-01B1

(a) DOD and/or NELAC Accredited Analyte  
Inorganic Method Blanks for 008463

Page 1 of 1

**LABORATORY CONTROL SAMPLE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566     Mt. Vernon, IL     62864**

Lab Report No: 008463

Report Date: 04/02/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	LCS 1 Result	LCS 1 Level	LCS 1 % Rec	LCS 2 Result	LCS 2 Level	LCS 2 % Rec	% Rec Limits	Mean % Rec	Analytical Run	QC Lab Number
Ammonia Nitrogen	0.99	1.0	99				80-120		03144407	008463-01C1
Kjeldahl Nitrogen	0.81	1.0	81				80-120		03254428	008462-01C1
Nitrate as Nitrogen	1	1.0	100	--			80-120		03204421	008463-02C1
Nitrite as Nitrogen	0.97	1.0	97				80-120		03154411	008463-02C1
Phosphorus	0.75	0.67	112				80-120		03294448	008462-04C1
Phosphorus, -ortho .	0.10	0.10	103				80-120		03154410	008463-03C1
Total Organic Carbon	9.4	10.0	94				76-120		03294444	008462-01C1

NOTE: Any values tabulated above marked with an asterisk are outside of acceptable limits.

(a) DOD and/or NELAC Accredited Analyte

Inorganic LCS Results for 008463

Page 1 of 1

**MATRIX SPIKE/SPIKE DUPLICATE REPORT**  
**ARDL, INC. 400 Aviation Drive; P.O. Box 1566 Mt. Vernon, IL 62864**

Lab Report No: 008463

Report Date: 04/02/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	Sample Matrix	Sample Result	MS Result	MS Level	MS % Rec	MSD Result	MSD Level	MSD % Rec	% Rec Limits	RPD	RPD Limit	Run	QC Lab Number
Ammonia Nitrogen	WATER	0.16	2.2	2.0	104	2.2	2.0	104	75-125	0	20	03144407	008463-01MS
Kjeldahl Nitrogen	WATER	1.2	1.9	0.80	95	2.2	0.80	133 *	75-125	15	20	03254428	008463-01MS
Nitrate as Nitrogen	WATER	1.9	2.9	1.0	106	3.0	1.0	111	75-125	2	20	03204421	008463-02MS
Nitrite as Nitrogen	WATER	ND	1	1.0	100	0.97	1.0	97	75-125	2	20	03154411	008463-02MS
Phosphorus	WATER	1.4	2.1	0.83	78	2.2	0.83	92	75-125	5	20	03294448	008463-03MS
Phosphorus, -ortho	WATER	0.44	0.57	0.10	125	0.55	0.10	107	75-125	3	20	03154410	008463-03MS
Total Organic Carbon	WATER	3.2	8.2	5.0	100				76-120			03294444	008463-02MS

NOTE: Values tabulated above marked with an asterisk are explained in the associated narrative.

(a) DOD and/or NELAC Accredited Analyte.

Inorganic Matrix Spikes for 008463

Page 1 of 1



**SAMPLE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566     Mt. Vernon, IL     62864**

Lab Report No: 008463

Report Date: 04/02/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	Sample Conc'n	First Duplicate	Second Duplicate	Units	Percent Diff	Mean (Smp, D1, D2)	Analytical Run	QC Lab Number
Chlorophyll-a, Corrected	7.8	17.6	--	MG/CU.M.	77*	--	03274440	008463-01D1
Pheophytin-a	ND	0	--	MG/CU.M.	NC	--	03274440	008463-01D1
Solids, Total Suspended	476	509	--	MG/L	7	--	03184416	008463-07D1
Solids, Volatile Suspend	28.6	30.0	--	MG/L	5	--	03184417	008463-07D1

\* indicates that agreement between duplicates is greater than 20%. See Case Narrative for exceptions.

(a) DOD and/or NELAC Accredited Analyte

Sample Duplicates for 008463

Page 1 of 1



# Sample Receipt Information

Including as appropriate:

- COCs
- Cooler Receipts
- Airbills
- Email Communication/ Instructions from Customer

## CHAIN OF CUSTODY RECORD

PROJECT Lower River				PRESERVATION														
SAMPLERS: (Signature)				SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN														
SAMPLE NUMBER				DATE	TIME	COMP	GRAB	REMARKS OR SAMPLE LOCATION										ICED
T. Scheepker, B. Graefling				2019														
OPR-2 RM 44				3-12	946		X	X	X	X	X	X	X	X	X	X	X	X
OPR-3 RM 80				3-12	915		X	X	X	X	X	X	X	X	X	X	X	X
OPR-4 RM 110				3-12	1330		X	X	X	X	X	X	X	X	X	X	X	X
OPR-5 RM 150				3-12	1430		X	X	X	X	X	X	X	X	X	X	X	X
SLH-2 RM 177 / 630				3-12	1630		X	X	X	X	X	X	X	X	X	X	X	X
SLH-1 RM 162 / 530				3-12	800		X	X	X	X	X	X	X	X	X	X	X	X
SLH-15 RM 120				3-12	830		X	X	X	X	X	X	X	X	X	X	X	X

PURCHASE ORDER NO:

**COOLER RECEIPT REPORT**  
**ARDL, INC.**

ARDL #: 11-11-11

Cooler# 1111

Number of Coolers in Shipment: 1

Project: Lower River

Date Received: 11-11-11

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 11-11-11 (Signature) M

1. Did cooler come with a shipping slip (airbill, etc.)? YES @

If YES, enter carrier name and airbill number here: 1111-1111-1111

2. Were custody seals on outside of cooler? YES NIA

How many and where? 1, Seal Date: 11-11-11, Seal Name: 1111

3. Were custody seals unbroken and intact at the date and time of arrival? YES NO @,,

4. Did you screen samples for radioactivity using a Geiger Counter? NO @

5. Were custody papers sealed in a plastic bag? YES @,

6. Were custody papers filled out properly (ink, signed, etc.)? YES NO NIA

7. Were custody papers signed in appropriate place by ARDL personnel? YES NO NIA

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form: 1111 NO NIA

9. Was a separate container provided for measuring temperature? YES NO Observed Cooler Temp. 11.1 C Correction factor 0.1 C

B. **LOG-IN PHASE:** Date samples were logged-in: 11-11-11 (Signature) Ad/11

10. Describe type of packing in cooler: 1111

11. Were all samples sealed in separate plastic bags? YES (R) NIA

12. Did all containers arrive unbroken and were labels in good condition? YES NO

13. Were sample labels complete? YES NO

14. Did all sample labels agree with custody papers? YES NO

15. Were correct containers used for the tests indicated? YES NO

16. Was pH correct on preserved water samples? YES NO NIA

17. Was a sufficient amount of sample sent for tests indicated? YES NO

18. Were bubbles absent in VOA samples? If NO, list by sample#: 1111 YES NO

19. Was the ARDL project coordinator notified of any deficiencies? YES NO WA'

Comments and/or Corrective Action:	
(By: Signature)	Date:

Sample Transfer	
Fraction <u>1111</u>	Fraction
Area# <u>1111</u>	Area#
By <u>1111</u>	By
On <u>11-11-11</u>	On

Chain-of-Custody # 1111

**COOLER RECEIPT REPORT**  
**ARDL, INC.**

ARDL #: 2cf=-& 3 ..----

Cooler# .2 .2

Number of CoolerPin Shipment: -----

Project: L c t u e r // 'r/a

Date Received: S '2 -1- Cj Li -/f/Zl-j-

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 3 - 13 - 19 (Signature) N 16 : -/L.&=-"C-""L'""d d-""A""2""""

1. Did cooler come with a shipping slip (airbill, etc.)?.....YES (@

If YES, enter carrier name and airbill number here: 6==-"": :A. aA'""/2CL.d'---" "-d"-"/----

2. Were custody seals on outside of cooler?.....YES § N/A

How many and where?\_\_\_\_\_, Seal Date:\_\_\_\_\_, Seal Name:\_\_\_\_\_

3. Were custody seals unbroken and intact at the date and time of arrival?.....YES NO

4. Did you screen samples for radioactivity using a Geiger Counter?.....NO

5. Were custody papers sealed in a plastic bag?.....YES (NQ,;

6. Were custody papers filled out properly (ink, signed, etc.)?.....Q NO N/A

7. Were custody papers signed in appropriate place by ARDL personnel?.....> NO

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form.....@ NO N/A

9. Was a separate container provided for measuring temperature? YES\_ NO\_ - Observed Cooler Temp. CJ.I °C O  
/U // Correction factor Q, C

B. **LOG-IN PHASE:** Date samples were logged-in: 3 - 13 - 19 (Signature) G ..Z..

10 Describe type of packing in cooler: bf..... rZl/ .....=-"/-"".-'--<=g. ..)""

11. Were all samples sealed in separate plastic bags? .....YES <&.§; N/A

12. Did all containers arrive unbroken and were labels in good condition?.....€ NO

13. Were sample labels complete?.....NO

14. Did all sample labels agree with custody papers? .....QEf' NO

15. Were correct containers used for the tests indicated? .....NO

16. Was pH correct on preserved water samples?.....€" NO N/A

17. Was a sufficient amount of sample sent for tests indicated?.....@ NO

18. Were bubbles absent in VOA samples? If NO, list by sample#:\_\_\_\_\_YES NO @A'

19. Was the ARDL project coordinator notified of any deficiencies?.....YES NO Gifi.'

Comments and/or Corrective Action:	
(By: Signature)	Date:

Sample Transfer	
Fraction <u>OLU</u>	Fraction
Area#	Area#
By <u>Walker</u>	By
On <u>3-13-19</u>	On

Chain-of-Custody# N/A



Environmental | Analytical | Management | Safety

PO Box 1566  
400 Aviation Drive  
Mt. Vernon, IL 62864  
618-244-3235

[www.ardlinc.com](http://www.ardlinc.com)

**Customer Name: SLCOE**

**Date: 4/9/19**

**Project Name: Upper Mississippi River**

**Lab Name: ARDL, Inc.**

**Samples Received at ARDL: 3/13/19**

**ARDL Report No.: 8464**

### CASE NARRATIVE

Customer Sample No.	Date Collected	Lab ID Number	Anal ses Requested
UMR-5 MILE 212.5	3/13/19	8464-01	Inorganics(1)
UMR-6 MILE 231	3/13/19	8464-02	Inorganics(1)
UMR-15	3/13/19	8464-03	Inorganics(1)
UMR-7 MILE 241	3/13/19	8464-04	Inorganics(1)
UMR-LM RM 251	3/13/19	8464-05	Inorganics(1)
UMR-9 MILE 273	3/13/19	8464-06	Inorganics(1)
UMR-LA RM 283	3/13/19	8464-07	Inorganics(1)
UMR-DP RM 294	3/13/19	8464-08	Inorganics(1)

(1) Including ammonia, chlorophyll/pheophytin, nitrite, nitrate, TKN, TOC, orthophosphate, total phosphorus, TSS, and TVSS.

The quality control data are summarized as follows:

TOC were analyzed by an accredited outside laboratory due to instrument status.

#### PREPARATION BLANK

Results of the preparation blanks were within acceptable limits.

#### LABORATORY CONTROL SAMPLE

Percent recoveries of all LCS analyses were within control limits.

#### MATRIX SPIKE

Percent recovery of all matrix spikes and matrix spike duplicates were within control limits, except 1 of 2 for total phosphorus.

#### DUPLICATE

Duplicate analyses are reported as MS/MSD, except chlorophyll/pheophytin, TSS, and TVSS. RPO of the duplicate analyses met criteria, except chlorophyll.

CASE NARRATIVE (Continued)

**DATA REPORTING QUALIFIERS**

The following data reporting qualifiers are used as required:

ND - Indicates parameter was analyzed for but not detected. The sample quantitation limit has been corrected for weight, dilution and/or percent moisture.

J - Indicates an estimated value. This flag is used either when estimating a concentration or this flag indicates analyte(s) associated with a DOD-QSM specified non-compliance pertaining to matrix QC criteria.

Release of the data contained in this package has been authorized by the Technical Services Manager or his designee as verified by the following signature.



---

Dean S. Dickerson  
Technical Services Manager



# Sample & QC Results

Including as appropriate:

Field Sample Results

Batch QC

Prep Blank

LCS/Spike Blank

Matrix QC

MS/MSD

Sample Duplicate



**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008464

Report Date: 04/02/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008464-01	Sampling Loc'n: UPPER MISSISSIPPI RIVER	Matrix: WATER
Field ID: UMR-5 MILE 212.5	Sampling Date: 03/13/2019	Moisture: NA
Received: 03/14/2019	Sampling Time: 1645	

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.362	MG/L	NONE	350.1	NA	03/20/19	03214422
Chlorophyll-a, Correcte	1.0	1.00		5.1	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Kjeldahl Nitrogen	0.380	0.400		2.22	MG/L	351.2	351.2	03/20/19	03/21/19	03254429
Nitrate as Nitrogen	0.0380	0.0400		1.76	MG/L	NONE	GREEN	NA	03/25/19	03264430
Nitrite as Nitrogen	0.0200	0.0200		0.025	MG/L	NONE	354.1	NA	03/14/19	03154412
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Phosphorus	0.0160	0.0200		1.77	MG/L	365.2	365.2	03/26/19	03/27/19	03294449
Phosphorus, -ortho	0.00800	0.0100		0.518	MG/L	NONE	365.2	NA	03/14/19	03154413
Solids, Total Suspended	20.0	20.0		512	MG/L	NONE	160.2	NA	03/18/19	03274432
Solids, Volatile Suspen	20.0	20.0		36.0	MG/L	NONE	160.4	NA	03/18/19	03274433
Total Organic Carbon	0.500	1.00		5.0	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008464-01, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008464

Report Date: 04/02/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008464-02	Sampling Loc'n: UPPER MISSISSIPPI RIVER	Matrix: WATER
Field ID: UMR-6 MILE 231	Sampling Date: 03/13/2019	Moisture: NA
Received: 03/14/2019	Sampling Time: 1600	

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.338	MG/L	NONE	350.1	NA	03/20/19	03214422
Chlorophyll-a, Corrected	1.0	1.00		6.8	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Kjeldahl Nitrogen	0.190	0.200		1.42	MG/L	351.2	351.2	03/20/19	03/21/19	03254429
Nitrate as Nitrogen	0.0380	0.0400		1.6	MG/L	NONE	GREEN	NA	03/25/19	03264430
Nitrite as Nitrogen	0.0200	0.0200		0.022	MG/L	NONE	354.1	NA	03/14/19	03154412
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Phosphorus	0.0160	0.0200		2.55	MG/L	365.2	365.2	03/26/19	03/27/19	03294449
Phosphorus, -ortho	0.00800	0.0100		0.237	MG/L	NONE	365.2	NA	03/14/19	03154413
Solids, Total Suspended	20.0	20.0		314	MG/L	NONE	160.2	NA	03/18/19	03274432
Solids, Volatile Suspended	20.0	20.0		26.0	MG/L	NONE	160.4	NA	03/18/19	03274433
Total Organic Carbon	0.500	1.00		5.6	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008464-02, Inorganic Analyses

Page 1 of 1

ARDL, INC.  
400 Aviation Drive; P.O. Box 1566  
Mt. Vernon, Illinois 62864

Lab Report No: 008464

Report Date: 04/02/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008464-03  
Field ID: UMR-15  
Received: 03/14/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 03/13/2019  
Sampling Time: 0945

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.314	MG/L	NONE	350.1	NA	03/20/19	03214422
Chlorophyll-a, Correcte	1.0	1.00		6.8	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Kjeldahl Nitrogen	0.190	0.200		1.49	MG/L	351.2	351.2	03/20/19	03/21/19	03254429
Nitrate as Nitrogen	0.0380	0.0400		2.01	MG/L	NONE	GREEN	NA	03/25/19	03264430
Nitrite as Nitrogen	0.0200	0.0200		0.029	MG/L	NONE	354.1	NA	03/14/19	03154412
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Phosphorus	0.00800	0.0100		0.609	MG/L	365.2	365.2	03/26/19	03/27/19	03294449
Phosphorus, -ortho	0.00800	0.0100		0.183	MG/L	NONE	365.2	NA	03/14/19	03154413
Solids, Total Suspended	20.0	20.0		312	MG/L	NONE	160.2	NA	03/18/19	03274432
Solids, Volatile Suspen	20.0	20.0		22.0	MG/L	NONE	160.4	NA	03/18/19	03274433
Total Organic Carbon	0.500	1.00		4.5	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008464-03, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008464

Report Date: 04/02/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008464-04	Sampling Loc'n: UPPER MISSISSIPPI RIVER	Matrix: WATER
Field ID: UMR-7 MILE 241	Sampling Date: 03/13/2019	Moisture: NA
Received: 03/14/2019	Sampling Time: 1515	

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.345	MG/L	NONE	350.1	NA	03/20/19	03214422
Chlorophyll-a, Correcte	1.0	1.00		3.4	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Kjeldahl Nitrogen	0.190	0.200		1.72	MG/L	351.2	351.2	03/20/19	03/21/19	03254429
Nitrate as Nitrogen	0.0380	0.0400		1.71	MG/L	NONE	GREEN	NA	03/25/19	03264430
Nitrite as Nitrogen	0.0200	0.0200		0.027	MG/L	NONE	354.1	NA	03/14/19	03154412
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Phosphorus	0.0160	0.0200		1.62	MG/L	365.2	365.2	03/26/19	03/27/19	03294449
Phosphorus, -ortho	0.00800	0.0100		0.271	MG/L	NONE	365.2	NA	03/14/19	03154413
Solids, Total Suspended	20.0	20.0		330	MG/L	NONE	160.2	NA	03/18/19	03274432
Solids, Volatile Suspen	20.0	20.0		20.0	MG/L	NONE	160.4	NA	03/18/19	03274433
Total Organic Carbon	0.500	1.00		6.0	MG/L	NONE	415.1	NA	03/20/19	03294444

(a) DOD and/or NELAC Accredited Analyte.

Sample 008464-04, Inorganic Analyses

Page 1 of 1

ARDL, INC.  
400 Aviation Drive; P.O. Box 1566  
Mt. Vernon, Illinois 62864

Lab Report No: 008464

Report Date: 04/02/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008464-05	Sampling Loc'n: UPPER MISSISSIPPI RIVER	Matrix: WATER
Field ID: UMR-LM RM 251	Sampling Date: 03/13/2019	Moisture: NA
Received: 03/14/2019	Sampling Time: 1430	

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.324	MG/L	NONE	350.1	NA	03/20/19	03214422
Chlorophyll-a, Correcte	1.0	1.00		5.3	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Kjeldahl Nitrogen	0.190	0.200		1.55	MG/L	351.2	351.2	03/20/19	03/21/19	03254429
Nitrate as Nitrogen	0.0380	0.0400		1.6	MG/L	NONE	GREEN	NA	03/25/19	03264430
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	03/14/19	03154412
Pheophytin'-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Phosphorus	0.00800	0.0100		1.46	MG/L	365.2	365.2	03/26/19	03/27/19	03294449
Phosphorus, -ortho	0.00800	0.0100		0.0693	MG/L	NONE	365.2	NA	03/14/19	03154413
Solids, Total Suspended	20.0	20.0		258	MG/L	NONE	160.2	NA	03/18/19	03274432
Solids, Volatile Suspen	20.0	20.0		ND	MG/L	NONE	160.4	NA	03/18/19	03274433
Total Organic Carbon	0.500	1.00		4.8	MG/L	NONE	415.1	NA	03/21/19	03294445

(a) DOD and/or NELAC Accredited Analyte.

Sample 008464-05, Inorganic Analyses

Page 1 of 1

ARDL, INC.  
400 Aviation Drive; P.O. Box 1566  
Mt. Vernon, Illinois 62864

Lab Report No: 008464

Report Date: 04/02/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008464-06      Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Field ID: UMR-9 MILE 273      Sampling Date: 03/13/2019  
Received: 03/14/2019      Sampling Time: 1250

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.283	MG/L	NONE	350.1	NA	03/20/19	03214422
Chlorophyll-a, Correcte	1.0	1.00		7.2	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Kjeldahl Nitrogen	0.190	0.200		1.98	MG/L	351.2	351.2	03/26/19	03/27/19	03274434
Nitrate as Nitrogen	0.0380	0.0400		1.85	MG/L	NONE	GREEN	NA	03/25/19	03264430
Nitrite as Nitrogen	0.0200	0.0200		0.020	MG/L	NONE	354.1	NA	03/14/19	03154412
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Phosphorus	0.00800	0.0100		1.13	MG/L	365.2	365.2	03/26/19	03/27/19	03294449
Phosphorus, -ortho	0.00800	0.0100		0.14	MG/L	NONE	365.2	NA	03/14/19	03154413
Solids, Total Suspended	20.0	20.0		304	MG/L	NONE	160.2	NA	03/18/19	03274432
Solids, Volatile Suspen	20.0	20.0		20.0	MG/L	NONE	160.4	NA	03/18/19	03274433
Total Organic Carbon	0.500	1.00		4.9	MG/L	NONE	415.1	NA	03/21/19	03294445

(a) DOD and/or NELAC Accredited Analyte.

Sample 008464-06, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008464

Report Date: 04/02/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008464-07      Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Field ID: UMR-LA RM 283      Sampling Date: 03/13/2019  
Received: 03/14/2019      Sampling Time: 1200

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.256	MG/L	NONE	350.1	NA	03/20/19	03214422
Chlorophyll-a, Correcte	1.0	1.00		6.8	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Kjeldahl Nitrogen	0.190	0.200		1.8	MG/L	351.2	351.2	03/26/19	03/27/19	03274434
Nitrate as Nitrogen	0.0380	0.0400		2.11	MG/L	NONE	GREEN	NA	03/25/19	03264430
Nitrite as Nitrogen	0.0200	0.0200		0.029	MG/L	NONE	354.1	NA	03/14/19	03154412
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Phosphorus	0.00800	0.0100		1.25	MG/L	365.2	365.2	03/26/19	03/27/19	03294449
Phosphorus, -ortho	0.00800	0.0100		0.041	MG/L	NONE	365.2	NA	03/14/19	03154413
Solids, Total Suspended	20.0	20.0		230	MG/L	NONE	160.2	NA	03/18/19	03274432
Solids, Volatile Suspen	20.0	20.0		ND	MG/L	NONE	160.4	NA	03/18/19	03274433
Total Organic Carbon	0.500	1.00		4.1	MG/L	NONE	415.1	NA	03/21/19	03294445

(a) DOD and/or NELAC Accredited Analyte.

Sample 008464-07, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008464

Report Date: 04/02/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008464-08  
 Field ID: UMR-DP RM 294  
 Received: 03/14/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Sampling Date: 03/13/2019  
 Sampling Time: 1030

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.276	MG/L	NONE	350.1	NA	03/20/19	03214422
Chlorophyll-a, Correcte	1.0	1.00		3.4	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Kjeldahl Nitrogen	0.190	0.200		1.74	MG/L	351.2	351.2	03/26/19	03/27/19	03274434
Nitrate as Nitrogen	0.0380	0.0400		2.11	MG/L	NONE	GREEN	NA	03/25/19	03264430
Nitrite as Nitrogen	0.0200	0.0200		0.029	MG/L	NONE	354.1	NA	03/14/19	03154412
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451
Phosphorus	0.00800	0.0100		1.24	MG/L	365.2	365.2	03/26/19	03/27/19	03294449
Phosphorus, -ortho	0.00800	0.0100		0.0608	MG/L	NONE	365.2	NA	03/14/19	03154413
Solids, Total Suspended	20.0	20.0		276	MG/L	NONE	160.2	NA	03/18/19	03274432
Solids, Volatile Suspen	20.0	20.0		ND	MG/L	NONE	160.4	NA	03/18/19	03274433
Total Organic Carbon	0.500	1.00		4.2	MG/L	NONE	415.1	NA	03/21/19	03294445

(a) DOD and/or NELAC Accredited Analyte.



**BLANK SUMMARY REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566      Mt. Vernon, IL    62864**

Lab Report No: 008464

Report Date: 04/02/2019

Project Name: UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	LOD	LOQ	Blank Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run	QC Lab Number
Ammonia Nitrogen	0.020	0.030	ND	MG/L	NONE	350.1	NA	03/20/19	03214422	008464-01B1
Chlorophyll-a, Corre	1.0	1.0	ND	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451	008464-02B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	03/20/19	03/21/19	03254429	008464-01B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	03/26/19	03/27/19	03274434	008467-01B1
Nitrate as Nitrogen	0.019	0.020	ND	MG/L	NONE	GREEN	NA	03/25/19	03264430	008464-02B1
Nitrite as Nitrogen	0.020	0.020	ND	MG/L	NONE	354.1	NA	03/14/19	03154412	008464-03B1
Pheophytin-a	1.0	1.0	ND	MG/CU.M.	10200H	10200H	03/14/19	03/28/19	03294451	008464-02B1
Phosphorus	0.008	0.010	ND	MG/L	365.2	365.2	03/26/19	03/27/19	03294449	008464-07B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	NA	03/14/19	03154413	008464-02B1
Solids, Total Suspen	1.0	1.0	ND	MG/L	NONE	160.2	NA	03/18/19	03274432	008464-08B1
Solids, Volatile Sus	1.0	1.0	ND	MG/L	NONE	160.4	NA	03/18/19	03274433	008464-08B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	03/20/19	03294444	008462-01B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	03/21/19	03294445	008464-05B1

(a) DOD and/or NELAC Accredited Analyte  
Inorganic Method Blanks for 008464

Page 1 of 1

**LABORATORY CONTROL SAMPLE REPORT**  
**ARDL, INC.    400 Aviation Drive; P.O. Box 1566    Mt. Vernon, IL    62864**

Lab Report No: 008464

Report Date: 04/02/2019

Project Name: UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	LCS 1 Result	LCS 1 Level	LCS 1 % Rec	LCS 2 Result	LCS 2 Level	LCS 2 % Rec	% Rec Limits	Mean % Rec	Analytical Run	QC Lab Number
Ammonia Nitrogen	0.98	1.0	98				80-120		03214422	008464-01C1
Kjeldahl Nitrogen	0.99	1.0	99				80-120		03254429	008464-01C1
Kjeldahl Nitrogen	0.97	1.0	97				80-120		03274434	008467-01C1
Nitrate as Nitrogen	0.91	1.0	91				80-120		03264430	008464-02C1
Nitrite as Nitrogen	0.92	1.0	92				80-120		03154412	008464-03C1
Phosphorus	0.71	0.67	106				80-120		03294449	008464-07C1
Phosphorus, -ortho	0.11	0.10	106				80-120		03154413	008464-02C1
Total Organic Carbon	9.4	10.0	94				76-120		03294444	008462-01C1
Total Organic Carbon	10.4	10.0	104				76-120		03294445	008464-05C1

NOTE: Any values tabulated above marked with an asterisk are outside of acceptable limits.

(a) DOD and/or NELAC Accredited Analyte

**MATRIX SPIKE/SPIKE DUPLICATE REPORT**  
**ARDL, INC. 400 Aviation Drive; P.O. Box 1566 Mt. Vernon, IL 62864**

Lab Report No: 008464

Report Date: 04/02/2019

Project Name: UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	Sample Matrix	Sample Result	MS Result	MS Level	MS % Rec	MSD Result	MSD Level	MSD % Rec	% Rec Limits	RPD	RPD Limit	Run	QC Lab Number
Ammonia Nitrogen	WATER	0.36	2.5	2.0	105	2.4	2.0	102	75-125	3	20	03214422	008464-01MS
Kjeldahl Nitrogen	WATER	2.2	3.0	0.80	99	3.0	0.80	100	75-125	0	20	03254429	008464-01MS
Nitrate as Nitrogen	WATER	1.6	2.5	1.0	92	2.7	1.0	106	75-125	5	20	03264430	008464-02MS
Nitrite as Nitrogen	WATER	0.029	1.0	1.0	98	1.0	1.0	99	75-125	1	20	03154412	008464-03MS
Phosphorus	WATER	1.3	2.1	0.83	106	2.5	0.83	146 *	75-125	14	20	03294449	008464-07MS
Phosphorus, -ortho	WATER	0.24	0.33	0.10	95	0.34	0.10	105	75-125	3	20	03154413	008464-02MS
Total Organic Carbon	WATER	4.8	9.9	5.0	101	9.7	5.0	97	76-120	2	20	03294445	008464-05MS

NOTE: Values tabulated above marked with an asterisk are explained in the associated narrative.

(a) DOD and/or NELAC Accredited Analyte.

Inorganic Matrix Spikes for 008464

Page 1 of 1

**SAMPLE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566     Mt. Vernon, IL     62864**

Lab Report No: 008464

Report Date: 04/02/2019

Project Name: UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	Sample Conc'n	First Duplicate	Second Duplicate	Units	Percent Diff	Mean (Smp,D1,D2)	Analytical Run	QC Lab Number
Chlorophyll-a, Corrected	6.8	10.1	--	MG/CU.M.	39*	--	03294451	008464-02D1
Pheophytin-a	ND	0	--	MG/CU.M.	NC	--	03294451	008464-02D1
Solids, Total Suspended	276	290	--	MG/L	5	--	03274432	008464-08D1
Solids, Volatile Suspend	ND	20.0	--	MG/L	NC	--	03274433	008464-08D1

\* indicates that agreement between duplicates is greater than 20 . See Case Narrative for exceptions.

(a) DOD and/or NELAC Accredited Analyte

Sample Duplicates for 008464

Page 1 of 1



# Sample Receipt Information

Including as appropriate:

- COCs
- Cooler Receipts
- Airbills
- Email Communication/ Instructions from Customer

P.O. Box 1566, 400 Aviation Drive, Mt. Vernon, IL 62864  
(618) 244-3235 Phone      (618) 244-1149 Fax

$$JL/-IP \quad t.)$$

## CHAIN OF CUSTODY RECORD

PROJECT Upper Mississippi River				<div>I //</div>																			PRESERVATION		
SAMPLERS: (Signature)					<div>50%</div>																			CI	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
SAMPLE NUMBER      DATE      TINff"      I																									
:Jt)l'1      8 t)																									
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UMR-5 Mile 212.5																									
UMR-6 Mile 231																									
UMR-15																									
UMR-7Mile241																									
UMR-LM RM 251																									
UMR-9 Mile 273																									
UMR-LARM 283																									
UMR- DP RM 294'																									
																							X		
Re shed b ignature) ' / - ; ? '				:;D<7	Time (/(/I)	fJm /; 1--																		REMARKS/SPECIAL INSTRUCTIONS:  *Preserved with HiSO4	
=edl,y: i:Ztur ) 'eLA0				Date _fJ-/q--/2	Time ,...J/)q,'.)	Received by ture)																			
Received for ratory by:				Date	Time	Shipping Ticket No.																			
.c?.lh, .----				t;	0536																				

**COOLER RECEIPT REPORT**  
**ARDL INC.**

ARDL #: -J\_-;..t/-\_u\_t/- \_\_\_\_\_

Cooler# I £!::J :

Number of codf{rs in Shipment:   

Project: 7J/J/Jet, 12:5.s:ss:p:J.' J?ve.L

Date Received: 3-13-11 ?«f.

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 3-11-19 (Signature) &&

1. Did cooler come with a shipping slip (airbill, etc.)?.....YES

Enter carrier name and airbill number here: \_\_\_\_\_, =-""11 ""-""L= =. \_\_\_\_\_

2. Were custody seals on outside of cooler?.....YES (@:: N/A

How many and where? \_\_\_\_\_, Seal Date: \_\_\_\_\_, Seal Name: \_\_\_\_\_

3. Were custody seals unbroken and intact at the date and time of arrival?.....YES NO

4. Did you screen samples for radioactivity using a Geiger Counter?.....Y@ NO

5. Were custody papers sealed in a plastic bag?.....YES @

6. Were custody papers filled out properly (ink, signed, etc.)?.....@ " NO NIA

7. Were custody papers signed in appropriate place by ARDL personnel?..... NO NIA

8. Was project identifiable from custody papers? If YES, nter project name at the top of this form..... NO N/A

9. Was a separate container provided for measuring temperature? YES\_ NO V Observed Cooler Temp. 3 Correction Factor 0' C C

B. **LOG-IN PHASE:** Date samples were logged-in: 3-11-19 (Signature) Jt!J d2Zd

10. Describe type of packing in cooler: --/2 "-----"£ \_L---""iC: \_:R"""/'-----

11. Were all samples sealed in separate plastic bags? ..... YES NIA

12. Did all containers arrive unbroken and were labels in good condition? ..... '@, NO

13. Were sample labels complete?.....' @: NO

14. Did all sample labels agree with custody papers? ..... NO

15. Were correct containers used for the tests indicated? ..... NO

16. Was pH correct on preserved water samples? .....€ NO NIA

17. Was a sufficient amount of sample sent for tests indicated?.....:ZEs NO

18. Were bubbles absent in VOA samples? If NO, list by sample#: \_\_\_\_\_ YES NO @, ' ,

19. Was the ARDL project coordinator notified of any deficiencies?.....YES NO (ffffi

**Comments and/or Corrective Action:**

Note: Changes on CofC init. initialed or dated.

**Sample Transfer**

Fraction	Fraction
t!Uf	
Area#	Area#
t!//P!kc--	
By	By
ft'u	
On	On
J-1¥--19	

Chain-of-Custody# N/A

B : Si nature

Date: 3-14-19

**COOLER RECEIPT REPORT**  
**ARDL INC.**

ARDL #: 8464

Cooler# : IZ 1

Number of Cool7sin Shipment: 1

Project: Upper Mississippi River

Date Received: 3-13-17 upriv

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 3-19 (Signature) [Signature]

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES m

If YES, enter carrier name and airbill number here: \_\_\_\_\_

2. Were custody seals on outside of cooler? ..... YES @ NIA

How many and where? \_\_\_\_\_, Seal Date: \_\_\_\_\_, Seal Name: \_\_\_\_\_

3. Were custody seals unbroken and intact at the date and time of arrival? ..... YES NO

4. Did you screen samples for radioactivity using a Geiger Counter? ..... tr NO

5. Were custody papers sealed in a plastic bag? ..... YES

6. Were custody papers filled out properly (ink, signed, etc.)? ..... NO NIA

7. Were custody papers signed in appropriate place by ARDL personnel? ..... NO NIA

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form ..... NO NIA

9. Was a separate container provided for measuring temperature? YES NO Observed Cooler Temp. 0.3 C  
LV ft Correction factor 0, C C

B. **LOG-IN PHASE:** Date samples were logged-in: 3-19 (Signature) [Signature]

10. Describe type of packing in cooler: 1/4 " \_\_\_\_\_

11. Were all samples sealed in separate plastic bags? ..... YES NIA

12. Did all containers arrive unbroken and were labels in good condition? ..... !!\$: NO

13. Were sample labels complete? ..... NO

14. Did all sample labels agree with custody papers? ..... NO

15. Were correct containers used for the tests indicated? ..... NO

16. Was pH correct on preserved water samples? ..... € NO NIA

17. Was a sufficient amount of sample sent for tests indicated? ..... NO

18. Were bubbles absent in VOA samples? If NO, list by sample#: \_\_\_\_\_ YES NO <fiii.

19. Was the ARDL project coordinator notified of any deficiencies? ..... YES NO@

Comments and/or Corrective Action:	
(By: Signature)	Date:

Sample Transfer	
Fraction <u>11?fJ</u>	Fraction
Area# <u>WIZ</u>	Area#
By <u>d,tc</u>	By
On <u>8-1 -11</u>	On

Chain-of-Custody# N/A





Environmental | Analytical | Management | Safety

PO Box 1566  
400 Aviation Drive  
Mt. Vernon, IL 62864  
618-244-3235  
[www.ardlinc.com](http://www.ardlinc.com)

**Customer Name: SLCOE**

**Date: 7/31/19**

**Project Name: Upper Mississippi River**

**Lab Name: ARDL, Inc.**

**Samples Received at ARDL: 7/2/19**

**ARDL Report No.: 8485**

### CASE NARRATIVE

<u>Customer Sample No.</u>	<u>Date Collected</u>	<u>Lab ID Number</u>	<u>Analyses Requested</u>
UMR-1 CHAIN OF ROCKS CAVE	7/1/19	8485-01	Inorganics(1)
UMR-2 CONFLUENCE	7/2/19	8485-02	Inorganics(1)
UMR-3-MILE 200	7/1/19	8485-03	Inorganics(1)
UMR-5 MILE 212.5	7/1/19	8485-04	Inorganics(1)
UMR-6 MILE 231	7/2/19	8485-05	Inorganics(1)
UMR-15	7/2/19	8485-06	Inorganics(1)
UMR-9 MILE 273	7/2/19	8485-07	Inorganics(1)
UMR-LA RM 283	7/2/19	8485-08	Inorganics(1)
UMR-DP RM 294	7/2/19	8485-09	Inorganics(1)
SLH-3	7/1/19	8485-10	Inorganics(1)
SLH-3	7/1/19	8485-11	Inorganics(1)
SLH-1	7/1/19	8485-12	Inorganics(1)
SLH-15	7/1/19	8485-13	Inorganics(1)

(1) Including ammonia, chlorophyll/pheophytin, nitrite, nitrate, TKN, TOC, orthophosphate, total phosphorus, TSS, and TVSS.

The quality control data are summarized as follows:

TOC were analyzed by an accredited outside laboratory due to instrument status.

#### PREPARATION BLANK

Results of the preparation blanks were within acceptable limits.

#### LABORATORY CONTROL SAMPLE

Percent recoveries of all LCS analyses were within control limits.

#### MATRIX SPIKE

Percent recovery of all matrix spikes and matrix spike duplicates were within control limits.

#### DUPLICATE

Duplicate analyses are reported as MS/MSD, except chlorophyll/pheophytin, TSS, and TVSS. RPO of the duplicate analyses met criteria.

**CASE NARRATIVE (Continued)**

**DATA REPORTING QUALIFIERS**

The following data reporting qualifiers are used as required:

- ND - Indicates parameter was analyzed for but not detected. The sample quantitation limit has been corrected for weight, dilution and/or percent moisture.
- J - Indicates an estimated value. This flag is used either when estimating a concentration or this flag indicates analyte(s) associated with a DOD-QSM specified non-compliance pertaining to matrix QC criteria.

Release of the data contained in this package has been authorized by the Technical Services Manager or his designee as verified by the following signature.



Dean S. Dickerson  
Technical Services Manager



# Sample & QC Results

Including as appropriate:

- Field Sample Results

- Batch QC

  - Prep Blank

  - LCS/Spike Blank

- Matrix QC

  - MS/MSD

  - Sample Duplicate

ARDL Data Package      8485 - Inorganics

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008485-01      Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Field ID: UMR-1 CHAIN OF ROCKS CA      Sampling Date: 07/01/2019  
 Received: 07/02/2019      Sampling Time: 0915

Matrix: WATER  
 Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	07/10/19	07104682
Chlorophyll-a, Correcte	1.0	1.00		52.7	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		1.16	MG/L	351.2	351.2	07/08/19	07/09/19	07104685
Nitrate as Nitrogen	0.0380	0.0400		2.16	MG/L	NONE	GREEN	NA	07/09/19	07244731
Nitrite as Nitrogen	0.0200	0.0200		0.029	MG/L	NONE	354.1	NA	07/02/19	07224724
Pheophytin-a	1.0	1.00		10.9	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.271	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.074	MG/L	NONE	365.2	NA	07/02/19	07054674
Solids, Total Suspended	2.86	2.86		17.4	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	2.86	2.86		6.86	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		4.9	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008485-01, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008485-02  
Field ID: UMR-2 CONFLUENCE  
Received: 07/02/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 07/02/2019  
Sampling Time: 1234

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0397	MG/L	NONE	350.1	NA	07/10/19	07104682
Chlorophyll-a, Correcte	1.0	1.00		56.7	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		2.08	MG/L	351.2	351.2	07/08/19	07/09/19	07104685
Nitrate as Nitrogen	0.0190	0.0200		1.01	MG/L	NONE	GREEN	NA	07/09/19	07244730
Nitrite as Nitrogen	0.0200	0.0200		0.020	MG/L	NONE	354.1	NA	07/03/19	07224723
Pheophytin-a	1.0	1.00		25.3	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		1.07	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.117	MG/L	NONE	365.2	NA	07/03/19	07054673
Solids, Total Suspended	10.0	10.0		402	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	10.0	10.0		39.0	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		5.5	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008485-02, Inorganic Analyses

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**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008485-03	Sampling Loc'n: UPPER MISSISSIPPI RIVER	Matrix: WATER
Field ID: UMR-3 MILE 200	Sampling Date: 07/01/2019	Moisture: NA
Received: 07/02/2019	Sampling Time: 1100	

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	07/10/19	07104682
Chlorophyll-a, Correcte	1.0	1.00		13.6	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.380	0.400		4.0	MG/L	351.2	351.2	07/08/19	07/09/19	07104685
Nitrate as Nitrogen	0.0380	0.0400		3.62	MG/L	NONE	GREEN	NA	07/09/19	07244731
Nitrite as Nitrogen	0.0200	0.0200		0.054	MG/L	NONE	354.1	NA	07/02/19	07224724
Pheophytin-a	1.0	1.00		2.3	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.276	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.134	MG/L	NONE	365.2	NA	07/02/19	07054674
Solids, Total Suspended	2.0	2.00		27.0	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	2.0	2.00		4.0	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		3.8	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008485-03, Inorganic Analyses

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**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008485-04  
Field ID: UMR-5 MILE 212.5  
Received: 07/02/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 07/01/2019  
Sampling Time: 1230

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	07/10/19	07104682
Chlorophyll-a, Correcte	1.0	1.00		13.2	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		1.22	MG/L	351.2	351.2	07/08/19	07/09/19	07104685
Nitrate as Nitrogen	0.0380	0.0400		3.71	MG/L	NONE	GREEN	NA	07/09/19	07244731
Nitrite as Nitrogen	0.0200	0.0200		0.037	MG/L	NONE	354.1	NA	07/03/19	07224723
Pheophytin-a	1.0	1.00		2.1	MG/CU.M.	10200H	10200H	07/03/19	07/0&/19	07114690
Phosphorus	0.00800	0.0100		0.288	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.142	MG/L	NONE	365.2	NA	07/03/19	07054673
Solids, Total Suspended	2.86	2.86		24.6	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	2.86	2.86		4.0	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		3.8	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008485-04, Inorganic Analyses

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**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008485-05  
Field ID: UMR-6 MILE 231  
Received: 07/02/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 07/02/2019  
Sampling Time: 1215

Matrix: WATER  
Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0547	MG/L	NONE	350.1	NA	07/10/19	07104682
Chlorophyll-a, Correcte	1.0	1.00		16.3	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		1.14	MG/L	351.2	351.2	07/08/19	07/09/19	07104685
Nitrate as Nitrogen	0.0380	0.0400		2.64	MG/L	NONE	GREEN	NA	07/09/19	07244731
Nitrite as Nitrogen	0.0200	0.0200		0.030	MG/L	NONE	354.1	NA	07/03/19	07224723
Pheophytin-a	1.0	1.00		5.3	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.366	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.114	MG/L	NONE	365.2	NA	07/03/19	07054673
Solids, Total Suspended	4.0	4.00		67.6	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	4.0	4.00		9.2	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		4.8	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008485-05, Inorganic Analyses

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**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008485-06  
Field ID: UMR-15  
Received: 07/02/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 07/02/2019  
Sampling Time: 1120

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0389	MG/L	NONE	350.1	NA	07/10/19	07104682
Chlorophyll-a, Correcte	1.0	1.00		26.5	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		2.71	MG/L	351.2	351.2	07/08/19	07/09/19	07104685
Nitrate as Nitrogen	0.0190	0.0200		1.06	MG/L	NONE	GREEN	NA	07/09/19	07244730
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	07/03/19	07224723
Pheophytin-a	1.0	1.00		5.3	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		1.05	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.109	MG/L	NONE	365.2	NA	07/03/19	07054673
Solids, Total Suspended	10.0	10.0		363	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	10.0	10.0		38.0	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		5.3	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008485-06, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008485-07      Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Field ID: UMR-9 MILE 273      Sampling Date: 07/02/2019  
 Received: 07/02/2019      Sampling Time: 0940

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	07/10/19	07104682
Chlorophyll-a, Correcte	1.0	1.00		14.0	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		1.03	MG/L	351.2	351.2	07/08/19	07/09/19	07104685
Nitrate as Nitrogen	0.0380	0.0400		3.51	MG/L	NONE	GREEN	NA	07/09/19	07244731
Nitrite as Nitrogen	0.0200	0.0200		0.029	MG/L	NONE	354.1	NA	07/03/19	07224723
Pheophytin-a	1.0	1.00		1.9	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.491	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.112	MG/L	NONE	365.2	NA	07/03/19	07054673
Solids, Total Suspended	6.67	6.67		101	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	6.67	6.67		11.3	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		4.3	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008485-07, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008485-08  
Field ID: UMR-LA RM 283  
Received: 07/02/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 07/02/2019  
Sampling Time: 0910

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0529	MG/L	NONE	350.1	NA	07/10/19	07104682
Chlorophyll-a, Correcte	1.0	1.00		9.1	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		1.13	MG/L	351.2	351.2	07/08/19	07/09/19	07104685
Nitrate as Nitrogen	0.0380	0.0400		2.34	MG/L	NONE	GREEN	NA	07/09/19	07244731
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	07/03/19	07224723
Pheophytin-a	1.0	1.00		3.0	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.482	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.103	MG/L	NONE	365.2	NA	07/03/19	07054673
Solids, Total Suspended	10.0	10.0		91.0	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	10.0	10.0		12.0	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		4.8	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008485-08, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008485-09  
Field ID: UMR-DP RM 294  
Received: 07/02/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 07/02/2019  
Sampling Time: 0815

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	07/10/19	07104682
Chlorophyll-a, Correcte	1.0	1.00		11.8	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		1.76	MG/L	351.2	351.2	07/08/19	07/09/19	07104685
Nitrate as Nitrogen	0.0760	0.0800		4.16	MG/L	NONE	GREEN	NA	07/09/19	07244732
Nitrite as Nitrogen	0.0200	0.0200		0.033	MG/L	NONE	354.1	NA	07/03/19	07224723
Pheophytin-a	1.0	1.00		6.6	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.586	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.12	MG/L	NONE	365.2	NA	07/03/19	07054673
Solids, Total Suspended	9.09	9.09		151	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	9.09	9.09		17.3	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		4.1	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008485-09, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008485-10  
Field ID: SLH-3  
Received: 07/02/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 07/01/2019  
Sampling Time: 1015

Matrix: WATER  
Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	07/10/19	07104682
Chlorophyll-a, Correcte	1.0	1.00		6.7	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		1.09	MG/L	351.2	351.2	07/08/19	07/09/19	07104685
Nitrate as Nitrogen	0.0190	0.0200		1.1	MG/L	NONE	GREEN	NA	07/09/19	07244730
Nitrite as Nitrogen	0.0200	0.0200		0.040	MG/L	NONE	354.1	NA	07/02/19	07224724
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.426	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.0987	MG/L	NONE	365.2	NA	07/02/19	07054674
Solids, Total Suspended	6.67	6.67		76.7	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	6.67	6.67		10.7	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		4.7	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008485-10, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008485-11  
Field ID: SLH-2  
Received: 07/02/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 07/01/2019  
Sampling Time: 0715

Matrix: WATER  
Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300	J	0.0291	MG/L	NONE	350.1	NA	07/10/19	07104682
Chlorophyll-a, Correcte	1.0	1.00		8.3	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		1.27	MG/L	351.2	351.2	07/08/19	07/09/19	07104685
Nitrate as Nitrogen	0.0190	0.0200		1.24	MG/L	NONE	GREEN	NA	07/09/19	07244730
Nitrite as Nitrogen	0.0200	0.0200		0.037	MG/L	NONE	354.1	NA	07/02/19	07224724
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.689	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.102	MG/L	NONE	365.2	NA	07/02/19	07054674
Solids, Total Suspended	7.69	7.69		191	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	7.69	7.69		13.9	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		4.4	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008485-11, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008485-12	Sampling Loc'n: UPPER MISSISSIPPI RIVER	Matrix: WATER
Field ID: SLH-1	Sampling Date: 07/01/2019	Moisture: NA
Received: 07/02/2019	Sampling Time: 0800	

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	07/10/19	07104682
Chlorophyll-a, Correcte	1.0	1.00		8.3	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		1.16	MG/L	351.2	351.2	07/08/19	07/09/19	07104685
Nitrate as Nitrogen	0.0190	0.0200		1.35	MG/L	NONE	GREEN	NA	07/09/19	07244730
Nitrite as Nitrogen	0.0200	0.0200		0.041	MG/L	NONE	354.1	NA	07/02/19	07224724
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.672	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.113	MG/L	NONE	365.2	NA	07/02/19	07054674
Solids, Total Suspended	5.88	5.88		182	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	5.88	5.88		14.1	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		4.4	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008485-12, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008485-13  
Field ID: SLH-15  
Received: 07/02/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 07/01/2019  
Sampling Time: 0940

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	07/10/19	07104682
Chlorophyll-a, Correcte	1.0	1.00		14.1	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		2.21	MG/L	351.2	351.2	07/08/19	07/09/19	07104685
Nitrate as Nitrogen	0.0380	0.0400		3.63	MG/L	NONE	GREEN	NA	07/09/19	07244731
Nitrite as Nitrogen	0.0200	0.0200		0.051	MG/L	NONE	354.1	NA	07/02/19	07224724
Pheophytin-a	1.0	1.00		3.4	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.314	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.134	MG/L	NONE	365.2	NA	07/02/19	07054674
Solids, Total Suspended	4.0	4.00		40.8	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	4.0	4.00		5.6	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		4.0	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008485-13, Inorganic Analyses

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**BLANK SUMMARY REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566     Mt. Vernon, IL     62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	LOD	LOQ	Blank Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run	QC Lab Number
Ammonia Nitrogen	0.020	0.030	ND	MG/L	NONE	350.1	NA	07/10/19	07104682	008485-01B1
Chlorophyll-a, Corre	1.0	1.0	ND	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690	008485-05B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	07/08/19	07/09/19	07104685	008485-01B1
Nitrate as Nitrogen	0.019	0.020	ND	MG/L	NONE	GREEN	NA	07/09/19	07244732	008486-01B1
Nitrate as Nitrogen	0.019	0.020	ND	MG/L	NONE	GREEN	NA	07/09/19	07244731	008485-01B1
Nitrate as Nitrogen	0.019	0.020	ND	MG/L	NONE	GREEN	NA	07/09/19	07244730	008485-02B1
Nitrite as Nitrogen	0.020	0.020	ND	MG/L	NONE	354.1	NA	07/02/19	07224724	008485-01B1
Nitrite as Nitrogen	0.020	0.020	ND	MG/L	NONE	354.1	NA	07/03/19	07224723	008486-02B1
Pheophytin-a	1.0	1.0	ND	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690	008485-05B1
Phosphorus	0.008	0.010	ND	MG/L	365.2	365.2	07/18/19	07/19/19	07214718	008485-01B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	NA	07/03/19	07054673	008486-02B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	NA	07/02/19	07054674	008485-01B1
Solids, Total Suspen	1.0	1.0	ND	MG/L	NONE	160.2	NA	07/03/19	07104688	008485-02B1
Solids, Volatile Sus	1.0	1.0	ND	MG/L	NONE	160.4	NA	07/03/19	07104689	008485-02B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	07/10/19	07184717	008485-01B1

(a) DOD and/or NELAC Accredited Analyte  
Inorganic Method Blanks for 008485

Page 1 of 1

**LABORATORY CONTROL SAMPLE REPORT**  
**ARDL, INC.    400 Aviation Drive; P.O. Box 1566    Mt. Vernon, IL    62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	LCS 1 Result	LCS 1 Level	LCS 1 % Rec	LCS 2 Result	LCS 2 Level	LCS 2 % Rec	% Rec Limits	Mean % Rec	Analytical Run	QC Lab Number
Ammonia Nitrogen	1.0	1.0	104	--	--	--	80-120	--	07104682	008485-01C1
Kjeldahl Nitrogen	1.2	1.0	118	--	--	--	80-120	--	07104685	008485-01C1
Nitrate as Nitrogen	0.99	1.0	99	--	--	--	80-120	--	07244732	008486-01C1
Nitrate as Nitrogen	0.98	1.0	98	--	--	--	80-120	--	07244731	008485-01C1
Nitrate as Nitrogen	0.97	1.0	97	--	--	--	80-120	--	07244730	008485-02C1
Nitrite as Nitrogen	1.0	1.0	102	--	--	--	80-120	--	07224724	008485-01C1
Nitrite as Nitrogen	0.99	1.0	99	--	--	--	80-120	--	07224723	008486-02C1
Phosphorus	0.64	0.67	96	--	--	--	80-120	--	07214718	008485-01C1
Phosphorus, -ortho	0.095	0.10	95	--	--	--	80-120	--	07054673	008486-02C1
Phosphorus, -ortho	0.10	0.10	104	--	--	--	80-120	--	07054674	008485-01C1
Total Organic Carbon	8.8	10.0	88	--	--	--	76-120	--	07184717	008485-01C1

NOTE: Any values tabulated above marked with an asterisk are outside of acceptable limits.

(a) DOD and/or NELAC Accredited Analyte

Inorganic LCS Results for 008485

Page 1 of 1

**MATRIX SPIKE/SPIKE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566   Mt. Vernon, IL   62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name:            UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	Sample Matrix	Sample Result	MS Result	MS Level	MS % Rec	MSD Result	MSD Level	MSD % Rec	% Rec Limits	RPD	RPD Limit	Run	QC Lab Number
Ammonia Nitrogen	WATER	ND	2.2	2.0	108	2.2	2.0	110	75-125	2	20	07104682	008485-01MS
Kjeldahl Nitrogen	WATER	1.2	1.8	0.80	76	1.9	0.80	91	75-125	7	20	07104685	008485-01MS
Nitrate as Nitrogen	WATER	2.2	3.1	1.0	93	3.2	1.0	99	75-125	2	20	07244731	008485-01MS
Nitrite as Nitrogen	WATER	0.029	1.0	1.0	102	1.1	1.0	103	75-125	1	20	07224724	008485-01MS
Phosphorus	WATER	0.27	1.1	0.83	99	1.1	0.83	100	75-125	1	20	07214718	008485-01MS
Phosphorus, -ortho	WATER	0.074	0.18	0.10	104	0.18	0.10	101	75-125	2	20	07054674	008485-01MS
Total Organic Carbon	WATER	4.9	9.2	5.0	86	9.1	5.0	84	76-120	1	20	07184717	008485-01MS

NOTE: Values tabulated above marked with an asterisk are explained in the associated narrative.

(a) DOD and/or NELAC Accredited Analyte.

Inorganic Matrix Spikes for 008485

Page 1 of 1

**SAMPLE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566   Mt. Vernon, IL   62864**

Lab Report No: 008485

Report Date: 07/30/2019

Project Name: UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	Sample Conc'n	First Duplicate	Second Duplicate	Units	Percent Diff	Mean (Smp,D1,D2)	Analytical Run	QC Lab Number
Chlorophyll-a, Corrected	16.3	15.4		MG/CU.M.	6	--	07114690	008485-05D1
Pheophytin-a	5.3	5.5		MG/CU.M.	4	--	07114690	008485-05D1
Solids, Total Suspended	402	406		MG/L	1	--	07104688	008485-02D1
Solids, Volatile Suspend	39.0	39.0		MG/L	0	--	07104689	008485-02D1

(a) DOD and/or NELAC Accredited Analyte  
Sample Duplicates for 008485

Page 1 of 1



# Sample Receipt Information

Including as appropriate:

- COCs
- Cooler Receipts
- Airbills
- Email Communication/  
Instructions from Customer

ARDL Data Package     8485 - Inorganics

## CHAIN OF CUSTODY RECORD

PROJECT Upper Mississippi River		NO. OF CONTAINERS		PRESERVATION									
SAMPLES: (Signature) <i>Tscherker</i>		DATE		TIME		COM		GRAB		REMARKS OR SAMPLE LOCATION		SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN	
SAMPLE NUMBER	DATE	TIME	COM	GRAB	TSS, TVSS, NO2-N	*TKN	*TOC, T-PO4	*NO3-N, NH3-N	Chlorophyll	M5/M5D			ICED
UMR-1 Chain of Rocks Canal	7-1	915		X	X	X	X	X	X	X	haz m5/msd Contaminant		X
UMR-2 Confluence	7-2	1234		X	X	X	X	X	X				X
UMR-3 Mile 200	7-1	1100		X	X	X	X	X	X				X
UMR-5 Mile 212.5	7-1	1230		X	X	X	X	X	X				X
UMR-6 Mile 231	7-2	1215		X	X	X	X	X	X				X
UMR-15	7-2	1120		X	X	X	X	X	X				X
<del>UMR-7 Mile 241</del>	X	X		X	X	X	X	X	X				X
<del>UMR-11 Mile 251</del>	X	X		X	X	X	X	X	X				X
UMR-9 Mile 273	7-2	940		X	X	X	X	X	X				X
UMR- LA RM 283	7-2	910		X	X	X	X	X	X				X
UMR- DP RM 294	7-2	815		X	X	X	X	X	X				X
SLH-3	7-1	1015		X	X	X	X	X	X				X
SLH-2	7-01	715		X	X	X	X	X	X				X
SLH-1	7-1	800		X	X	X	X	X	X				X
Relinquished by: (Signature) <i>T. 222</i>	Date 7-2	Time (830)											
Relinquished by: (Signature)	Date	Time											
Received for Laboratory by: (Signature) <i>Curby</i>	Date 7-2	Time 1430											

REMARKS/SPECIAL INSTRUCTIONS:

\*Preserved with H<sub>2</sub>SO<sub>4</sub>

1430 JY 7-2-19

PURCHASE ORDER NO:

(618) 244-3235 Phone      (618) 244-1149 Fax

7-3-19  
CHAIN OF CUSTODY RECORD

Illinois River				PROJECT SAMPLERS: (Signature)	PRESERVATION
SAMPLE NUMBER	DATE	TIME	REMARKS OR SAMPLER LOCATION		
IL-6	7-1	(c) Cf"			
IL-7	7-1	17.0%			
IL-8	7-1	17.0%			
IL-9	7-1	17.0%			
IL-10	7-1	17.0%			
IL-11	7-1	17.0%			
IL-12	7-1	17.0%			
IL-13	7-1	17.0%			
IL-14	7-1	17.0%			
IL-15	7-1	17.0%			
IL-16	7-1	17.0%			
IL-17	7-1	17.0%			
IL-18	7-1	17.0%			
IL-19	7-1	17.0%			
IL-20	7-1	17.0%			
IL-21	7-1	17.0%			
IL-22	7-1	17.0%			
IL-23	7-1	17.0%			
IL-24	7-1	17.0%			
IL-25	7-1	17.0%			
IL-26	7-1	17.0%			
IL-27	7-1	17.0%			
IL-28	7-1	17.0%			
IL-29	7-1	17.0%			
IL-30	7-1	17.0%			
IL-31	7-1	17.0%			
IL-32	7-1	17.0%			
IL-33	7-1	17.0%			
IL-34	7-1	17.0%			
IL-35	7-1	17.0%			
IL-36	7-1	17.0%			
IL-37	7-1	17.0%			
IL-38	7-1	17.0%			
IL-39	7-1	17.0%			
IL-40	7-1	17.0%			
IL-41	7-1	17.0%			
IL-42	7-1	17.0%			
IL-43	7-1	17.0%			
IL-44	7-1	17.0%			
IL-45	7-1	17.0%			
IL-46	7-1	17.0%			
IL-47	7-1	17.0%			
IL-48	7-1	17.0%			
IL-49	7-1	17.0%			
IL-50	7-1	17.0%			
IL-51	7-1	17.0%			
IL-52	7-1	17.0%			
IL-53	7-1	17.0%			
IL-54	7-1	17.0%			
IL-55	7-1	17.0%			
IL-56	7-1	17.0%			
IL-57	7-1	17.0%			
IL-58	7-1	17.0%			
IL-59	7-1	17.0%			
IL-60	7-1	17.0%			
IL-61	7-1	17.0%			
IL-62	7-1	17.0%			
IL-63	7-1	17.0%			
IL-64	7-1	17.0%			
IL-65	7-1	17.0%			
IL-66	7-1	17.0%			
IL-67	7-1	17.0%			
IL-68	7-1	17.0%			
IL-69	7-1	17.0%			
IL-70	7-1	17.0%			
IL-71	7-1	17.0%			
IL-72	7-1	17.0%			
IL-73	7-1	17.0%			
IL-74	7-1	17.0%			
IL-75	7-1	17.0%			
IL-76	7-1	17.0%			
IL-77	7-1	17.0%			
IL-78	7-1	17.0%			
IL-79	7-1	17.0%			
IL-80	7-1	17.0%			
IL-81	7-1	17.0%			
IL-82	7-1	17.0%			
IL-83	7-1	17.0%			
IL-84	7-1	17.0%			
IL-85	7-1	17.0%			
IL-86	7-1	17.0%			
IL-87	7-1	17.0%			
IL-88	7-1	17.0%			
IL-89	7-1	17.0%			
IL-90	7-1	17.0%			
IL-91	7-1	17.0%			
IL-92	7-1	17.0%			
IL-93	7-1	17.0%			
IL-94	7-1	17.0%			
IL-95	7-1	17.0%			
IL-96	7-1	17.0%			
IL-97	7-1	17.0%			
IL-98	7-1	17.0%			
IL-99	7-1	17.0%			
IL-100	7-1	17.0%			
IL-101	7-1	17.0%			

PURCHASE ORDER NO:

**COOLER RECEIPT REPORT**  
**ARDL, INC.**

*Original in 8486*  
*dec 7/31/19*

ARDL #: 8485/8486  
Upper Miss River  
Project: IL River

Cooler# -  
Number of Coolers in Shipment: 1:Yp  
Date Received: 7/2/19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 11/3/19 (Signature) [Signature]

1. Did cooler come with a shipping slip (airbill, etc.)?.....YES  
If YES, enter carrier name and airbill number here: [Blank]

2. Were custody seals on outside of cooler?.....YES e, NIA  
How many and where? [Blank], Seal Date: [Blank], Seal Name: [Blank]

3. Were custody seals unbroken and intact at the date and time of arrival?.....YES NO

4. Did you screen samples for radioactivity using a Geiger Counter?.....e.9 NO

5. Were custody papers sealed in a plastic bag?.....YES

6. Were custody papers filled out properly (ink, signed, etc.)?.....@ NO N/A

7. Were custody papers signed in appropriate place by ARDL personnel?.....f9> NO NIA

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form .....'@) NO NIA

9. Was a separate container provided for measuring temperature? YES NO Observed Cooler Temp. 0.8 C  
Reaction factor 1.11 C

B. **LOG-IN PHASE:** Date samples were logged-in: 11/3/19 (Signature) [Signature]

10. Describe type of packing in cooler: we, 1-1/2 e.e

11. Were all samples sealed in separate plastic bags?.....YES {S} NIA

12. Did all containers arrive unbroken and were labels in good condition?.....@''' NO

13. Were sample labels complete?.....NO

14. Did all sample labels agree with custody papers?.....NO

15. Were correct containers used for the tests indicated?.....NO

16. Was pH correct on preserved water samples?.....NO NIA

17. Was a sufficient amount of sample sent for tests indicated?.....NO

18. Were bubbles absent in VOA samples? If NO, list by sample#:.....YES NO

19. Was the ARDL project coordinator notified of any deficiencies?.....YES NO

Comments and/or Corrective Action:	
(Bv: Signature)	Date:

Sample Transfer	
Fraction <u>t-u</u>	Fraction
AreaLi-1 <u>1</u>	Area#
By <u>I</u>	By
On <u>7 11J1f</u>	On

Chain-of-Custody# c/4



**COOLER RECEIPT REPORT**  
**ARDL, INC.**

*Original in 8486*  
*dec*  
*7-3-19*

ARDL#: &'ft / <fy:f(p

Cooler#      -     

(JP- ((//.S /21 -t.,\..

Number of Coolers in Shipment: 2 of 5

Project: <C] / L t v -

Date Received: 12--/(

A. PRELIMINARY EXAMINATION PHASE: Date cooler was opened: (21 1 (Signature) "r,Z S y

1. Did cooler come with a shipping slip (airbill, etc.)?.....YES

If YES, enter carrier name and airbill number here: Jl-rz 11 U.I.q.t..

2. Were custody seals on outside of cooler?.....YES N/A

How many and where?.....,Seal Date:.....,Seal Name:.....

3. Were custody seals unbroken and intact at the date and time of arrival? .....YES NO

4. Did you screen samples for radioactivity using a Geiger Counter? .....@ NO

5. Were custody papers sealed in a plastic bag?.....YES @

6. Were custody papers filled out properly (ink, signed, etc.)? .....-@ NO N/A

7. Were custody papers signed in appropriate place by ARDL personnel? .....@ NO N/A

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form.....(R) NO N/A

9. Was a separate container provided for measuring temperature? YES\_ NO N Observed Cooler Temp. C?/ Correction factor V.L.(/) C

B. LOG-IN PHASE: Date samples were logged-in: 7-5-19' (Signature) /Lc..(1-yt..>

10. Describe type of packing in cooler: 1... 2... 3... /

11. Were all samples sealed in separate plastic bags?.....YES (R) N/A

12. Did all containers arrive unbroken and were labels in good condition? .....NO

13. Were sample labels complete?.....@ NO

14. Did all sample labels agree with custody papers? .....- NO

15. Were correct containers used for the tests indicated? .....- NO

16. Was pH correct on preserved water samples?.....NO N/A

17. Was a sufficient amount of sample sent for tests indicated? .....€" NO

18. Were bubbles absent in VOA samples? If NO, list by sample#:.....YES NO WA

19. Was the ARDL project coordinator notified of any deficiencies? .....YES NO@

Comments and/or Corrective Action:	
(By: SiQnature)	Date:

Sample Transfer	
Fraction <u>/4-1?</u>	Fraction
Area # <u>cool 17</u>	Area#
By <u>ASD</u>	By
On <u>7/2/19</u>	On

Chain-of-Custody #

**COOLER RECEIPT REPORT**  
**ARDL, INC.**

*original in 8486*  
*dec*  
*7-3-19*

ARDL #: 8485/8486  
Project: Upper Miss River  
IL River

Cooler#                       
Number of Coolers in Shipment: 3075  
Date Received: --'--/--'--/19--

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: '1(t<)/ (Signature) JY

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES

If YES, enter carrier name and airbill number here:

JLRA3 b 0

2. Were custody seals on outside of cooler? ..... YES N/A

How many and where? ..... Seal Date: ..... Seal Name: .....

3. Were custody seals unbroken and intact at the date and time of arrival? ..... YES NO @

4. Did you screen samples for radioactivity using a Geiger Counter? ..... @ NO

5. Were custody papers sealed in a plastic bag? ..... YES '@

6. Were custody papers filled out properly (ink, signed, etc.)? ..... @ NO N/A

7. Were custody papers signed in appropriate place by ARDL personnel? ..... (@ NO N/A

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form ..... NO N/A

9. Was a separate container provided for measuring temperature? YES\_ NO Observed Cooler Temp. 0/ Y C  
Correction factor 10/ 17 rJ-0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 7-3-19 (Signature) /24/1

10. Describe type of packing in cooler:                      / C.L

11. Were all samples sealed in separate plastic bags? ..... YES @ N/A

12. Did all containers arrive unbroken and were labels in good condition? ..... NO

13. Were sample labels complete? ..... NO

14. Did all sample labels agree with custody papers? ..... @ NO

15. Were correct containers used for the tests indicated? ..... NO

16. Was pH correct on preserved water samples? ..... NO N/A

17. Was a sufficient amount of sample sent for tests indicated? ..... @ NO

18. Were bubbles absent in VOA samples? If NO, list by sample #: ..... YES NO CWA

19. Was the ARDL project coordinator notified of any deficiencies? ..... YES NO

Comments and/or Corrective Action:	
(By: Signature)	Date:

Sample Transfer	
Fraction <u>Q-1.1</u>	Fraction
Area # <u>Cooler</u>	Area#
By <u>O1/1</u>	By
On <u>12/18</u>	On

Chain-of-Custody # tV/A



original in 8486  
all  
7-3-19

Project: V/-,r- L 2.1U-1.A.. fl v'AA..

: : =o\_f\_C\_o\_o\_l\_e\_r\_s-in\_S\_h-ip-ment: S5  
 Date Received: > w(k /.J./"").

A. PRELIMINARY EXAMINATION PHASE: Date cooler was opened: 2-11-2017 (Signature) [Signature]

1. Did cooler come with a shipping slip (airbill, etc.)?..... YES

If YES, enter carrier name and airbill number here:

$$\frac{l)J_{z,\dots,0}L}{\frac{\Delta!0\Delta\Delta\dots G\dots\mathfrak{E}j)}{\mathfrak{Y}}}$$

2. Were custody seals on outside of cooler?.....YES

NO  $e: >$

How many and where? \_\_\_\_\_, Seal Date: \_\_\_\_\_, Seal Name: \_\_\_\_\_

3. Were custody seals unbroken and intact at the date and time of arrival?.....YES NO - (a)

4. Did you screen samples for radioactivity using a Geiger Counter?.....@ NO

5. Were custody papers sealed in a plastic bag?.....YES @

6. Were custody papers filled out properly (ink, signed, etc.)?..... NO N/A

7. Were custody papers signed in appropriate place by ARDL personnel?.....@ NO N/A

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form..... NO N/A

9. Was a separate container provided for measuring temperature? YES    NO       i/" Observed Cooler Temp. 0.7  
               Correction factor    C    C

B. LOG-IN PHASE: Date samples were logged-in: 7 - 3 - 19 (Signature) h.Jfl..A-t-r---led

10. Describe type of packing in cooler: ccM, a:/, -+f, t-f, c. l. -----

11. Were all samples sealed in separate plastic bags? ..... YES € , N/A

12. Did all containers arrive unbroken and were labels in good condition? .....tEs? NO

13. Were sample labels complete?..... NO

14. Did all sample labels agree with custody papers? ..... €, NO

15. Were correct containers used for the tests indicated? ..... W NO

16. Was pH correct on preserved water samples?.....Y NO N/A

17. Was a sufficient amount of sample sent for tests indicated?.....~~YES~~ NO

18. Were bubbles absent in VOA samples? If NO, list by sample#:. \_\_\_\_\_ YES NO N/A

19. Was the ARDL project coordinator notified of any deficiencies? ..... YES NO N/A

Samole Transfer	
Fraction <i>j;ll</i>	Fraction
<i>Are</i>	Area#
By 0	By
On <i>,17,?</i>	On

Chain-of-Custody#



[www.ardlinc.com](http://www.ardlinc.com)

Date: 7/31/19

**Lab Name: ARDL, Inc.**

**ARDL Report No.: 8486**

<u>Customer</u>	<u>Date</u>	<u>Lab ID</u>	<u>Analyses Requested</u>
<u>Sam o.</u>	<u>Collected</u>	<u>Number</u>	
<u>IL-2</u>	<u>7/1/19</u>	<u>8486-01</u>	<u>Inorganics(1)</u>
<u>IL-6</u>	<u>7/1/19</u>	<u>8486-02</u>	<u>Inorganics(1)</u>
<u>IL-7</u>	<u>7/1/19</u>	<u>8486-03</u>	<u>Inorganics(1)</u>
<u>IL-8</u>	<u>7/1/19</u>	<u>8486-04</u>	<u>Inorganics(1)</u>
<u>IL-9</u>	<u>7/1/19</u>	<u>8486-05</u>	<u>Inorganics(1)</u>

(1) Including ammonia, chlorophyll/pheophytin, nitrite, nitrate, TKN, TOC, orthophosphate, total phosphorus, TSS, and TVSS.

The quality control data are summarized as follows:

TOC were analyzed by an accredited outside laboratory due to instrument status.

## PREPARATION BLANK

Results of the preparation blanks were within acceptable limits.

LABORATORY CONTROL SAMPLE

Percent recoveries of all LCS analyses were within control limits.

MATRIX SPIKE

Percent recovery of all matrix spikes and matrix spike duplicates were within control limits, except 1 of 2 for TKN.

DUPLICATE

Duplicate analyses are reported as MS/MSD, except chlorophyll/pheophytin, TSS, and TVSS. RPO of the duplicate analyses met criteria, except pheophytin.

## DATA REPORTING QUALIFIERS

The following data reporting qualifiers are used as required:

ND - Indicates parameter was analyzed for but not detected. The sample quantitation limit has been corrected for weight, dilution and/or percent moisture.

J - Indicates an estimated value. This flag is used either when estimating a concentration or this flag indicates analyte(s) associated with a DOD-QSM specified non-compliance pertaining to matrix QC criteria.

Release of the data contained in this package has been authorized by the Technical Services Manager or his designee as verified by the following signature. 

Dean S. Dickerson  
Technical Services Manager

*"Test everything, keep the good" 1 Thes. 5:21*

Page 1 of 1



# Sample & QC Results

Including as appropriate:

- Field Sample Results

- Batch QC

  - Prep Blank

  - LCS/Spike Blank

- Matrix QC

  - MS/MSD

  - Sample Duplicate

ARDL Data Package    8486 - Inorganics

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008486

Report Date: 07/31/2019

Project Name: ILLINOIS RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008486-01  
 Field ID: IL-2  
 Received: 07/02/2019

Sampling Loc'n: ILLINOIS RIVER  
 Sampling Date: 07/01/2019  
 Sampling Time: 1500

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	07/10/19	07104681
Chlorophyll-a, Correcte	1.0	1.00		18.2	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200	J	0.871	MG/L	351.2	351.2	07/08/19	07/09/19	07104686
Nitrate as Nitrogen	0.0760	0.0800		3.5	MG/L	NONE	GREEN	NA	07/09/19	07244732
Nitrite as Nitrogen	0.0200	0.0200		0.040	MG/L	NONE	354.1	NA	07/03/19	07224723
Pheophytin-a	1.0	1.00		2.5	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.245	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.145	MG/L	NONE	365.2	NA	07/03/19	07054673
Solids, Total Suspended	2.0	2.00		24.4	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	2.0	2.00		3.8	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		4.2	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008486-01, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008486

Report Date: 07/31/2019

Project Name: ILLINOIS RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008486-02  
Field ID: IL-6  
Received: 07/02/2019

Sampling Loc'n: ILLINOIS RIVER  
Sampling Date: 07/01/2019  
Sampling Time: 1655

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.857	MG/L	NONE	350.1	NA	07/10/19	07104681
Chlorophyll-a, Correcte	1.0	1.00		12.5	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		0.847	MG/L	351.2	351.2	07/08/19	07/09/19	07104686
Nitrate as Nitrogen	0.0380	0.0400		3.62	MG/L	NONE	GREEN	NA	07/09/19	07244731
Nitrite as Nitrogen	0.0200	0.0200		0.033	MG/L	NONE	354.1	NA	07/03/19	07224723
Pheophytin-a	1.0	1.00		2.5	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.25	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.153	MG/L	NONE	365.2	NA	07/03/19	07054673
Solids, Total Suspended	2.22	2.22		23.8	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	2.22	2.22		3.11	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		3.9	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008486-02, Inorganic Analyses

Page 1 of 1



ARDL, INC.  
400 Aviation Drive; P.O. Box 1566  
Mt. Vernon, Illinois 62864

Lab Report No: 008486

Report Date: 07/31/2019

Project Name: ILLINOIS RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008486-03  
Field ID: IL-7  
Received: 07/02/2019

Sampling Loc'n: ILLINOIS RIVER  
Sampling Date: 07/01/2019  
Sampling Time: 1730

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300	J	0.0286	MG/L	NONE	350.1	NA	07/10/19	07104681
Chlorophyll-a, Correcte	1.0	1.00		22.7	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		1.08	MG/L	351.2	351.2	07/08/19	07/09/19	07104686
Nitrate as Nitrogen	0.0380	0.0400		3.57	MG/L	NONE	GREEN	NA	07/09/19	07244731
Nitrite as Nitrogen	0.0200	0.0200		0.032	MG/L	NONE	354.1	NA	07/03/19	07224723
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.254	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.148	MG/L	NONE	365.2	NA	07/03/19	07054673
Solids, Total Suspended	2.86	2.86		22.6	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	2.86	2.86		4.57	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		4.0	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008486-03, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008486

Report Date: 07/31/2019

Project Name: ILLINOIS RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008486-04  
Field ID: IL-8  
Received: 07/02/2019

Sampling Loc'n: ILLINOIS RIVER  
Sampling Date: 07/01/2019  
Sampling Time: 1830

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	07/10/19	07104681
Chlorophyll-a, Correcte	1.0	1.00		20.4	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		0.509	MG/L	351.2	351.2	07/08/19	07/09/19	07104686
Nitrate as Nitrogen	0.0380	0.0400		3.45	MG/L	NONE	GREEN	NA	07/09/19	07244731
Nitrite as Nitrogen	0.0200	0.0200		0.030	MG/L	NONE	354.1	NA	07/03/19	07224723
Pheophytin-a	1.0	1.00		2.8	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.237	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.145	MG/L	NONE	365.2	NA	07/03/19	07054673
Solids, Total Suspended	2.50	2.50		16.5	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	2.50	2.50		3.75	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		4.1	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008486-04, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008486

Report Date: 07/31/2019

Project Name: ILLINOIS RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008486-05  
Field ID: IL-9  
Received: 07/02/2019

Sampling Loc'n: ILLINOIS RIVER  
Sampling Date: 07/01/2019  
Sampling Time: 1900

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300	J	0.0269	MG/L	NONE	350.1	NA	07/10/19	07104681
Chlorophyll-a, Correcte	1.0	1.00	J	13.6	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Kjeldahl Nitrogen	0.190	0.200		0.912	MG/L	351.2	351.2	07/08/19	07/09/19	07104686
Nitrate as Nitrogen	0.0380	0.0400		3.63	MG/L	NONE	GREEN	NA	07/09/19	07244731
Nitrite as Nitrogen	0.0200	0.0200		0.036	MG/L	NONE	354.1	NA	07/03/19	07224723
Pheophytin-a	1.0	1.00		2.6	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690
Phosphorus	0.00800	0.0100		0.31	MG/L	365.2	365.2	07/18/19	07/19/19	07214718
Phosphorus, -ortho	0.00800	0.0100		0.225	MG/L	NONE	365.2	NA	07/03/19	07054673
Solids, Total Suspended	2.22	2.22		17.6	MG/L	NONE	160.2	NA	07/03/19	07104688
Solids, Volatile Suspen	2.22	2.22		3.56	MG/L	NONE	160.4	NA	07/03/19	07104689
Total Organic Carbon	0.500	1.00		4.0	MG/L	NONE	415.1	NA	07/10/19	07184717

(a) DOD and/or NELAC Accredited Analyte.

Sample 008486-05, Inorganic Analyses

Page 1 of 1

**BLANK SUMMARY REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566     Mt. Vernon, IL   62864**

Lab Report No: 008486

Report Date: 07/31/2019

Project Name: ILLINOIS RIVER

NELAC Certified - IL100308

Analyte	LOD	LOQ	Blank Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run	QC Lab Number
Ammonia Nitrogen	0.020	0.030	ND	MG/L	NONE	350.1	<b>NA</b>	07/10/19	07104681	008486-01B1
Chlorophyll-a, Corre	1.0	1.0	ND	MG/CU.M.	10200H	10200H	07/03/19	07/08/19	07114690	008485-05B1
Kjeldahl Nitrogen	0.19	<b>0.20</b>	<b>ND</b>	MG/L	351.2	351.2	07/08/19	07/09/19	07104686	008486-01B1
Nitrate as Nitrogen	0.019	0.020	ND	MG/L	NONE	GREEN	NA	07/09/19	07244732	008486-01B1
Nitrate as Nitrogen	0.019	0.020	ND	MG/L	NONE	GREEN	<b>NA</b>	07/09/19	07244731	008485-01B1
Nitrite as Nitrogen	0.020	0.020	ND	MG/L	NONE	354.1	<b>NA</b>	07/03/19	07224723	008486-02B1
Pheophytin-a	1.0	1.0	ND	<b>MG/CU.M.</b>	10200H	10200H	07/03/19	07/08/19	07114690	008485-05B1
Phosphorus	0.008	0.010	ND	MG/L	365.2	365.2	07/18/19	07/19/19	07214718	008485-01B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	<b>NA</b>	07/03/19	07054673	008486-02B1
Solids, Total Suspen	1.0	1.0	ND	MG/L	NONE	160.2	<b>NA</b>	07/03/19	07104688	008485-02B1
Solids, Volatile Sus	1.0	1.0	ND	MG/L	<b>NONE</b>	<b>160.4</b>	<b>NA</b>	07/03/19	07104689	008485-02B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	<b>NA</b>	07/10/19	07184717	008485-01B1

(a) DOD and/or NELAC Accredited Analyte  
Inorganic Method Blanks for 008486

Page 1 of 1

**LABORATORY CONTROL SAMPLE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566     Mt. Vernon, IL     62864**

Lab Report No: 008486

Report Date: 07/31/2019

Project Name: ILLINOIS RIVER

NELAC Certified - IL100308

Analyte	LCS 1 Result	LCS 1 Level	LCS 1 % Rec	LCS 2 Result	LCS 2 Level	LCS 2 % Rec	% Rec Limits	Mean % Rec	Analytical Run	QC Lab Number
Ammonia Nitrogen	1.1	1.0	106	--	--	--	80-120	--	07104681	008486-01C1
Kjeldahl Nitrogen	1.2	1.0	117	--	--	--	80-120	--	07104686	008486-01C1
Nitrate as Nitrogen	0.99	1.0	99	--	--	--	80-120	--	07244732	008486-01C1
Nitrate as Nitrogen	0.98	1.0	98	--	--	--	80-120	--	07244731	008485-01C1
Nitrite as Nitrogen	0.99	1.0	99	--	--	--	80-120	--	07224723	008486-02C1
Phosphorus	0.64	0.67	96	--	--	--	80-120	--	07214718	008485-01C1
Phosphorus, -ortho	0.095	0.10	95	--	--	--	80-120	--	07054673	008486-02C1
Total Organic Carbon	8.8	10.0	88	--	--	--	76-120	--	07184717	008485-01C1

NOTE: Any values tabulated above marked with an asterisk are outside of acceptable limits.

(a) DOD and/or NELAC Accredited Analyte

Inorganic LCS Results for 008486

Page 1 of 1

**MATRIX SPIKE/SPIKE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566 Mt. Vernon, IL   62864**

Lab Report No: 008486

Report Date: 07/31/2019

Project Name: ILLINOIS RIVER

NELAC Certified - IL100308

Analyte	Sample Matrix	Sample Result	MS Result	MS Level	MS % Rec	MSD Result	MSD Level	MSD % Rec	% Rec Limits	RPD	RPD Limit	Run	QC Lab Number
Ammonia Nitrogen	WATER	ND	2.2	2.0	110	2.2	2.0	109	75-125	1	20	07104681	008486-01MS
Kjeldahl Nitrogen	WATER	0.87	1.9	0.80	127 •	1.7	0.80	99	75-125	13	20	07104686	008486-01MS
Nitrate as Nitrogen	WATER	3.5	4.4	1.0	94	4.3	1.0	77	75-125	4	20	07244732	008486-01MS
Nitrite as Nitrogen	WATER	0.033	1.1	1.0	106	1.1	1.0	106	75-125	0	20	07224723	008486-02MS
Phosphorus	WATER	0.31	1.1	0.83	99	1.2	0.83	102	75-125	2	20	07214718	008486-05MS
Phosphorus, -ortho	WATER	0.15	0.26	0.10	104	0.27	0.10	113	75-125	4	20	07054673	008486-02MS

NOTE: Values tabulated above marked with an asterisk are explained in the associated narrative.

(a) DOD and/or NELAC Accredited Analyte.

Inorganic Matrix Spikes for 008486

Page 1 of 1

**SAMPLE DUPLICATE REPORT**  
**ARDL, INC.    400 Aviation Drive; P.O. Box 1566    Mt. Vernon, IL    62864**

Lab Report No: 008486

Report Date: 07/31/2019

Project Name: ILLINOIS RIVER

NELAC Certified - IL100308

Analyte	Sample Conc'n	First Duplicate	Second Duplicate	Units	Percent Diff	Mean (Smp, D1, D2)	Analytical Run	QC Lab Number
Chlorophyll-a, Corrected	13.6	13.1	--	MG/CU.M.	4	--	07114690	008486-05D1
Pheophytin-a	2.6	3.8	--	MG/CU.M.	38*	--	07114690	008486-05D1
Solids, Total Suspended	16.5	15.3	--	MG/L	8	--	07104688	008486-04D1
Solids, Volatile Suspend	3.8	3.8	--	MG/L	0	--	07104689	008486-04D1

\* indicates that agreement between duplicates is greater than 20%. See Case Narrative for exceptions.

(a) DOD and/or NELAC Accredited Analyte

Sample Duplicates for 008486

Page 1 of 1



# Sample Receipt Information

Including as appropriate:

- COCs
- Cooler Receipts
- Airbills
- Email Communication/  
Instructions from Customer

ARDL Data Package     8486 - Inorganics



CHAIN OF CUSTODY RECORD

Illinois River			PRESERVATION	
SAMPLES: (Signature)			SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN	
1 sc'1, f Ke;.--			REMARKS OR SAMPLE LOCATION	
SAMPLE NUMBER DATE TIME				
IL-2 7-/ l CG ). X X X X X X X X			X	
IL-6 7-/ , l(\ ). X X X X X X X			X	
IL-7 7-/ 17.Yo ). X X X X X X X			X	
IL-8 7-.-, f1g ). X X X X X X X			X	
IL-9 .")-( refcx._" X X X X X X X			X	
SLH crqo li y y \c , y X X			-	
Relin by: (Signature) Date ?.,;j Received by: (Signature)			REMARKS/SPECIAL INSTRUCTIONS:	
Relinquished by: (Signature) Date Time Received by: (Signature)			*Preserved with lliSO4	
Received for Laboratory by: Date Time Shipping Ticket No.				
CS i UW.i -r?_				
PURCHASE ORDER NO: _ _ _ _ _				

ARDL #: 8485 / 8486  
Upper Miss River +  
Project: IL River

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 1/21/21 (Signature) J. ...

- If YES, enter carrier name and airbill number **here:**           / K | \_ \_ \_ ' - ' - v - / / . f vt \_ \_ \_ \_ \_

- How many and where? \_\_\_\_\_ Seal Date: \_\_\_\_\_, Seal Name: \_\_\_\_\_

4. Did you screen samples for radioactivity using a Geiger Counter? ..... **e9** NO

6. Were custody papers filled out properly (ink, signed, etc.)?.....@ NO NIA

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form ..... ( ) NO NIA

9. Was a separate container provided for measuring temperature? YES\_\_ NO Observed Cooler Temp. 0.6 C

- B. LOG-IN PHASE: Date samples were logged-in: 11/3/91 actor  
(Signature)

10. Describe type of packing in cooler: we, / c.L

11. Were all samples sealed in separate plastic bags? ..... YES @ NIA

12. Did all containers arrive unbroken and were labels in good condition?..... @''' NO

13. Were sample labels complete?..... <YES" NO

14. Did all sample labels agree with custody papers? ..... NO

15. Were correct containers used for the tests indicated? ..... NO

16. Was pH correct on preserved water samples?.....<sup>®</sup> NO NIA

17. Was a sufficient amount of sample sent for tests indicated?.....ms''' NO

18. Were bubbles absent in VOA samples? If NO, list by sample#: \_\_\_\_\_ YES NO

19. Was the ARDL project coordinator notified of any deficiencies?.....YES NO

Comments and/or Corrective Action:	
(Bv: Signature)	Date:

Sample Transfer	
Fraction $1/1$	Fraction
Area 4 1	Area#
By 1	By
On -, 1 (1	On

Chain-of-Custody # \_\_\_\_\_

**COOLER RECEIPT REPORT**  
**ARDL, INC.**

ARDL#: &'ff 5 { tyf/p  
V p. tr//s. /21 --k  
Project: rt: 1 /J..t V-t.A

Cooler#      -       
Number of Coolers in Shipment: 285  
Date Received: 7/2.../t

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 7/21 (Signature) 'r'A ...JY

1. Did cooler come with a shipping slip (airbill, etc.)?     

If YES, enter carrier name and alrbill number here: :-J.fz l>l.. f/..f...

2. Were custody seals on outside of cooler?.....YES @) N/A

How many and where?....., Seal Date:....., Seal Name:.....

3. Were custody seals unbroken and intact at the date and time of arrival?.....YES NO if,;>

4. Did you screen samples for radioactivity using a Geiger Counter?.....@ NO

5. Were custody papers sealed in a plastic bag?.....YES

6. Were custody papers filled out properly (Ink, signed, etc.)?.....NO N/A

7. Were custody papers signed in appropriate place by ARDL personnel?.....@ NO N/A

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form.....NO N/A

9. Was a separate container provided for measuring temperature? YES NO / N Observed Cooler Temp. t?..Y C .Q C

B. **LOG-IN PHASE:** Date samples were logged-in: 7-5 -19' (Signature) /: J-4.LI: {g./Zu.v.

10. Describe type of packing in cooler: 4" " -Z :./

11. Were all samples sealed in separate plastic bags?.....YES @ N/A

12. Did all containers arrive unbroken and were labels in good condition?.....NO

13. Were sample labels complete?.....@ NO

14. Did all sample labels agree with custody papers?.....NO

15. Were correct containers used for the tests indicated?.....NO

16. Was pH correct on preserved water samples?.....NO N/A

17. Was a sufficient amount of sample sent for tests indicated?.....€" NO

18. Were bubbles absent in VOA samples? If NO, list by sample #:.....YES NO WA

19. Was the ARDL project coordinator notified of any deficiencies?.....YES NO@

Comments and/or Corrective Action:	
(By: Sil:mature)	Date:

Sample Transfer	
Fraction	Fraction
Area #	Area#
By	By
On	On

Chain-of-Custody #

**COOLER RECEIPT REPORT**  
**ARDL, INC.**

ARDL #: 8485/8486  
Upper Miss River  
Project: IL River

Cooler#                       
Number of Coolers in Shipment: 3 Yfj  
Date Received: 1.1.16

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 1/16/16 (Signature) fY

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES  
If YES, enter carrier name and airbill number here: AAJ-110>1
2. Were custody seals on outside of cooler? ..... YES N/A  
How many and where?                     , Seal Date:                     , Seal Name:
3. Were custody seals unbroken and intact at the date and time of arrival? ..... YES NO @
4. Did you screen samples for radioactivity using a Geiger Counter? ..... @ NO
5. Were custody papers sealed in a plastic bag? ..... YES @
6. Were custody papers filled out properly (ink, signed, etc.)? ..... @ NO N/A
7. Were custody papers signed in appropriate place by ARDL personnel? ..... (@ NO N/A
8. Was project identifiable from custody papers? If YES, enter project name at the top of this form ..... NO N/A
9. Was a separate container provided for measuring temperature? YES                      NO                      Observed Cooler Temp. 0.1 Correction factor D.0 C
- B. **LOG-IN PHASE:** Date samples were logged-in: 1-3-16 (Signature                     )
10. Describe type of packing in cooler: 1. A.P. / 1. CL
11. Were all samples sealed in separate plastic bags? ..... YES @ N/A
12. Did all containers arrive unbroken and were labels in good condition? ..... € NO
13. Were sample labels complete? ..... NO
14. Did all sample labels agree with custody papers? ..... @ NO
15. Were correct containers used for the tests indicated? ..... NO
16. Was pH correct on preserved water samples? ..... NO N/A
17. Was a sufficient amount of sample sent for tests indicated? ..... NO
18. Were bubbles absent in VOA samples? If NO, list by sample#:                      YES NO (WA
19. Was the ARDL project coordinator notified of any deficiencies? ..... YES NO (Jfi;

Comments and/or Corrective Action:	
(By: Signature)	Date:

Sample Transfer	
Fraction <u>1/4t1</u>	Fraction
Area # <u>Cooler</u>	Area#
By	By
On <u>7/2/15</u>	On

Chain-of-Custody # 14/A

ARDL#: 1 1

Project: 1 1

Cooler# \_\_\_\_\_ u Δ  
 Number of Coolers in Shipment: 1 S  
 Date Received: . :z /2 /;-f

1. Did cooler come with a shipping slip (airbill, etc.)? \_\_\_\_\_ YES @).

If YES, enter carrier name and airbill number **here:** A M--t- 6J. ....k-& LA. - .....

2. Were custody seals on outside of cooler?.....YES @ NIA

How many and where? \_\_\_\_\_, Seal Date: \_\_\_\_\_, Seal Name: \_\_\_\_\_

3. Were custody seals unbroken and intact at the date and time of arrival?.....YES NO

4. Did you screen samples for radioactivity using a Geiger Counter?.....- @ NO

5. Were custody papers sealed in a plastic bag?.....YES

6. Were custody papers filled out properly (ink, signed, etc.)?..... NO NIA

7. Were custody papers signed in appropriate place by ARDL personnel?..... NO NIA

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form ..... @ ) NO **NIA**

9. Was a separate container provided for measuring temperature? YES NO Observed Cooler Temp. 0.7 °C  
Correction factor 0.7 °C

B. LOG-IN PHASE: Date samples were logged-in: 7-3-17 (Signature) Lec.e./t.-t.e..vn--L

10. Describe type of packing in cooler: 1. b1, 'tL

11. Were oil samples sealed in separate plastic bags? ..... YES @=: NIA

12. Did all containers arrive unbroken and were labels in good condition? ..... €- NO

13. Were sample labels complete?..... NO

14. Did all sample labels agree with custody papers? ..... @, NO

15. Were correct containers used for the tests indicated? .....@., NO

16. Was pH correct on preserved water samples?.....ru) NO N/A

17. Was a sufficient amount of sample sent for tests indicated?.....aES NO

18. Were bubbles absent in VOA samples? If NO, list by sample#: \_\_\_\_\_ YES NO WA'

19. Was the ARDL project coordinator notified of any deficiencies? ..... YES NO @

Comments and/or Corrective Action:	
(Bv: Signature)	Date:

Sam le Transfer	
Fractio"/t 11	Fraction
Area# Kolen	Area#
By SWS	By
On 7/2/2011	On

Chain-of-Custody# N/A

# COOLER RECEIPT REPORT ARDL, INC.

ARDL #: 8485 / 8486  
Upper Miss River  
 Project: EL River

Cooler# \_\_\_\_\_  
 Number of Coolers in Shipment: 1  
 Date Received: J 11/11/19

**A. PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 12-11 (Signature) J 11/11

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES

If YES, enter carrier name and airbill number here: 1 AJ/9V, (M: J)

2. Were custody seals on outside of cooler? ..... YES NO

How many and where? \_\_\_\_\_, Seal Date: \_\_\_\_\_ Seal Name: \_\_\_\_\_

3. Were custody seals unbroken and intact at the date and time of arrival? ..... YES NO 1/5J

4. Did you screen samples for radioactivity using a Geiger Counter? ..... @ NO

5. Were custody papers sealed in a plastic bag? ..... YES @

6. Were custody papers filled out properly (Ink, signed, etc.)? ..... NO N/A

7. Were custody papers signed in appropriate place by ARDL personnel? ..... @ NO N/A

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form ..... NO N/A

9. Was a separate container provided for measuring temperature? YES NO i./" Observed Cooler Temp. 0.7 C  
 -f correction factor U/a C

B. LOG-IN PHASE: Date samples were logged-in: 7 -3 -19 (Signature) ELan

10. Describe type of packing in cooler: ..V/&...><...;a.../... {..u".....

11. Were all samples sealed in separate plastic bags? ..... YES € N/A

12. Did all containers arrive unbroken and were labels in good condition? ..... {Es? NO

13. Were sample labels complete? ..... NO

14. Did all sample labels agree with custody papers? ..... NO

15. Were correct containers used for the tests Indicated? ..... NO

16. Was pH correct on preserved water samples? ..... Y NO N/A

17. Was a sufficient amount of sample sent for tests indicated? ..... NO

18. Were bubbles absent in VOA samples? If NO, list by sample #: ..... YES NO (wA'

19. Was the ARDL project coordinator notified of any deficiencies? ..... YES NO

Comments and/or Corrective Action:	
(By: Signature)	Date:

Sample Transfer	
Fraction <u>/U/</u>	Fraction
Area # <u>cooler</u>	Area#
By <u>AS</u>	By
On <u>7/2/19</u>	On

Chain-of-Custody# N/A



Environmental | Analytical | Management | Safety

PO Box 1566  
400 Aviation Drive  
Mt. Vernon, IL 62864  
618-244-3235

[www.ardlinc.com](http://www.ardlinc.com)

**Customer Name: SLCOE**

**Date: 8/20/19**

**Project Name: Lower River**

**Lab Name: ARDL, Inc.**

**Samples Received at ARDL: 7/11/19**

**ARDL Report No.: 8489**

### **CASE NARRATIVE**

<b><u>Customer Sample No.</u></b>	<b><u>Date Collected</u></b>	<b><u>Lab ID Number</u></b>	<b><u>Analyses Requested</u></b>
OPR-2 RM 44	7/11/19	8489-01	Inorganics(1)
OPR-3 RM 80	7/11/19	8489-02	Inorganics(1)
<u>OPR-4 RM 110</u>	<u>7/11/19</u>	<u>8489-03</u>	<u>Inorg a ni c s( 1.) ---</u>

(1) Including ammonia, chlorophyll/pheophytin, nitrite, nitrate, TKN, TOC, orthophosphate, total phosphorus, TSS, and TVSS.

The quality control data are summarized as follows:

TOC were analyzed by an accredited outside laboratory due to instrument status.

The reported nitrate data was acquired via Method 300.0 eleven days beyond the normal 28 day holding period. Originally, nitrate data was collected via the Green method within holding times. Review of that data revealed inconsistencies from the instrument for some of the samples. Once noted, holding times had expired. ARDL analyzed the samples using the secondary method and got comparable data for the majority of the samples, and believes that the reported data are the most accurate available. These data have been flagged with an 'X'.

### **PREPARATION BLANK**

Results of the preparation blanks were within acceptable limits.

### **LABORATORY CONTROL SAMPLE**

Percent recovery of all LCS analyses were within control limits.

### **MATRIX SPIKE**

Percent recovery of all matrix spikes and matrix spike duplicates were within control limits.

### **DUPLICATE**

Duplicate analyses are reported as MS/MSD, except chlorophyll/pheophytin, TSS, and TVSS. RPO of the duplicate analyses met criteria, except pheophytin.

### **DATA REPORTING QUALIFIERS**

The following data reporting qualifiers are used as required:

ND - Indicates parameter was analyzed for but not detected. The sample quantitation limit has been corrected for weight, dilution and/or percent moisture.

I - Indicates parameter was analyzed for outside of normally accepted holding times.

**CASE NARRATIVE (Continued)**


J - Indicates an estimated value. This flag is used either when estimating a concentration or this flag indicates analyte(s) associated with a DOD-QSM specified non-compliance pertaining to matrix QC criteria.

Release of the data contained in this package has been authorized by the Technical Services Manager or his designee as verified by the following signature.



Dean S. Dickerson  
Technical Services Manager





# Sample & QC Results

Including as appropriate:

- Field Sample Results

- Batch QC

  - Prep Blank

  - LCS/Spike Blank

- Matrix QC

  - MS/MSD

  - Sample Duplicate

ARDL Data Package     8489 - Inorganics

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008489

Report Date: 08/20/2019

Project Name: LOWER RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008489-01  
Field ID: OPR-2 RM 44  
Received: 07/11/2019

Sampling Loc'n: LOWER RIVER  
Sampling Date: 07/11/2019  
Sampling Time: 1045

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
(a) Nitrate-N	0.80	1.0	X	2.3	MG/L	NONE	300.0	NA	08/19/19	08204817
Ammonia Nitrogen	0.0200	0.0300		0.051	MG/L	NONE	350.1	NA	07/15/19	07164699
Chlorophyll-a, Correcte	1.0	1.00		9.1	MG/CU.M.	10200H	10200H	07/12/19	07/15/19	07164701
Kjeldahl Nitrogen	0.190	0.200		0.756	MG/L	351.2	351.2	07/23/19	07/24/19	07284739
Nitrite as Nitrogen	0.0200	0.0200		0.021	MG/L	NONE	354.1	NA	07/12/19	07314750
Pheophytin-a	1.0	1.00		3.6	MG/CU.M.	10200H	10200H	07/12/19	07/15/19	07164701
Phosphorus	0.00800	0.0100		0.461	MG/L	365.2	365.2	07/18/19	07/19/19	07214719
Phosphorus, -ortho	0.00800	0.0100		0.134	MG/L	NONE	365.2	NA	07/12/19	07164696
Solids, Total Suspended	4.0	4.00		120	MG/L	NONE	160.2	NA	07/16/19	07174715
Solids, Volatile Suspen	4.0	4.00		8.4	MG/L	NONE	160.4	NA	07/16/19	07174716
Total Organic Carbon	0.500	1.00		3.8	MG/L	NONE	415.1	NA	07/23/19	07254733

(a) DOD and/or NELAC Accredited Analyte.

Sample 008489-01, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008489

Report Date: 08/20/2019

Project Name: LOWER RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008489-02  
Field ID: OPR-3 RM 80  
Received: 07/11/2019

Sampling Loc'n: LOWER RIVER  
Sampling Date: 07/11/2019  
Sampling Time: 1313

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
(a) Nitrate-N	0.80	1.0	X	2.4	MG/L	NONE	300.0	NA	08/19/19	08204817
Ammonia Nitrogen	0.0200	0.0300		0.0392	MG/L	NONE	350.1	NA	07/15/19	07164699
Chlorophyll-a, Correcte	1.0	1.00		9.1	MG/CU.M.	10200H	10200H	07/12/19	07/15/19	07164701
Kjeldahl Nitrogen	0.190	0.200		0.894	MG/L	351.2	351.2	07/23/19	07/24/19	07284739
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	07/12/19	07314750
Pheophytin-a	1.0	1.00		2.6	MG/CU.M.	10200H	10200H	07/12/19	07/15/19	07164701
Phosphorus	0.00800	0.0100		0.426	MG/L	365.2	365.2	07/18/19	07/19/19	07214719
Phosphorus, -ortho	0.00800	0.0100		0.142	MG/L	NONE	365.2	NA	07/12/19	07164696
Solids, Total Suspended	6.67	6.67		104	MG/L	NONE	160.2	NA	07/16/19	07174715
Solids, Volatile Suspen	6.67	6.67		8.0	MGh	NONE	160.4	NA	07/16/19	07174716
Total Organic Carbon	0.500	1.00		3.8	MG/L	NONE	415.1	NA	07/23/19	07254733

(a) DOD and/or NELAC Accredited Analyte.

Sample 008489-02, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008489

Report Date: 08/20/2019

Project Name: LOWER RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008489-03  
Field ID: OPR-4 RM 110  
Received: 07/11/2019

Sampling Loc'n: LOWER RIVER  
Sampling Date: 07/11/2019  
Sampling Time: 1415

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
(a) Nitrate-N	0.80	1.0	X	2.5	MG/L	NONE	300.0	NA	08/19/19	08204817
Ammonia Nitrogen	0.0200	0.0300		0.0794	MG/L	NONE	350.1	NA	07/15/19	07164699
Chlorophyll-a, Correcte	1.0	1.00		10.6	MG/CU.M.	10200H	10200H	07/12/19	07/15/19	07164701
Kjeldahl Nitrogen	0.190	0.200		0.825	MG/L	351.2	351.2	07/23/19	07/24/19	07284739
Nitrite as Nitrogen	0.0200	0.0200		0.028	MG/L	NONE	354.1	NA	07/12/19	07314750
Pheophytin-a	1.0	1.00		3.2	MG/CU.M.	10200H	10200H	07/12/19	07/15/19	07164701
Phosphorus	0.00800	0.0100		0.439	MG/L	365.2	365.2	07/18/19	07/19/19	07214719
Phosphorus, -ortho	0.00800	0.0100		0.142	MG/L	NONE	365.2	NA	07/12/19	07164696
Solids, Total Suspended	6.67	6.67		125	MG/L	NONE	160.2	NA	07/16/19	07174715
Solids, Volatile Suspen	6.67	6.67		9.33	MG/L	NONE	160.4	NA	07/16/19	07174716
Total Organic Carbon	0.500	1.00		3.9	MG/L	NONE	415.1	NA	07/23/19	07254733

(a) DOD and/or NELAC Accredited Analyte.

Sample 008489-03, Inorganic Analyses

Page 1 of 1

**BLANK SUMMARY REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566      Mt. Vernon, IL    62864**

Lab Report No: 008489

Report Date: 08/20/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	LOD	LOQ	Blank Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run	QC Lab Number
(a) Nitrate-N	0.80	1.0	ND	MG/L	NONE	300.0	NA	08/19/19	08204817	008489-02B1
Ammonia Nitrogen	0.020	0.030	ND	MG/L	NONE	350.1	NA	07/15/19	07164699	008488-13B1
Chlorophyll-a, Corre	1.0	1.0	ND	MG/CU.M.	10200H	10200H	07/12/19	07/15/19	07164701	008489-02B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	07/23/19	07/24/19	07284739	008489-01B1
Nitrite as Nitrogen	0.020	0.020	ND	MG/L	NONE	354.1	NA	07/12/19	07314750	008489-01B1
Pheophytin-a	1.0	1.0	ND	MG/CU.M.	10200H	10200H	07/12/19	07/15/19	07164701	008489-02B1
Phosphorus	0.008	0.010	ND	MG/L	365.2	365.2	07/18/19	07/19/19	07214719	008489-02B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	NA	07/12/19	07164696	008489-02B1
Solids, Total Suspen	1.0	1.0	ND	MG/L	NONE	160.2	NA	07/16/19	07174715	008489-03B1
Solids, Volatile Sus	1.0	1.0	ND	MG/L	NONE	160.4	NA	07/16/19	07174716	008489-03B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	07/23/19	07254733	008489-01B1

(a) DOD and/or NELAC Accredited Analyte  
Inorganic Method Blanks for 008489

**LABORATORY CONTROL SAMPLE REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566      Mt. Vernon, IL      62864**

Lab Report No: 008489

Report Date: 08/20/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	LCS 1 Result	LCS 1 Level	LCS 1 % Rec	LCS 2 Result	LCS 2 Level	LCS 2 % Rec	% Rec Limits	Mean % Rec	Analytical Run	QC Lab Number
(a) Nitrate-N	12.7	14.0	91	--	--	--	90-110	--	08204817	008489-02C1
Ammonia Nitrogen	0.99	1.0	99	--	--	--	80-120	--	07164699	008488-13C1
Kjeldahl Nitrogen	0.83	1.0	83	--	--	--	80-120	--	07284739	008489-01C1
Nitrite as Nitrogen	1.0	1.0	102	--	--	--	80-120	--	07314750	008489-01C1
Phosphorus	0.67	0.67	100	--	--	--	80-120	--	07214719	008489-02C1
Phosphorus, -ortho	0.10	0.10	101	--	--	--	80-120	--	07164696	008489-02C1
Total Organic Carbon	8.7	10.0	87	--	--	--	76-120	--	07254733	008489-01C1

NOTE: Any values tabulated above marked with an asterisk are outside of acceptable limits.

(a) DOD and/or NELAC Accredited Analyte

Inorganic LCS Results for 008489

Page 1 of 1

**MATRIX SPIKE/SPIKE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566 Mt. Vernon, IL     62864**

Lab Report No: 008489

Report Date: 08/20/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	Sample Matrix	Sample Result	MS Result	MS Level	MS % Rec	MSD Result	MSD Level	MSD % Rec	% Rec Limits	RPD	RPD Limit	Run	QC Lab Number
(a) Nitrate-N	WATER	2.4	9.5	8.0	89	9.6	8.0	89	75-125	1	20	08204817	008489-02MS
Ammonia Nitrogen	WATER	0.051	2.1	2.0	101	2.2	2.0	105	75-125	4	20	07164699	008489-01MS
Kjeldahl Nitrogen	WATER	0.76	1.4	0.80	83	1.6	0.80	107	75-125	13	20	07284739	008489-01MS
Nitrite as Nitrogen	WATER	0.021	0.99	1.0	97	0.99	1.0	<b>97</b>	75-125	1	20	07314750	008489-01MS
Phosphorus	WATER	0.43	1.2	0.83	99	1.2	0.83	98	75-125	0	20	07214719	008489-02MS
Phosphorus, -ortho	WATER	0.14	0.25	0.10	108	0.24	0.10	96	75-125	5	20	07164696	008489-02MS
Total Organic Carbon	WATER	3.8	8.4	5.0	91	8.3	5.0	90	76-120	1	20	07254733	008489-01MS

NOTE: Values tabulated above marked with an asterisk are explained in the associated narrative.

(a) DOD and/or NELAC Accredited Analyte.

Inorganic Matrix Spikes for 008489

Page 1 of 1

**SAMPLE DUPLICATE REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566   Mt. Vernon, IL   62864**

Lab Report No: 008489

Report Date: 08/20/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	Sample Conc'n	First Duplicate	Second Duplicate	Units	Percent Diff	Mean (Smp, D1, D2)	Analytical Run	QC Lab Number
Chlorophyll-a, Corrected	9.1	7.6	--	MG/CU.M.	18	--	07164701	008489-02D1
Pheophytin-a	2.6	6.2	--	MG/CU.M.	82*	--	07164701	008489-02D1
Solids, Total Suspended	125	126	--	MG/L	1	--	07174715	008489-03D1
Solids, Volatile Suspend	9.3	10.0	--	MG/L	7	--	07174716	008489-03D1
Total Organic Carbon	3.8	3.9	--	MG/L	2	--	07254733	008489-01D1

\* indicates that agreement between duplicates is greater than 20%. See Case Narrative for exceptions.

(a) DOD and/or NELAC Accredited Analyte

Sample Duplicates for 008489

Page 1 of 1





# Sample Receipt Information

Including as appropriate:

- COCs
- Cooler Receipts
- Airbills
- Email Communication/  
Instructions from Customer

ARDL Data Package     8489 - Inorganics

## CHAIN OF CUSTODY RECORD

[illegible]

## ARDL Report 8489 - Page 13 of 13



Environmental | Analytical | Management | Safety

PO Box 1566  
400 Aviation Drive  
Mt. Vernon, IL 62864  
618-244-3235  
[www.ardlinc.com](http://www.ardlinc.com)

**Customer Name: SLCOE**

**Date: 9/24/19**

**Project Name: Lower River**

**Lab Name: ARDL, Inc.**

**Samples Received at ARDL: 9/3/19**

**ARDL Report No.: 8515**

### CASE NARRATIVE

Customer Sam12le No.	Date Collected	Lab ID	Anal ses Requested
		Number	
OPR-2 RM 44	9/3/19	8515-01	Inorganics(1)
OPR-3 RM 80	9/3/19	8515-02	Inorganics(1)
OPR-4 RM 110	9/3/19	8515-03	Inorganics(1)
OPR-5 RM 150	9/3/19	8515-04	Inorganics{1
SLH-2 RM 177	9/3/19	8515-05	Inorganics(1)
SLH-1 RM 162	9/3/19	8515-06	Inorganics(1)
SLH-15 RM 120	9/3/19	8515-07	<u>Inorganics(l)</u>

(1) Including ammonia, chlorophyll/pheophytin, nitrate, nitrite, TKN, TOC, orthophosphate, total phosphorus, TSS, and TVSS.

The quality control data are summarized as follows:

TOC were analyzed by an accredited outside laboratory due to instrument status.

The samples for nitrate and nitrite were analyzed by Ion Chromatography using Method 300.0 due to instrument status. Samples were analyzed within holding times.

#### PREPARATION BLANK

Results of the preparation blanks were within acceptable limits.

#### LABORATORY CONTROL SAMPLE

Percent recoveries of all LCS analyses were within control limits.

#### MATRIX SPIKE

Percent recovery of all matrix spikes and matrix spike duplicates were within control limits.

#### DUPLICATE

Duplicate analyses are reported as MS/MSD, except chlorophyll/pheophytin, TSS, and TVSS. RPO of the duplicate analyses met criteria, except chlorophyll-a and pheophytin-a.

**CASE NARRATIVE (Continued)**

**DATA REPORTING QUALIFIERS**

The following data reporting qualifiers are used as required:

- ND - Indicates parameter was analyzed for but not detected. The sample quantitation limit has been corrected for weight, dilution and/or percent moisture.
- J - Indicates an estimated value. This flag is used either when estimating a concentration or this flag indicates analyte(s) associated with a DOD-QSM specified non-compliance pertaining to matrix QC criteria.

Release of the data contained in this package has been authorized by the Technical Services Manager or his designee as verified by the following signature.

Dean S. Dickerson  
Technical Services Manager



# Sample & QC Results

Including as appropriate:

- Field Sample Results

- Batch QC

  - Prep Blank

  - LCS/Spike Blank

- Matrix QC

  - MS/MSD

  - Sample Duplicate

ARDL Data Package      8515 - Inorganic

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008515

Report Date: 09/24/2019

Project Name: LOWER RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008515-01  
 Field ID: OPR-2 RM 44  
 Received: 09/03/2019

Sampling Loc'n: LOWER RIVER  
 Sampling Date: 09/03/2019  
 Sampling Time: 1038

Matrix: **WATER**  
 Moisture: **NA**

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300	J	0.0295	MG/L	NONE	350.1	NA	09/04/19	09054857
Chlorophyll-a, Correcte	1.0	1.00		13.6	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Kjeldahl Nitrogen	0.190	0.200		0.697	MG/L	351.2	351.2	09/09/19	09/10/19	09124866
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Phosphorus	0.00800	0.0100		0.51	MG/L	365.2	365.2	09/12/19	09/13/19	09174893
Phosphorus, -ortho	0.00800	0.0100		0.252	MG/L	NONE	365.2	NA	09/04/19	09124868
Solids, Total Suspended	10.0	10.0		199	MG/L	NONE	160.2	NA	09/09/19	09164884
Solids, Volatile Suspen	10.0	10.0		15.0	MG/L	NONE	160.4	NA	09/09/19	09164885
Total Organic Carbon	0.500	1.00		4.1	MG/L	NONE	415.1	NA	09/17/19	09244911

(a) DOD and/or NELAC Accredited Analyte.

Sample 008515-01, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008515

Report Date: 09/24/2019

Project Name: LOWER RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008515-02  
Field ID: OPR-3 RM 80  
Received: 09/03/2019

Sampling Loc'n: LOWER RIVER  
Sampling Date: 09/03/2019  
Sampling Time: 0856

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0413	MG/L	NONE	350.1	NA	09/04/19	09054857
Chlorophyll-a, Corrected	1.0	1.00		13.6	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Kjeldahl Nitrogen	0.190	0.200		0.631	MG/L	351.2	351.2	09/09/19	09/10/19	09124866
Nitrate as Nitrogen	0.800	1.00		1.05	MG/L	NONE	300.0	NA	09/04/19	09064859
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/04/19	09064858
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Phosphorus	0.00800	0.0100		0.544	MG/L	365.2	365.2	09/12/19	09/13/19	09174893
Phosphorus, -ortho	0.00800	0.0100		0.138	MG/L	NONE	365.2	NA	09/04/19	09124868
Solids, Total Suspended	10.0	10.0		216	MG/L	NONE	160.2	NA	09/09/19	09164884
Solids, Volatile Suspended	10.0	10.0		15.0	MG/L	NONE	160.4	NA	09/09/19	09164885
Total Organic Carbon	0.500	1.00		5.0	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008515-02, Inorganic Analyses

Page 1 of 1



**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008515

Report Date: 09/24/2019

Project Name: LOWER RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008515-03  
 Field ID: OPR-4 RM 110  
 Received: 09/03/2019

Sampling Loc'n: LOWER RIVER  
 Sampling Date: 09/03/2019  
 Sampling Time: 1230

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0341	MG/L	NONE	350.1	NA	09/04/19	09054857
Chlorophyll-a, Correcte	1.0	1.00		15.9	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Kjeldahl Nitrogen	0.190	0.200		0.563	MG/L	351.2	351.2	09/09/19	09/10/19	09124866
Nitrate as Nitrogen	0.800	1.00		1.03	MG/L	NONE	300.0	NA	09/04/19	09064859
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/04/19	09064858
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Phosphorus	0.00800	0.0100		0.51	MG/L	365.2	365.2	09/12/19	09/13/19	09174893
Phosphorus, -ortho	0.00800	0.0100		0.211	MG/L	NONE	365.2	NA	09/04/19	09124868
Solids, Total Suspended	10.0	10.0		217	MG/L	NONE	160.2	NA	09/09/19	09164884
Solids, Volatile Suspen	10.0	10.0		16.0	MG/L	NONE	160.4	NA	09/09/19	09164885
Total Organic Carbon	0.500	1.00		4.1	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008515-03, Inorganic Analyses

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**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008515

Report Date: 09/24/2019

Project Name: LOWER RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008515-04  
 Field ID: OPR-5 RM 150  
 Received: 09/03/2019

Sampling Loc'n: LOWER RIVER  
 Sampling Date: 09/03/2019  
 Sampling Time: 1405

Matrix: WATER  
 Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300	J	0.0203	MG/L	NONE	350.1	NA	09/04/19	09054857
Chlorophyll-a, Correcte	1.0	1.00		11.3	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Kjeldahl Nitrogen	0.190	0.200		0.869	MG/L	351.2	351.2	09/09/19	09/10/19	09124866
Nitrate as Nitrogen	0.800	1.00		1.02	MG/L	NONE	300.0	NA	09/04/19	09064859
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/04/19	09064858
Pheophytin-a	1.0	1.00		4.5	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Phosphorus	0.00800	0.0100		0.60	MG/L	365.2	365.2	09/12/19	09/13/19	09174893
Phosphorus, -ortho	0.00800	0.0100		0.138	MG/L	NONE	365.2	NA	09/04/19	09124868
Solids, Total Suspended	10.0	10.0		319	MG/L	NONE	160.2	NA	09/09/19	09164884
Solids, Volatile Suspen	10.0	10.0		26.0	MG/L	NONE	160.4	NA	09/09/19	09164885
Total Organic Carbon	0.500	1.00		4.1	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008515-04, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008515

Report Date: 09/24/2019

Project Name: LOWER RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008515-05  
 Field ID: SLH-2 RM 177  
 Received: 09/03/2019

Sampling Loc'n: LOWER RIVER  
 Sampling Date: 09/03/2019  
 Sampling Time: 1330

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300	J	0.0266	MG/L	NONE	350.1	NA	09/04/19	09054857
Chlorophyll-a, Correcte	1.0	1.00		9.1	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Kjeldahl Nitrogen	0.190	0.200		0.849	MG/L	351.2	351.2	09/09/19	09/10/19	09124866
Nitrate as Nitrogen	0.800	1.00		ND	MG/L	NONE	300.0	NA	09/04/19	09064859
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/04/19	09064858
Pheophytin-a	1.0	1.00		5.2	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Phosphorus	0.00800	0.0100		0.687	MG/L	365.2	365.2	09/12/19	09/13/19	09174893
Phosphorus, -ortho	0.00800	0.0100		0.333	MG/L	NONE	365.2	NA	09/04/19	09124868
Solids, Total Suspended	10.0	10.0		377	MG/L	NONE	160.2	NA	09/09/19	09164884
Solids, Volatile Suspen	10.0	10.0		30.0	MG/L	NONE	160.4	NA	09/09/19	09164885
Total Organic Carbon	0.500	1.00		4.2	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008515-05, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008515

Report Date: 09/24/2019

Project Name: LOWER RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008515-06  
Field ID: SLH-1 RM 162  
Received: 09/03/2019

Sampling Loc'n: LOWER RIVER  
Sampling Date: 09/03/2019  
Sampling Time: 1530

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0646	MG/L	NONE	350.1	NA	09/04/19	09054857
Chlorophyll-a, Correcte	1.0	1.00		13.6	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Kjeldahl Nitrogen	0.190	0.200		0.754	MG/L	351.2	351.2	09/09/19	09/10/19	09124866
Nitrate as Nitrogen	0.800	1.00		1.05	MG/L	NONE	300.0	NA	09/04/19	09064859
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/04/19	09064858
Pheophytin-a	1.0	1.00		3.9	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Phosphorus	0.00800	0.0100		0.575	MG/L	365.2	365.2	09/12/19	09/13/19	09174893
Phosphorus, -ortho	0.00800	0.0100		0.141	MG/L	NONE	365.2	NA	09/04/19	09124868
Solids, Total Suspended	10.0	10.0		311	MG/L	NONE	160.2	NA	09/09/19	09164884
Solids, Volatile Suspen	10.0	10.0		24.0	MG/L	NONE	160.4	NA	09/09/19	09164885
Total Organic Carbon	0.500	1.00		4.4	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008515-06, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008515

Report Date: 09/24/2019

Project Name: LOWER RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008515-07  
 Field ID: SLH-15 RM 120  
 Received: 09/03/2019

Sampling Loc'n: LOWER RIVER  
 Sampling Date: 09/03/2019  
 Sampling Time: 1600

Matrix: WATER  
 Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0386	MG/L	NONE	350.1	NA	09/04/19	09054857
Chlorophyll-a, Correcte	1.0	1.00	J	11.3	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Kjeldahl Nitrogen	0.190	0.200		0.877	MG/L	351.2	351.2	09/09/19	09/10/19	09124866
Nitrate as Nitrogen	0.800	1.00		ND	MG/L	NONE	300.0	NA	09/04/19	09064859
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/04/19	09064858
Pheophytin-a	1.0	1.00	J	1.4	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886
Phosphorus	0.00800	0.0100		0.67	MG/L	365.2	365.2	09/12/19	09/13/19	09174893
Phosphorus, -ortho	0.00800	0.0100		0.146	MG/L	NONE	365.2	NA	09/04/19	09124868
Solids, Total Suspended	10.0	10.0		381	MG/L	NONE	160.2	NA	09/09/19	09164884
Solids, Volatile Suspen	10.0	10.0		30.0	MG/L	NONE	160.4	NA	09/09/19	09164885
Total Organic Carbon	0.500	1.00		4.3	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008515-07, Inorganic Analyses

Page 1 of 1

**BLANK SUMMARY REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566      Mt. Vernon, IL    62864**

Lab Report No: 008515

Report Date: 09/24/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	LOO	LOQ	Blank Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run	QC Lab Number
Ammonia Nitrogen	0.020	0.030	ND	MG/L	NONE	350.1	NA	09/04/19	09054857	008515-01B1
Chlorophyll-a, Corre	1.0	1.0	ND	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886	008515-07B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	09/09/19	09/10/19	09124866	008515-01B1
Nitrate as Nitrogen	0.80	1.0	ND	MG/L	NONE	300.0	NA	09/04/19	09064859	008515-01B1
Nitrite as Nitrogen	0.40	0.50	ND	MG/L	NONE	300.0	NA	09/04/19	09064858	008515-01B1
Pheophytin-a	1.0	1.0	ND	MG/CU.M.	10200H	10200H	09/04/19	09/09/19	09164886	008515-07B1
Phosphorus	0.008	0.010	ND	MG/L	365.2	365.2	09/12/19	09/13/19	09174893	008515-01B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	NA	09/04/19	09124868	008515-04B1
Solids, Total Suspen	1.0	1.0	ND	MG/L	NONE	160.2	NA	09/09/19	09164884	008515-03B1
Solids, Volatile Sus	1.0	1.0	ND	MG/L	NONE	160.4	NA	09/09/19	09164885	008515-03B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	09/17/19	09244910	008515-02B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	09/17/19	09244911	008515-01B1

(a) DOD and/or NELAC Accredited Analyte  
Inorganic Method Blanks for 008515

Page 1 of 1

**LABORATORY CONTROL SAMPLE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566     Mt. Vernon, IL     62864**

Lab Report No: 008515

Report Date: 09/24/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	LCS 1 Result	LCS 1 Level	LCS 1 % Rec	LCS 2 Result	LCS 2 Level	LCS 2 % Rec	% Rec Limits	Mean % Rec	Analytical Run	QC Lab Number
Ammonia Nitrogen	0.99	1.0	99	--	--	--	80-120	--	09054857	008515-01C1
Kjeldahl Nitrogen	0.93	1.0	93	--	--	--	80-120	--	09124866	008515-01C1
Nitrate as Nitrogen	12.8	14.0	91	--	--	--	80-120	--	09064859	008515-01C1
Nitrite as Nitrogen	6.4	7.0	92	--	--	--	80-120	--	09064858	008515-01C1
Phosphorus	0.65	0.67	98	--	--	--	80-120	--	09174893	008515-01C1
Phosphorus, -ortho	0.092	0.10	92	--	--	--	80-120	--	09124868	008515-04C1
Total Organic Carbon	9.0	10.0	90	--	--	--	76-120	--	09244910	008515-02C1
Total Organic Carbon	8.9	10.0	89	--	--	--	76-120	--	09244911	008515-01C1

NOTE: Any values tabulated above marked with an asterisk are outside of acceptable limits.

(a) DOD and/or NELAC Accredited Analyte

Inorganic LCS Results for 008515

Page 1 of 1

**MATRIX SPIKE/SPIKE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566 Mt. Vernon, IL 62864**

Lab Report No: 008515

Report Date: 09/24/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	Sample Matrix	Sample Result	MS Result	MS Level	MS % Rec	MSD Result	MSD Level	MSD % Rec	% Rec Limits	RPO RPO	RPO Limit	Run	QC Lab Number
Ammonia Nitrogen	WATER	J 0.030	2.1	2.0	104	2.1	2.0	103	75-125	1	20	09054857	008515-01MS
Kjeldahl Nitrogen	WATER	0.70	1.5	0.80	94	1.6	0.80	109	75-125	8	20	09124866	008515-01MS
Nitrate as Nitrogen	WATER	1.0	8.0	8.0	87	8.0	8.0	88	75-125	1	20	09064859	008515-01MS
Nitrite as Nitrogen	WATER	ND	4.0	4.0	100	4.1	4.0	101	75-125	2	20	09064858	008515-01MS
Phosphorus	WATER	0.51	1.3	0.83	101	1.3	0.83	99	75-125	1	20	09174893	008515-01MS
Phosphorus, -ortho	WATER	0.14	0.24	0.10	103	0.24	0.10	100	75-125	1	20	09124868	008515-04MS
Total Organic Carbon	WATER	4.1	8.3	5.0	84	8.2	5.0	83	76-120	1	20	09244911	008515-01MS

NOTE: Values tabulated above marked with an asterisk are explained in the associated narrative.

(a) DOD and/or NELAC Accredited Analyte.

Inorganic Matrix Spikes for 008515

Page 1 of 1



**SAMPLE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566   Mt. Vernon, IL   62864**

Lab Report No: 008515

Report Date: 09/24/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	Sample Conc'n	First Duplicate	Second Duplicate	Units	Percent Diff	Mean (Smp, D1, D2)	Analytical Run	QC Lab Number
Chlorophyll-a, Corrected	11.3	9.1	--	MG/CU.M.	22*	--	09164886	008515-07D1
Pheophytin-a	1.4	3.6	--	MG/CU.M.	88*	--	09164886	008515-07D1
Solids, Total Suspended	217	229	--	MG/L	5	--	09164884	008515-03D1
Solids, Volatile Suspend	16.0	16.0	--	MG/L	0	--	09164885	008515-03D1

\* indicates that agreement between duplicates is greater than 20%. See Case Narrative for exceptions.

(a) DOD and/or NELAC Accredited Analyte

Sample Duplicates for 008515

Page 1 of 1



# Sample Receipt Information

Including as appropriate:

- COCs
- Cooler Receipts
- Airbills
- Email Communication/  
Instructions from Customer

ARDL Data Package      8515 - Inorganic

## CHAIN OF CUSTODY RECORD

[illegible]

PURCHASE ORDER NO:

# COOLER RECEIPT REPORT

## ARDL, INC.

ARDL #: \_\_,aa...J\_5\_/\_5\_

Cooler#      ≤  
Number of Coolers in Shipment:      . ! , ;

Project: *Lower Rt<sub>r/e v-</sub>*

Date Received: 9 - 3 - 19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 9-3-19 (Signature) a/c E Ave.,

1. Did cooler come with a shipping slip (airbill, etc.)?.....YES @----

If YES, enter carrier name and airbill number here: \_\_\_\_\_ . /4 .... 6-10-4

2. Were custody seals on outside of cooler? .....YES **N/A**

How many and where? \_\_\_\_\_ Seal Date: \_\_\_\_\_ Seal Name: \_\_\_\_\_

3. Were custody seals unbroken and intact at the date and time of arrival?..... YES NO

4. Did you screen samples for radioactivity using a Geiger Counter?.....tES NO

5. Were custody papers sealed in a plastic bag? ..... YES @, /

6. Were custody papers filled out properly (ink, signed, etc.)? ..... @' NO N/A

7. Were custody papers signed in appropriate place by ARDL personnel?.....' NO **N/A**

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form..... NO NIA

9. Was a separate container provided for measuring temperature? YES 1 / NO 0 . Observed Cooler Temp. 0 <sup>1</sup> 9 C  
Correction factor 0.0 C

B. LOG-IN PHASE: Date samples were logged-in: 9-17-11 (Signature) [Signature]

10. Describe type of packing in cooler:- "''''''' -==...e.-...aa.<'---'U!.. ==-€---=-----

11. Were all samples sealed in separate plastic bags? ..... YES N/A

12. Did all containers arrive unbroken and were labels in good condition?..... @ - NO

13. Were sample labels complete?.....@ NO

14. Did all sample labels agree with custody papers? ..... €' NO

15. Were correct containers used for the tests indicated? ..... £' NO

16. Was pH correct on preserved water samples? .....@ NO N/A

17. Was a sufficient amount of sample sent for tests indicated?.....€5' NO

18. Were bubbles absent in VOA samples? If NO, list by sample #: YES NO N/A

19. Was the ARDL project coordinator notified of any deficiencies?.....YES NO u,VA.

<b>Comments and/or Corrective Action:</b>	
(By: Signature)	Date:

Sample Transfer	
Fraction <i>a--l.f</i>	Fraction
Area# <i>Ivft-ilwc</i>	Area#
By <i>C: -</i>	By
On <i>7- '4 - 19</i>	On

Chain-of-Custody #

# COOLER RECEIPT REPORT ARDL, INC.

ARDL 5 / S

Cooler # 2 CC-

Number of Coolers in Shipment: 7

Project: Lower River

Date Received: 9-3-19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened 9-3-19 (Signature) LJt/5:--<-e:--/-,-c

1. Did cooler come with a shipping slip (airbill, etc.)?.....YES €

If YES, enter carrier name and airbill number here: \_\_\_\_\_

2. Were custody seals on outside of cooler? .....YES N/A

How many and where? \_\_\_\_\_, Seal Date: \_\_\_\_\_, Seal Name: \_\_\_\_\_

3. Were custody seals unbroken and intact at the date and time of arrival?.....YES NO

4. Did you screen samples for radioactivity using a Geiger Counter?.....NO

5. Were custody papers sealed in a plastic bag? .....YES

6. Were custody papers filled out properly (ink, signed, etc.)?.....' NO N/A

7. Were custody papers signed in appropriate place by ARDL personnel? .....@ NO N/A

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form .....€ NO N/A

9. Was a separate container provided for measuring temperature? YES NO Observed Cooler Temp. 1.7 C Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 9-11-19 (Signature) LJf.r:t-e /! ..-c:,,,rvcc./

10. Describe type of packing in cooler: h"=====a .:?.1:"'=-..= a::: l--c. -" =='

11. Were all samples sealed in separate plastic bags?.....YES N6:: NIA

12. Did all containers arrive unbroken and were labels in good condition? .....ID' NO

13. Were sample labels complete?.....ru" NO

14. Did all sample labels agree with custody papers?.....€ ; NO

15. Were correct containers used for the tests indicated?.....€' NO

16. Was pH correct on preserved water samples? .....€ NO N/A

17. Was a sufficient amount of sample sent for tests indicated? .....YES' NO

18. Were bubbles absent in VOA samples? If NO, list by sample#: \_\_\_\_\_YES NO (!VA'

19. Was the ARDL project coordinator notified of any deficiencies?.....YES NO @A"

Comments and/or Corrective Action:	
(By: Signature)	Date:

Sample Transfer	
Fraction	Fraction
<u>all</u>	
Area #	Area#
<u>Wakkin</u>	
By	By
<u>all</u>	
On	On
<u>9-11-19</u>	

Chain-of-Custody # J//.1



Environmental | Analytical | Management | Safety

PO Box 1566  
400 Aviation Drive  
Mt. Vernon, IL 62864  
618-244-3235  
[www.ardlinc.com](http://www.ardlinc.com)

**Customer Name: SLCOE**

**Date: 10/1/19**

**Project Name: Illinois River**

**Lab Name: ARDL, Inc.**

**Samples Received at ARDL: 9/5/19**

**ARDL Report No.: 8516**

### CASE NARRATIVE

Customer Sample No.	Date Collected	Lab ID	Analyses Requested
		Number	
IL-2	9/4/19	8516-01	Inorganics(1)
IL-6	9/4/19	8516-02	Inorganics(1)
IL-7	9/4/19	8516-03	Inorganics(1)
IL-8	9/4/19	8516-04	Inorganics(1)
IL-9	9/4/19	8516-05	Inorganics(1)

(1) Including ammonia, chlorophyll/pheophytin, nitrite, nitrate, TKN, TOC, orthophosphate, total phosphorus, TSS, and TVSS.

The quality control data are summarized as follows:

TOC were analyzed by an accredited outside laboratory due to instrument status.

Nitrate and nitrite were analyzed by Ion Chromatography using Method 300.0 due to instrument status. Samples were analyzed within holding times.

#### PREPARATION BLANK

Results of the preparation blanks were within acceptable limits.

#### LABORATORY CONTROL SAMPLE

Percent recoveries of all LCS analyses were within control limits.

#### MATRIX SPIKE

Percent recovery of all matrix spikes and matrix spike duplicates were within control limits.

#### DUPLICATE

Duplicate analyses are reported as MS/MSD, except chlorophyll/pheophytin, TOC, TSS, and TVSS. RPO of the duplicate analyses met criteria.

#### DATA REPORTING QUALIFIERS

The following data reporting qualifiers are used as required:

ND - Indicates parameter was analyzed for but not detected. The sample quantitation limit has been corrected for weight, dilution and/or percent moisture.

Release of the data contained in this package has been authorized by the Technical Services Manager or his designee as verified by the following signature.

Dean S. Dickerson  
Technical Services Manager



# Sample & QC Results

Including as appropriate:

- Field Sample Results

- Batch QC

  - Prep Blank

  - LCS/Spike Blank

- Matrix QC

  - MS/MSD

  - Sample Duplicate

ARDL Data Package      8516 - Inorganic

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008516

Report Date: 10/01/2019

Project Name: ILLINOIS RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008516-01  
 Field ID: IL-2  
 Received: 09/05/2019

Sampling Loc'n: ILLINOIS RIVER  
 Sampling Date: 09/04/2019  
 Sampling Time: 1137

Matrix: WATER  
 Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0652	MG/L	NONE	350.1	NA	09/09/19	09164887
Chlorophyll-a, Correcte	1.0	1.00		17.2	MG/CU.M.	10200H	10200H	09/05/19	09/12/19	09174898
Kjeldahl Nitrogen	0.190	0.200		0.882	MG/L	351.2	351.2	09/09/19	09/10/19	09124866
Nitrate as Nitrogen	0.800	1.00		1.67	MG/L	NONE	300.0	NA	09/05/19	09064861
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/05/19	09064860
Pheophytin-a	1.0	1.00		3.1	MG/CU.M.	10200H	10200H	09/05/19	09/12/19	09174898
Phosphorus	0.00800	0.0100		0.449	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.302	MG/L	NONE	365.2	NA	09/05/19	09164888
Solids, Total Suspended	4.0	4.00		29.2	MG/L	NONE	160.2	NA	09/09/19	09164884
Solids, Volatile Suspen	4.0	4.00		4.4	MG/L	NONE	160.4	NA	09/09/19	09164885
Total Organic Carbon	0.500	1.00		4.0	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008516-01, Inorganic Analyses

Page 1 of 1



**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008516

Report Date: 10/01/2019

Project Name: ILLINOIS RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008516-02  
 Field ID: **IL-6**  
 Received: 09/05/2019

Sampling Loc'n: ILLINOIS RIVER  
 Sampling Date: 09/04/2019  
 Sampling Time: 1145

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0705	MG/L	NONE	350.1	NA	09/09/19	09164887
Chlorophyll-a, Correcte	1.0	1.00		ND	MG/CU.M.	10200H	10200H	09/05/19	09/12/19	09174898
Kjeldahl Nitrogen	0.190	0.200		1.18	MG/L	351.2	351.2	09/09/19	09/10/19	09124866
Nitrate as Nitrogen	0.800	1.00		1.74	MG/L	NONE	300.0	NA	09/05/19	09064861
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/05/19	09064860
Pheophytin-a	1.0	1.00		11.8	MG/CU.M.	10200H	10200H	09/05/19	09/12/19	09174898
Phosphorus	0.00800	0.0100		0.471	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.319	MG/L	NONE	365.2	NA	09/05/19	09164888
Solids, Total Suspended	4.0	4.00		41.2	MG/L	NONE	160.2	NA	09/09/19	09164884
Solids, Volatile Suspen	4.0	4.00		4.8	MG/L	NONE	160.4	NA	09/09/19	09164885
Total Organic Carbon	0.500	1.00		3.8	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008516-02, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008516

Report Date: 10/01/2019

Project Name: ILLINOIS RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008516-03  
 Field ID: IL-7  
 Received: 09/05/2019

Sampling Loc'n: ILLINOIS RIVER  
 Sampling Date: 09/04/2019  
 Sampling Time: 1103

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0777	MG/L	NONE	350.1	NA	09/09/19	09164887
Chlorophyll-a, Correcte	1.0	1.00		9.1	MG/CU.M.	10200H	10200H	09/05/19	09/12/19	09174898
Kjeldahl Nitrogen	0.190	0.200		0.753	MG/L	351.2	351.2	09/09/19	09/10/19	09124866
Nitrate as Nitrogen	0.800	1.00		1.76	MG/L	NONE	300.0	NA	09/05/19	09064861
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/05/19	09064860
Pheophytin-a	1.0	1.00		3.6	MG/CU.M.	10200H	10200H	09/05/19	09/12/19	09174898
Phosphorus	0.00800	0.0100		0.462	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.34	MG/L	NONE	365.2	NA	09/05/19	09164888
Solids, Total Suspended	4.0	4.00		41.2	MG/L	NONE	160.2	NA	09/09/19	09164884
Solids, Volatile Suspen	4.0	4.00		4.4	MG/L	NONE	160.4	NA	09/09/19	09164885
Total Organic Carbon	0.500	1.00		3.8	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008516-03, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008516

Report Date: 10/01/2019

Project Name: ILLINOIS RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008516-04  
 Field ID: IL-8  
 Received: 09/05/2019

Sampling Loc'n: ILLINOIS RIVER  
 Sampling Date: 09/04/2019  
 Sampling Time: 0950

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0811	MG/L	NONE	350.1	NA	09/09/19	09164887
Chlorophyll-a, Correcte	1.0	1.00		13.6	MG/CU.M.	10200H	10200H	09/05/19	09/12/19	09174898
Kjeldahl Nitrogen	0.190	0.200		0.996	MG/L	351.2	351.2	09/09/19	09/10/19	09124866
Nitrate as Nitrogen	0.800	1.00		1.75	MG/L	NONE	300.0	NA	09/05/19	09064861
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/05/19	09064860
Pheophytin-a	1.0	1.00		6.1	MG/CU.M.	10200H	10200H	09/05/19	09/12/19	09174898
Phosphorus	0.00800	0.0100		0.522	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.302	MG/L	NONE	365.2	NA	09/05/19	09164888
Solids, Total Suspended	4.0	4.00		56.0	MG/L	NONE	160.2	NA	09/09/19	09164884
Solids, Volatile Suspen	4.0	4.00		5.6	MG/L	NONE	160.4	NA	09/09/19	09164885
Total Organic Carbon	0.500	1.00		3.9	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008516-04, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008516

Report Date: 10/01/2019

Project Name: ILLINOIS RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008516-05  
 Field ID: IL-9  
 Received: 09/05/2019

Sampling Loc'n: ILLINOIS RIVER  
 Sampling Date: 09/04/2019  
 Sampling Time: 0900

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.103	MG/L	NONE	350.1	NA	09/09/19	09164887
Chlorophyll-a, Correcte	1.0	1.00		15.4	MG/CU.M.	10200H	10200H	09/05/19	09/12/19	09174898
Kjeldahl Nitrogen	0.190	0.200		0.876	MG/L	351.2	351.2	09/09/19	09/10/19	09124866
Nitrate as Nitrogen	0.800	1.00		1.66	MG/L	NONE	300.0	NA	09/05/19	09064861
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/05/19	09064860
Pheophytin-a	1.0	1.00		7.4	MG/CU.M.	10200H	10200H	09/05/19	09/12/19	09174898
Phosphorus	0.00800	0.0100		0.599	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.364	MG/L	NONE	365.2	NA	09/05/19	09164888
Solids, Total Suspended	4.0	4.00		72.4	MG/L	NONE	160.2	NA	09/09/19	09164884
Solids, Volatile Suspen	4.0	4.00		7.6	MG/L	NONE	160.4	NA	09/09/19	09164885
Total Organic Carbon	0.500	1.00		3.9	MG/L	NONE	415.1	NA	09/17/19	09244911

(a) DOD and/or NELAC Accredited Analyte.

Sample 008516-05, Inorganic Analyses

Page 1 of 1

**BLANK SUMMARY REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566      Mt. Vernon, IL    62864**

Lab Report No: 008516

Report Date: 10/01/2019

Project Name: ILLINOIS RIVER

NELAC Certified - IL100308

Analyte	LOD	LOQ	Blank Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run	QC Lab Number
Ammonia Nitrogen	0.020	0.030	ND	MG/L	NONE	350.1	NA	09/09/19	09164887	008516-01B1
Chlorophyll-a, Corre	1.0	1.0	ND	MG/CU.M.	10200H	10200H	09/05/19	09/12/19	09174898	008516-01B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	09/09/19	09/10/19	09124866	008515-01B1
Nitrate as Nitrogen	0.80	1.0	ND	MG/L	NONE	300.0	NA	09/05/19	09064861	008516-01B1
Nitrite as Nitrogen	0.40	0.50	ND	MG/L	NONE	300.0	NA	09/05/19	09064860	008516-01B1
Pheophytin-a	1.0	1.0.	ND	MG/CU.M.	10200H	10200H	09/05/19	09/12/19	09174898	008516-01B1
Phosphorus	0.008	0.010	ND	MG/L	365.2	365.2	09/30/19	09/30/19	10014928	008516-01B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	NA	09/05/19	09164888	008516-02B1
Solids, Total Suspen	1.0	1.0	ND	MG/L	NONE	160.2	NA	09/09/19	09164884	008515-03B1
Solids, Volatile Sus	1.0	1.0	ND	MG/L	NONE	160.4	NA	09/09/19	09164885	008515-03B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	09/17/19	09244910	008515-02B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	09/17/19	09244911	008515-01B1

(a) DOD and/or NELAC Accredited Analyte  
Inorganic Method Blanks for 008516

Page 1 of 1

**LABORATORY CONTROL SAMPLE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566     Mt. Vernon, IL     62864**

Lab Report No: 008516

Report Date: 10/01/2019

Project Name: ILLINOIS RIVER

NELAC Certified - IL100308

Analyte	LCS 1 Result	LCS 1 Level	LCS 1 % Rec	LCS 2 Result	LCS 2 Level	LCS 2 % Rec	% Rec Limits	Mean % Rec	Analytical Run	QC Lab Number
Ammonia Nitrogen	1.0	1.0	100	--	--	--	80-120	--	09164887	008516-01C1
Kjeldahl Nitrogen	0.93	1.0	93	--	--	--	80-120	--	09124866	008515-01C1
Nitrate as Nitrogen	13.0	14.0	93	--	--	--	80-120	--	09064861	008516-01C1
Nitrite as Nitrogen	6.5	7.0	92	--	--	--	80-120	--	09064860	008516-01C1
Phosphorus	0.63	0.67	94	--	--	--	80-120	--	10014928	008516-01C1
Phosphorus, -ortho	0.099	0.10	99	--	--	--	80-120	--	09164888	008516-02C1
Total Organic Carbon	9.0	10.0	90	--	--	--	76-120	--	09244910	008515-02C1
Total Organic Carbon	8.9	10.0	89	--	--	--	76-120	--	09244911	008515-01C1

NOTE: Any values tabulated above marked with an asterisk are outside of acceptable limits.

(a) DOD and/or NELAC Accredited Analyte

Inorganic LCS Results for 008516

Page 1 of 1

**MATRIX SPIKE/SPIKE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566   Mt. Vernon, IL   62864**

Lab Report No: 008516

Report Date: 10/01/2019

Project Name: ILLINOIS RIVER

NELAC Certified - IL100308

Analyte	Sample Matrix	Sample Result	MS Result	MS Level	MS % Rec	MSD Result	MSD Level	MSD % Rec	% Rec Limits	RPD	RPD Limit	Run	QC Lab Number
Ammonia Nitrogen	WATER	0.065	2.1	2.0	103	2.1	2.0	102	75-125	1	20	09164887	008516-01MS
Kjeldahl Nitrogen	WATER	0.88	1.7	0.80	101	1.5	0.80	82	75-125	9	20	09124866	008516-01MS
Nitrate as Nitrogen	WATER	1.7	8.8	8.0	89	8.8	8.0	89	75-125	1	20	09064861	008516-01MS
Nitrite as Nitrogen	WATER	ND	4.4	4.0	110	4.4	4.0	109	75-125	0	20	09064860	008516-01MS
Phosphorus	WATER	0.45	1.3	0.83	99	1.3	0.83	102	75-125	2	20	10014928	008516-01MS
Phosphorus, -ortho	WATER	0.32	0.43	0.10	114	0.43	0.10	111	75-125	1	20	09164888	008516-02MS

NOTE: Values tabulated above marked with an asterisk are explained in the associated narrative.

(a) DOD and/or NELAC Accredited Analyte.

Inorganic Matrix Spikes for 008516

Page 1 of 1

**SAMPLE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566   Mt. Vernon, IL   62864**

Lab Report No: 008516

Report Date: 10/01/2019

Project Name: ILLINOIS RIVER

NELAC Certified - IL100308

Analyte	Sample Conc'n	First Duplicate	Second Duplicate	Units	Percent Diff	Mean (Smp, D1, D2)	Analytical Run	QC Lab Number
Chlorophyll-a, Corrected	17.2	18.2	--	MG/CU.M.	6	--	09174898	008516-01D1
Pheophytin-a	3.1	2.8	--	MG/CU.M.	10	--	09174898	008516-01D1
Solids, Total Suspended	29.2	29.6	--	MG/L	1	--	09164884	008516-01D1
Solids, Volatile Suspend	4.4	4.4	--	MG/L	0	--	09164885	008516-01D1

(a) DOD and/or NELAC Accredited Analyte  
Sample Duplicates for 008516

Page 1 of 1





# Sample Receipt Information

Including as appropriate:

- COCs
- Cooler Receipts
- Airbills
- Email Communication/  
Instructions from Customer

ARDL Data Package      8516 - Inorganic

## CHAIN OF CUSTODY RECORD

PROJECT				m IS S u g																	PRESERVATION	
SAMPLERS: (Signature)																					Q <sub>U</sub>	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Illinois River																						
SAMPLE NUMBER	DATE	MIME		REMARKS OR SAMPLE LOCATION																		
IL-2	F1-<.f	its')	)	X	X	X	X	X	X	X											X	
IL-6	-'---/	\I,C-	)	X	X	X	X	X		X											X	
IL-7	Cf-4	\\()	)	X	X	X	X	X		X											X	
IL-8	1-'-f	{\	)	X	X	X	X	X	X	X											X	
IL-9	1-'-f	1:RD6	)	X	X	X	X	X		X											X	
IL-15 (VA-	iAA	NPI																				
R uishe/ )	'1.-'-/	Time S'o')"	f	REMARKS/SPECIAL INSTRUCTIONS:																		
(Sil'ture)	Date /l--tl-/9	Time /ilt)(J	Received by: ature)	*Preserved with I-hS04																		
gz.omocyby,	Date /lf	Time OSSO	Shipping Ticket No.																			

**COOLER RECEIPT REPORT**  
**ARDL, INC.**

ARDL #: 8516

Cooler# L

Number of Cooler in Shipment: --<\_;

Project: Illinois River

Date Received: CJ-5-IC/

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: CJ-5 - 1 G (Signature) [Signature]

1. Did cooler come with a shipping slip (airbill, etc.)?.....YES @=)

If YES, enter carrier name and airbill number here: \_\_\_\_\_ - , - \_\_\_\_\_ / A''' ''-.i..t'''u'''a:.. ''U'-----

2. Were custody seals on outside of cooler?.....YES N/A

How many and where? \_\_\_\_\_ Seal Date: \_\_\_\_\_ Seal Name: \_\_\_\_\_

3. Were custody seals unbroken and intact at the date and time of arrival?.....YES NO !SA,'

4. Did you screen samples for radioactivity using a Geiger Counter?..... NO

5. Were custody papers sealed in a plastic bag?.....YES NQ.;

6. Were custody papers filled out properly (ink, signed, etc.)?.....@S' NO N/A

7. Were custody papers signed in appropriate place by ARDL personnel?.....@> NO N/A

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form.....@' NO N/A

9. Was a separate container provided for measuring temperature? YES V NO \_\_\_\_ . Observed Cooler Temp. 0 2 C

B. **LOG-IN PHASE:** Date samples were logged-in: 0/- .5 - 1q (Signature) [Signature] ctar 0 a.

10. Describe type of packing in cooler: :-& '# r:;£,d-V Lcv

11. Were all samples sealed in separate plastic bags? ..... YES O' N/A

12. Did all containers arrive unbroken and were labels in good condition? ..... NO

13. Were sample labels complete?.....' ..... NO

14. Did all sample labels agree with custody papers? ..... NO

15. Were correct containers used for the tests indicated? .....£' NO

16. Was pH correct on preserved water samples?.....W: NO N/A

17. Was a sufficient amount of sample sent for tests indicated?..... NO

18. Were bubbles absent in VOA samples? If NO, list by sample#:.....YES NO cHfA

19. Was the ARDL project coordinator notified of any deficiencies?.....YES NO

Comments and/or Corrective Action:	
(By: Signature)	Date:

Sample Transfer	
Fraction <u>tUt</u>	Fraction
Area# <u>U/t£Uu'v</u>	Area#
By <u>:ii&amp;</u>	By
On <u>9-S-r9</u>	On

Chain-of-Custody # N/A

## ARDL Report 8516 - Page 15 of 15



Environmental | Analytical | Management | Safety

PO Box 1566  
400 Aviation Drive  
Mt. Vernon, IL 62864  
618-244-3235  
[www.ardlinc.com](http://www.ardlinc.com)

**Customer Name: SLCOE**

**Date: 10/3/19**

**Project Name: Upper Mississippi River**

**Lab Name: ARDL, Inc.**

**Samples Received at ARDL: 9/6/19 & 9/9/19**

**ARDL Report No.: 8518**

### CASE NARRATIVE

<b>Customer Sample No.</b>	<b>Date Collected</b>	<b>Lab ID Number</b>	<b>Analyses Requested</b>
UMR-5 MILE 212.5	9/5/19	8518-01	Inorganics(1)
UMR-6 MILE 231	9/5/19	8518-02	Inorganics(1)
UMR-15	9/5/19	8518-03	Inorganics(1)
UMR-7 MILE 241	9/5/19	8518-04	Inorganics(1)
UMR-LM RM 251	9/5/19	8518-05	Inorganics(1)
UMR-9 MILE 273	9/5/19	8518-06	Inorganics(1)
UMR-LA RM 283	9/5/19	8518-07	Inorganics(1)
UMR-DP RM 294	9/5/19	8518-08	Inorganics(1)
UMR-1 CHAIN OF ROCKS CANAL	9/9/19	8518-09	Inorganics(1)
UMR-2 CONFLUENCE	9/9/19	8518-10	Inorganics(1)
UMR-3 MILE 200	9/9/19	8518-11	Inorganics(1)
SLH-3	9/9/19	8518-12	Inorganics(1)

(1) Including ammonia, chlorophyll/pheophytin, nitrite, nitrate, TKN, TOC, orthophosphate, total phosphorus, TSS, and TVSS.

The quality control data are summarized as follows:

TOC were analyzed by an accredited outside laboratory due to instrument status.

Nitrate and nitrite were analyzed by Ion Chromatography using Method 300.0 due to instrument status. Samples were analyzed within holding times.

#### PREPARATION BLANK

Results of the preparation blanks were within acceptable limits.

#### LABORATORY CONTROL SAMPLE

Percent recoveries of all LCS analyses were within control limits.

#### MATRIX SPIKE

Percent recovery of all matrix spikes and matrix spike duplicates were within control limits, except 1 of 2 for TKN.

#### DUPLICATE

Duplicate analyses are reported as MS/MSD, except chlorophyll/pheophytin, TSS, and TVSS. RPO of the duplicate analyses met criteria, except for pheophytin-a.

**CASE NARRATIVE (Continued)**

**DATA REPORTING QUALIFIERS**

The following data reporting qualifiers are used as required:

ND - Indicates parameter was analyzed for but not detected. The sample quantitation limit has been corrected for weight, dilution and/or percent moisture.

J - Indicates an estimated value. This flag is used either when estimating a concentration or this flag indicates analyte(s) associated with a DOD-QSM specified non-compliance pertaining to matrix QC criteria.

Release of the data contained in this package has been authorized by the Technical Services Manager or his designee as verified by the following signature.



---

Dean S. Dickerson  
Technical Services Manager



# Sample & QC Results

Including as appropriate:

- Field Sample Results

- Batch QC

  - Prep Blank

  - LCS/Spike Blank

- Matrix QC

  - MS/MSD

  - Sample Duplicate

ARDL Data Package      8518- Inorganic

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008518-01      Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Field ID: UMR-5 MILE 212.5      Sampling Date: 09/05/2019  
 Received: 09/06/2019      Sampling Time: 1600

Matrix: WATER  
 Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0376	MG/L	NONE	350.1	NA	09/09/19	09124872
Chlorophyll-a, Correcte	1.0	1.00		42.7	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Kjeldahl Nitrogen	0.190	0.200	J	0.842	MG/L	351.2	351.2	09/09/19	09/10/19	09124871
Nitrate as Nitrogen	0.800	1.00		1.16	MG/L	NONE	300.0	NA	09/06/19	09124874
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/06/19	09124873
Pheophytin-a	1.0	1.00		12.6	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Phosphorus	0.00800	0.0100		0.308	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.109	MG/L	NONE	365.2	NA	09/06/19	09124877
Solids, Total Suspended	4.0	4.00		34.8	MG/L	NONE	160.2	NA	09/09/19	09124869
Solids, Volatile Suspen	4.0	4.00		6.4	MG/L	NONE	160.4	NA	09/09/19	09124870
Total Organic Carbon	0.500	1.00		5.1	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008518-01, Inorganic Analyses

Page 1 of 1



**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008518-02      Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Field ID: UMR-6 MII 231      Sampling Date: 09/05/2019  
 Received: 09/06/2019      Sampling Time: 1500

Matrix: WATER  
 Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.125	MG/L	NONE	350.1	NA	09/09/19	09124872
Chlorophyll-a, Correcte	1.0	1.00		69.9	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Kjeldahl Nitrogen	0.190	0.200		0.705	MG/L	351.2	351.2	09/09/19	09/10/19	09124871
Nitrate as Nitrogen	0.800	1.00		ND	MG/L	NONE	300.0	NA	09/06/19	09124874
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/06/19	09124873
Pheophytin-a	1.0	1.00		14.6	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Phosphorus	0.00800	0.0100		0.295	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.0446	MG/L	NONE	365.2	NA	09/06/19	09124877
Solids, Total Suspended	4.0	4.00		40.0	MG/L	NONE	160.2	NA	09/09/19	09124869
Solids, Volatile Suspen	4.0	4.00		8.4	MG/L	NONE	160.4	NA	09/09/19	09124870
Total Organic Carbon	0.500	1.00		4.3	MG/L	NONE	415.1	NA	09/17/19	09244911

(a) DOD and/or NELAC Accredited Analyte.

Sample 008518-02, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008518-03  
 Field ID: UMR-15  
 Received: 09/06/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Sampling Date: 09/05/2019  
 Sampling Time: 1630

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0411	MG/L	NONE	350.1	NA	09/09/19	09124872
Chlorophyll-a, Correcte	1.0	1.00		70.8	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Kjeldahl Nitrogen	0.190	0.200		0.699	MG/L	351.2	351.2	09/09/19	09/10/19	09124871
Nitrate as Nitrogen	0.800	1.00		ND	MG/L	NONE	300.0	NA	09/06/19	09124874
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/06/19	09124873
Pheophytin-a	1.0	1.00	J	20.1	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Phosphorus	0.00800	0.0100		0.329	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.0581	MG/L	NONE	365.2	NA	09/06/19	09124877
Solids, Total Suspended	4.0	4.00		43.6	MG/L	NONE	160.2	NA	09/09/19	09124869
Solids, Volatile Suspen	4.0	4.00		8.8	MG/L	NONE	160.4	NA	09/09/19	09124870
Total Organic Carbon	0.500	1.00		5.5	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008518-03, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008518-04      Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Field ID: UMR-7 MILE 241      Sampling Date: 09/05/2019  
 Received: 09/06/2019      Sampling Time: 1345

Matrix: WATER  
 Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.101	MG/L	NONE	350.1	NA	09/09/19	09124872
Chlorophyll-a, Correcte	1.0	1.00		69.9	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Kjeldahl Nitrogen	0.190	0.200		0.744	MG/L	351.2	351.2	09/09/19	09/10/19	09124871
Nitrate as Nitrogen	0.800	1.00		ND	MG/L	NONE	300.0	NA	09/06/19	09124874
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/06/19	09124873
Pheophytin-a	1.0	1.00		15.9	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Phosphorus	0.00800	0.0100		0.261	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.0446	+MG/L	NONE	365.2	NA	09/06/19	09124877
Solids, Total Suspended	4.0	4.00		40.4	MG/L	NONE	160.2	NA	09/09/19	09124869
Solids, Volatile Suspen	4.0	4.00		8.4	MG/L	NONE	160.4	NA	09/09/19	09124870
Total Organic Carbon	0.500	1.00		5.0	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008518-04, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008518-05  
 Field ID: UMR-LM RM 251  
 Received: 09/06/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Sampling Date: 09/05/2019  
 Sampling Time: 1245

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.038	MG/L	NONE	350.1	NA	09/09/19	09124872
Chlorophyll-a, Correcte	1.0	1.00		69.0	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Kjeldahl Nitrogen	0.190	0.200		0.785	MG/L	351.2	351.2	09/09/19	09/10/19	09124871
Nitrate as Nitrogen	0.800	1.00		ND	MG/L	NONE	300.0	NA	09/06/19	09124874
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/06/19	09124873
Pheophytin-a	1.0	1.00		14.3	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Phosphorus	0.00800	0.0100		0.218	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.0446	MG/L	NONE	365.2	NA	09/06/19	09124877
Solids, Total Suspended	4.0	4.00		38.4	MG/L	NONE	160.2	NA	09/09/19	09124869
Solids, Volatile Suspen	4.0	4.00		8.4	MG/L	NONE	160.4	NA	09/09/19	09124870
Total Organic Carbon	0.500	1.00		4.8	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008518-05, Inorganic Analyses

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**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008518-06  
 Field ID: UMR-9 MILE 273  
 Received: 09/06/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Sampling Date: 09/05/2019  
 Sampling Time: 0900

Matrix: WATER  
 Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0895	MG/L	NONE	350.1	NA	09/09/19	09124872
Chlorophyll-a, Correcte	1.0	1.00		63.5	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Kjeldahl Nitrogen	0.190	0.200		0.328	MG/L	351.2	351.2	09/09/19	09/10/19	09124871
Nitrate as Nitrogen	0.800	1.00		ND	MG/L	NONE	300.0	NA	09/06/19	09124874
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/06/19	09124873
Pheophytin-a	1.0	1.00		17.2	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Phosphorus	0.00800	0.0100		0.231	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.050	MG/L	NONE	365.2	NA	09/06/19	09124877
Solids, Total Suspended	4.0	4.00		39.2	MG/L	NONE	160.2	NA	09/09/19	09124869
Solids, Volatile Suspen	4.0	4.00		8.4	MG/L	NONE	160.4	NA	09/09/19	09124870
Total Organic Carbon	0.500	1.00		4.7	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008518-06, Inorganic Analyses

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**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008518-07  
 Field ID: UMR-LA RM 283  
 Received: 09/06/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Sampling Date: 09/05/2019  
 Sampling Time: 0940

Matrix: WATER  
 Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0879	MG/L	NONE	350.1	NA	09/09/19	09124872
Chlorophyll-a, Correcte	1.0	1.00		67.2	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Kjeldahl Nitrogen	0.190	0.200		0.58	MG/L	351.2	351.2	09/09/19	09/10/19	09124871
Nitrate as Nitrogen	0.800	1.00		ND	MG/L	NONE	300.0	NA	09/06/19	09124874
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/06/19	09124873
Pheophytin-a	1.0	1.00		16.7	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Phosphorus	0.00800	0.0100		0.214	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.0527	MG/L	NONE	365.2	NA	09/06/19	09124877
Solids, Total Suspended	4.0	4.00		36.4	MG/L	NONE	160.2	NA	09/09/19	09124869
Solids, Volatile Suspen	4.0	4.00		8.4	MG/L	NONE	160.4	NA	09/09/19	09124870
Total Organic Carbon	0.500	1.00		4.9	MG/L	NONE	415.1	NA	09/17/19	09244911

(a) DOD and/or NELAC Accredited Analyte.

Sample 008518-07, Inorganic Analyses

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**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008518-08  
Field ID: UMR-DP RM 294  
Received: 09/06/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 09/05/2019  
Sampling Time: 1037

Matrix: WATER  
Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0768	MG/L	NONE	350.1	NA	09/09/19	09124872
Chlorophyll-a, Correcte	1.0	1.00		68.1	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Kjeldahl Nitrogen	0.190	0.200		0.816	MG/L	351.2	351.2	09/09/19	09/10/19	09124871
Nitrate as Nitrogen	0.800	1.00		1.02	MG/L	NONE	300.0	NA	09/06/19	09124874
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/06/19	09124873
Pheophytin-a	1.0	1.00		19.0	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899
Phosphorus	0.00800	0.0100		0.235	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.0849	MG/L	NONE	365.2	NA	09/06/19	09124877
Solids, Total Suspended	4.0	4.00		41.6	MG/L	NONE	160.2	NA	09/09/19	09124869
Solids, Volatile Suspen	4.0	4.00		9.2	MG/L	NONE	160.4	NA	09/09/19	09124870
Total Organic Carbon	0.500	1.00		5.0	MG/L	NONE	415.1	NA	09/17/19	09244911

(a) DOD and/or NELAC Accredited Analyte.

Sample 008518-08, Inorganic Analyses

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**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008518-09      Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Field ID: UMR-1 CHAIN OF ROCKS CA      Sampling Date: 09/09/2019  
 Received: 09/09/2019      Sampling Time: 0910

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.138	MG/L	NONE	350.1	NA	09/23/19	09244912
Chlorophyll-a, Correcte	1.0	1.00		14.5	MG/CU.M.	10200H	10200H	09/10/19	09/16/19	09174900
Kjeldahl Nitrogen	0.190	0.200		0.737	MG/L	351.2	351.2	09/23/19	09/24/19	10014929
Nitrate as Nitrogen	0.800	1.00		1.15	MG/L	NONE	300.0	NA	09/10/19	09124876
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/10/19	09124875
Pheophytin-a	1.0	1.00		1.4	MG/CU.M.	10200H	10200H	09/10/19	09/16/19	09174900
Phosphorus	0.00800	0.0100		0.291	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.124	MG/L	NONE	365.2	NA	09/10/19	09134879
Solids, Total Suspended	4.0	4.00		27.2	MG/L	NONE	160.2	NA	09/10/19	09134880
Solids, Volatile Suspen	4.0	4.00		4.0	MG/L	NONE	160.4	NA	09/10/19	09134881
Total Organic Carbon	0.500	1.00		4.4	MG/L	NONE	415.1	NA	09/17/19	09244911

(a) DOD and/or NELAC Accredited Analyte.

Sample 008518-09, Inorganic Analyses

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**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008518-10  
 Field ID: UMR-2 CONFLUENCE  
 Received: 09/09/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Sampling Date: 09/09/2019  
 Sampling Time: 0930

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0418	MG/L	NONE	350.1	NA	09/23/19	09244912
Chlorophyll-a, Correcte	1.0	1.00		12.1	MG/CU.M.	10200H	10200H	09/10/19	09/16/19	09174900
Kjeldahl Nitrogen	0.190	0.200		0.868	MG/L	351.2	351.2	09/23/19	09/24/19	10014929
Nitrate as Nitrogen	0.800	1.00		ND	MG/L	NONE	300.0	NA	09/10/19	09124876
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/10/19	09124875
Pheophytin-a	1.0	1.00		2.7	MG/CU.M.	10200H	10200H	09/10/19	09/16/19	09174900
Phosphorus	0.00800	0.0100		0.501	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.157	MG/L	NONE	365.2	NA	09/10/19	09134879
Solids, Total Suspended	6.67	6.67		192	MG/L	NONE	160.2	NA	09/10/19	09134880
Solids, Volatile Suspen	6.67	6.67		14.7	MG/L	NONE	160.4	NA	09/10/19	09134881
Total Organic Carbon	0.500	1.00		4.8	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008518-10, Inorganic Analyses

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**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008518-11      Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Field ID: UMR-3 MILE 200      Sampling Date: 09/09/2019  
 Received: 09/09/2019      Sampling Time: 1000

Matrix: WATER  
 Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.108	MG/L	NONE	350.1	NA	09/23/19	09244912
Chlorophyll-a, Correcte	1.0	1.00		42.7	MG/CU.M.	10200H	10200H	09/10/19	09/16/19	09174900
Kjeldahl Nitrogen	0.190	0.200		0.798	MG/L	351.2	351.2	09/23/19	09/24/19	10014929
Nitrate as Nitrogen	0.800	1.00		ND	MG/L	NONE	300.0	NA	09/10/19	09124876
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/10/19	09124875
Pheophytin-a	1.0	1.00		10.7	MG/CU.M.	10200H	10200H	09/10/19	09/16/19	09174900
Phosphorus	0.00800	0.0100		0.209	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.0542	MG/L	NONE	365.2	NA	09/10/19	09134879
Solids, Total Suspended	4.0	4.00		31.2	MG/L	NONE	160.2	NA	09/10/19	09134880
Solids, Volatile Suspen	4.0	4.00		5.6	MG/L	NONE	160.4	NA	09/10/19	09134881
Total Organic Carbon	0.500	1.00		4.9	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008518-11, Inorganic Analyses

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**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008518-12  
 Field ID: SLH-3  
 Received: 09/09/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Sampling Date: 09/09/2019  
 Sampling Time: 0845

Matrix: WATER  
 Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.065	MG/L	NONE	350.1	NA	09/23/19	09244912
Chlorophyll-a, Correcte	1.0	1.00		28.7	MG/CU.M.	10200H	10200H	09/10/19	09/16/19	09174900
Kjeldahl Nitrogen	0.190	0.200		0.668	MG/L	351.2	351.2	09/23/19	09/24/19	10014929
Nitrate as Nitrogen	0.800	1.00		ND	MG/L	NONE	300.0	NA	09/10/19	09124876
Nitrite as Nitrogen	0.400	0.500		ND	MG/L	NONE	300.0	NA	09/10/19	09124875
Pheophytin-a	1.0	1.00		7.3	MG/CU.M.	10200H	10200H	09/10/19	09/16/19	09174900
Phosphorus	0.00800	0.0100		0.531	MG/L	365.2	365.2	09/30/19	09/30/19	10014928
Phosphorus, -ortho	0.00800	0.0100		0.116	MG/L	NONE	365.2	NA	09/10/19	09134879
Solids, Total Suspended	6.67	6.67		121	MG/L	NONE	160.2	NA	09/10/19	09134880
Solids, Volatile Suspen	6.67	6.67		9.33	MG/L	NONE	160.4	NA	09/10/19	09134881
Total Organic Carbon	0.500	1.00		4.4	MG/L	NONE	415.1	NA	09/17/19	09244910

(a) DOD and/or NELAC Accredited Analyte.

Sample 008518-12, Inorganic Analyses

Page 1 of 1

**BLANK SUMMARY REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566      Mt. Vernon, IL    62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	LOD	LOQ	Blank Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run	QC Lab Number
Ammonia Nitrogen	0.020	0.030	ND	MG/L	NONE	350.1	NA	09/09/19	09124872	008518-01B1
Ammonia Nitrogen	0.020	0.030	ND	MG/L	NONE	350.1	NA	09/23/19	09244912	008518-09B1
Chlorophyll-a, Corre	1.0	1.0	ND	MG/CU.M.	10200H	10200H	09/10/19	09/16/19	09174900	008518-09B1
Chlorophyll-a, Corre	1.0	1.0	ND	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899	008518-03B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	09/09/19	09/10/19	09124871	008518-01B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	09/23/19	09/24/19	10014929	008518-09B1
Nitrate as Nitrogen	0.80	1.0	ND	MG/L	NONE	300.0	NA	09/06/19	09124874	008518-02B1
Nitrate as Nitrogen	0.80	1.0	ND	MG/L	NONE	300.0	NA	09/10/19	09124876	008518-09B1
Nitrite as Nitrogen	0.40	0.50	ND	MG/L	NONE	300.0	NA	09/06/19	09124873	008518-02B1
Nitrite as Nitrogen	0.40	0.50	ND	MG/L	NONE	300.0	NA	09/10/19	09124875	008518-09B1
Pheophytin-a	1.0	1.0	ND	MG/CU.M.	10200H	10200H	09/10/19	09/16/19	09174900	008518-09B1
Pheophytin-a	1.0	1.0	ND	MG/CU.M.	10200H	10200H	09/06/19	09/16/19	09174899	008518-03B1
Phosphorus	0.008	0.010	ND	MG/L	365.2	365.2	09/30/19	09/30/19	10014928	008516-01B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	NA	09/06/19	09124877	008518-03B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	NA	09/10/19	09134879	008518-09B1
Solids, Total Suspen	1.0	1.0	ND	MG/L	NONE	160.2	NA	09/09/19	09124869	008518-01B1
Solids, Total Suspen	1.0	1.0	ND	MG/L	NONE	160.2	NA	09/10/19	09134880	008518-09B1
Solids, Volatile Sus	1.0	1.0	ND	MG/L	NONE	160.4	NA	09/09/19	09124870	008518-01B1
Solids, Volatile Sus	1.0	1.0	ND	MG/L	NONE	160.4	NA	09/10/19	09134881	008518-09B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	09/17/19	09244910	008515-02B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	09/17/19	09244911	008515-01B1

(a) DOD and/or NELAC Accredited Analyte  
Inorganic Method Blanks for 008518

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**LABORATORY CONTROL SAMPLE REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566      Mt. Vernon, IL      62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER

**NELAC** Certified - IL100308

Analyte	LCS 1 Result	LCS 1 Level	LCS 1 % Rec	LCS 2 Result	LCS 2 Level	LCS 2 % Rec	% Rec Limits	Mean % Rec	Analytical Run	QC Lab Number
Ammonia Nitrogen	0.98	1.0	98	--	--	--	80-120	--	09244912	008518-09C1
Ammonia Nitrogen	1	1.0	100	--	--	--	80-120	--	09124872	008518-01C1
Kjeldahl Nitrogen	0.84	1.0	84	--	--	--	80-120	--	10014929	008518-09C1
Kjeldahl Nitrogen	0.96	1.0	96	--	--	--	80-120	--	09124871	008518-01C1
Nitrate as Nitrogen	13.2	14.0	94	--	--	--	80-120	--	09124876	008518-09C1
Nitrate as Nitrogen	13.1	14.0	93	--	--	--	80-120	--	09124874	008518-02C1
Nitrite as Nitrogen	6.4	7.0	91	--	--	--	80-120	--	09124875	008518-09C1
Nitrite as Nitrogen	6.4	7.0	92	--	--	--	80-120	--	09124873	008518-02C1
Phosphorus	0.63	0.67	94	--	--	--	80-120	--	10014928	008516-01C1
Phosphorus, -ortho	0.096	0.10	96	--	--	--	80-120	--	09124877	008518-03C1
Phosphorus, -ortho	0.11	0.10	106	--	--	--	80-120	--	09134879	008518-09C1
Total Organic Carbon	9.0	10.0	90	--	--	--	76-120	--	09244910	008515-02C1
Total Organic Carbon	8.9	10.0	89	--	--	--	76-120	--	09244911	008515-01C1

NOTE: Any values tabulated above marked with an asterisk are outside of acceptable limits.

(a) DOD and/or NELAC Accredited Analyte

Inorganic LCS Results for 008518

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**MATRIX SPIKE/SPIKE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566 Mt. Vernon, IL     62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name:            UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	Sample Matrix	Sample Result	MS Result	MS Level	MS % Rec	MSD Result	MSD Level	MSD % Rec	% Rec Limits	RPO	RPO Limit	Run	QC Lab Number
Ammonia Nitrogen	WATER	0.038	2.1	2.0	102	2.1	2.0	103	75-125	1	20	09124872	008518-01MS
Kjeldahl Nitrogen	WATER	0.84	1.4	0.80	71 *	1.6	0.80	91	75-125	11	20	09124871	008518-01MS
Nitrate as Nitrogen	WATER	ND	8.0	8.0	100	8.0	8.0	100	75-125	1	20	09124874	008518-02MS
Nitrite as Nitrogen	WATER	ND	3.9	4.0	98	4.0	4.0	100	75-125	2	20	09124873	008518-02MS
Phosphorus	WATER	0.29	1.1	0.83	98	1.1	0.83	98	75-125	0	20	10014928	008518-09MS
Phosphorus, -ortho	WATER	0.058	0.16	0.10	106	0.16	0.10	103	75-125	2	20	09124877	008518-03MS

NOTE: Values tabulated above marked with an asterisk are explained in the associated narrative.

(a) DOD and/or NELAC Accredited Analyte.

Inorganic Matrix Spikes for 008518

Page 1 of 1

**SAMPLE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566   Mt. Vernon, IL   62864**

Lab Report No: 008518

Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	Sample Conc'n	First Duplicate	Second Duplicate	Units	Percent Diff	Mean (Smp, D1, D2)	Analytical Run	QC Lab Number
Chlorophyll-a, Corrected	70.8	60.8	--	MG/CU.M.	15	--	09174899	008518-03D1
Pheophytin-a	20.1	14.8	--	MG/CU.M.	30*	--	09174899	008518-03D1
Solids, Total Suspended	34.8	36.8	--	MG/L	6	--	09124869	008518-01D1
Solids, Volatile Suspend	6.4	7.2	--	MG/L	12	--	09124870	008518-0101

\* indicates that agreement between duplicates is greater than 20%. See Case Narrative for exceptions.

(a) DOD and/or NELAC Accredited Analyte

Sample Duplicates for 008518

Page 1 of 1



# Sample Receipt Information

Including as appropriate:

- COCs
- Cooler Receipts
- Airbills
- Email Communication/  
Instructions from Customer

ARDL Data Package      8518 - Inorganic





P.O. Box 1566, 400 Aviation Drive, Mt Vernon, IL 62864

(618) 244-3235 Phone      (618) 244-1149 Fax

## CHAIN OF CUSTODY RECORD

[illegible]

PURCHASE ORDER NO: \_\_\_\_\_

## ARDL Report 8518 - Page 23 of 25

## ARDL Report 8518 - Page 24 of 25

**COOLER RECEIPT REPORT**  
**ARDL, INC.**

ARDL #: 8518

Cooler# No 11/c;

Number of Coolers in Shipment:       ,/'-----

Project: Upper Miss. River

Date Received.: 9 9- 19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 9- CJ- / 9' (Signature) h.i.;--?'dZA:..<'U'Z,

1. Did cooler come with a shipping slip (airbill, etc.)?.....YES @)

If YES, enter carrier name and airbill number here:-----,-----= =-'tfl- "'-tA,:c...:: ='-\_ - U'-----

2. Were custody seals on outside of cooler?.....YES N/A

How many and where?\_\_\_\_\_ Seal Date:\_\_\_\_\_,Seal Name:\_\_\_\_\_

3. Were custody seals unbroken and intact at the date and time of arrivat? .....YES NO @

4. Did you screen samples for radioactivity using a Geiger Counter?.....NO

5. Were custody papers sealed in a plastic bag? .....YES

6. Were custody papers filled out properly (ink, signed, etc.)?..... @ NO N/A

7. Were custody papers signed in appropriate place by ARDL personnel? .....@, NO N/A

8. Was project identifiable from custody papers? If YES, enter project name at the top of this fomi..... @) NO N/A

9. Was a separate container provided for measuring temperature? YES\_ NO 1/. Observed Cooler Temp. ..?'0 C Correction factor 0..C C

B. **LOG-IN PHASE:** Date samples were logged-in: 9'- CJ- / CJ' (Signature)l-f:0/fA..t:.,c'--J...-c-,,

10. Describe type of packing in cooler: \_\_\_/4 - - - -itJ - - - U.- =<l':- \_\_\_\_\_

11. Were all samples sealed in separate plastic bags? .....YES NQj NIA

12. Did all containers arrive unbroken and were labels in good condition? .....NO

13. Were sample labels complete?..... @' NO

14. Did all sample labels agree with custody papers? .....ID' NO

15. Were correct containers used for the tests indicated? .....@ \$,' NO

16. Was pH correct on preserved water samples?.....NO N/A

17. Was a sufficient amount of sample sent for tests indicated?.....€ NO

18. Were bubbles absent in VOA samples? If NO, list by sample#:\_\_\_\_\_YES NO <@E)

19. Was the ARDL project coordinator notified of any deficiencies?.....YES NO

Comments and/or Corrective Action:	
(Bv: Signature)	Date:

Sample Transfer	
Fraction <u>cll-l</u>	Fraction
Area# <u>/t?/tt_,e &lt;.,,</u>	Area#
By <u>/f//.,.</u>	By
On <u>9-9 19</u>	On

Chain-of-Custody# N/A



Environmental | Analytical | Management | Safety

PO Box 1566  
400 Aviation Drive  
Mt. Vernon, IL 62864  
618-244-3235  
[www.ardlinc.com](http://www.ardlinc.com)

**Customer Name: SLCOE**

**Date: 12/9/19**

**Project Name: Upper Mississippi River**

**Lab Name: ARDL, Inc.**

**Samples Received at ARDL: 11/18/19**

**ARDL Report No.: 8573**

### CASE NARRATIVE

<b>Customer Sample No.</b>	<b><u>Date</u> Collected</b>	<b>Lab ID Number</b>	<b><u>Analyses Requested</u></b>
UMR-5 MILE 212.5	11/18/19	8573-01	Inorganics(1)
UMR-6 MILE 231	11/18/19	8573-02	Inorganics(1)
UMR-15	11/18/19	8573-03	Inorganics(1)
UMR-7 MILE 241	11/18/19	8573-04	Inorganics(1)
UMR-LM RM 251	11/18/19	8573-05	Inorganics(1)
UMR-9 MILE 273	11/18/19	8573-06	Inorganics(1)
UMR-LA RM 283	11/18/19	8573-07	Inorganics(1)
UMR-DP RM 294	11/18/19	8573-08	Inorganics(1)

(1) Including ammonia, chlorophyll/pheophytin, nitrite, nitrate, TKN, TOC, orthophosphate, total phosphorus, TSS, and TVSS.

The quality control data are summarized as follows:

TOC were analyzed by an accredited outside laboratory due to instrument status.

#### PREPARATION BLANK

Results of the preparation blanks were within acceptable limits, except 1 of 2 for TOC. The associated samples have been flagged appropriately with a 'B' qualifier.

#### LABORATORY CONTROL SAMPLE

Percent recoveries of all LCS analyses were within control limits.

#### MATRIX SPIKE

Percent recovery of all matrix spikes and matrix spike duplicates were within control limits, except 2 of 2 for TKN. The parent sample has been flagged appropriately with a 'J' qualifier.

#### DUPLICATE

Duplicate analyses are reported as MS/MSD, except chlorophyll/pheophytin, TSS, and TVSS. RPO on all duplicate analyses were within control limits, with the exception of pheophytin. The parent sample has been flagged appropriately with a 'J' qualifier.

**CASE NARRATIVE (Continued)**

**DATA REPORTING QUALIFIERS**

The following data reporting qualifiers are used as required:

- ND - Indicates parameter was analyzed for but not detected. The sample quantitation limit has been corrected for weight, dilution and/or percent moisture.
- J - Indicates an estimated value. This flag is used either when estimating a concentration or this flag indicates analyte(s) associated with a DOD-QSM specified non-compliance pertaining to matrix QC criteria.
- B - This flag is used when the analyte is found in the blank as well as the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Release of the data contained in this package has been authorized by the Technical Services Manager or his designee as verified by the following signature.



Dean S. Dickerson  
Technical Services Manager



# Sample & QC Results

Including as appropriate:

- Field Sample Results

- Batch QC

  - Prep Blank

  - LCS/Spike Blank

- Matrix QC

  - MS/MSD

  - Sample Duplicate

ARDL Data Package      8573 - Inorganic



**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008573

Report Date: 12/09/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008573-01	Sampling Loc'n: UPPER MISSISSIPPI RIVER	Matrix: WATER
Field ID: UMR-5 MILE 212.5	Sampling Date: 11/18/2019	Moisture: NA
Received: 11/18/2019	Sampling Time: 1546	

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	11/20/19	11205054
Chlorophyll-a, Correcte	1.0	1.00		6.4	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Kjeldahl Nitrogen	0.19	0.20	J	0.927	MG/L	351.2	351.2	12/03/19	12/04/19	12055077
Nitrate as Nitrogen	0.0380	0.0400		2.53	MG/L	NONE	GREEN	NA	11/22/19	12035070
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/19/19	11265059
Pheophytin-a	1.0	1.00	J	1.9	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Phosphorus	0.00800	0.0100		0.196	MG/L	365.2	365.2	12/02/19	12/04/19	12055078
Phosphorus, -ortho	0.00800	0.0100		0.0632	MG/L	NONE	365.2	NA	11/19/19	11205052
Solids, Total Suspended	4.0	4.00		39.2	MG/L	NONE	160.2	NA	11/25/19	12035064
Solids, Volatile Suspen	4.0	4.00		4.0	MG/L	NONE	160.4	NA	11/25/19	12035065
Total Organic Carbon	0.500	1.00	B	6.5	MG/L	NONE	415.1	NA	12/02/19	12095081

(a) DOD and/or NELAC Accredited Analyte.

Sample 008573-01, Inorganic Analyses

Page 1 of 1

ARDL, INC.  
400 Aviation Drive; P.O. Box 1566  
Mt. Vernon, Illinois 62864

Lab Report No: 008573

Report Date: 12/09/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008573-02  
Field ID: UMR-6 MILE 231  
Received: 11/18/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 11/18/2019  
Sampling Time: 1430

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0452	MG/L	NONE	350.1	NA	11/20/19	11205054
Chlorophyll-a, Correcte	1.0	1.00		7.3	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Kjeldahl Nitrogen	0.190	0.200		0.878	MG/L	351.2	351.2	12/02/19	12/03/19	12055075
Nitrate as Nitrogen	0.0380	0.0400		2.54	MG/L	NONE	GREEN	NA	11/22/19	12035070
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/19/19	11265059
Pheophytin-a	1.0	1.00		1.6	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Phosphorus	0.00800	0.0100		0.204	MG/L	365.2	365.2	12/02/19	12/04/19	12055078
Phosphorus, -ortho	0.00800	0.0100		0.0738	MG/L	NONE	365.2	NA	11/19/19	11205052
Solids, Total Suspended	4.0	4.00		33.2	MG/L	NONE	160.2	NA	11/25/19	12035064
Solids, Volatile Suspen	4.0	4.00		4.4	MG/L	NONE	160.4	NA	11/25/19	12035065
Total Organic Carbon	0.500	1.00	B	5.9	MG/L	NONE	415.1	NA	12/02/19	12095081

(a) DOD and/or NELAC Accredited Analyte.

Sample 008573-02, Inorganic Analyses

Page 1 of 1

ARDL, INC.  
400 Aviation Drive; P.O. Box 1566  
Mt. Vernon, Illinois 62864

Lab Report No: 008573

Report Date: 12/09/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008573-03  
Field ID: UMR-15  
Received: 11/18/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 11/18/2019  
Sampling Time: 1215

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	11/20/19	11205054
Chlorophyll-a, Correcte	1.0	1.00		6.4	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Kjeldahl Nitrogen	0.190	0.200		0.919	MG/L	351.2	351.2	12/02/19	12/03/19	12055075
Nitrate as Nitrogen	0.0950	0.100		2.65	MG/L	NONE	GREEN	NA	11/22/19	12035070
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/19/19	11265059
Pheophytin-a	1.0	1.00		1.3	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Phosphorus	0.00800	0.0100		0.204	MG/L	365.2	365.2	12/02/19	12/04/19	12055078
Phosphorus, -ortho	0.00800	0.0100		0.0685	MG/L	NONE	365.2	NA	11/19/19	11205052
Solids, Total Suspended	4.0	4.00		35.6	MG/L	NONE	160.2	NA	11/25/19	12035064
Solids, Volatile Suspen	4.0	4.00		4.4	MG/L	NONE	160.4	NA	11/25/19	12035065
Total Organic Carbon	0.500	1.00	B	5.8	MG/L	NONE	415.1	NA	12/02/19	12095081

(a) DOD and/or NELAC Accredited Analyte.

Sample 008573-03, Inorganic Analyses

Page 1 of 1

ARDL, INC.  
400 Aviation Drive; P.O. Box 1566  
Mt. Vernon, Illinois 62864

Lab Report No: 008573

Report Date: 12/09/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008573-04  
Field ID: UMR-7 MILE 241  
Received: 11/18/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 11/18/2019  
Sampling Time: 1340

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	11/20/19	11205054
Chlorophyll-a, Correcte	1.0	1.00		7.3	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Kjeldahl Nitrogen	0.190	0.200		0.872	MG/L	351.2	351.2	12/02/19	12/03/19	12055075
Nitrate as Nitrogen	0.0950	0.100		2.59	MG/L	NONE	GREEN	NA	11/22/19	12035070
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/19/19	11265059
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Phosphorus	0.00800	0.0100		0.196	MG/L	365.2	365.2	12/02/19	12/04/19	12055078
Phosphorus, -ortho	0.00800	0.0100		0.0658	MG/L	NONE	365.2	NA	11/19/19	11205052
Solids, Total Suspended	4.0	4.00		34.4	MG/L	NONE	160.2	NA	11/25/19	12035064
Solids, Volatile Suspen	4.0	4.00		4.0	MG/L	NONE	160.4	NA	11/25/19	12035065
Total Organic Carbon	0.500	1.00	B	5.8	MG/L	NONE	415.1	NA	12/02/19	12095081

(a) DOD and/or NELAC Accredited Analyte.

Sample 008573-04, Inorganic Analyses

Page 1 of 1

ARDL, INC.  
400 Aviation Drive; P.O. Box 1566  
Mt. Vernon, Illinois 62864

Lab Report No: 008573

Report Date: 12/09/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008573-05  
Field ID: UMR-LM RM 251  
Received: 11/18/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
Sampling Date: 11/18/2019  
Sampling Time: 1317

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	11/20/19	11205054
Chlorophyll-a, Correcte	1.0	1.00		6.4	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Kjeldahl Nitrogen	0.190	0.200		0.816	MG/L	351.2	351.2	12/02/19	12/03/19	12055075
Nitrate as Nitrogen	0.0380	0.0400		2.56	MG/L	NONE	GREEN	NA	11/22/19	12035070
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/19/19	11265059
Pheophytin-a	1.0	1.00		1.9	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Phosphorus	0.00800	0.0100		0.187	MG/L	365.2	365.2	12/02/19	12/04/19	12055078
Phosphorus, -ortho	0.00800	0.0100		0.0658	MG/L	NONE	365.2	NA	11/19/19	11205052
Solids, Total Suspended	4.0	4.00		30.4	MG/L	NONE	160.2	NA	11/25/19	12035064
Solids, Volatile Suspen	4.0	4.00		4.0	MG/L	NONE	160.4	NA	11/25/19	12035065
Total Organic Carbon	0.500	1.00	B	5.8	MG/L	NONE	415.1	NA	12/02/19	12095081

(a) DOD and/or NELAC Accredited Analyte.

Sample 008573-05, Inorganic Analyses

Page 1 of 1

ARDL, INC.  
400 Aviation Drive; P.O. Box 1566  
Mt. Vernon, Illinois 62864

Lab Report No: 008573

Report Date: 12/09/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008573-06	Sampling Loc'n: UPPER MISSISSIPPI RIVER	Matrix: WATER
Field ID: UMR-9 MILE 273	Sampling Date: 11/18/2019	Moisture: NA
Received: 11/18/2019	Sampling Time: 1151	

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	11/20/19	11205054
Chlorophyll-a, Correcte	1.0	1.00		6.4	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Kjeldahl Nitrogen	0.190	0.200		1.08	MG/L	351.2	351.2	12/02/19	12/03/19	12055075
Nitrate as Nitrogen	0.0380	0.0400		2.77	MG/L	NONE	GREEN	NA	11/22/19	12035070
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/19/19	11265059
Pheophytin-a	1.0	1.00		1.3	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Phosphorus	0.00800	0.0100		0.187	MG/L	365.2	365.2	12/02/19	12/04/19	12055078
Phosphorus, -ortho	0.00800	0.0100		0.0658	MG/L	NONE	365.2	NA	11/19/19	11205052
Solids, Total Suspended	4.0	4.00		36.0	MG/L	NONE	160.2	NA	11/25/19	12035064
Solids, Volatile Suspen	4.0	4.00		4.0	MG/L	NONE	160.4	NA	11/25/19	12035065
Total Organic Carbon	0.500	1.00	B	5.9	MG/L	NONE	415.1	NA	12/02/19	12095081

(a) DOD and/or NELAC Accredited Analyte.

Sample 008573-06, Inorganic Analyses

Page 1 of 1

ARDL, INC.  
400 Aviation Drive; P.O. Box 1566  
Mt. Vernon, Illinois 62864

Lab Report No: 008573

Report Date: 12/09/2019

Project Name: UPPER MISSISSIPPI RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008573-07	Sampling Loc'n: UPPER MISSISSIPPI RIVER	Matrix: WATER
Field ID: UMR-LA RM 283	Sampling Date: 11/18/2019	Moisture: NA
Received: 11/18/2019	Sampling Time: 1100	

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	11/20/19	11205054
Chlorophyll-a, Correcte	1.0	1.00		6.4	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Kjeldahl Nitrogen	0.190	0.200		1.07	MG/L	351.2	351.2	12/02/19	12/03/19	12055075
Nitrate as Nitrogen	0.0380	0.0400		2.66	MG/L	NONE	GREEN	NA	11/22/19	12035070
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/19/19	11265059
Pheophytin-a	1.0	1.00		1.9	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Phosphorus	0.00800	0.0100		0.187	MG/L	365.2	365.2	12/02/19	12/04/19	12055078
Phosphorus, -ortho	0.00800	0.0100		0.0553	MG/L	NONE	365.2	NA	11/19/19	11205052
Solids, Total Suspended	4.0	4.00		36.4	MG/L	NONE	160.2	NA	11/25/19	12035064
Solids, Volatile Suspen	4.0	4.00		4.0	MG/L	NONE	160.4	NA	11/25/19	12035065
Total Organic Carbon	0.500	1.00		6.0	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008573-07, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008573

Report Date: 12/09/2019

Project Name: UPPER MISSISSIPPI RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008573-08  
 Field ID: UMR-DP RM 294  
 Received: 11/18/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER  
 Sampling Date: 11/18/2019  
 Sampling Time: 1000

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0437	MG/L	NONE	350.1	NA	11/20/19	11205054
Chlorophyll-a, Correcte	1.0	1.00		6.4	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Kjeldahl Nitrogen	0.190	0.200		0.816	MG/L	351.2	351.2	12/02/19	12/03/19	12055075
Nitrate as Nitrogen	0.0380	0.0400		2.6	MG/L	NONE	GREEN	NA	11/22/19	12035070
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/19/19	11265059
Pheophytin-a	1.0	1.00		1.3	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074
Phosphorus	0.00800	0.0100		0.191	MG/L	365.2	365.2	12/02/19	12/04/19	12055078
Phosphorus, -ortho	0.00800	0.0100		0.0553	MG/L	NONE	365.2	NA	11/19/19	11205052
Solids, Total Suspended	4.0	4.00		36.0	MG/L	NONE	160.2	NA	11/25/19	12035064
Solids, Volatile Suspen	4.0	4.00		4.0	MG/L	NONE	160.4	NA	11/25/19	12035065
Total Organic Carbon	0.500	1.00		5.4	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008573-08, Inorganic Analyses

Page 1 of 1



**BLANK SUMMARY REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566     Mt. Vernon, IL     62864**

Lab Report No: 008573

Report Date: 12/09/2019

Project Name: UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	LOD	LOQ	Blank Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run	QC Lab Number
Ammonia Nitrogen	0.020	0.030	ND	MG/L	NONE	350.1	NA	11/20/19	11205054	008573-01B1
Chlorophyll-a, Corre	1.0	1.0	ND	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074	008573-01B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	12/02/19	12/04/19	12055075	008574-01B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	12/03/19	12/04/19	12055077	008573-01B1
Nitrate as Nitrogen	0.019	0.020	ND	MG/L	NONE	GREEN	NA	11/22/19	12035070	008573-05B1
Nitrite as Nitrogen	0.020	0.020	ND	MG/L	NONE	354.1	NA	11/19/19	11265059	008573-01B1
Pheophytin-a	1.0	1.0	ND	MG/CU.M.	10200H	10200H	11/19/19	12/03/19	12055074	008573-01B1
Phosphorus	0.008	0.010	ND	MG/L	365.2	365.2	12/02/19	12/04/19	12055078	008573-04B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	NA	11/19/19	11205052	008573-03B1
Solids, Total Suspen	1.0	1.0	ND	MG/L	NONE	160.2	NA	11/25/19	12035064	008573-02B1
Solids, Volatile Sus	1.0	1.0	ND	MG/L	NONE	160.4	NA	11/25/19	12035065	008573-02B1
Total Organic Carbon	0.50	1.0	0.66	MG/L	NONE	415.1	NA	12/02/19	12095081	008573-01B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	12/04/19	12095082	008574-01B1

(a) DOD and/or NELAC Accredited Analyte  
Inorganic Method Blanks for 008573

Page 1 of 1

**LABORATORY CONTROL SAMPLE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566     Mt. Vernon, IL     62864**

Lab Report No: 008573

Report Date: 12/09/2019

Project Name:            UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	LCS 1 Result	LCS 1 Level	LCS 1 % Rec	LCS 2 Result	LCS 2 Level	LCS 2 % Rec	% Rec Limits	Mean % Rec	Analytical Run	QC Lab Number
Ammonia Nitrogen	0.93	1.0	93	--	--	--	80-120	--	11205054	008573-01C1
Kjeldahl Nitrogen	1.2	1.0	118	--	--	--	80-120	--	12055075	008574-01C1
Kjeldahl Nitrogen	0.84	1.0	84	--	--	--	80-120	--	12055077	008573-01C1
Nitrate as Nitrogen	0.98	1.0	98	--	--	--	80-120	--	12035070	008573-05C1
Nitrite as Nitrogen	0.99	1.0	99	--	--	--	80-120	--	11265059	008573-01C1
Phosphorus	0.66	0.67	98	--	--	--	80-120	--	12055078	008573-04C1
Phosphorus, -ortho	0.10	0.10	103	--	--	--	80-120	--	11205052	008573-03C1
Total Organic Carbon	18.6	20.0	93	--	--	--	76-120	--	12095081	008573-01C1
Total Organic Carbon	19.0	20.0	95	--	--	--	76-120	--	12095082	008574-01C1

NOTE: Any values tabulated above marked with an asterisk are outside of acceptable limits.

(a) DOD and/or NELAC Accredited Analyte

Inorganic LCS Results for 008573

Page 1 of 1

**MATRIX SPIKE/SPIKE DUPLICATE REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566 Mt. Vernon, IL    62864**

Lab Report No: 008573

Report Date: 12/09/2019

Project Name:            UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	Sample Matrix	Sample Result	MS Result	MS Level	MS % Rec	MSD Result	MSD Level	MSD % Rec	% Rec Limits	RFD	RFD Limit	Run	QC Lab Number
Ammonia Nitrogen	WATER	ND	2.0	2.0	102	2.0	2.0	101	75-125	1	20	11205054	008573-01MS
Kjeldahl Nitrogen	WATER	0.93	2.6	0.80	209 *	1.5	0.80	68 *	75-125	56 *	20	12055077	008573-01MS
Nitrate as Nitrogen	WATER	2.6	3.5	1.0	92	3.5	1.0	92	75-125	0	20	12035070	008573-05MS
Nitrite as Nitrogen	WATER	ND	0.99	1.0	99	0.95	1.0	95	75-125	4	20	11265059	008573-01MS
Phosphorus	WATER	0.20	1.0	0.83	99	1.0	0.83	102	75-125	3	20	12055078	008573-04MS
Phosphorus, -ortho	WATER	0.069	0.17	0.10	106	0.17	0.10	106	75-125	0	20	11205052	008573-03MS
Total Organic Carbon	WATER	6.5	11.5	5.0	100	11.8	5.0	106	76-120	3	20	12095081	008573-01MS

NOTE: Values tabulated above marked with an asterisk are explained in the associated narrative.

(a) DOD and/or NELAC Accredited Analyte.

Inorganic Matrix Spikes for 008573

Page 1 of 1

**SAMPLE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566   Mt. Vernon, IL   62864**

Lab Report No: 008573

Report Date: 12/09/2019

Project Name: UPPER MISSISSIPPI RIVER

NELAC Certified - IL100308

Analyte	Sample Conc'n	First Duplicate	Second Duplicate	Units	Percent Diff	Mean (Smp, D1, D2)	Analytical Run	QC Lab Number
Chlorophyll-a, Corrected	6.4	5.4		MG/CU.M.	17	--	12055074	008573-01D1
Pheophytin-a	1.9	3.4		MG/CU.M.	57*	--	12055074	008573-01D1
Solids, Total Suspended	33.2	33.6		MG/L	1	--	12035064	008573-02D1
Solids, Volatile Suspend	4.4	4.4		MG/L	0	--	12035065	008573-02D1

\* indicates that agreement between duplicates is greater than 20%. See Case Narrative for exceptions.

(a) DOD and/or NELAC Accredited Analyte

Sample Duplicates for 008573

Page 1 of 1



# Sample Receipt Information

Including as appropriate:

- COCs
- Cooler Receipts
- Airbills
- Email Communication/  
Instructions from Customer

ARDL Data Package      8573 - Inorganic

## CHAIN OF CUSTODY RECORD

PROJECT Upper Mississippi River			NO. OF CONTAINERS		PRESERVATION									
SAMPLERS: (Signature)			DATE		TIME		COMP		GRAB		REMARKS OR SAMPLE LOCATION		SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN	
SAMPLE NUMBER			DATE		TIME		COMP		GRAB		REMARKS OR SAMPLE LOCATION		SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN	
Schepker & Greeley			2019											
UMR-1 Chain of Rocks Canal			X		8		X		X				X	
UMR-2 Confluence			X		8		X		X				X	
UMR-3 Mile 200			X		8		X		X				X	
UMR-5 Mile 212.5			11-18		1546		X		X				X	
UMR-6 Mile 231			11-18		1430		X		X				X	
UMR-15			11-18		1215		X		X				X	
UMR-7 Mile 241			11-18		1340		X		X				X	
UMR-LM RM 251			11-18		1317		X		X				X	
UMR-9 Mile 273			11-18		1151		X		X				X	
UMR- LA RM 283			11-18		1100		X		X				X	
UMR- DP RM 294			11-18		1060		X		X				X	
SLH-3			8		X		X		X				X	
11-19-19														
11-19-19														
Relinquished by: (Signature)			Date		Time		Received by: (Signature)		Date		Time		REMARKS/SPECIAL INSTRUCTIONS:	
Schepker & Greeley			11/18/19		1719		Schepker & Greeley		11/18/19		1719		*Preserved with H <sub>2</sub> SO <sub>4</sub>	
Relinquished by: (Signature)			Date		Time		Received by: (Signature)		Date		Time			
Schepker & Greeley			11/18/19		1945		Schepker & Greeley		11/18/19		1945			
Received for Laboratory by: (Signature)			Date		Time		Shipping Ticket No.		Date		Time			
Schepker & Greeley			11/19/19		0535				11/19/19		0535			

## ARDL Report 8573 - Page 18 of 19

**COOLER RECEIPT REPORT**  
**ARDL, INC.**

ARDL #: 573

Cooler # 201

Number of Coolers in Shipment: 1

Project: 1/10/11

Date Received: 1/10/11

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 1/10/11 (Signature) [Signature]

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES @

If YES, enter carrier name and airbill number here: \_\_\_\_\_

2. Were custody seals on outside of cooler? ..... YES (Es; NIA

How many and where? \_\_\_\_\_, Seal Date: \_\_\_\_\_, Seal Name: \_\_\_\_\_

3. Were custody seals unbroken and intact at the date and time of arrival? ..... YES NO @

4. Did you screen samples for radioactivity using a Geiger Counter? ..... G& NO

5. Were custody papers sealed in a plastic bag? ..... YES m3

6. Were custody papers filled out properly by ARDL personnel? ..... YES NIA

7. Were custody papers signed in appropriate place by ARDL personnel? ..... YES NO NIA

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form. .... NO NIA

9. Was a separate container provided for measuring temperature? YES NO Observed Cooler Temp. 0.1 C  
Correction factor 0.1 C

B. **LOG-IN PHASE:** Date samples were logged-in: 1/10/11 (Signature) [Signature]

10. Describe type of packing in cooler: \_\_\_\_\_

11. Were all samples sealed in separate plastic bags? ..... YES @, NIA

12. Did all containers arrive unbroken and were labels in good condition? ..... NO

13. Were sample labels complete? ..... NO

14. Did all sample labels agree with custody papers? ..... YES NO

15. Were correct containers used for the tests indicated? ..... NO

16. Was pH correct on preserved water samples? ..... NO NIA

17. Was a sufficient amount of sample sent for tests indicated? ..... NO

18. Were bubbles absent in VOA samples? If NO, list by sample#: \_\_\_\_\_ YES NO r<LA?

19. Was the ARDL project coordinator notified of any deficiencies? ..... YES NIA

Comments and/or Corrective Action:	
(Bv: Signature)	Date:

Sample Transfer	
Fraction <u>cut</u>	Fraction
Area# <u>LVIU/U4</u>	Area#
By <u>[Signature]</u>	By
On <u>1/10/11</u>	On

Chain-of-Custody # 1/10/11





Environmental | Analytical | Management | Safety

PO Box 1566  
400 Aviation Drive  
Mt. Vernon, IL 62864  
618-244-3235

[www.ardlinc.com](http://www.ardlinc.com)

**Customer Name: SLCOE**

**Date: 12/12/19**

**Project Name: Illinois River**

**Lab Name: ARDL, Inc.**

**Samples Received at ARDL: 11/19/19**

**ARDL Report No.: 8574**

### CASE NARRATIVE

Customer Sample No.	Date Collected	Lab ID	Analyses Requested
		Number	
IL-2	11/19/19	8574-01	Inorganics(1)
IL-6	11/19/19	8574-02	Inorganics(1)
IL-7	11/19/19	8574-03	Inorganics(1)
IL-8	11/19/19	8574-04	Inorganics(1)
IL-9	11/19/19	8574-05	Inorganics(1)
UMR-1	11/19/19	8574-06	Inorganics(1)
UMR-3	11/19/19	8574-07	Inorganics(1)
UMR-2	11/19/19	8574-08	Inorganics(1)
SLH-3	11/19/19	8574-09	Inorganics(1)

(1) Including ammonia, chlorophyll/pheophytin, nitrite, nitrate, TKN, TOC, orthophosphate, total phosphorus, TSS, and TVSS.

The quality control data are summarized as follows:

TOC were analyzed by an accredited outside laboratory due to instrument status.

#### PREPARATION BLANK

Results of the preparation blanks were within acceptable limits.

#### LABORATORY CONTROL SAMPLE

Percent recoveries of all LCS analyses were within control limits.

#### MATRIX SPIKE

Percent recovery of all matrix spikes and matrix spike duplicates were within control limits, except 1 of 2 for TKN. The parent sample has been flagged appropriately with a 'J' qualifier.

#### DUPLICATE

Duplicate analyses are reported as MS/MSD, except chlorophyll/pheophytin, TSS, and TVSS. RPO of the duplicate analyses met criteria, except for TKN. The parent sample has been flagged appropriately with a 'J' qualifier.

**CASE NARRATIVE (Continued)**

**DATA REPORTING QUALIFIERS**

The following data reporting qualifiers are used as required:

ND - Indicates parameter was analyzed for but not detected. The sample quantitation limit has been corrected for weight, dilution and/or percent moisture.

J - Indicates an estimated value. This flag is used either when estimating a concentration or this flag indicates analyte(s) associated with a DOD-QSM specified non-compliance pertaining to matrix QC criteria.

Release of the data contained in this package has been authorized by the Technical Services Manager or his designee as verified by the following signature.



---

Dean S. Dickerson  
Technical Services Manager



# Sample & QC Results

Including as appropriate:

- Field Sample Results

- Batch QC

  - Prep Blank

  - LCS/Spike Blank

- Matrix QC

  - MS/MSD

  - Sample Duplicate

ARDL Data Package      8574- Inorganic

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008574

Report Date: 12/12/2019

Project Name: ILLINOIS RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008574-01  
 Field ID: IL-2  
 Received: 11/19/2019

Sampling Loc'n: ILLINOIS RIVER  
 Sampling Date: 11/19/2019  
 Sampling Time: 1415

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	11/20/19	11205053
Chlorophyll-a, Correcte	1.0	1.00		13.6	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Kjeldahl Nitrogen	0.190	0.200	J	1.1	MG/L	351.2	351.2	12/02/19	12/04/19	12055075
Nitrate as Nitrogen	0.0380	0.0400		2.94	MG/L	NONE	GREEN	NA	11/25/19	12035071
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/20/19	11265060
Pheophytin-a	1.0	1.00		1.6	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Phosphorus	0.00800	0.0100		0.346	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.151	MG/L	NONE	365.2	NA	11/20/19	11215055
Solids, Total Suspended	4.0	4.00		54.4	MG/L	NONE	160.2	NA	11/26/19	12035066
Solids, Volatile Suspen	4.0	4.00		4.4	MG/L	NONE	160.4	NA	11/26/19	12035067
Total Organic Carbon	0.500	1.00		4.7	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008574-01, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008574

Report Date: 12/12/2019

Project Name: ILLINOIS RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008574-02  
Field ID: IL-6  
Received: 11/19/2019

Sampling Loc'n: ILLINOIS RIVER  
Sampling Date: 11/19/2019  
Sampling Time: 1215

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0322	MG/L	NONE	350.1	NA	11/20/19	11205053
Chlorophyll-a, Correcte	1.0	1.00		13.6	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Kjeldahl Nitrogen	0.190	0.200		1.13	MG/L	351.2	351.2	12/02/19	12/04/19	12055075
Nitrate as Nitrogen	0.0380	0.0400		2.57	MG/L	NONE	GREEN	NA	11/25/19	12035071
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/20/19	11265060
Pheophytin-a	1.0	1.00		2.9	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Phosphorus	0.00800	0.0100		0.372	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.166	MG/L	NONE	365.2	NA	11/20/19	11215055
Solids, Total Suspended	4.0	4.00		71.6	MG/L	NONE	160.2	NA	11/26/19	12035066
Solids, Volatile Suspen	4.0	4.00		5.6	MG/L	NONE	160.4	NA	11/26/19	12035067
Total Organic Carbon	0.500	1.00		4.7	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008574-02, Inorganic Analyses

Page 1 of 1

ARDL, INC.  
400 Aviation Drive; P.O. Box 1566  
Mt. Vernon, Illinois 62864

Lab Report No: 008574

Report Date: 12/12/2019

Project Name: ILLINOIS RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008574-03  
Field ID: IL-7  
Received: 11/19/2019

Sampling Loc'n: ILLINOIS RIVER  
Sampling Date: 11/19/2019  
Sampling Time: 1222

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300	J	0.0274	MG/L	NONE	350.1	NA	11/20/19	11205053
Chlorophyll-a, Correcte	1.0	1.00		14.5	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Kjeldahl Nitrogen	0.190	0.200		0.967	MG/L	351.2	351.2	12/02/19	12/04/19	12055075
Nitrate as Nitrogen	0.0380	0.0400		2.57	MG/L	NONE	GREEN	NA	11/25/19	12035071
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/20/19	11265060
Pheophytin-a	1.0	1.00		2.0	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Phosphorus	0.00800	0.0100		0.316	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.18	MG/L	NONE	365.2	NA	11/20/19	11215055
Solids, Total Suspended	4.0	4.00		41.6	MG/L	NONE	160.2	NA	11/26/19	12035066
Solids, Volatile Suspen	4.0	4.00		4.4	MG/L	NONE	160.4	NA	11/26/19	12035067
Total Organic Carbon	0.500	1.00		4.8	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008574-03, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008574

Report Date: 12/12/2019

Project Name: ILLINOIS RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008574-04  
Field ID: IL-8  
Received: 11/19/2019

Sampling Loc'n: ILLINOIS RIVER  
Sampling Date: 11/19/2019  
Sampling Time: 1100

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0365	MG/L	NONE	350.1	NA	11/20/19	11205053
Chlorophyll-a, Correcte	1.0	1.00		14.5	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Kjeldahl Nitrogen	0.190	0.200		0.784	MG/L	351.2	351.2	12/02/19	12/04/19	12055075
Nitrate as Nitrogen	0.0380	0.0400		2.6	MG/L	NONE	GREEN	NA	11/25/19	12035071
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/20/19	11265060
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Phosphorus	0.00800	0.0100		0.265	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.148	MG/L	NONE	365.2	NA	11/20/19	11215055
Solids, Total Suspended	4.0	4.00		28.0	MG/L	NONE	160.2	NA	11/26/19	12035066
Solids, Volatile Suspen	4.0	4.00		ND	MG/L	NONE	160.4	NA	11/26/19	12035067
Total Organic Carbon	0.500	1.00		4.5	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008574-04, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008574

Report Date: 12/12/2019

Project Name: ILLINOIS RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008574-05  
Field ID: IL-9  
Received: 11/19/2019

Sampling Loc'n: ILLINOIS RIVER  
Sampling Date: 11/19/2019  
Sampling Time: 0730

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300	J	0.0235	MG/L	NONE	350.1	NA	11/20/19	11205053
Chlorophyll-a, Correcte	1.0	1.00		14.5	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Kjeldahl Nitrogen	0.190	0.200		0.721	MG/L	351.2	351.2	12/02/19	12/04/19	12055075
Nitrate as Nitrogen	0.0380	0.0400		2.66	MG/L	NONE	GREEN	NA	11/25/19	12035071
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/20/19	11265060
Pheophytin-a	1.0	1.00		2.6	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Phosphorus	0.00800	0.0100		0.256	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.219	MG/L	NONE	365.2	NA	11/20/19	11215055
Solids, Total Suspended	4.0	4.00		26.4	MG/L	NONE	160.2	NA	11/26/19	12035066
Solids, Volatile Suspen	4.0	4.00		ND	MG/L	NONE	160.4	NA	11/26/19	12035067
Total Organic Carbon	0.500	1.00		4.6	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008574-05, Inorganic Analyses

Page 1 of 1



**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008574

Report Date: 12/12/2019

Project Name: ILLINOIS RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008574-06  
 Field ID: UMR-1  
 Received: 11/19/2019

Sampling Loc'n: ILLINOIS RIVER  
 Sampling Date: 11/19/2019  
 Sampling Time: 1620

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0307	MG/L	NONE	350.1	NA	11/20/19	11205053
Chlorophyll-a, Correcte	1.0	1.00		2.7	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Kjeldahl Nitrogen	0.190	0.200		0.758	MG/L	351.2	351.2	12/02/19	12/04/19	12055075
Nitrate as Nitrogen	0.0380	0.0400		2.35	MG/L	NONE	GREEN	NA	11/25/19	12035071
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/20/19	11265060
Pheophytin-a	1.0	1.00		2.4	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Phosphorus	0.00800	0.0100		0.239	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.116	MG/L	NONE	365.2	NA	11/20/19	11215055
Solids, Total Suspended	4.0	4.00		25.2	MG/L	NONE	160.2	NA	11/26/19	12035066
Solids, Volatile Suspen	4.0	4.00		ND	MG/L	NONE	160.4	NA	11/26/19	12035067
Total Organic Carbon	0.500	1.00		5.3	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008574-06, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008574

Report Date: 12/12/2019

Project Name: ILLINOIS RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008574-07  
Field ID: UMR-3  
Received: 11/19/2019

Sampling Loc'n: ILLINOIS RIVER  
Sampling Date: 11/19/2019  
Sampling Time: 1600

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.14	MG/L	NONE	350.1	NA	11/20/19	11205053
Chlorophyll-a, Correcte	1.0	1.00		15.9	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Kjeldahl Nitrogen	0.190	0.200		1.88	MG/L	351.2	351.2	12/02/19	12/04/19	12055075
Nitrate as Nitrogen	0.0380	0.0400		2.47	MG/L	NONE	GREEN	NA	11/25/19	12035071
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/20/19	11265060
Pheophytin-a	1.0	1.00		9.5	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Phosphorus	0.00800	0.0100		0.919	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.106	MG/L	NONE	365.2	NA	11/20/19	11215055
Solids, Total Suspended	14.3	14.3		439	MG/L	NONE	160.2	NA	11/26/19	12035066
Solids, Volatile Suspen	14.3	14.3		28.6	MG/L	NONE	160.4	NA	11/26/19	12035067
Total Organic Carbon	0.500	1.00		5.6	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008574-07, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008574

Report Date: 12/12/2019

Project Name: ILLINOIS RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008574-08  
Field ID: UMR-2  
Received: 11/19/2019

Sampling Loc'n: ILLINOIS RIVER  
Sampling Date: 11/19/2019  
Sampling Time: 1700

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	11/20/19	11205053
Chlorophyll-a, Correcte	1.0	1.00		2.7	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Kjeldahl Nitrogen	0.190	0.200		0.971	MG/L	351.2	351.2	12/02/19	12/04/19	12055075
Nitrate as Nitrogen	0.0190	0.0200		0.972	MG/L	NONE	GREEN	NA	11/22/19	12035071
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/20/19	11265060
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Phosphorus	0.00800	0.0100		0.354	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.111	MG/L	NONE	365.2	NA	11/20/19	11215055
Solids, Total Suspended	4.0	4.00		102	MG/L	NONE	160.2	NA	11/26/19	12035066
Solids, Volatile Suspen	4.0	4.00		6.0	MG/L	NONE	160.4	NA	11/26/19	12035067
Total Organic Carbon	0.500	1.00		4.3	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008574-08, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008574

Report Date: 12/12/2019

Project Name: ILLINOIS RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008574-09  
 Field ID: SLH-3  
 Received: 11/19/2019

Sampling Loc'n: ILLINOIS RIVER  
 Sampling Date: 11/19/2019  
 Sampling Time: 1635

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300	J	0.024	MG/L	NONE	350.1	NA	11/20/19	11205053
Chlorophyll-a, Correcte	1.0	1.00		9.1	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Kjeldahl Nitrogen	0.190	0.200		0.89	MG/L	351.2	351.2	12/02/19	12/03/19	12055075
Nitrate as Nitrogen	0.0380	0.0400		2.51	MG/L	NONE	GREEN	NA	11/25/19	12035071
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/20/19	11265060
Pheophytin-a	1.0	1.00		2.4	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079
Phosphorus	0.00800	0.0100		0.299	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.10	MG/L	NONE	365.2	NA	11/20/19	11215055
Solids, Total Suspended	4.0	4.00		66.4	MG/L	NONE	160.2	NA	11/26/19	12035066
Solids, Volatile Suspen	4.0	4.00		5.2	MG/L	NONE	160.4	NA	11/26/19	12035067
Total Organic Carbon	0.500	1.00		5.0	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008574-09, Inorganic Analyses

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**BLANK SUMMARY REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566      Mt. Vernon, IL    62864**

Lab Report No: 008574

Report Date: 12/12/2019

Project Name: ILLINOIS RIVER

NELAC Certified - IL100308

Analyte	LOD	LOQ	Blank Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run	QC Lab Number
Ammonia Nitrogen	0.020	0.030	ND	MG/L	NONE	350.1	NA	11/20/19	11205053	008574-01B1
Chlorophyll-a, Corre	1.0	1.0	ND	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079	008574-02B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	12/02/19	12/04/19	12055075	008574-01B1
Nitrate as Nitrogen	0.019	0.020	ND	MG/L	NONE	GREEN	NA	11/25/19	12035071	008574-04B1
Nitrite as Nitrogen	0.020	0.020	ND	MG/L	NONE	354.1	NA	11/20/19	11265060	008574-02B1
Pheophytin-a	1.0	1.0	ND	MG/CU.M.	10200H	10200H	11/20/19	12/06/19	12065079	008574-02B1
Phosphorus	0.008	0.010	ND	MG/L	365.2	365.2	12/09/19	12/09/19	12105083	008574-06B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	NA	11/20/19	11215055	008574-03B1
Solids, Total Suspen	1.0	1.0	ND	MG/L	NONE	160.2	NA	11/26/19	12035066	008574-01B1
Solids, Volatile Sus	1.0	1.0	ND	MG/L	NONE	160.4	NA	11/26/19	12035067	008574-01B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	12/04/19	12095082	008574-01B1

(a) DOD and/or NELAC Accredited Analyte  
Inorganic Method Blanks for 008574

**LABORATORY CONTROL SAMPLE REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566      Mt. Vernon, IL      62864**

Lab Report No: 008574

Report Date: 12/12/2019

Project Name: ILLINOIS RIVER

NELAC Certified - IL100308

Analyte	LCS 1 Result	LCS 1 Level	LCS 1 % Rec	LCS 2 Result	LCS 2 Level	LCS 2 % Rec	% Rec Limits	Mean % Rec	Analytical Run	QC Lab Number
Ammonia Nitrogen	0.96	1.0	96	--	--	--	80-120	--	11205053	008574-01C1
Kjeldahl Nitrogen	1.2	1.0	118	--	--	--	80-120	--	12055075	008574-01C1
Nitrate as Nitrogen	1.1	1.0	105	--	--	--	80-120	--	12035071	008574-04C1
Nitrite as Nitrogen	0.93	1.0	93	--	--	--	80-120	--	11265060	008574-02C1
Phosphorus	0.64	0.67	95	--	--	--	80-120	--	12105083	008574-06C1
Phosphorus, -ortho	0.095	0.10	95	--	--	--	80-120	--	11215055	008574-03C1
Total Organic Carbon	19.0	20.0	95	--	--	--	76-120	--	12095082	008574-01C1

NOTE: Any values tabulated above marked with an asterisk are outside of acceptable limits.

(a) DOD and/or NELAC Accredited Analyte

Inorganic LCS Results for 008574

Page 1 of 1

**MATRIX SPIKE/SPIKE DUPLICATE REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566 Mt. Vernon, IL    62864**

Lab Report No: 008574

Report Date: 12/12/2019

Project Name: ILLINOIS RIVER

NELAC Certified - IL100308

Analyte	Sample Matrix	Sample Result	MS Result	MS Level	MS % Rec	MSD Result	MSD Level	MSD % Rec	% Rec Limits	RPD	RPD Limit	Run	QC Lab Number
Ammonia Nitrogen	WATER	ND	1.9	2.0	97	1.9	2.0	96	75-125	1	20	11205053	008574-01MS
Kjeldahl Nitrogen	WATER	1.1	2.0	0.80	116	1.4	0.80	41 *	75-125	35 *	20	12055075	008574-01MS
Nitrate as Nitrogen	WATER	2.6	3.5	1.0	95	3.5	1.0	90	75-125	1	20	12035071	008574-04MS
Nitrite as Nitrogen	WATER	ND	1.0	1.0	103	1.0	1.0	104	75-125	1	20	11265060	008574-02MS
Phosphorus	WATER	0.24	1.1	0.83	99	1.1	0.83	100	75-125	1	20	12105083	008574-06MS
Phosphorus, -ortho	WATER	0.18	0.27	0.10	87	0.26	0.10	82	75-125	2	20	11215055	008574-03MS
Total Organic Carbon	WATER	4.7	9.3	5.0	92	9.4	5.0	94	76-120	1	20	12095082	008574-01MS
Total Organic Carbon	WATER	4.7	9.7	5.0	100	9.6	5.0	97	76-120	2	20	12095082	008574-02MS

NOTE: Values tabulated above marked with an asterisk are explained in the associated narrative.

(a) DOD and/or NELAC Accredited Analyte.

Inorganic Matrix Spikes for 008574

Page 1 of 1

**SAMPLE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566   Mt. Vernon, IL   62864**

Lab Report No: 008574

Report Date: 12/12/2019

Project Name: ILLINOIS RIVER

NELAC Certified - IL100308

Analyte	Sample Conc'n	First Duplicate	Second Duplicate	Units	Percent Diff	Mean (Smp,D1,D2)	Analytical Run	QC Lab Number
Chlorophyll-a, Corrected	13.6	13.6	--	MG/CU.M.	0	--	12065079	008574-02D1
Pheophytin-a	2.9	2.9	--	MG/CU.M.	0	--	12065079	008574-02D1
Solids, Total Suspended	54.4	58.8	--	MG/L	8	--	12035066	008574-0101
Solids, Volatile Suspend	4.4	5.2	--	MG/L	17	--	12035067	008574-01D1

(a) DOD and/or NELAC Accredited Analyte  
Sample Duplicates for 008574

Page 1 of 1





# Sample Receipt Information

Including as appropriate:

- COCs
- Cooler Receipts
- Airbills
- Email Communication/  
Instructions from Customer

ARDL Data Package      8574- Inorganic

8574

PROJECT Illinois River						NO. OF CONTAINERS		TSS, TVSS, NO <sub>2</sub> -N TKN TOC, TP04 O-P04 MS/MSD Chloro/Phen								REMARKS OR SAMPLE LOCATION		PRESERVATION	
SAMPLERS: (Signature)																		SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN	
SAMPLE NUMBER	DATE	TIME	COMP	GRAB		TSS	TVSS	NO <sub>2</sub> -N	TKN	O-P04	*NO <sub>3</sub> -N	MS/MSD	Chloro/Phen						
IL-2	11-19-19	1415	X	X		X	X	X	X	X	X	X	X				X		
IL-6	"	1315	X	X		X	X	X	X	X	X	X	X				X		
IL-7	"	1222	X	X		X	X	X	X	X	X	X	X				X		
IL-8	"	1100	X	X		X	X	X	X	X	X	X	X				X		
IL-9	"	730	X	X		X	X	X	X	X	X	X	X				X		
IL-15	"	1015	X	X		X	X	X	X	X	X	X	X				X		
UMR-1	"	1620																	
UMR-3	"	1600																	
UMR-7	"	1700																	
SLH-3	"	1635																	
Relinquished by: (Signature)						Date	Time	Received by: (Signature)											
Relinquished by: (Signature)						Date	Time	Received by: (Signature)											
Received Laboratory by:						Date	Time	Shipping Ticket No.											

**COOLER RECEIPT REPORT**  
**ARDL INC.**

ARDL -- -5\_7\_1\_\_

Cooler # L ttg .1

Number of Coolers in Shipment: -<'-'-----

Project: £11,711,000 River

Date Received: 1/-...&-19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 1/-...&-19 (Signature) A-f J

1. Did cooler come with a shipping slip (airbill, etc.)?.....YES (R)'

If YES, enter carrier name and airbill number here: ---

2. Were custody seals on outside of cooler? .....YES NIA

How many and where? ---, Seal Date: ---, Seal Name: ---

3. Were custody seals unbroken and intact at the date and time of arrival? ..... YES NO @

4. Did you screen samples for radioactivity using a Geiger Counter?..... NO

5. Were custody papers sealed in a plastic bag?.....YES

6. Were custody papers filled out properly (ink, signed, etc.)? .....YES @ NIA

7. Were custody papers signed in appropriate place by ARDL personnel? ..... € NO NIA

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form..... @', ,NO NIA

9. Was a separate container provided for measuring temperature? YES NO Y Observed Cooler Temp. Q °C  
Correction factor Q, Q C

B. **LOG-IN PHASE:** Date samples were logged-in: 1- & 0 -1 9 (Signature) /v./)Lt:Le... 1-f/G-

10. Describe type of packing in cooler = --- k--R ---

11. Were all samples sealed in separate plastic bags? ..... YES c:E0 NIA

12. Did all containers arrive unbroken and were labels in good condition? ..... £ NO

13. Were sample labels complete?..... IliJ NO

14. Did all sample labels agree with custody papers? ..... YES >

15. Were correct containers used for the tests indicated? ..... : NO

16. Was pH correct on preserved water samples?..... @ NO NIA

17. Was a sufficient amount of sample sent for tests indicated?..... m:: NO

18. Were bubbles absent in VOA samples? If NO, list by sample#: --- YES NO @,

19. Was the ARDL project coordinator notified of any deficiencies?..... ' NO NIA

**Comments and/or Corrective Action:**

NO ANALYSIS INDICATED FOR LAST 4  
SAMPLES. CONTAINERS INDICATE THE  
0'AIY71" 4/11.LJ.h;.s.s AS 'rlec/ous \$,1.rnpl't:'"  
CIV --- --- LLSC ---

14 Did NOT receive ANY SAMPLES FOR  
IL-15.

**Sample Transfer**

Fraction	Fraction
<u>all</u>	
Area #	Area#
<u>Walchin</u>	
By	By
<u>dlc</u>	
On	On
<u>11-20-19</u>	

Chain-of-Custody # ---

8 : Si nature ( ) Date: 11-.../1-/C/

# **COOLER RECEIPT REPORT** **ARDL INC.**

ARDL #: 8574

Cooler# 2 J 4

Number of Coolers in Shipment: -- '-----

Project: f LL.11/0/S R..r/e e.

Date Received: // - / CJ' - If

A. **PRELIMINARY EXAMINATION PHASE**: Date cooler was opened: // - / 9 - 19 (Signature) /JL--u--n-u

1. Did cooler come with a shipping slip (airbill, etc.)?.....YES @)

If YES, enter carrier name and airbill number here: U:....L= :...='-----

2. Were custody seals on outside of cooler?.....YES @, NIA

How many and where?....., Seal Date:....., Seal Name:.....

3. Were custody seals unbroken and intact at the date and time of arrival?.....YES NO

4. Did you screen samples for radioactivity using a Geiger Counter?.....€s' NO

5. Were custody papers sealed in a plastic bag?.....YES (No)

6. Were custody papers filled out properly (ink, signed, etc.)?.....YES NIA

7. Were custody papers signed in appropriate place by ARDL personnel?.....@ NO NIA

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form..... NO NIA

9. Was a separate container provided for measuring temperature? YES\_\_\_ No\_\_\_:..... Observed Cooler Temp. ;; 0 C  
Correction factor /J.0 C

B. **LOG-IN PHASE**: Date samples were logged-in: // - Jf) - 1 'J (Signature) o £J z:/ U...u11'

10. Describe type of packing in cooler: 100% sealed in plastic bags.....

11. Were all samples sealed in separate plastic bags?.....YES NIA

12. Did all containers arrive unbroken and were labels in good condition?.....v€s; NO

13. Were sample labels complete?.....- NO

14. Did all sample labels agree with custody papers?.....YES 00:,

15. Were correct containers used for the tests indicated?.....NO

16. Was pH correct on preserved water samples?.....Y NO NIA

17. Was a sufficient amount of sample sent for tests indicated?.....(YES NO

18. Were bubbles absent in VOA samples? If NO, list by sample#:.....YES NO CwA'

19. Was the ARDL project coordinator notified of any deficiencies?.....NO NIA

Comments and/or Corrective Action:	
& I -- ?-	
l ....tu. (!..<nL/l.e.v /2.u.LL(J' Ic-j' .-r	
(By: SiQnature) <u>clt..r</u> Date: <u>// ;{tJ- 19</u>	

Sample Transfer	
Fraction <u>/J.P..!</u>	Fraction
Area# <u>{f/y/:c.-:..U</u>	Area#
By <u>;;tZf.c_</u>	By
On <u>//-.:?'0--19</u>	On

Chain-of-Custody# \_\_\_\_\_

## Donna Cockrum

---

**From:** "Donna Cockrum" <dcockrum@ardlinc.com>  
**To:** "Dean Dickerson" <ddickerson@ardlinc.com>  
**Sent:** Wednesday, November 20, 2019 6:15 AM  
**Subject:** SLCOE 8574 - 11/19/19  
Received samples from Illinois River 11-19-19.

Last 4 sample numbers were hand written with no analysis indicated on C of C. Containers were the same for the previous 5 samples so I logged them in for the same tests.

Also, did not receive any samples for IL-15 as indicated on C of C.

All above noted on cooler receipt form.

Donna Cockrum  
Sample Receipt  
ARDL, Inc  
618-244-3235x240

### CONFIDENTIAL & PRIVILEGED TRANSMISSION

The message included with this e-mail and any attached document(s) contains information from ARDL, Inc. which may be confidential and/or privileged. This information is intended to be for the use of the addressee named on this transmittal sheet. If you are not the addressee, note that any disclosure, photocopying, distribution or use of the contents of this e-mail information is prohibited. If you have received this e-mail in error, please notify the sender above immediately so that arrangements can be made for the retrieval of the original document(s) at no cost to you.



Environmental | Analytical | Management | Safety

PO Box 1566  
400 Aviation Drive  
Mt. Vernon, IL 62864  
618-244-3235  
[www.ardlinc.com](http://www.ardlinc.com)

**Customer Name: SLCOE**

**Date: 12/12/19**

**Project Name: Lower River**

**Lab Name: ARDL, Inc.**

**Samples Received at ARDL: 11/20/19**

**ARDL Report No.: 8576**

### CASE NARRATIVE

Customer Sample No.	Date Collected	Lab ID	Analyses Requested
		Number	
OPR-2 RM 44	11/20/19	8576-01	Inorganics(1)
OPR-3 RM 80	11/20/19	8576-02	Inorganics( 1)
OPR-4 RM 110	11/20/19	8576-03	Inorganics(1)
OPR-5 RM 150	11/20/19	8576-04	Inorganics(1)
SLH-2 RM 177	11/20/19	8576-05	Inorganics(1)
SLH-1 RM 162	11/20/19	8576-06	Inorganics(1)
SLH-15 RM 120	11/20/19	8576-07	Inorganics(.1)

(1) Including ammonia, chlorophyll/pheophytin, nitrate, nitrite, TKN, TOC, orthophosphate, total phosphorus, TSS, and TVSS.

The quality control data are summarized as follows:

TOC were analyzed by an accredited outside laboratory due to instrument status.

#### PREPARATION BLANK

Results of the preparation blanks were within acceptable limits.

#### LABORATORY CONTROL SAMPLE

Percent recoveries of all LCS analyses were within control limits.

#### MATRIX SPIKE

Percent recovery of all matrix spikes and matrix spike duplicates were within control limits, except 2 of 2 for TKN. The parent sample has been flagged appropriately with a 'J' qualifier.

#### DUPLICATE

Duplicate analyses are reported as MS/MSD, except chlorophyll/pheophytin, TSS, and TVSS. RPO of the duplicate analyses met criteria.

**CASE NARRATIVE (Continued)**

**DATA REPORTING QUALIFIERS**

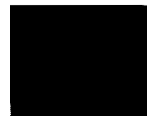
The following data reporting qualifiers are used as required:

- ND - Indicates parameter was analyzed for but not detected. The sample quantitation limit has been corrected for weight, dilution and/or percent moisture.
- J - Indicates an estimated value. This flag is used either when estimating a concentration or this flag indicates analyte(s) associated with a DOD-QSM specified non-compliance pertaining to matrix QC criteria.

Release of the data contained in this package has been authorized by the Technical Services Manager or his designee as verified by the following signature.



Dean S. Dickerson  
Technical Services Manager



# Sample & QC Results

Including as appropriate:

Field Sample Results

Batch QC

Prep Blank

LCS/Spike Blank

Matrix QC

**MS/MSD**

Sample Duplicate

ARDL Data Package      8576 - Inorganic



**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008576

Report Date: 12/12/2019

Project Name: LOWER RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008576-01  
 Field ID: OPR-2 RM 44  
 Received: 11/20/2019

Sampling Loc'n: LOWER RIVER  
 Sampling Date: 11/20/2019  
 Sampling Time: 1015

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	11/26/19	11265062
Chlorophyll-a, Correcte	1.0	1.00		4.5	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Kjeldahl Nitrogen	0.190	0.200	J	0.524	MG/L	351.2	351.2	12/02/19	12/04/19	12055076
Nitrate as Nitrogen	0.0190	0.0200		1.65	MG/L	NONE	GREEN	NA	11/25/19	12035072
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/21/19	11265061
Pheophytin-a	1.0	1.00		1.8	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Phosphorus	0.00800	0.0100		0.325	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.0947	MG/L	NONE	365.2	NA	11/21/19	11265063
Solids, Total Suspended	4.0	4.00		92.4	MG/L	NONE	160.2	NA	11/27/19	12035068
Solids, Volatile Suspen	4.0	4.00		7.2	MG/L	NONE	160.4	NA	11/27/19	12035069
Total Organic Carbon	0.500	1.00		4.9	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008576-01, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008576

Report Date: 12/12/2019

Project Name: LOWER RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008576-02  
 Field ID: OPR-3 RM 80  
 Received: 11/20/2019

Sampling Loc'n: LOWER RIVER  
 Sampling Date: 11/20/2019  
 Sampling Time: 1120

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		0.0378	MG/L	NONE	350.1	NA	11/26/19	11265062
Chlorophyll-a, Correcte	1.0	1.00		6.4	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Kjeldahl Nitrogen	0.190	0.200		0.214	MG/L	351.2	351.2	12/02/19	12/04/19	12055076
Nitrate as Nitrogen	0.0190	0.0200		1.67	MG/L	NONE	GREEN	NA	11/25/19	12035072
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/21/19	11265061
Pheophytin-a	1.0	Loo		1.3	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Phosphorus	0.00800	0.0100		0.307	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.0973	MG/L	NONE	365.2	NA	11/21/19	11265063
Solids, Total Suspended	4.0	4.00		84.0	MG/L	NONE	160.2	NA	11/27/19	12035068
Solids, Volatile Suspen	4.0	4.00		7.2	MG/L	NONE	160.4	NA	11/27/19	12035069
Total Organic Carbon	0.500	1.00		4.7	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008576-02, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008576

Report Date: 12/12/2019

Project Name: LOWER RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008576-03  
Field ID: OPR-4 RM 110  
Received: 11/20/2019

Sampling Loc'n: LOWER RIVER  
Sampling Date: 11/20/2019  
Sampling Time: 1340

Matrix: WATER  
Moisture: NA

Analyte	LOO	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300	J	0.0285	MG/L	NONE	350.1	NA	11/26/19	11265062
Chlorophyll-a, Correcte	1.0	1.00		4.5	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Kjeldahl Nitrogen	0.190	0.200		0.678	MG/L	351.2	351.2	12/02/19	12/04/19	12055076
Nitrate as Nitrogen	0.0190	0.0200		1.66	MG/L	NONE	GREEN	NA	11/25/19	12035072
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/21/19	11265061
Pheophytin-a	1.0	1.00		1.8	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Phosphorus	0.00800	0.0100		0.312	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.126	MG/L	NONE	365.2	NA	11/21/19	11265063
Solids, Total Suspended	4.0	4.00		88.4	MG/L	NONE	160.2	NA	11/27/19	12035068
Solids, Volatile Suspen	4.0	4.00		6.4	MG/L	NONE	160.4	NA	11/27/19	12035069
Total Organic Carbon	0.500	1.00		5.2	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008576-03, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008576

Report Date: 12/12/2019

Project Name: LOWER RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008576-04  
 Field ID: OPR-5 RM 150  
 Received: 11/20/2019

Sampling Loc'n: LOWER RIVER  
 Sampling Date: 11/20/2019  
 Sampling Time: 1440

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	11/26/19	11265062
Chlorophyll-a, Correcte	1.0	1.00		6.4	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Kjeldahl Nitrogen	0.190	0.200		0.852	MG/L	351.2	351.2	12/02/19	12/04/19	12055076
Nitrate as Nitrogen	0.0190	0.0200		1.64	MG/L	NONE	GREEN	NA	11/25/19	12035072
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/21/19	11265061
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Phosphorus	0.00800	0.0100		0.316	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.0973	MG/L	NONE	365.2	NA	11/21/19	11265063
Solids, Total Suspended	4.0	4.00		78.0	MG/L	NONE	160.2	NA	11/27/19	12035068
Solids, Volatile Suspen	4.0	4.00		6.4	MG/L	NONE	160.4	NA	11/27/19	12035069
Total Organic Carbon	0.500	1.00		4.6	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008576-04, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008576

Report Date: 12/12/2019

Project Name: LOWER RIVER  
 Project No:

Analysis: Inorganics  
 NELAC Certified - IL100308

ARDL No: 008576-05  
 Field ID: SLH-2 RM 177  
 Received: 11/20/2019

Sampling Loc'n: LOWER RIVER  
 Sampling Date: 11/20/2019  
 Sampling Time: 1700

Matrix: WATER  
 Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	11/26/19	11265062
Chlorophyll-a, Correcte	1.0	1.00		4.5	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Kjeldahl Nitrogen	0.190	0.200		0.586	MG/L	351.2	351.2	12/02/19	12/04/19	12055076
Nitrate as Nitrogen	0.0190	0.0200		1.32	MG/L	NONE	GREEN	NA	11/25/19	12035072
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/21/19	11265061
Pheophytin-a	1.0	1.00		ND	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Phosphorus	0.00800	0.0100		0.423	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.108	MG/L	NONE	365.2	NA	11/21/19	11265063
Solids, Total Suspended	4.0	4.00		84.0	MG/L	NONE	160.2	NA	11/27/19	12035068
Solids, Volatile Suspen	4.0	4.00		6.4	MG/L	NONE	160.4	NA	11/27/19	12035069
Total Organic Carbon	0.500	1.00		5.4	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008576-05, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008576

Report Date: 12/12/2019

Project Name: LOWER RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008576-06  
Field ID: SLH-1 RM 162  
Received: 11/20/2019

Sampling Loc'n: LOWER RIVER  
Sampling Date: 11/20/2019  
Sampling Time: 1345

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300	J	0.0282	MG/L	NONE	350.1	NA	11/26/19	11265062
Chlorophyll-a, Correcte	1.0	1.00		4.5	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Kjeldahl Nitrogen	0.190	0.200		0.538	MG/L	351.2	351.2	12/02/19	12/04/19	12055076
Nitrate as Nitrogen	0.0380	0.0400		1.78	MG/L	NONE	GREEN	NA	11/25/19	12035072
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/21/19	11265061
Pheophytin-a	1.0	1.00		2.5	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Phosphorus	0.00800	0.0100		0.295	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.0973	MG/L	NONE	365.2	NA	11/21/19	11265063
Solids, Total Suspended	4.0	4.00		72.8	MG/L	NONE	160.2	NA	11/27/19	12035068
Solids, Volatile Suspen	4.0	4.00		6.0	MG/L	NONE	160.4	NA	11/27/19	12035069
Total Organic Carbon	0.500	1.00		4.7	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008576-06, Inorganic Analyses

Page 1 of 1

**ARDL, INC.**  
**400 Aviation Drive; P.O. Box 1566**  
**Mt. Vernon, Illinois 62864**

Lab Report No: 008576

Report Date: 12/12/2019

Project Name: LOWER RIVER  
Project No:

Analysis: Inorganics  
NELAC Certified - IL100308

ARDL No: 008576-07      Sampling Loc'n: LOWER RIVER  
Field ID: SLH-15 RM 120      Sampling Date: 11/20/2019  
Received: 11/20/2019      Sampling Time: 1330

Matrix: WATER  
Moisture: NA

Analyte	LOD	LOQ	Flag	Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run Number
Ammonia Nitrogen	0.0200	0.0300		ND	MG/L	NONE	350.1	NA	11/26/19	11265062
Chlorophyll-a, Correcte	1.0	1.00		4.5	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Kjeldahl Nitrogen	0.190	0.200		0.318	MG/L	351.2	351.2	12/02/19	12/04/19	12055076
Nitrate as Nitrogen	0.0190	0.0200		1.64	MG/L	NONE	GREEN	NA	11/25/19	12035072
Nitrite as Nitrogen	0.0200	0.0200		ND	MG/L	NONE	354.1	NA	11/21/19	11265061
Pheophytin-a	1.0	1.00		1.8	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080
Phosphorus	0.00800	0.0100		0.282	MG/L	365.2	365.2	12/09/19	12/09/19	12105083
Phosphorus, -ortho	0.00800	0.0100		0.0947	MG/L	NONE	365.2	NA	11/21/19	11265063
Solids, Total Suspended	4.0	4.00		75.6	MG/L	NONE	160.2	NA	11/27/19	12035068
Solids, Volatile Suspen	4.0	4.00		6.0	MG/L	NONE	160.4	NA	11/27/19	12035069
Total Organic Carbon	0.500	1.00		4.7	MG/L	NONE	415.1	NA	12/04/19	12095082

(a) DOD and/or NELAC Accredited Analyte.

Sample 008576-07, Inorganic Analyses

Page 1 of 1

**BLANK SUMMARY REPORT**  
**ARDL, INC.      400 Aviation Drive; P.O. Box 1566      Mt. Vernon, IL    62864**

Lab Report No: 008576

Report Date: 12/12/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	LOD	LOQ	Blank Result	Units	Prep Method	Analysis Method	Prep Date	Analysis Date	Run	QC Lab Number
Ammonia Nitrogen	0.020	0.030	ND	MG/L	NONE	350.1	NA	11/26/19	11265062	008576-01B1
Chlorophyll-a, Corre	1.0	1.0	ND	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080	008576-05B1
Kjeldahl Nitrogen	0.19	0.20	ND	MG/L	351.2	351.2	12/02/19	12/04/19	12055076	008576-01B1
Nitrate as Nitrogen	0.019	0.020	ND	MG/L	NONE	GREEN	NA	11/25/19	12035072	008576-06B1
Nitrite as Nitrogen	0.020	0.020	ND	MG/L	NONE	354.1	NA	11/21/19	11265061	008576-04B1
Pheophytin-a	1.0	1.0	ND	MG/CU.M.	10200H	10200H	11/21/19	12/06/19	12065080	008576-05B1
Phosphorus	0.008	0.010	ND	MG/L	365.2	365.2	12/09/19	12/09/19	12105083	008574-06B1
Phosphorus, -ortho	0.008	0.010	ND	MG/L	NONE	365.2	NA	11/21/19	11265063	008576-02B1
Solids, Total Suspen	1.0	1.0	ND	MG/L	NONE	160.2	NA	11/27/19	12035068	008576-03B1
Solids, Volatile Sus	1.0	1.0	ND	MG/L	NONE	160.4	NA	11/27/19	12035069	008576-03B1
Total Organic Carbon	0.50	1.0	ND	MG/L	NONE	415.1	NA	12/04/19	12095082	008574-01B1

(a) DOD and/or NELAC Accredited Analyte  
Inorganic Method Blanks for 008576

Page 1 of 1



**LABORATORY CONTROL SAMPLE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566     Mt. Vernon, IL     62864**

Lab Report No: 008576

Report Date: 12/12/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	LCS 1 Result	LCS 1 Level	LCS 1 % Rec	LCS 2 Result	LCS 2 Level	LCS 2 % Rec	% Rec Limits	Mean % Rec	Analytical Run	QC Lab Number
Ammonia Nitrogen	0.93	1.0	93	--	--	--	80-120	--	11265062	008576-01C1
Kjeldahl Nitrogen	0.96	1.0	96	--	--	--	80-120	--	12055076	008576-01C1
Nitrate as Nitrogen	1.0	1.0	103	--	--	--	80-120	--	12035072	008576-06C1
Nitrite as Nitrogen	0.92	1.0	<b>92</b>	--	--	--	80-120	--	11265061	008576-04C1
Phosphorus	0.64	0.67	95	--	--	--	80-120	--	12105083	008574-06C1
Phosphorus, -ortho	0.097	0.10	97	--	--	--	80-120	--	11265063	008576-02C1
Total Organic Carbon	19.0	20.0	95	--	--	--	76-120	--	12095082	008574-01C1

NOTE: Any values tabulated above marked with an asterisk are outside of acceptable limits.

(a) DOD and/or NELAC Accredited Analyte

Inorganic LCS Results for 008576

Page 1 of 1

**MATRIX SPIKE/SPIKE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566 Mt. Vernon, IL     62864**

Lab Report No: 008576

Report Date: 12/12/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	Sample Matrix	Sample Result	MS Result	MS Level	MS % Rec	MSD Result	MSD Level	MSD % Rec	% Rec Limits	RPO	RPO Limit	Run	QC Lab Number
Ammonia Nitrogen	WATER	ND	2.0	2.0	101	2.0	2.0	98	75-125	3	20	11265062	008576-01MS
Kjeldahl Nitrogen	WATER	0.52	1.9	0.80	171 *	1.6	0.80	137 *	75-125	15	20	12055076	008576-01MS
Nitrate as Nitrogen	WATER	1.8	2.7	1.0	91	2.7	1.0	88	75-125	1	20	12035072	008576-06MS
Nitrite as Nitrogen	WATER	ND	1.0	1.0	100	1.0	1.0	102	75-125	2	20	11265061	008576-04MS
Phosphorus	WATER	0.32	1.1	0.83	98	1.1	0.83	98	75-125	0	20	12105083	008576-04MS
Phosphorus, -ortho	WATER	0.097	0.20	0.10	98	0.20	0.10	104	75-125	3	20	11265063	008576-02MS

NOTE: Values tabulated above marked with an asterisk are explained in the associated narrative.

(a) DOD and/or NELAC Accredited Analyte.

Inorganic Matrix Spikes for 008576

Page 1 of 1

**SAMPLE DUPLICATE REPORT**  
**ARDL, INC.     400 Aviation Drive; P.O. Box 1566   Mt. Vernon, IL   62864**

Lab Report No: 008576

Report Date: 12/12/2019

Project Name: LOWER RIVER

NELAC Certified - IL100308

Analyte	Sample Conc'n	First Duplicate	Second Duplicate	Units	Percent Diff	Mean (Smp,D1,D2)	Analytical Run	QC Lab Number
Chlorophyll-a, Corrected	4.5	4.5		MG/CU.M.	0	--	12065080	008576-05D1
Pheophytin-a	ND	0		MG/CU.M.	NC	--	12065080	008576-05D1
Solids, Total Suspended	88.4	86.8		MG/L	2	--	12035068	008576-03D1
Solids, Volatile Suspend	6.4	6.4		MG/L	0	--	12035069	008576-03D1

(a) DOD and/or NELAC Accredited Analyte  
Sample Duplicates for 008576

Page 1 of 1



# Sample Receipt Information

Including as appropriate:

- COCs
- Cooler Receipts
- Airbills
- Email Communication /  
Instructions from Customer

ARDL Data Package      8576 - Inorganic

## CHAIN OF CUSTODY RECORD

## PROJECT

## Lower River

**SAMPLERS: (Signature)**

T. Schepker, B. Breiling

SAMPLE NUMBER	DATE	TIME	COMP	GRAB	NO. OF	TSS, TVS, TOC, O-P, NP, MS/M, Chlorophyll												REMARKS OR SAMPLE LOCATION	
						TSS	TVS	TOC	O-P	NP	MS/M	Chlorophyll							
OPR-2 RM 44	11-20-19	1015	x	x	x	x	x	x	x	x	x	x	x	x	X				
OPR-3 RM 80	11-20-19	1120	x	x	x	x	x	x	x	x	x	x	x	x	X				
OPR-4 RM 110	11-20-19	1340	x	x	x	x	x	x	x	x	x	x	x	x	X				
OPR-5 RM 150	11-20-19	1440	x	x	x	x	x	x	x	x	x	x	x	x	X				
SLH-2 RM 177	11-20-19	1700	x	x	x	x	x	x	x	x	x	x	x	x	X				
SLH-1 RM 162	11-20-19	1345	x	x	x	x	x	x	x	x	x	x	x	x	X				
SLH-15 RM 120	11-20-19	1330	x	x	x	x	x	x	x	x	x	x	x	x	X				
REMARKS/SPECIAL INSTRUCTIONS:																			
*Preserved with H <sub>2</sub> SO <sub>4</sub>																			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)																
Relinquished by: (Signature)	Date	Time	Received by: (Signature)																
Received for Laboratory by: (Signature)	Date	Time	Shipping Ticket No.																

PURCHASE ORDER NO:

## ARDL Report 8576 - Page 17 of 18

**COOLER RECEIPT REPORT**  
**ARDL, INC.**

ARDL 957 & .

Cooler#      :<

Number of Coolers 1n Shipment: .,Z

Project: Lower River

Date Received: /1-.zo- 19

A **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: // -d0-19 (Signature) ..LL-'""JA "':.. fu-e::=-'4/4. .u...'-'"0=---

1. Did cooler come with a shipping slip (airbill, etc.)?.....YES @.)

If YES, enter carrier name and airbill number here: ..&u==([.. / -'" / (.c.f.==d

2. Were custody seals on outside of cooler?.....YES (lli1' N/A

How many and where?                     , Seal Date:                     , Seal Name:                     

3. Were custody seals unbroken and intact at the date and time of arrival?.....YES NO €)

4. Did you screen samples for radioactivity using a Geiger Counter?.....ms' NO

5. Were custody papers sealed in a plastic bag?.....YES C@)

6. Were custody papers filled out properly (ink, signed, etc.)?.....ru' NO N/A

7. Were custody papers signed in appropriate place by ARDL personnel?.....<YES' NO N/A

8. Was project identifiable from custody papers? If YES, enter project name at the top of this form.....@; NO N/A

9. Was a separate container provided for measuring temperature? YES      NO      Observed Cooler Temp. 0.9 C  
Correction factor (J..0 C

B. **LOG-IN PHASE:** Date samples were logged-in: // - ? I- I''/ (Signature) tdjt c JUC.C-7'c.../

10. Describe type of packing in cooler: - d--'-e... .. f==f :...e. -----

11. Were all samples sealed in separate plastic bags? ..... YES t-4cL.; N/A

12. Did all containers arrive unbroken and were labels in good condition? ..... YG 'NO

13. Were sample labels complete?.....; NO

14. Did all sample labels agree with custody papers? .....)(ES; NO

15. Were correct containers used for the tests indicated? .....ru' NO

16. Was pH correct on preserved water samples?.....Y ' NO N/A

17. Was a sufficient amount of sample sent for tests indicated?.....S' NO

18. Were bubbles absent in VOA samples? If NO, list by sample#:                      YES NO €fiA'

19. Was the ARDL project coordinator notified of any deficiencies?.....YES NO @'

Comments and/or Corrective Action:	
(By: Signature)	Date:

Sample Transfer	
Fraction <u>a.ft</u>	Fraction
Area# <u>(vtfU,L,;v</u>	Area#
By <u>c/14.,,</u>	By
On <u>// -- I-19</u>	On

Chain-of-Custody# N/A