2019 Water Quality Monitoring Report

U.S. Army Corps of Engineers
Saint Louis District

Water Quality Conditions in the Mississippi and Illinois Rivers: 2012-2019

February 2020

Water Quality Conditions in the Mississippi and Illinois Rivers: 2012 - 2019

Prepared for

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Saint Louis District
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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 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 United States Army Corps of Engineers, Saint Louis District (CEMVS), implemented a water quality monitoring program during the 1970s to evaluate how its civil projects may be affecting water resources. Data collected from this effort serves as an invaluable tool for evaluating the significance of annual water quality measurements and tracking long-term trends. Water quality data is provided to 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 two years by the Clean Water Act 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. These waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for water on the lists and develop action plans named Total Maximum Daily Loads, to guide water quality improvement.

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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 2019, as well as reference data collected from 2010-2018. 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).

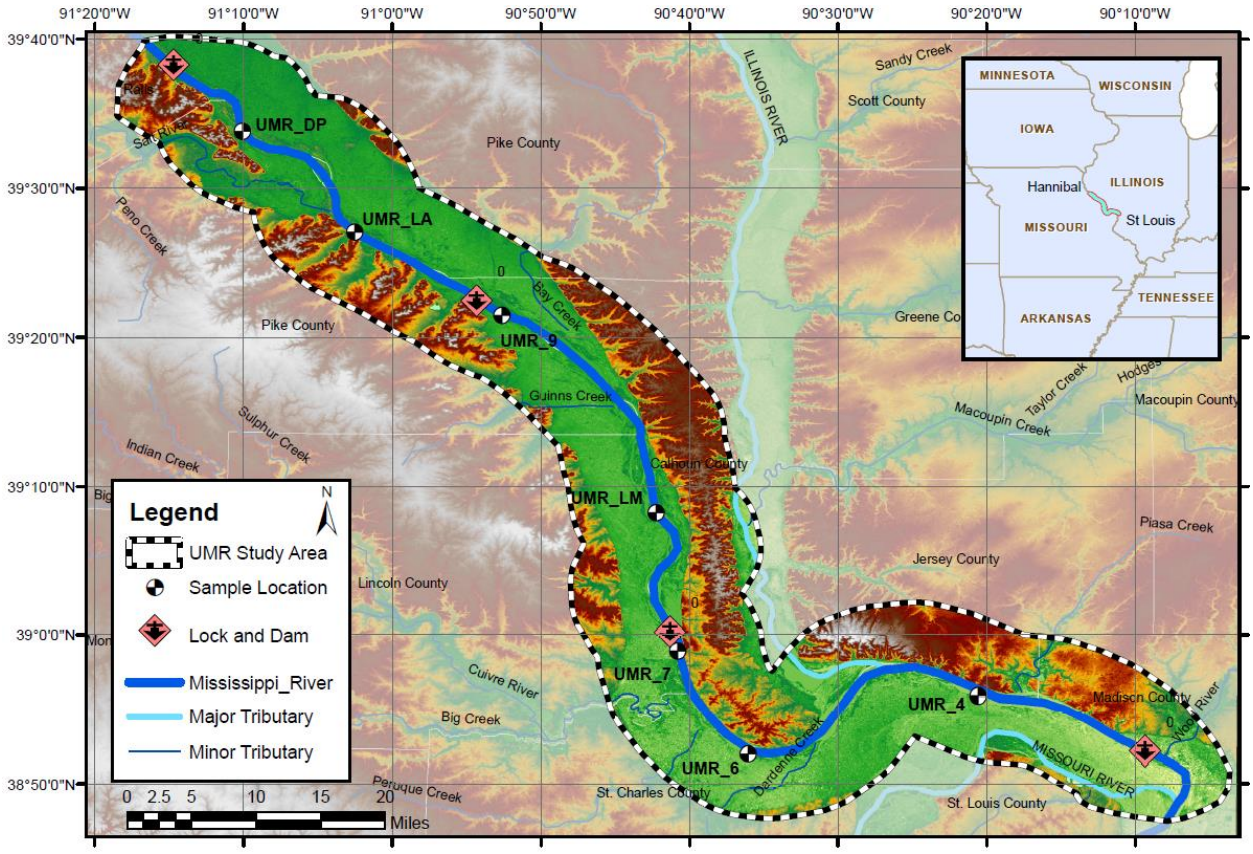


***Figure 1**: Upper Mississippi River study area. During 2019, USACE personnel monitored water quality at seven locations in the Upper Mississippi River. Chemical, biological, and physical samples were collected during four sampling events.*

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).

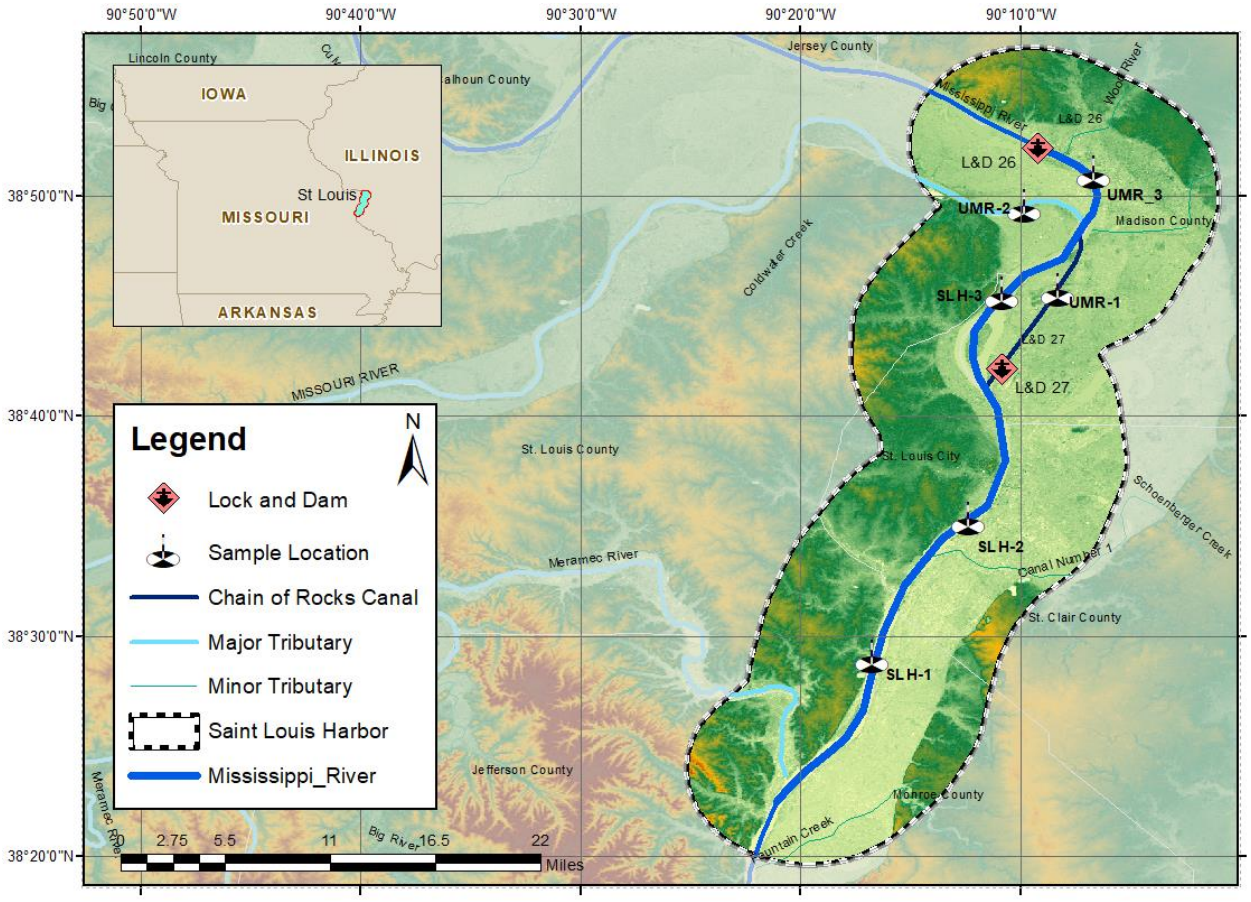


***Figure 2**: Saint Louis Harbor study area. During 2019, USACE personnel monitored water quality at six locations in Saint Louis Harbor. Chemical, biological, and physical samples were collected during four sampling events.*

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).

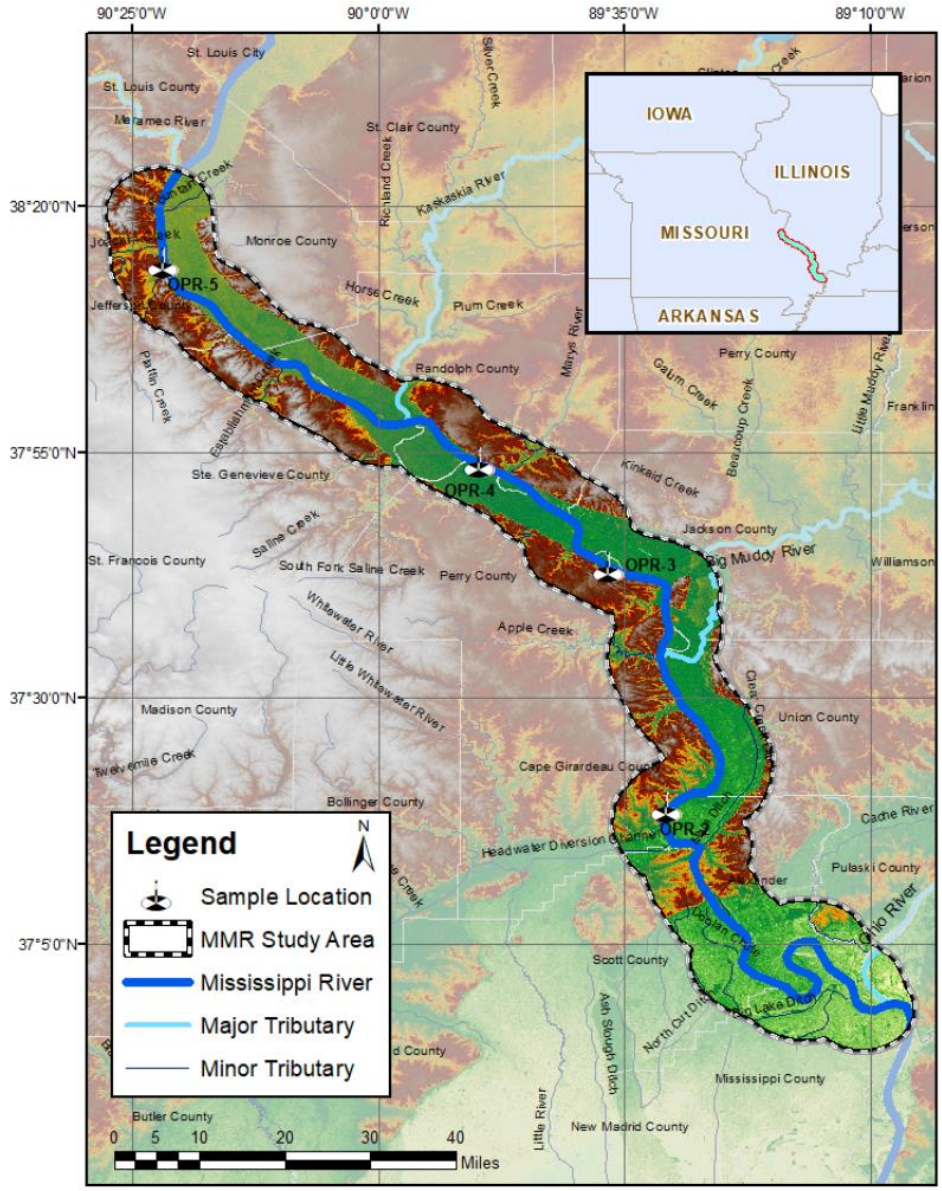


***Figure 3**: Middle Mississippi River study area. During 2019, USACE personnel monitored water quality at four locations in the Middle Mississippi River. Chemical, biological, and physical samples were collected during four sampling events.*

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.

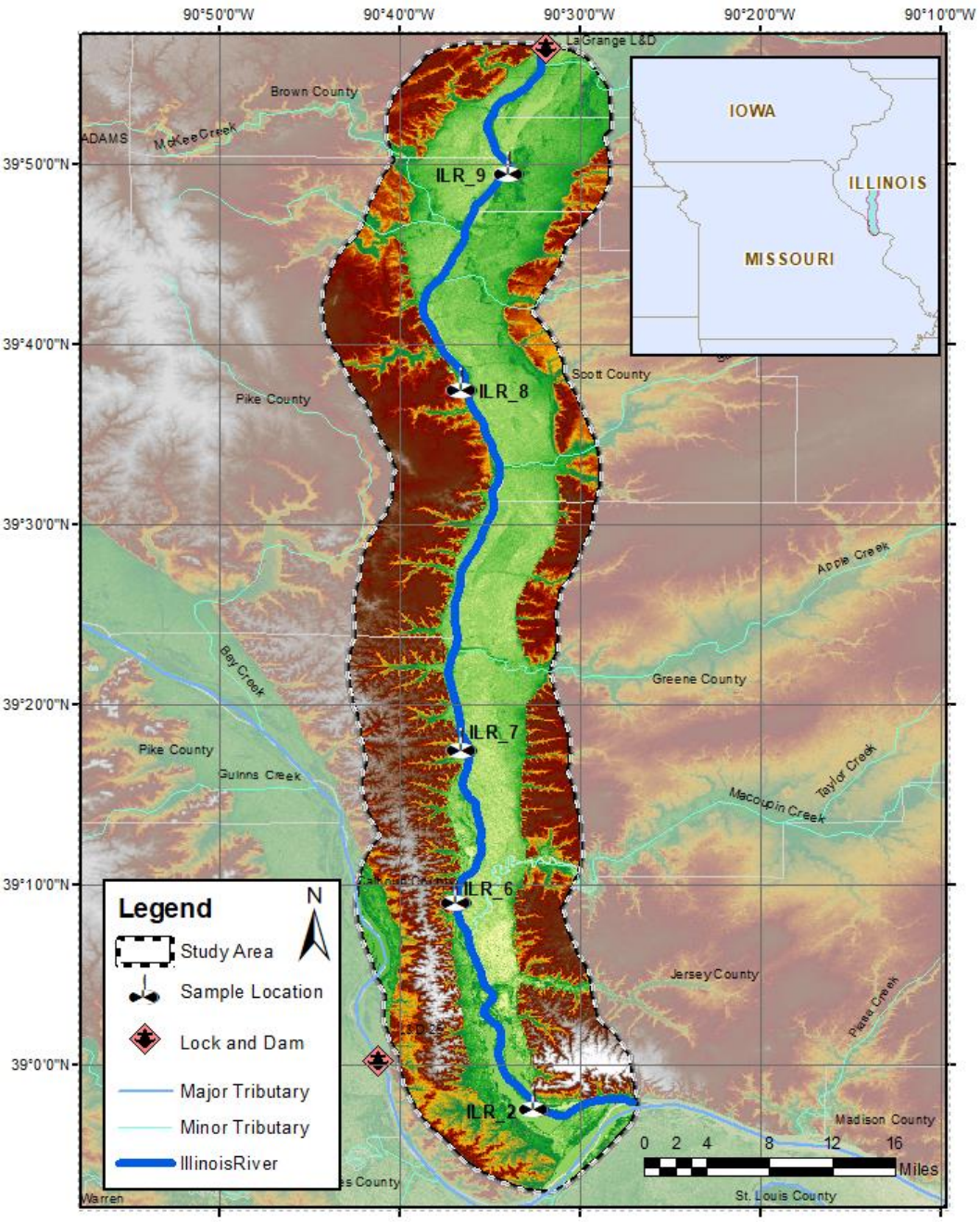


Figure 4: *Illinois River study area. During 2019, USACE personnel monitored water quality at five locations in the Illinois River. Chemical, biological, and physical samples were collected during four sampling events.*

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 2019, water quality samples were collected and analyzed for 22 locations during four sampling events (n=88; 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 seven years (2012-2018) on the Mississippi River, and previous four years (2015-2018) on the Illinois River. 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. A one-sample Mann-Whitney Rank Sum Test with continuity correction was used to determine if a parameter was within an acceptable water quality criterion.

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 includes 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^{o}C. Water temperature criteria for warm water bodies in Missouri and Illinois are less than 33^{o}C or within 2.5^{o}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. 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 have a standard criterion for NVSS or VSS.

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.*

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 ($CO_2 + H_2O$ (CH_2O) + O_2) from phytoplankton and aquatic vegetation. Additional factors influencing DO include temperature, pressure, and salinity.

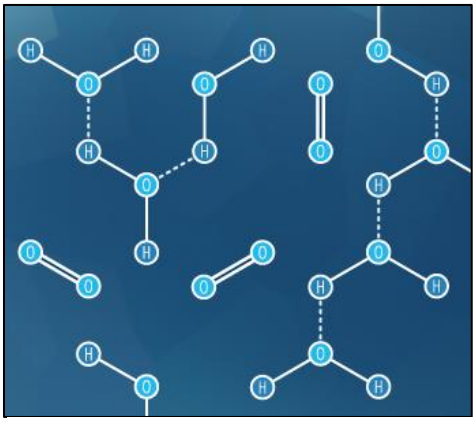


Figure 6: *Dissolved oxygen (O_2) vs oxygen bonded in water (H_2O).*

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 ≥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 ≥ 5mg/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 µS/cm is a rule of thumb value that is often associated with some form of biological impairment.

Total Phosphorus (TP) is analyzed as 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. Dissolved phosphorous, also called **Orthophosphate (PO_4-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 (N2), nitrite (NO2-N), nitrate (NO3-N), ammonia (NH3), and ammonium (NH4). 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 NO3-N as a food source, thus excess levels of NO3-N can promote increases in algal production and hypereutrophic conditions.

In general, NO3-N does not have a *direct* effect on fish or aquatic insects. Missouri and Illinois have both set criteria standards for NO3-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 NO2-N can be toxic to

aquatic life, they are rarely observed in freshwater systems at undesirable levels as they are rapidly converted to NO3-N by benthic and planktonic microorganisms (*Nitrobacter*).

Total Ammonia Nitrogen (TAN) includes NH3 and NH4. 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 regards 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:

TSI (Seechi Depth) = 10(6 - (ln SD/ln 2))
TSI (Chlorophyll-*a*) = TSI(Chl) = 10(6 - ((2.04 - 0.68 ln Chl)/ln 2))
TSI (Total Phosphorus) = TSI(TP) = 10(6 – (ln (48/TP)/ln 2))

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
40-60	Mesotrophic
60-70	Eutrophic
80-100	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_3	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/cm^3 (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_3	Green Method	See Total Nitrogen	EPA Region 7
Nitrite as Nitrogen	NO_2	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+ NO2-N+NO3-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	Less than 116 mg/L	Illinois EPA
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

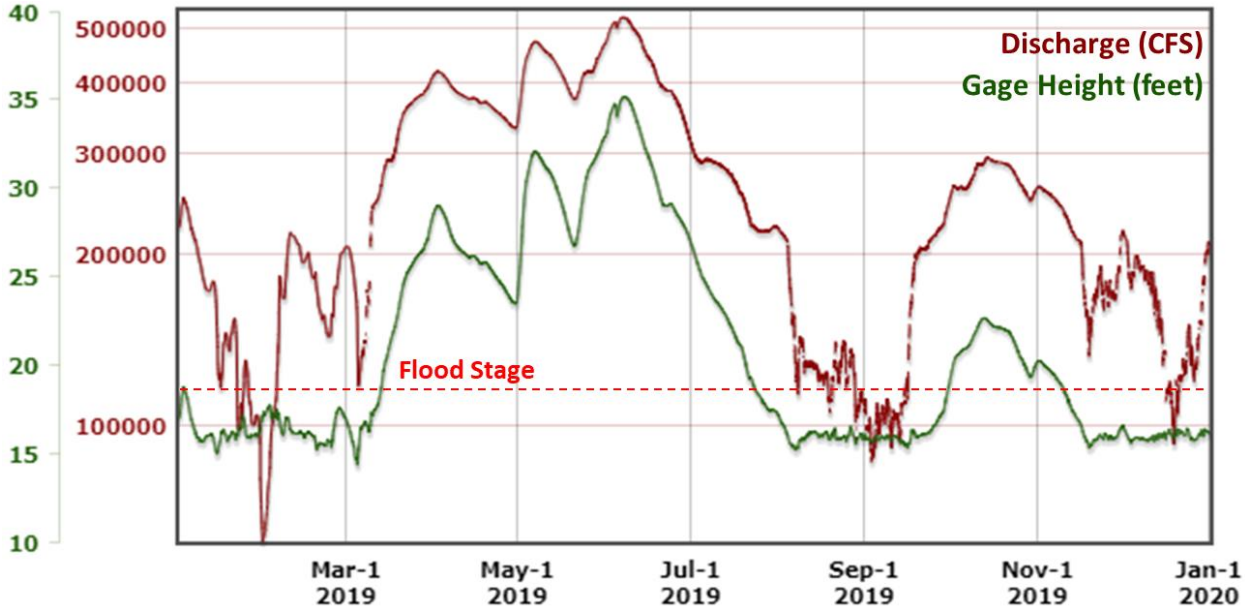


Figure 7: *Upper Mississippi River at Grafton IL (USGS 05587450). The National Weather Service recognizes river flood stage at 18'.*

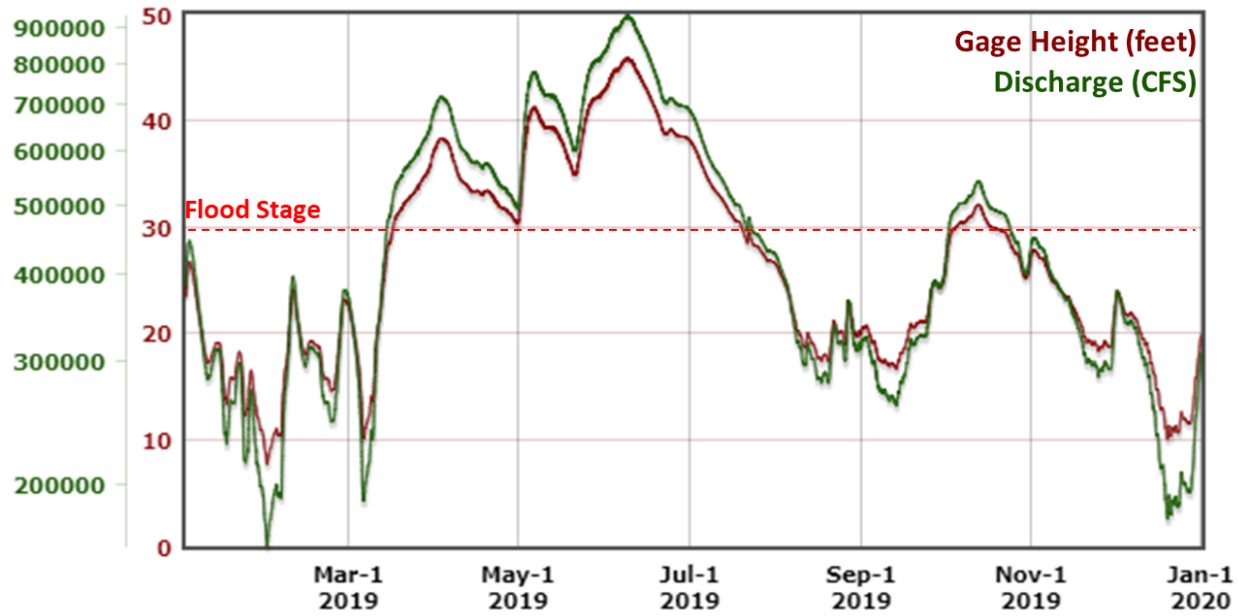


Figure 8: *Saint Louis Harbor at St Louis, MO (USGS 07010000). The National Weather Service recognizes river flood stage at 30'.*

River Discharge and Stage Summary: *Continued*

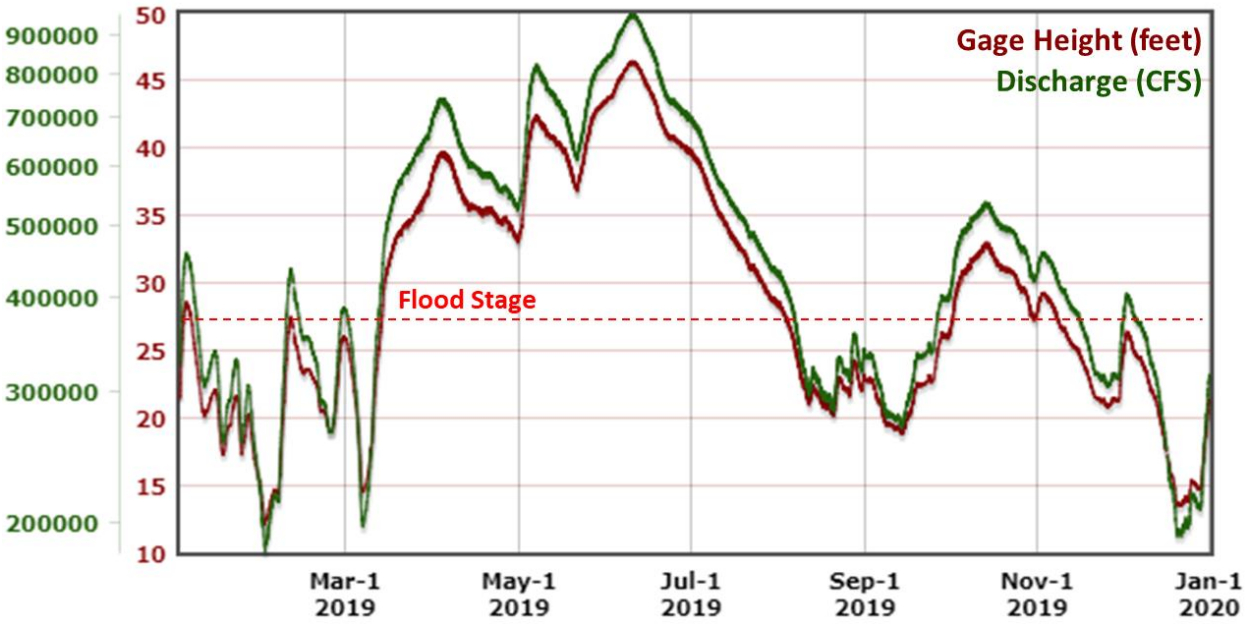


Figure 9: *Middle Mississippi River at Chester, IL (USGS 07020500). The National Weather Service recognizes river flood stage at 27'.*

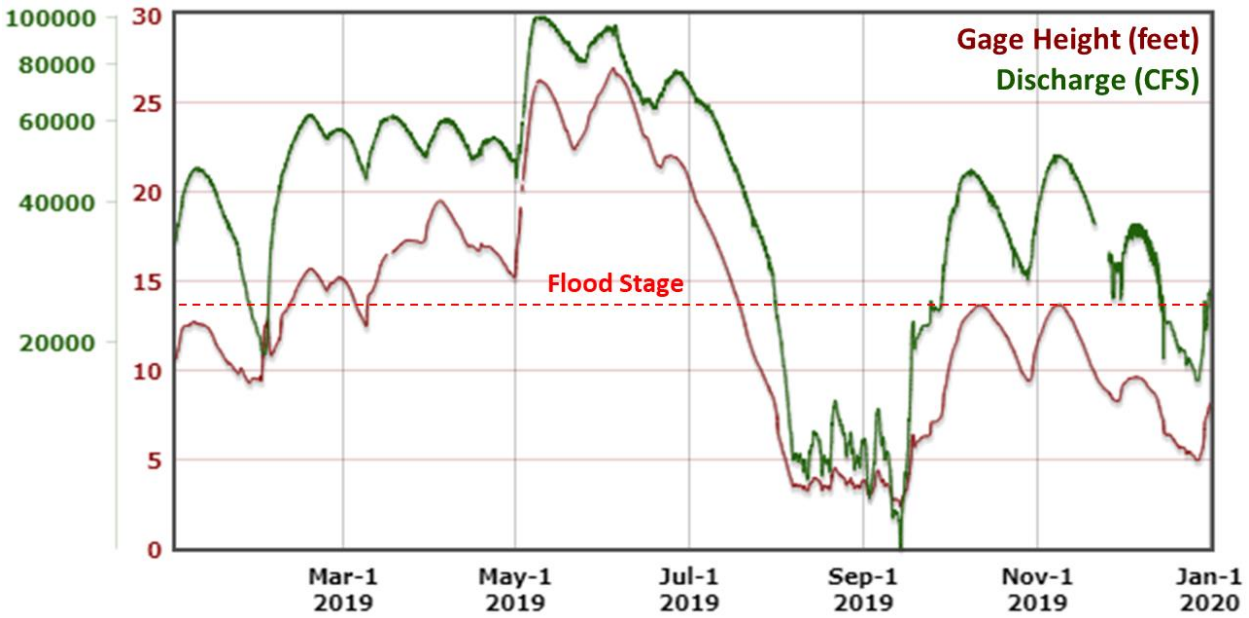
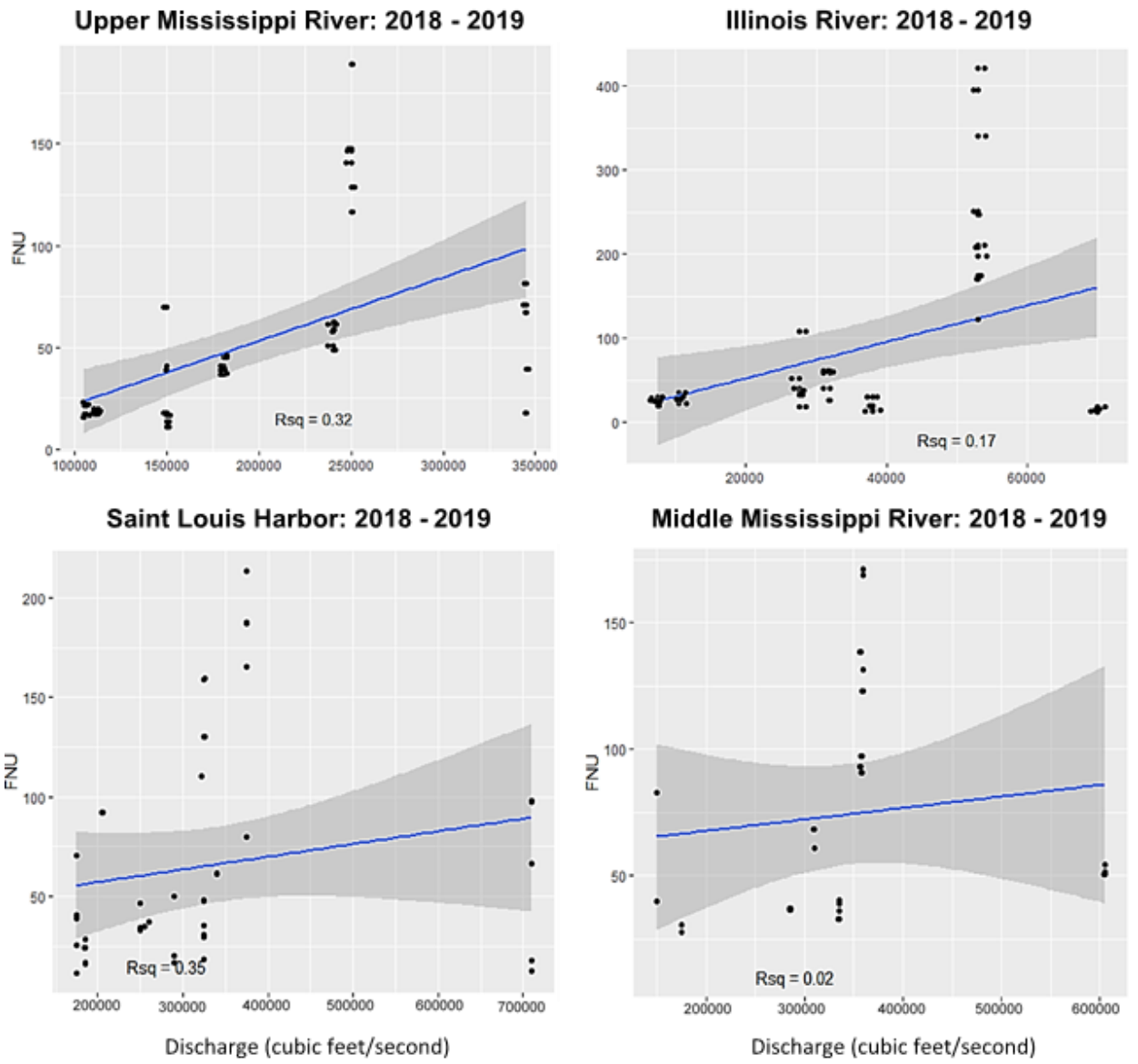


Figure 10: *Illinois River at Valley City, IL (USGS 05586100). The National Weather Service recognizes river flood stage at 14'.*

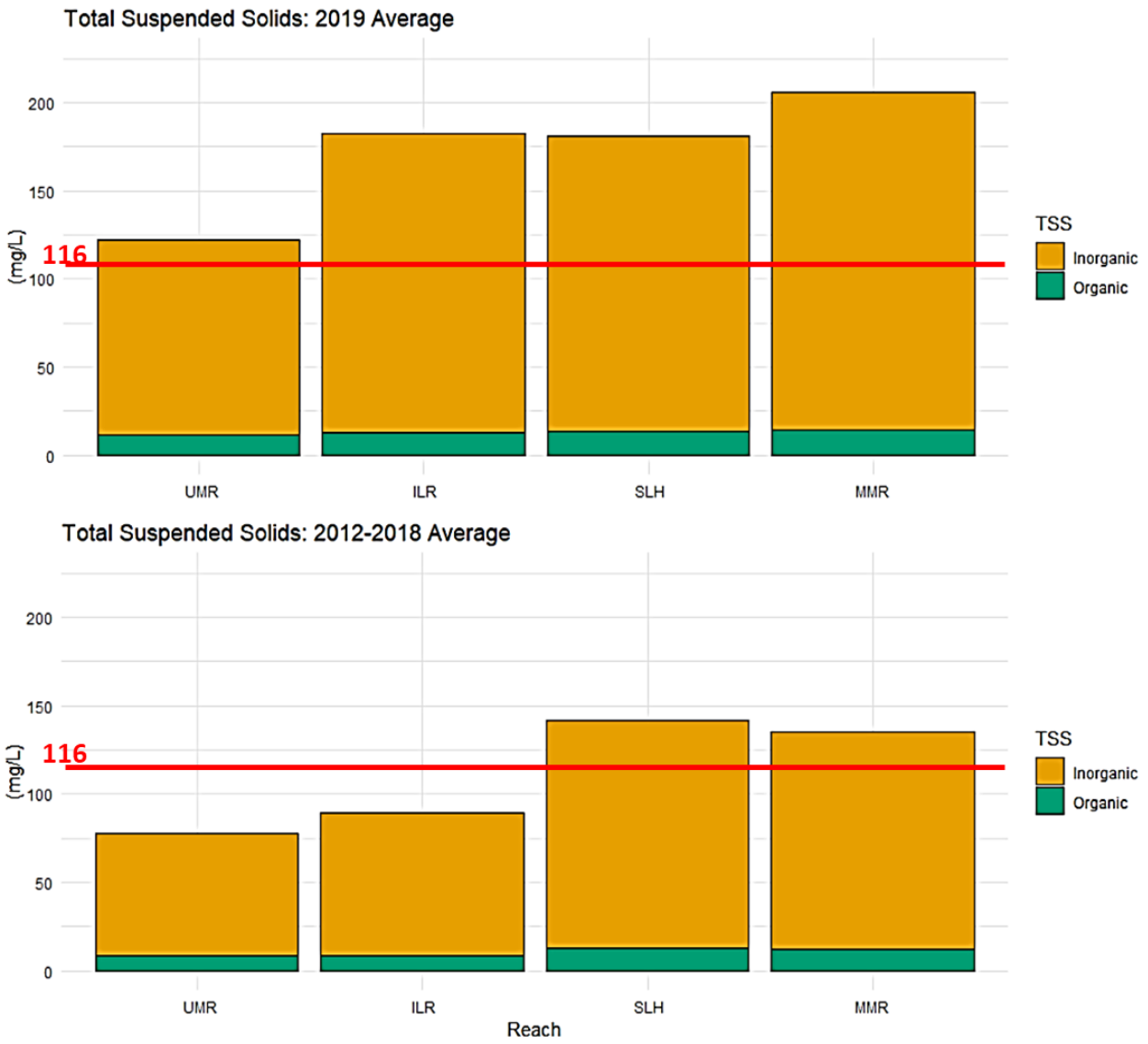
Turbidity and River Discharge Relationship (2018-2019)



		2018				2019			
Metric	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
Turbidity	ILR	24	46.51	76.64	27.90	20	27.45	99.22	66.64
	UMR	28	38.79	36.98	6.86	18	53.38	70.89	29.27
	SLH	16	35.63	44.04	14.39	20	58.18	83.18	31.53
	MMR	8	38.36	47.93	16.84	15	90.79	87.97	27.12

Figure 11: *Turbidity during years 2018 and 2019 (MVS_EC-EQ began collecting turbidity in 2018). Turbidity data were not normally distributed and do not appear to have a linear relationship with river discharge. A non-linear function could be used to better describe the relationship. This study does not acknowledge a water quality criterion for turbidity.*

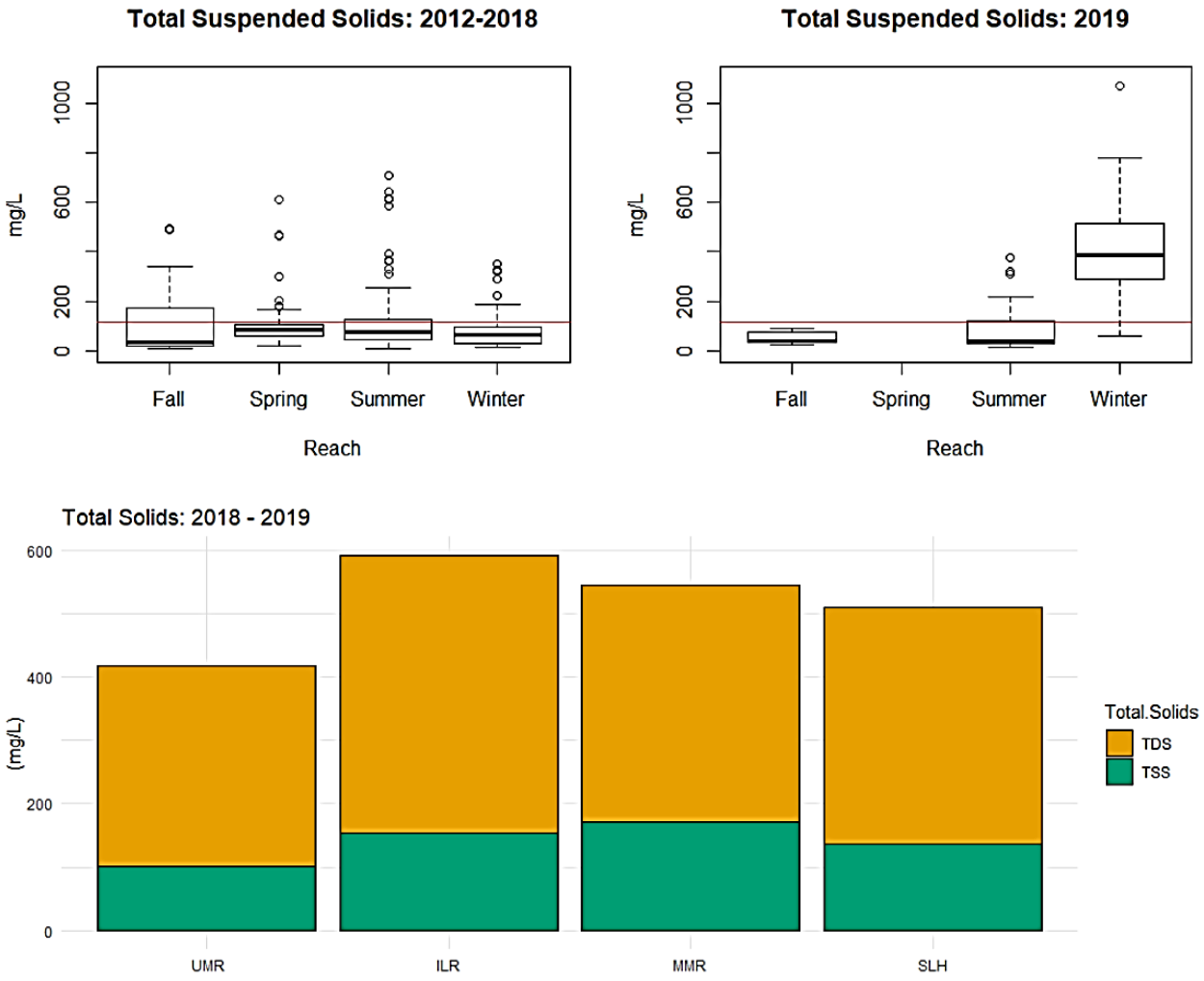
Total Suspended Solids Summary (Organic vs Inorganic)



		2012-2018				2019			
Metric	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
Inorganic	ILR	60	56.35	80.72	20.54	20	37.00	169.85	132.73
(NVSS)	UMR	156	62.05	69.19	7.60	26	32.40	110.53	50.07
	SLH	111	76	128.73	27.85	20	72.20	167.24	82.28
	MMR	46	92.45	123.00	28.03	15	184.00	191.50	64.10
Organic	ILR	60	7.40	8.62	1.29	20	4.49	12.89	7.95
(VSS)	UMR	156	7.55	8.19	0.64	26	8.40	11.60	3.36
	SLH	110	8.4	12.82	2.33	19	9.33	13.61	4.83
	MMR	46	9.67	11.94	2.34	15	15.00	14.49	4.32

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. Total Suspended Solids study criterion was 116 mg/L.*

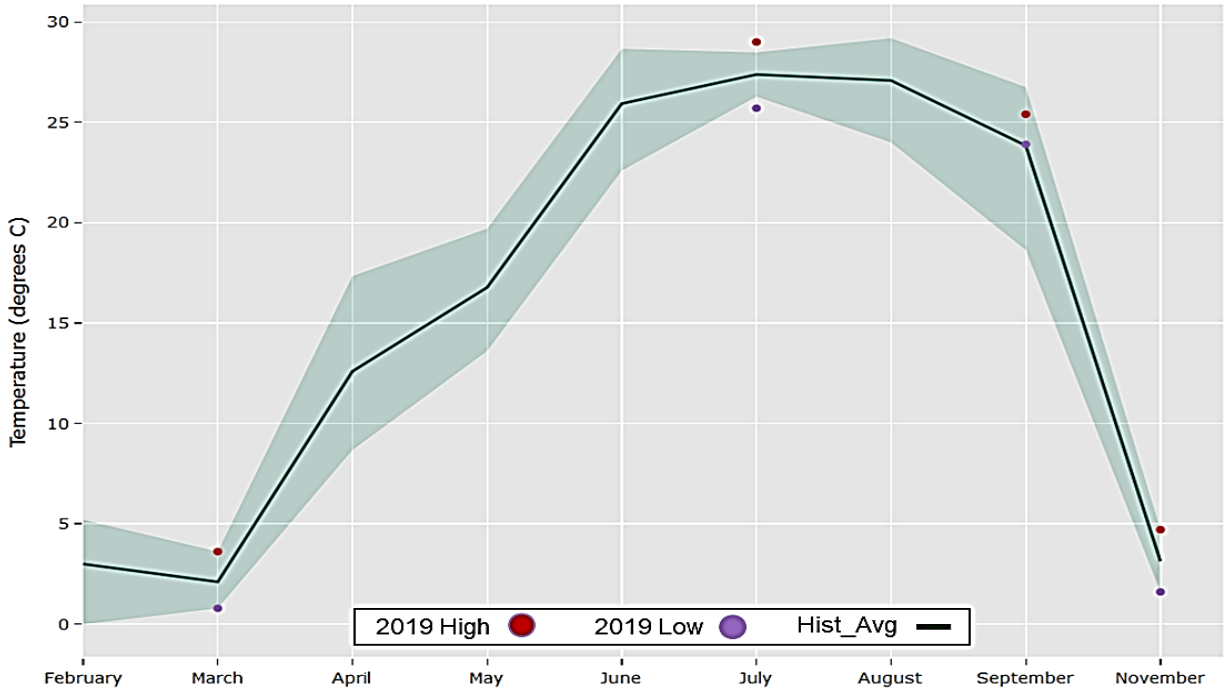
Total Solids (TSS + TDS)



		2012-2018 Total Suspended Solids				2019 Total Suspended Solids			
Metric	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
TSS	ILR	60	63.20	89.34	21.74	20	41.40	182.75	140.66
	UMR	156	68.65	77.38	8.14	26	40.20	122.14	53.31
	SLH	110	85.75	142.72	30.19	19	84.00	189.66	89.47
	MMR	46	99.8	134.94	30.23	15	199.00	205.99	68.33
TDS	ILR	24	468.23	455.45	20.62	20	429.00	414.80	24.72
	UMR	28	324.50	327.95	8.85	26	306.00	304.81	12.75
	SLH	16	414.40	404.28	29.57	20	338.50	349.00	18.67
	MMR	8	395.50	396.82	11.41	15	345.00	360.87	17.34

Figure 13: *A Wilcoxon Signed Ranks Test indicated that Total Suspended Solids (TSS) on the Middle Mississippi River during 2019 was significantly greater than 116 mg/L (Z = 95, p < 0.05). Values for TSS at all study reaches were greatest during the winter sampling event, which took place during the buildup of the 2019 flood event. All Total Dissolved Solid values were significantly less than the study criterion of 500 mg/L in 2019.*

Seasonal Water Temperature: Average, Highs, and Lows: 2012 - 2019

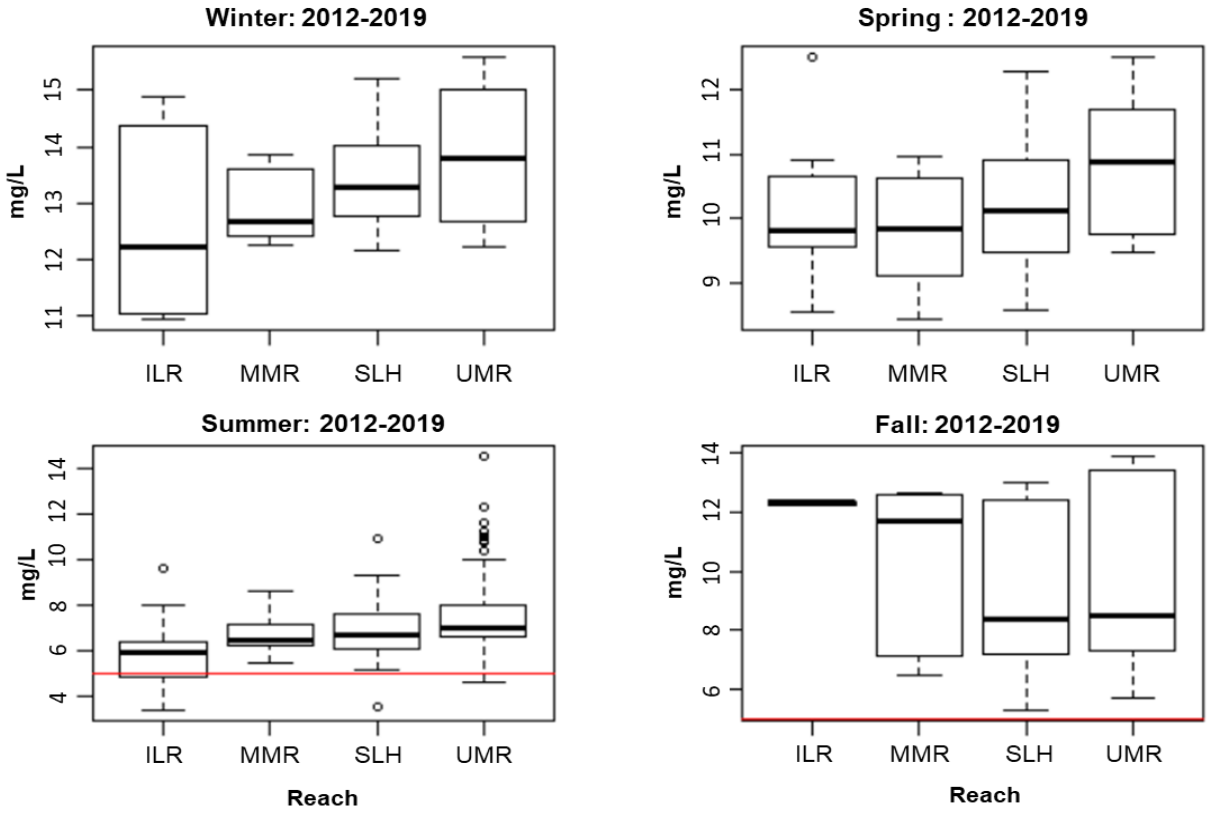


		2012-2018 Seasonal Temperatures				2019 Seasonal Temperatures			
Season	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
Winter	ILR	12	3.75	4.04	0.45	5	2.17	2.20	0.38
	UMR	14	1.45	1.46	0.67	7	1.17	1.35	0.52
	SLH	10	3.15	3.34	0.96	5	2.44	2.49	0.90
	MMR	4	4.33	4.29	1.25	4	2.69	2.81	0.58
Spring	ILR	24	14.58	14.71	1.47	-	-	-	-
	UMR	28	12.15	12.63	1.22	-	-	-	-
	SLH	22	12.42	13.12	1.22	-	-	-	-
	MMR	10	11.81	12.77	1.48	-	-	-	-
Summer	ILR	24	26.97	27.28	0.43	10	25.65	25.48	0.52
	UMR	84	26.33	26.07	0.29	12	24.70	25.11	0.73
	SLH	63	26.48	26.28	0.32	10	25.30	25.36	0.67
	MMR	28	26.93	26.52	0.46	7	24.90	26.39	1.99
Fall	ILR	-	-	-	-	5	3.40	3.38	0.06
	UMR	18	20.47	21.65	1.36	7	2.00	1.93	0.24
	SLH	9	21.35	22.55	1.36	4	4.00	3.88	1.01
	MMR	4	23.21	22.81	3.07	4	4.00	4.00	0.13

Figure 14: *Solid green line represents average temperature, and green shaded area shows the high and low monthly temperatures from 2012-2018. Red and purple dots represent high and low temperatures observed during 2019. Figure includes all river segments. All temperature observations were classified as acceptable by criteria used for this study.*

SUMMARY RESULTS: CHEMICAL CRITERIA

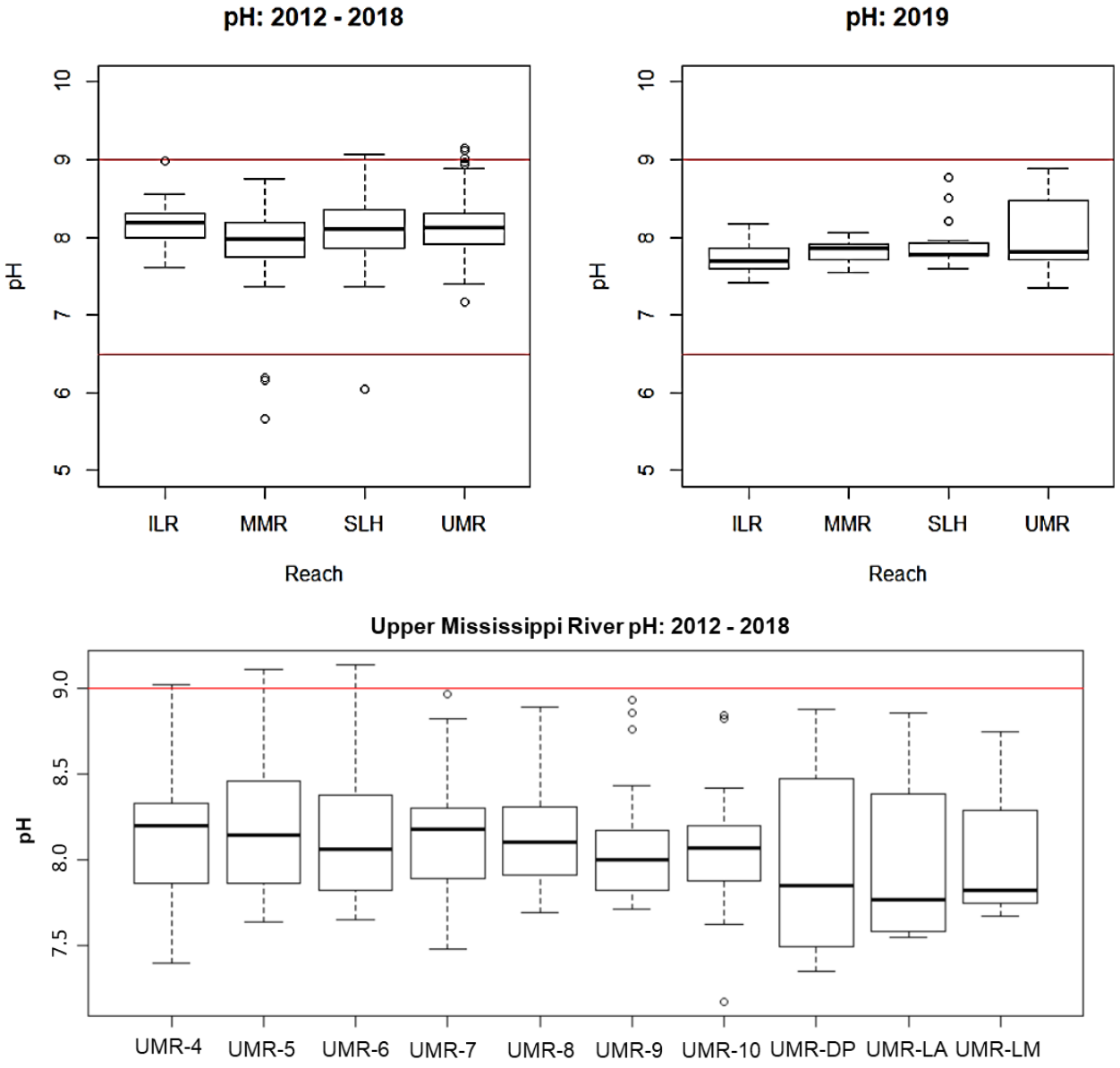
Seasonal Dissolved Oxygen: 2012 - 2019



		Dissolved Oxygen: 2012 - 2018				Dissolved Oxygen: 2019			
Season	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
Winter	ILR	12	13.05	12.83	1.13	5	12.24	12.63	1.14
	UMR	13	14.09	14.37	0.57	7	12.59	12.66	0.27
	SLH	10	13.95	13.90	0.62	5	12.73	12.63	0.37
	MMR	4	13.59	13.34	1.16	4	12.57	12.54	0.31
Spring	ILR	24	9.82	9.92	0.40	-	-	-	-
	UMR	28	10.88	10.78	0.39	-	-	-	-
	SLH	21	10.12	10.25	0.45	-	-	-	-
	MMR	10	9.85	9.84	0.65	-	-	-	-
Summer	ILR	24	5.71	5.33	0.67	10	6.55	6.62	0.37
	UMR	84	6.99	7.38	0.33	12	9.31	8.36	1.34
	SLH	63	6.88	6.84	0.27	10	6.17	6.39	0.72
	MMR	28	6.62	6.81	0.28	7	6.43	6.18	0.31
Fall	ILR	-	-	-	-	5	12.34	12.32	0.07
	UMR	21	7.71	7.84	0.59	7	13.65	13.70	0.16
	SLH	9	7.76	7.52	0.83	5	12.66	12.46	0.69
	MMR	4	7.14	7.94	3.26	4	12.60	12.58	0.13

Figure 15: *All values reported for dissolved oxygen during 2019 were within the acceptable criteria used in this study (> 5 mg/L).*

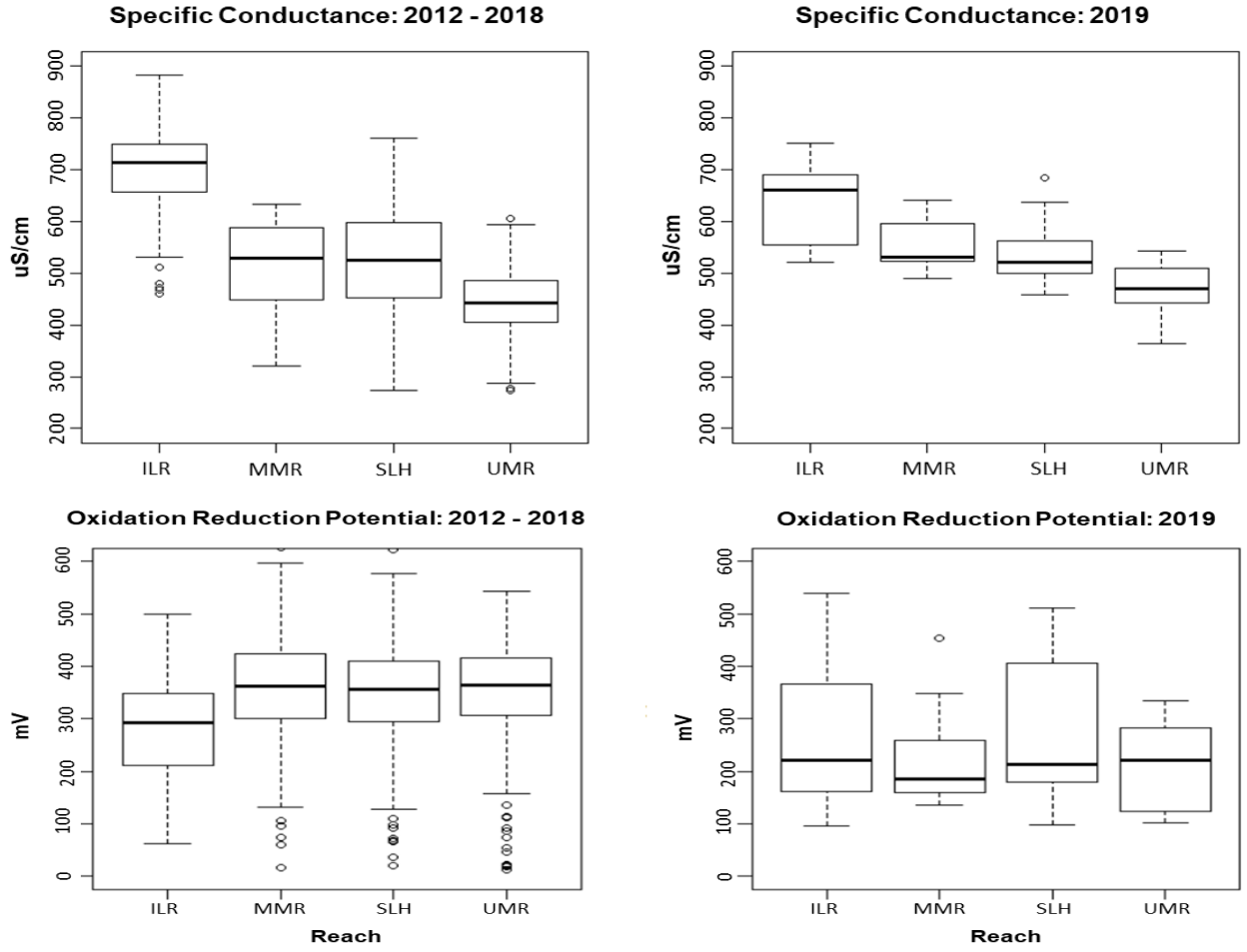
Seasonal Potential of Hydrogen (pH): 2012 - 2019



	pH: 2012-2018				pH: 2019			
Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
ILR	60	8.19	8.15	0.06	20	7.70	7.76	0.10
UMR	144	8.12	8.14	0.06	26	7.81	8.02	0.20
SLH	104	8.11	8.10	0.08	20	7.78	7.89	0.14
UMR	46	7.98	7.91	0.18	15	7.86	7.83	0.08

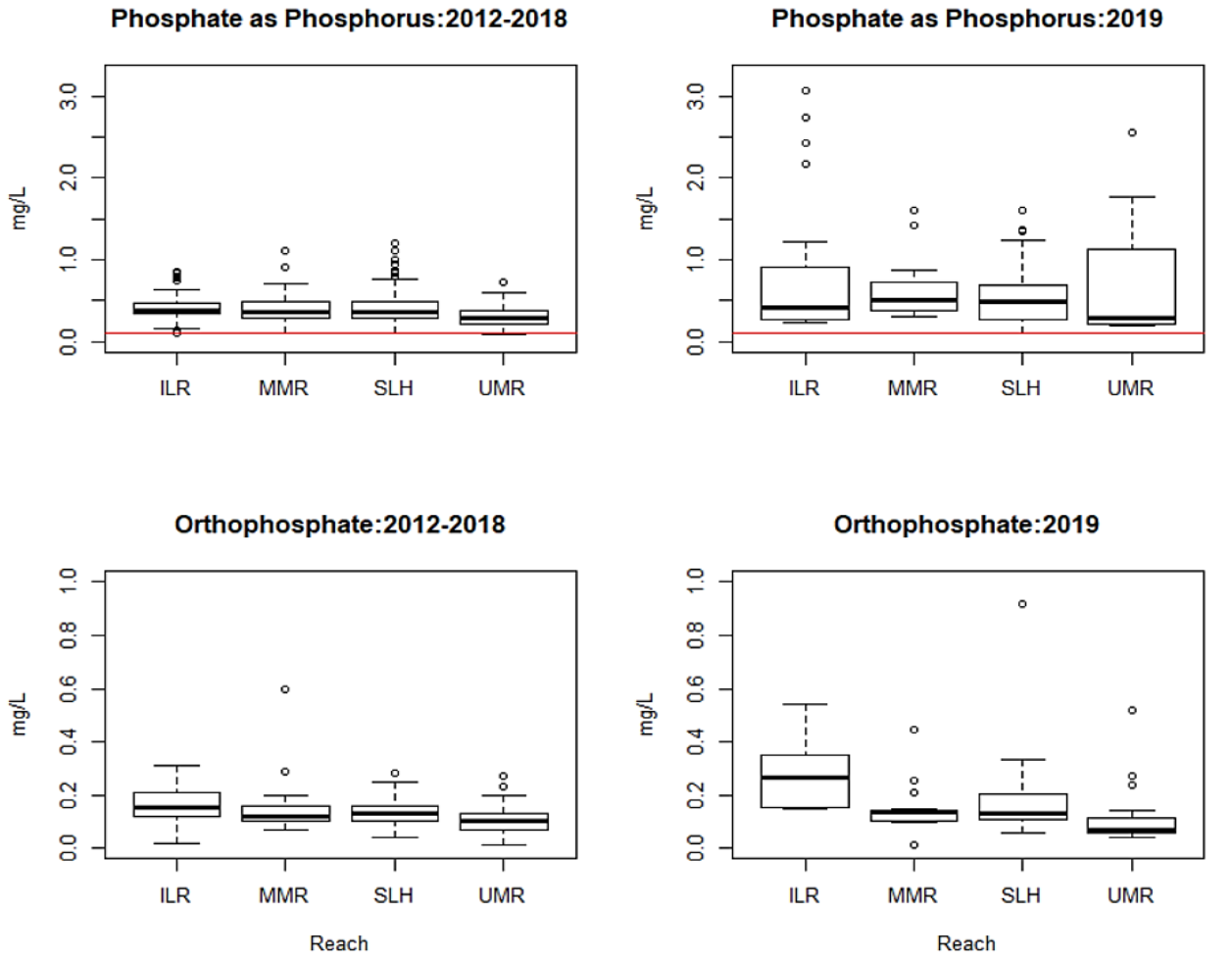
Figure 16: *All values reported for pH during 2019 were within the acceptable criteria used in this study (6.5 – 9.0).*

Specific Conductance and Oxidation Reduction Potential Summary



		Historical Water Quality: 2012-2018				Water Quality: 2019			
Metric	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
SpCond	ILR	60	714.70	695.11	25.04	20	660.55	638.31	39.99
	UMR	144	442.85	437.18	10.57	26	470.60	468.90	19.60
	SLH	103	526.00	527.70	20.20	20	520.60	536.87	28.70
	MMR	46	529.45	508.53	26.41	15	530.60	555.23	26.69
ORP	ILR	60	292.50	273.94	30.04	20	220.45	266.39	70.05
	UMR	144	365.00	343.87	20.65	26	220.95	212.79	30.50
	SLH	103	355.70	342.56	24.30	20	213.00	267.23	67.60
	MMR	46	361.50	338.73	42.24	15	185.30	223.54	50.93

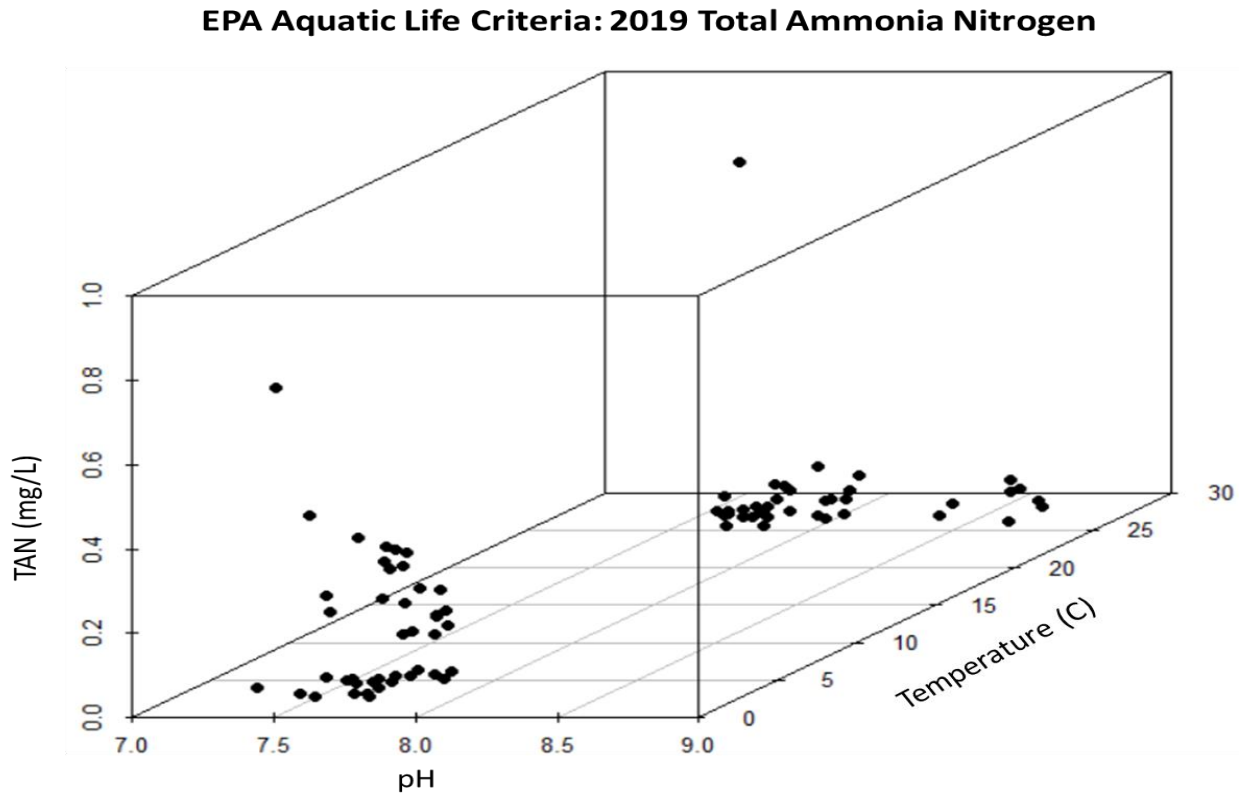
Figure 17: *Summary data for Specific Conductance (SpCond) and Oxidation Reduction Potential (ORP). Values for SpCond are reported in microsiemens per centimeter at 25°Celsius. Values for ORP are reported in millivolts (mV). This report does not acknowledge a water quality criterion for SpCond or ORP.*



		Water Quality Data: 2012-2018				Water Quality Data: 2019			
Metric	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
TP	ILR	60	0.38	0.40	0.04	20	0.41	0.85	0.44
	UMR	156	0.29	0.31	0.02	26	0.29	0.63	0.26
	SLH	111	0.36	0.42	0.04	20	0.48	0.59	0.21
	MMR	46	0.37	0.40	0.06	15	0.51	0.63	0.22
PO4	ILR	60	0.15	0.16	0.02	20	0.26	0.27	0.06
	UMR	156	0.10	0.10	0.01	26	0.07	0.11	0.04
	SLH	111	0.13	0.14	0.01	20	0.13	0.19	0.09
	MMR	46	0.12	0.14	0.02	15	0.14	0.15	0.05

Figure 18: *The median value for total phosphorus in 2019 exceeded the proposed criterion of 0.10 mg/L at all river segments ($p<0.05$). This study does not acknowledge a water quality criterion for orthophosphate.*

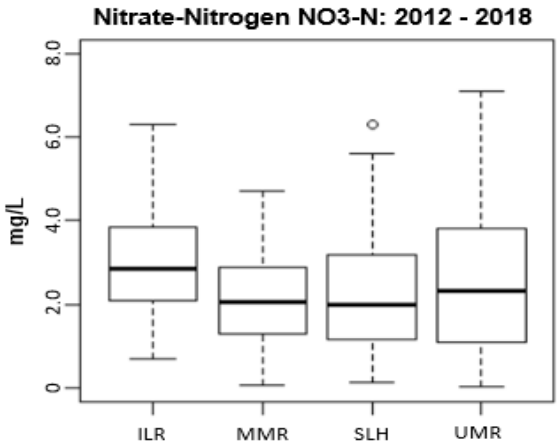
Seasonal Ammonia Nitrogen

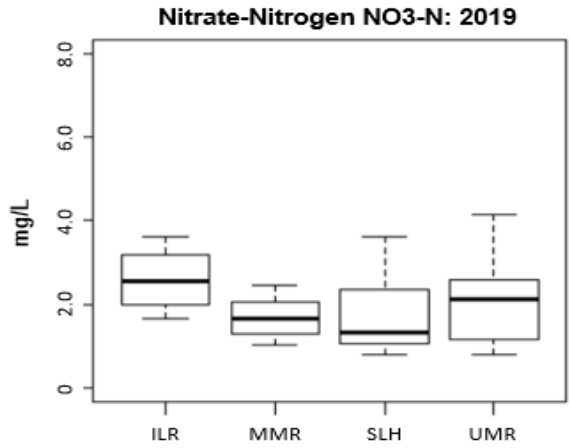


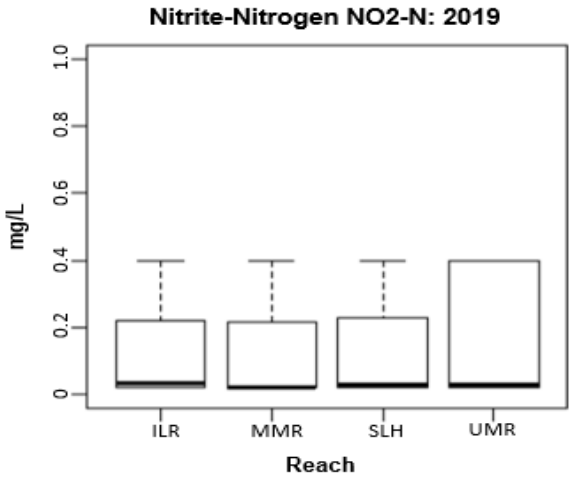
		Total Ammonia Nitrogen: 2012-2018				Total Ammonia Nitrogen: 2019			
Season	Reach	n	Mean	Median	CI (95%)	n	Mean	Median	CI (95%)
Winter	ILR	12	0.21	0.18	0.04	5	0.38	0.46	0.21
	UMR	14	0.28	0.32	0.08	7	0.32	0.31	0.04
	SLH	10	0.22	0.26	0.07	5	0.21	0.21	0.07
	MMR	4	0.21	0.19	0.07	4	0.18	0.18	0.04
Spring	ILR	24	0.08	0.09	0.02	-	-	-	-
	UMR	28	0.07	0.07	0.01	-	-	-	-
	SLH	22	0.09	0.10	0.02	-	-	-	-
	MMR	10	0.10	0.11	0.05	-	-	-	-
Summer	ILR	24	0.07	0.07	0.02	10	0.07	0.14	0.18
	UMR	93	0.08	0.09	0.02	12	0.05	0.06	0.02
	SLH	66	0.08	0.09	0.02	10	0.03	0.05	0.03
	MMR	28	0.07	0.11	0.07	7	0.04	0.04	0.02
Fall	ILR	-	-	-	-	5	0.03	0.03	0.01
	UMR	21	0.08	0.09	0.02	7	0.02	0.03	0.01
	SLH	13	0.10	.010	0.02	5	0.03	0.05	0.06
	MMR	4	0.07	0.07	0.03	4	0.02	0.03	0.01

Figure 19: *Total Ammonia Nitrogen (TAN) is evaluated using EPA Aquatic Life Ambient Water Quality Criteria for Ammonia - Freshwater (EPA 2013). All 2019 measurements for TAN were below EPA threshold criteria.*

Nitrate and Nitrate Nitrogen Summary



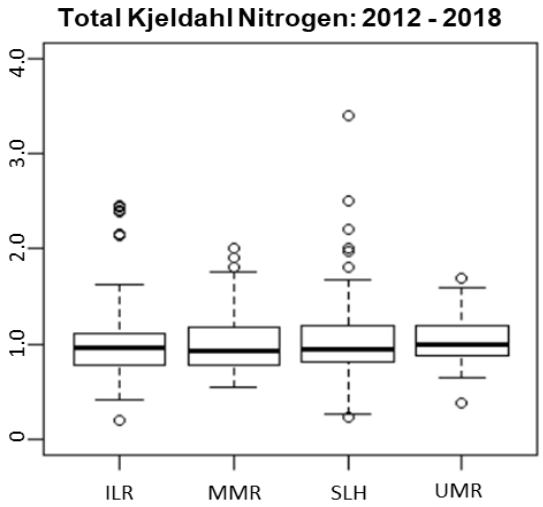


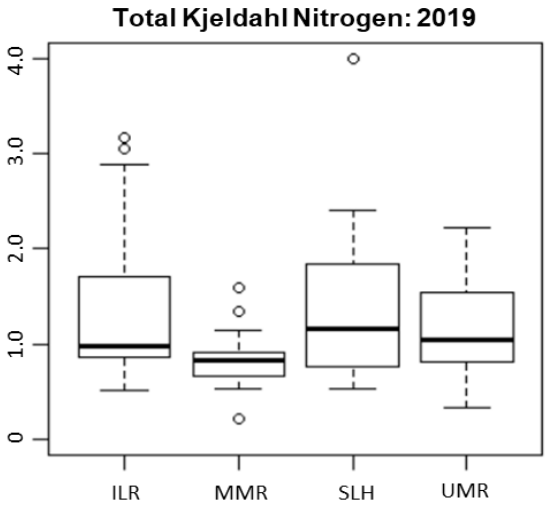


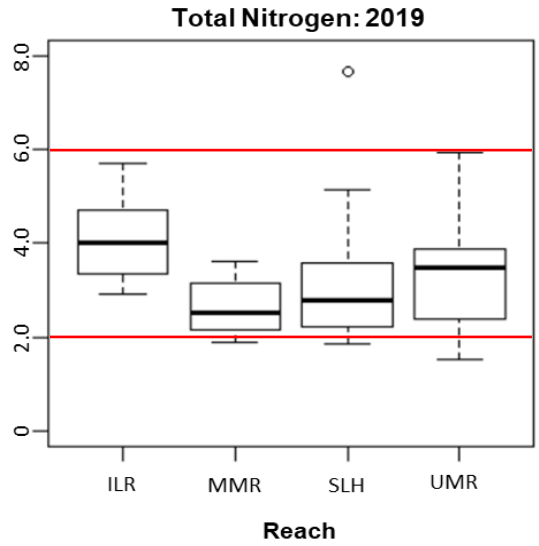
		Nitrogen: 2012-2018				Nitrogen: 2019			
Metric	Reach	n	Mean	Median	CI (95%)	n	Mean	Median	CI (95%)
NO2-N	ILR	-	-	-	-	20	0.03	0.12	0.08
	UMR	-	-	-	-	26	0.03	0.13	0.07
	SLH	-	-	-	-	20	0.03	0.12	0.08
	MMR	-	-	-	-	15	0.02	0.12	0.10
NO3-N	ILR	60	2.85	2.99	0.37	20	2.56	2.60	0.32
	UMR	156	2.33	2.59	0.29	26	2.11	2.06	0.38
	SLH	111	1.99	2.21	0.26	20	1.33	1.68	0.38
	MMR	46	2.05	2.12	0.34	15	1.66	1.70	0.28
NO2+N03	ILR	-	-	-	-	20	2.59	2.72	0.27
	UMR	-	-	-	-	26	2.14	2.18	0.33
	SLH	-	-	-	-	20	1.50	1.81	0.34
	MMR	-	-	-	-	15	1.68	1.82	0.21

Figure 20: *Nitrate (NO3-N) was collected at all river segments during the historical reference period. Both Illinois and Missouri recommend NO3-N not exceed 10 mg/L (human health criteria). Collection of nitrite (NO2-N) began in 2019. This study does not identify specific water quality criteria for NO2-N.*

Total Kjeldahl Nitrogen and Total Nitrogen Summary



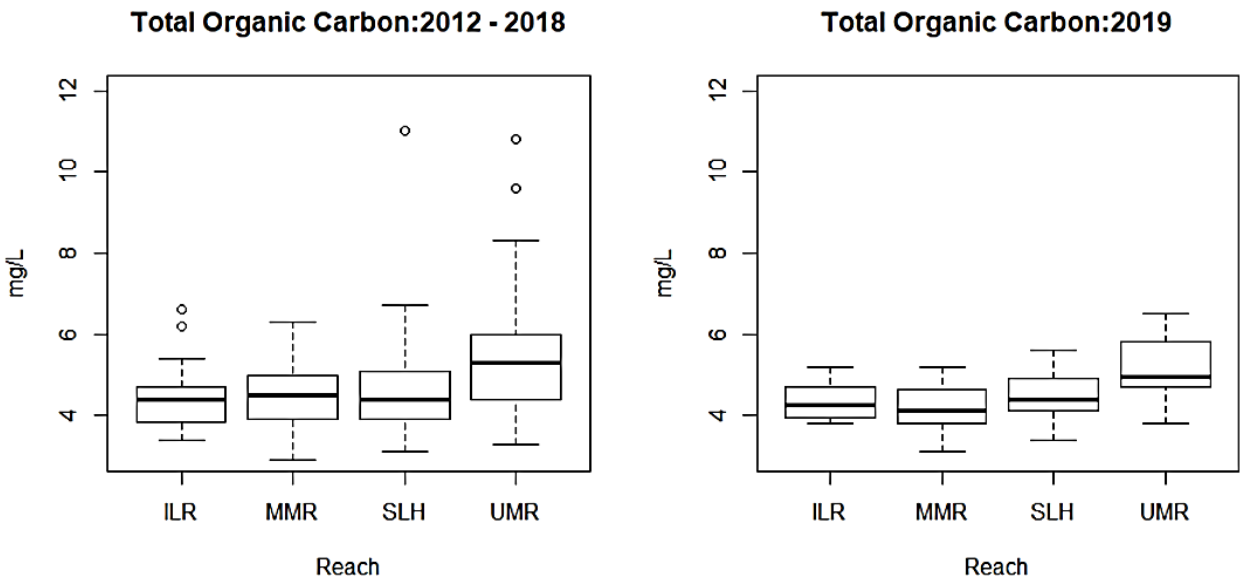




		Nitrogen: 2012-2018				Nitrogen: 2019			
Metric	Reach	n	Mean	Median	CI (95%)	n	Mean	Median	CI (95%)
TKN	ILR	60	0.96	1.07	0.13	20	0.98	1.38	0.41
	UMR	156	1.00	1.06	0.04	26	1.05	1.15	0.19
	SLH	111	0.94	1.07	0.08	20	1.16	1.36	0.39
	MMR	46	0.92	1.03	0.11	15	0.83	0.83	0.19
TN	ILR	-	-	-	-	20	4.02	4.10	0.42
	UMR	-	-	-	-	26	3.47	3.34	0.42
	SLH	-	-	-	-	20	2.80	3.17	0.66
	MMR	-	-	-	-	15	2.51	2.65	0.32

Figure 21: *Total Nitrogen (TN) is derived from the sum of NO2-N, NO3-N, and TKN. Based on literature review and guidance from the United States Environmental Protection Agency, this study recognizes an acceptable range for TN as 2 mg/L to 6 mg/L (aquatic life criteria). Overall, TN was within the acceptable range during 2019. This study does not acknowledge a criterion for Total Kjeldahl Nitrogen (TKN).*

Seasonal Total Organic Carbon

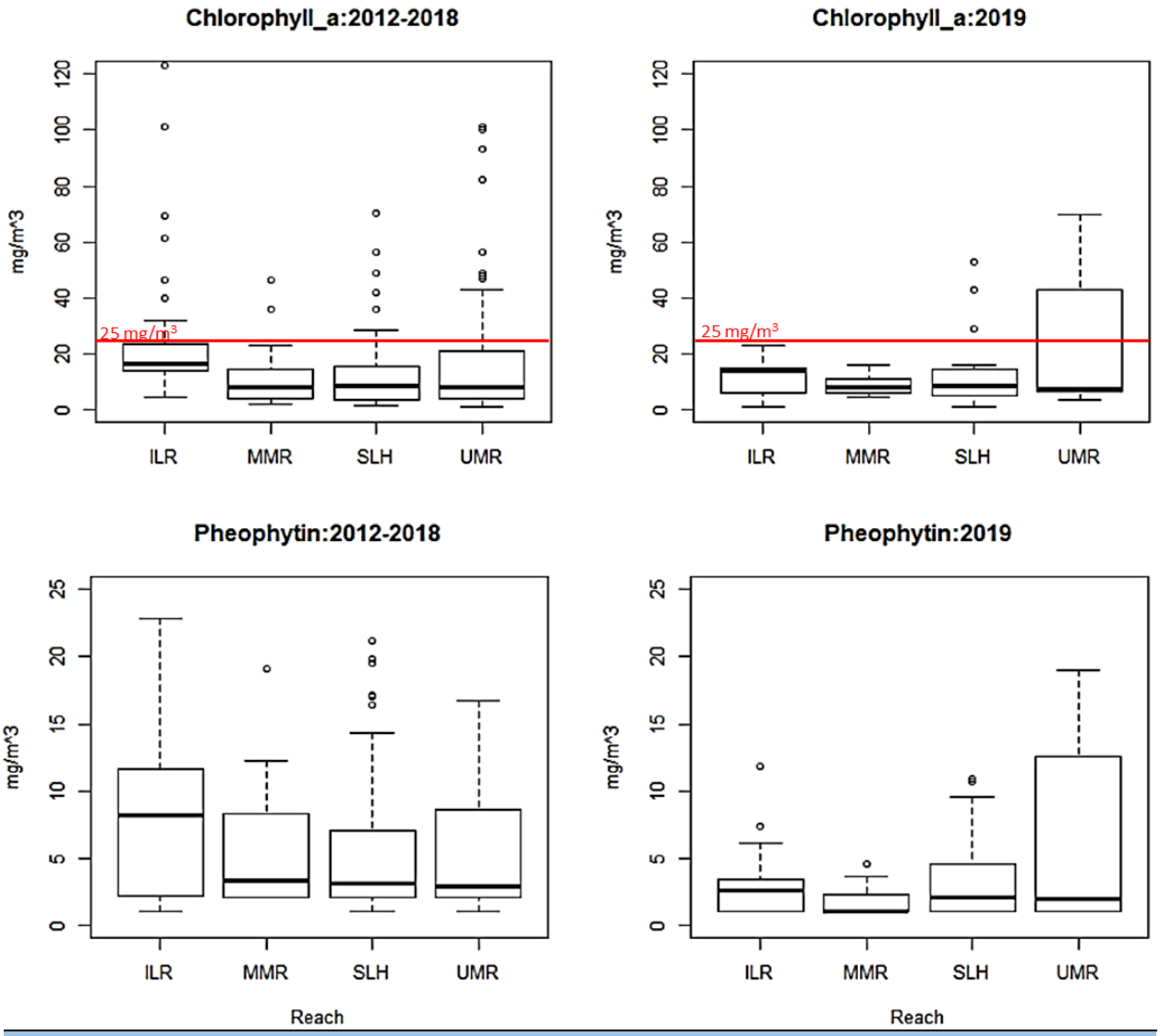


		Total Organic Carbon: 2012-2018				Total Organic Carbon: 2019			
Season	Reach	n	Mean	Median	CI (95%)	n	Mean	Median	CI (95%)
Winter	ILR	12	3.85	3.89	0.28	5	4.90	4.84	0.49
	UMR	14	4.75	4.61	0.20	7	4.90	4.94	0.64
	SLH	10	4.00	4.03	0.41	5	3.90	3.82	0.39
	MMR	4	3.90	3.85	0.40	4	3.50	3.52	0.70
Spring	ILR	24	4.30	4.33	0.23	-	-	-	-
	UMR	28	4.60	4.75	0.28	-	-	-	-
	SLH	22	4.45	4.75	0.68	-	-	-	-
	MMR	10	4.70	4.51	0.37	-	-	-	-
Summer	ILR	24	4.60	4.57	0.27	10	3.95	3.96	0.09
	UMR	93	5.40	5.46	0.26	12	4.80	4.63	0.26
	SLH	66	4.30	4.52	0.21	10	4.40	4.45	0.23
	MMR	28	4.50	4.61	0.34	7	4.10	4.11	0.38
Fall	ILR	-	-	-	-	5	4.70	4.66	0.14
	UMR	21	6.50	6.51	0.32	7	5.90	5.90	0.30
	SLH	13	5.80	5.13	0.83	5	5.30	5.20	0.44
	MMR	4	4.30	4.20	1.96	4	4.80	4.85	0.42

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

SUMMARY RESULTS: BIOLOGICAL CRITERIA

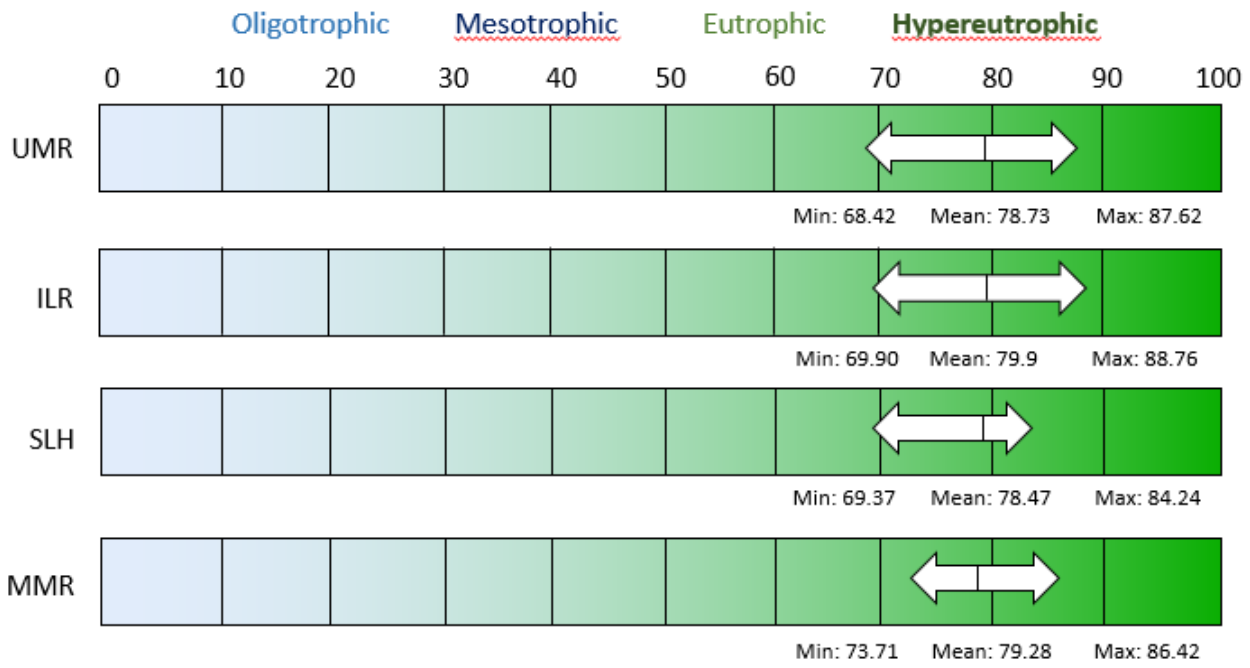
Chlorophyll a and Pheophytin Summary



		Water Quality Data: 2012-2018				Water Quality Data: 2019			
Metric	Reach	n	Median	Mean	CI (95%)	n	Median	Mean	CI (95%)
CHLa	ILR	60	16.50	23.04	5.22	20	13.60	11.54	3.08
	UMR	156	7.60	14.92	2.81	26	7.30	23.05	10.57
	SLH	111	8.50	11.05	2.10	20	8.30	12.73	6.35
	MMR	46	7.65	10.17	2.62	15	7.80	8.71	2.01
Pheo	ILR	60	8.15	7.92	1.42	30	2.55	3.01	1.25
	UMR	155	2.90	5.67	0.73	26	1.90	5.66	2.61
	SLH	111	3.10	5.24	0.88	20	2.05	3.42	1.60
	MMR	46	3.30	5.01	1.16	15	1.00	1.79	0.64

Figure 23: *Chlorophyll_a (CHLa) and Pheophytin summary data. Overall, 2019 CHLa observations were not statistically greater than the water quality criteria acknowledged by this study. There were no criteria used for evaluating Pheophytin.*

Carlson Trophic State Index: 2018 – 2019



<40 = Oligotrophic __ 40-60 = Mesotrophic __ 60-70 = Eutrophic __ >80 Hypereutrophic

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

DISCUSSION: WATER QUALITY

Water quality metrics assessed by CEMVS can be sporadic and highly variable from year to year, thus long-term data collection using consistent and comparable methodology is critical to identify trends and patterns. 0This 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.

Suspended sediments were a primary concern during the winter sampling event, which took place during the buildup of the 2019 flood event (week of March 10; Figure 13). During the sampling event, average TSS from all samples collected was 416 mg/L, which was significantly greater than this study's proposed criterion of 116 mg/L. Total suspended solids did however descend to ordinary levels during the summer sampling event ($\bar{x}$ = 76.85), which occurred towards the end the flood event. As previously discussed, suspended solids are of high concern because they affect 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 levels were also a concern during the winter sampling event which took place during the buildup of the 2019 flood event. Total phosphorus can be released from the sediment into the overlying water column, and the exchange of phosphorus across the sediment–water interface is closely related to the sediment biogeochemistry for the systems. Additional inputs may have resulted from upland runoff. Thus, the simultaneous elevated levels of TSS and TP were expected.

Sixteen of the twenty-seven TP samples collected during the 2019 winter sampling event exceeded *all* TP values observed from 2012–2018. Phosphorus is considered to be a limiting nutrient for primary producers (e.g., plants and algae); thus elevated levels of TP can stimulate rapid growth of algae which may cause depletion of DO during respiration and decaying processes. Given the cold temperatures and rapid flow, depleted DO was not an issue during the winter 2019.

Concentrations for Chl_a observed on the UMR reach during the September sampling event ($\bar{x}$ = 64.33) were relatively high when compared to historical reference data. Although neither the state of Illinois nor Missouri have numerical criteria designated for Chl_a, this study recognizes values exceeding 25 mg/m^3 having the potential for stimulating hypereutrophic conditions. Nevertheless, such conditions were not observed during the sampling event.

All remaining parameters evaluated during the 2019 water quality monitoring effort were within designated criteria or within historical reference norms. It is recommended that a minimum of four seasonal water quality monitoring events are performed during 2020. Lastly, sediment from within the navigation channel should also be evaluated at all 22 monitoring locations. One aspect of dredging that has not been adequately investigated

by CEMVS is the relation between sediment disturbance and release of sediment-bound contaminants into the overlying water column.

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APPENDIX A: WATER QUALITY SAMPLING EVENT MEMORANDUMS

CEMVS-EC-EQ 15 March 2019

MEMORANDUM FOR RECORD

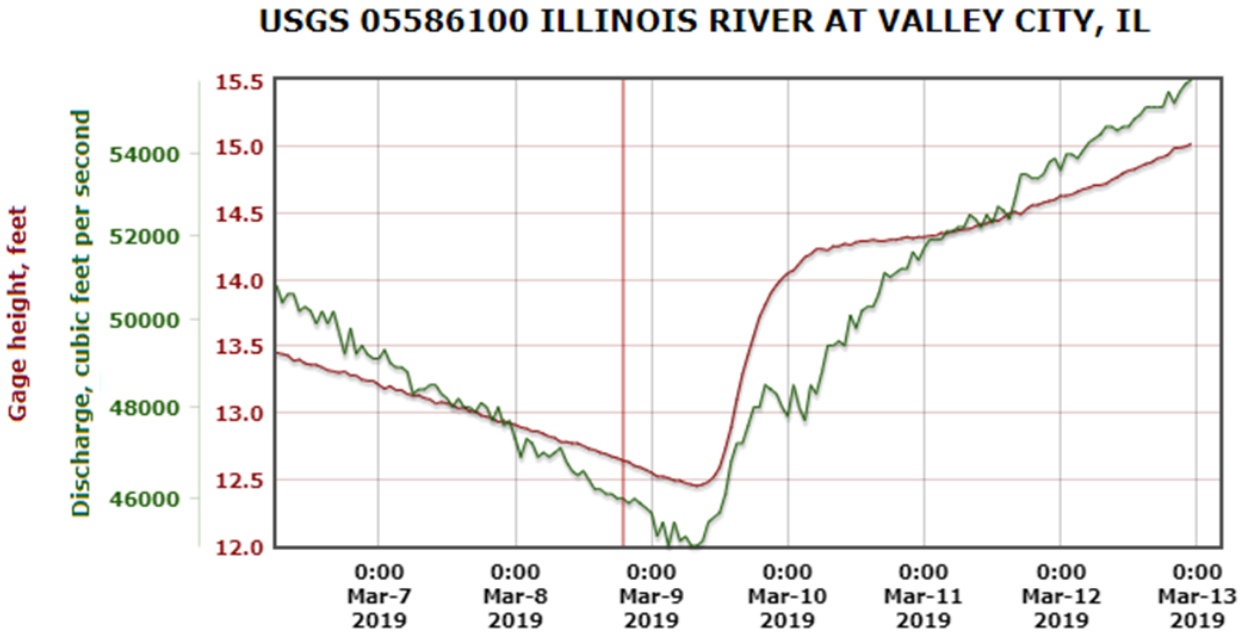
SUBJECT: River Water Quality Sampling (Winter Event ¼)

RIVERS WINTER SAMPLING EVENT ¼

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)

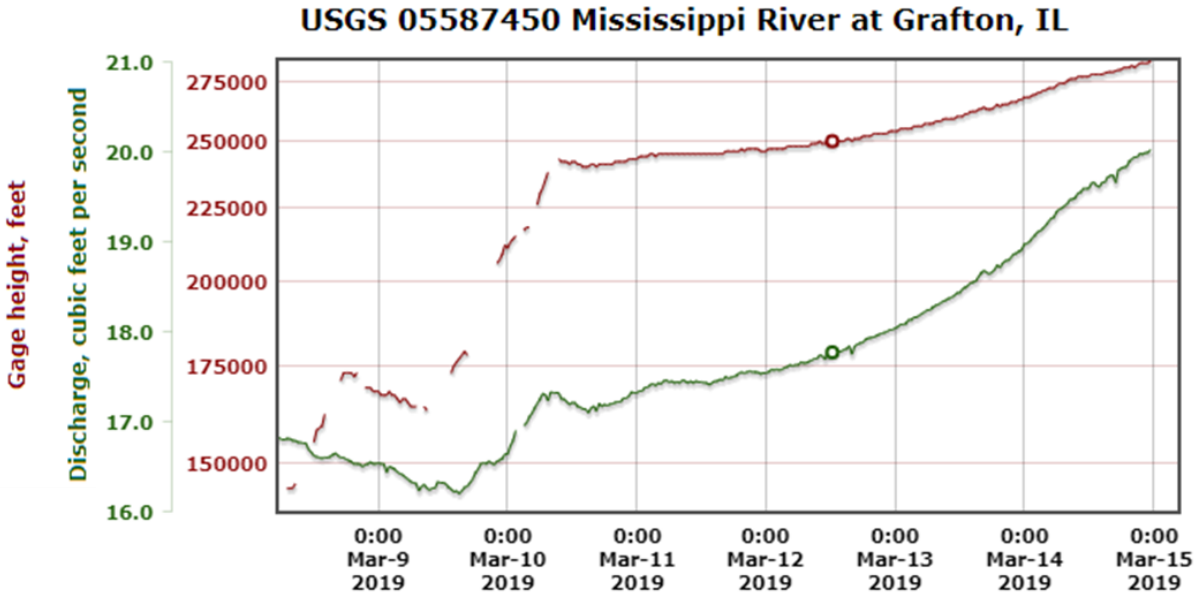
Samples for the ILR were collected on 3/11/2019 by Ben Greeling and Rick Archeski. Samples IL-07 and IL-08 were collected from shore due to flooding on boat ramps.



- 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)

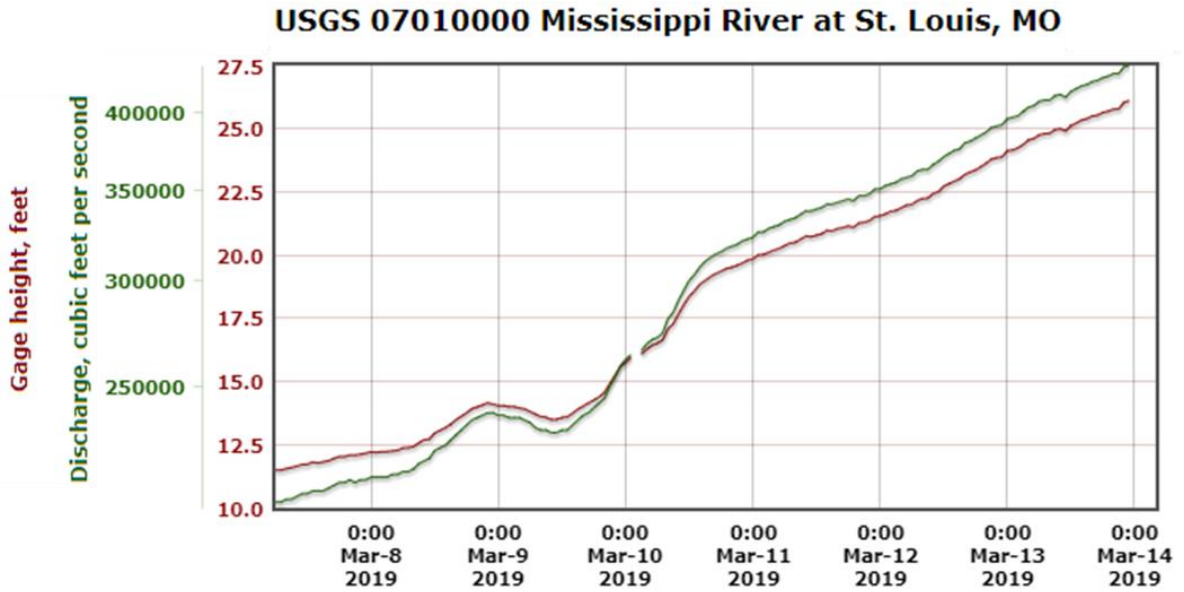
Samples from the Upper Mississippi River were collected on 13 March 2019 by Ben Greeling, Rick Archeski, and Travis Schepker. Samples UMR-5 and UMR-7 were collected from shore due to debris on boat ramps. The remaining UMR sites were collected from the navigation channel. Duplicate sample UMR-15 was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

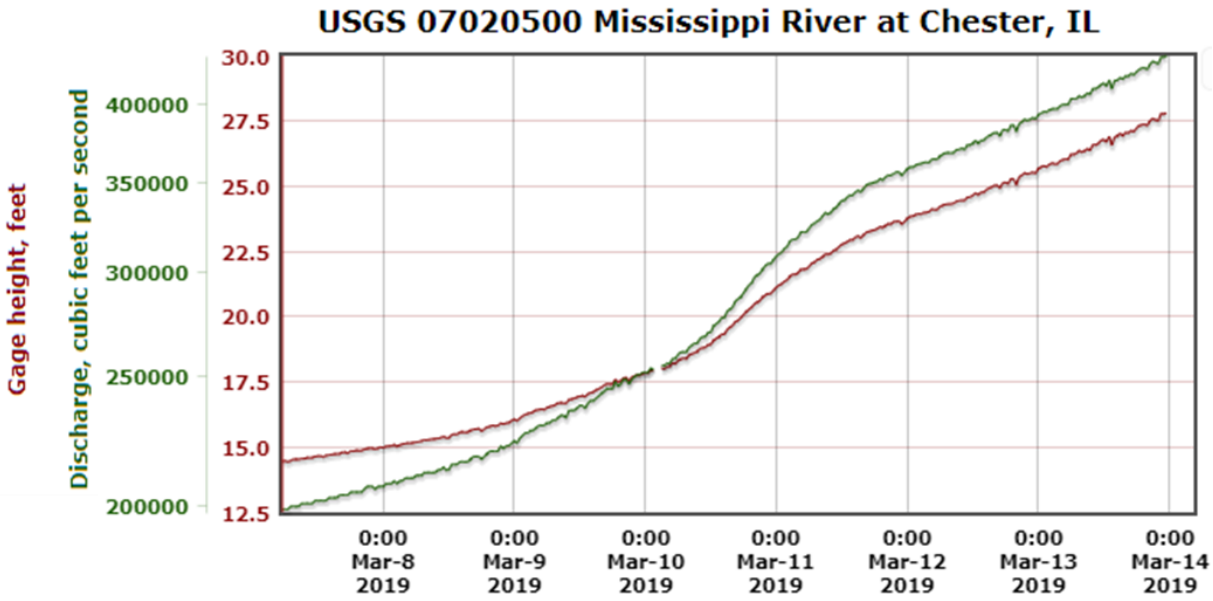
Samples from Saint Louis Harbor were collected on 11 March and 12 March 2019 by Ben Greeling and Travis Schepker. All samples were collected from the navigation channel except UMR-2, which was collected from the service base dredging dock. Duplicate sample SLH-15 was collected with SLH-1.



- 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

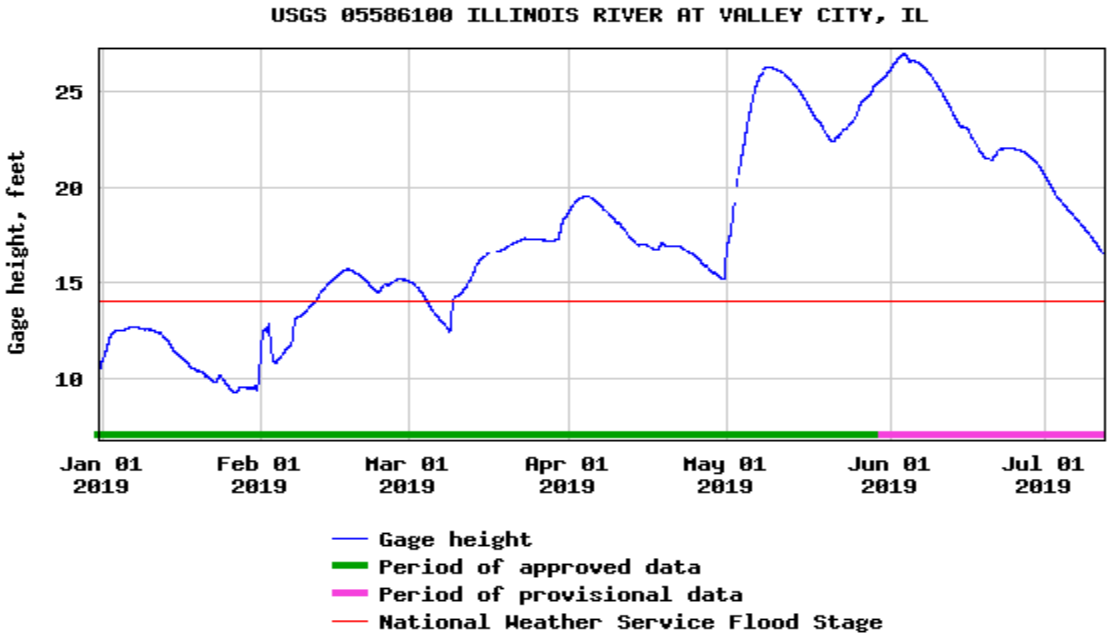
SUBJECT: River Water Quality Sampling (Summer Event 2/4)

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

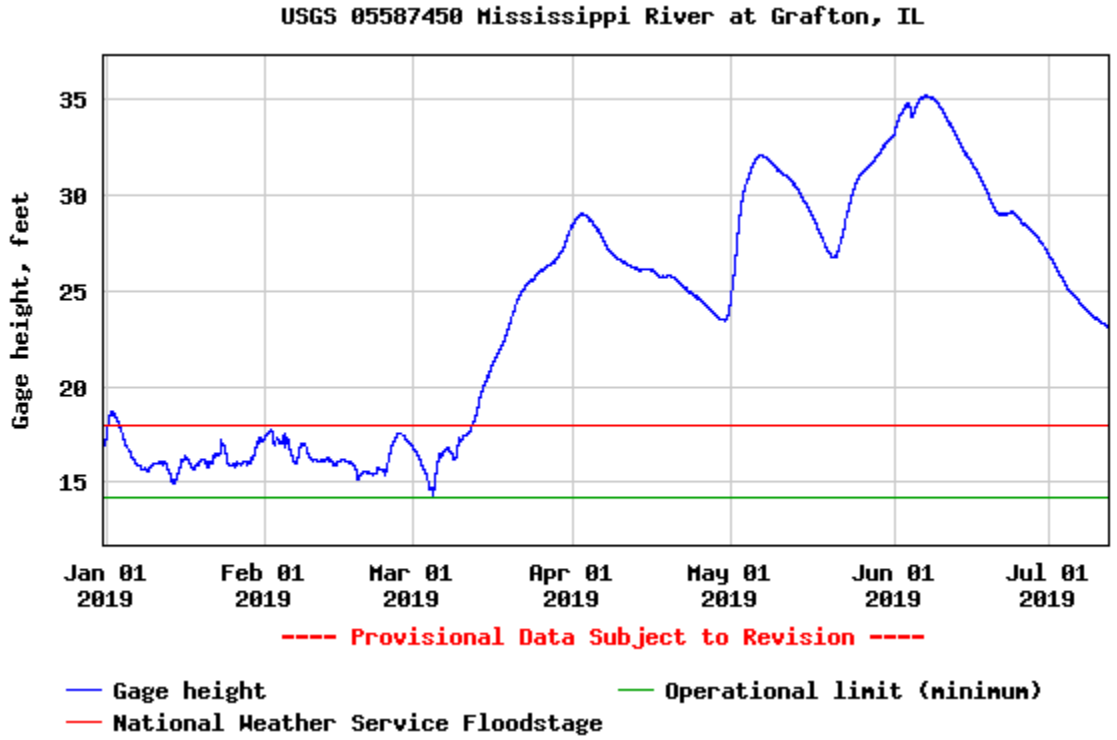
Samples for the ILR were collected on 07/01/2019 by Travis Schepker and Andy Patton. All samples were collected by land in areas with adequate flow. Exact locations are listed below:



- 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

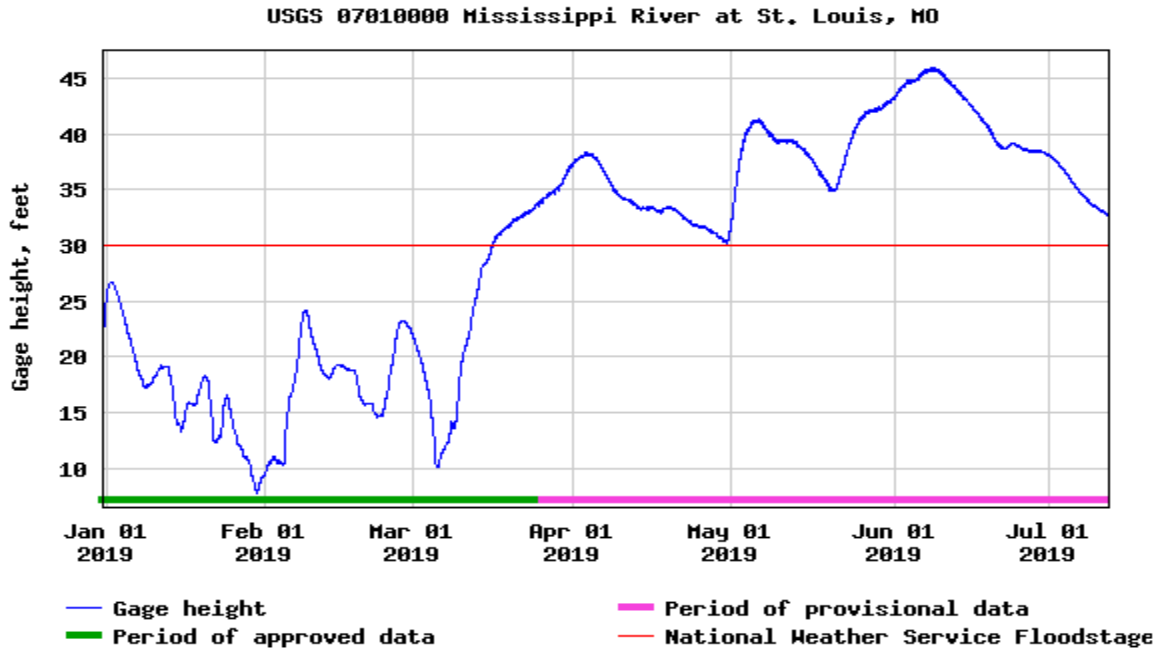
Samples for UMR were collected on 07/01/2019 and 07/02/2019 by Travis Schepker and Andy Patton. All samples were collected by land in areas with adequate flow. However, UMR-7 and UMR-LM were not collected since there were not accessible locations to the river that had adequate current/flow. Exact locations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

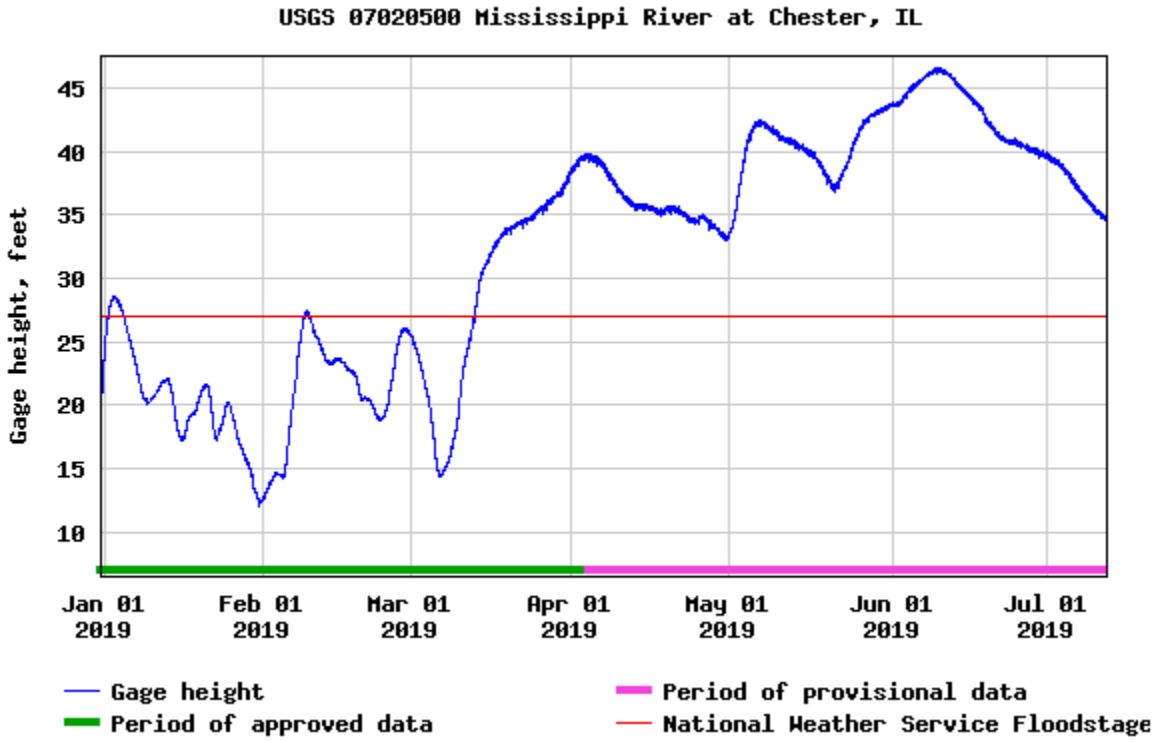
Samples for SLH were collected on 07/01/2019 by Travis Schepker and Andy Patton. All samples were collected by land in areas with adequate flow. Exact locations are listed below:



- 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

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

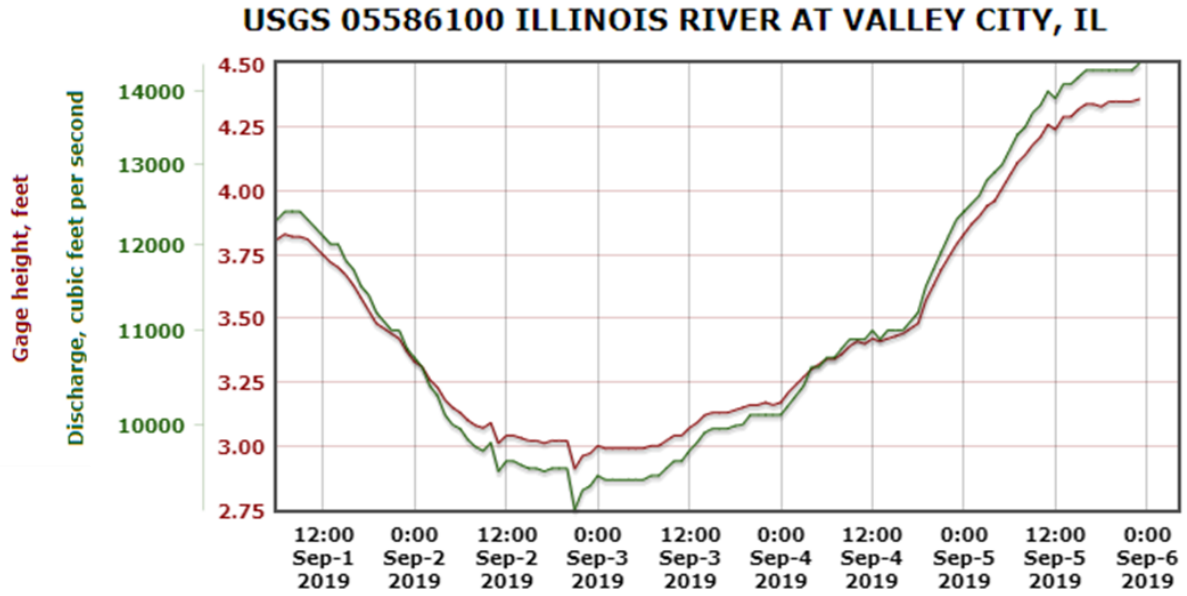
SUBJECT: River Water Quality Sampling (Summer Event 3/4)

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)

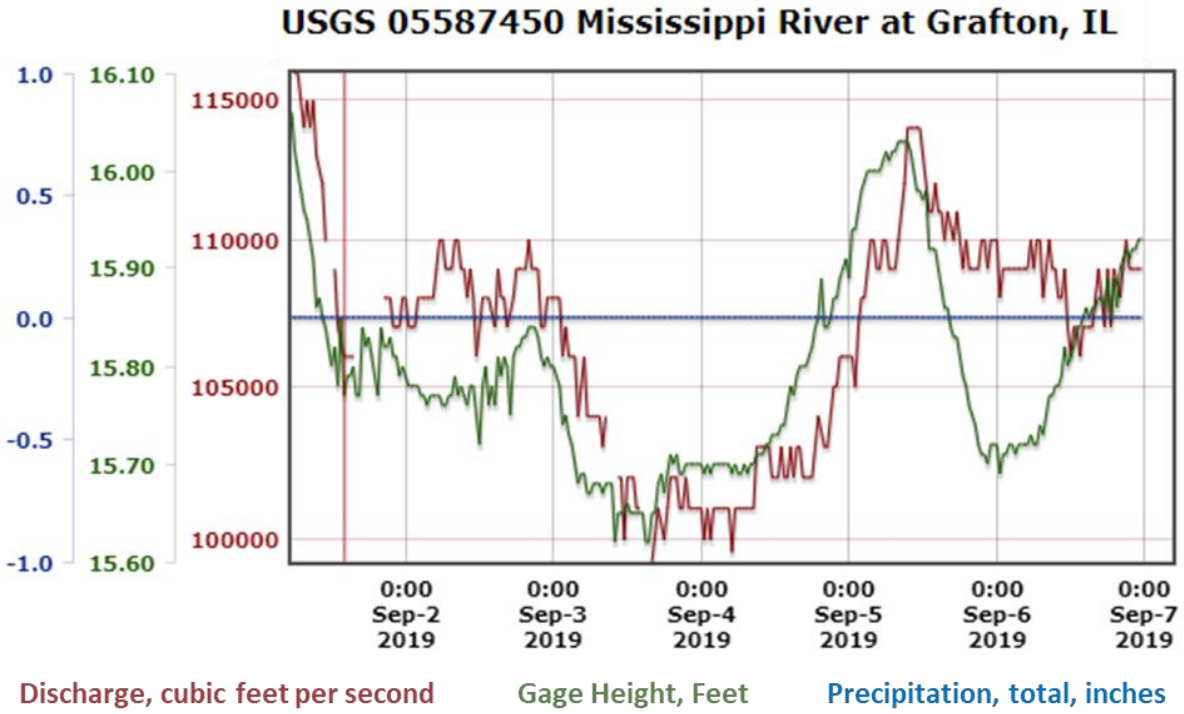
Samples for the ILR were collected on 09/04/2019 by Travis Schepker and Ben Greeling. All samples were collected from the navigation channel. No reported issues.



- 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)

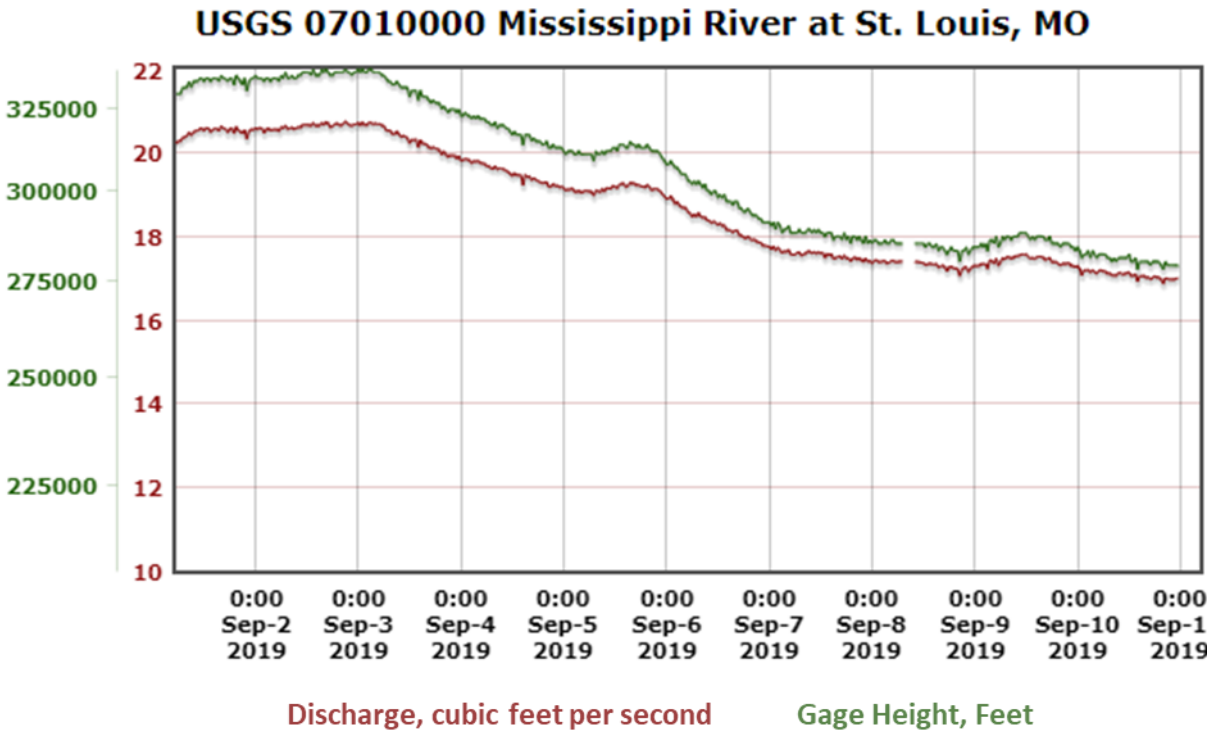
Samples for UMR were collected on 09/05/2019 by Travis Schepker and Ben Greeling. All samples were collected by boat within the navigation channel. No reported issues.



- 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)

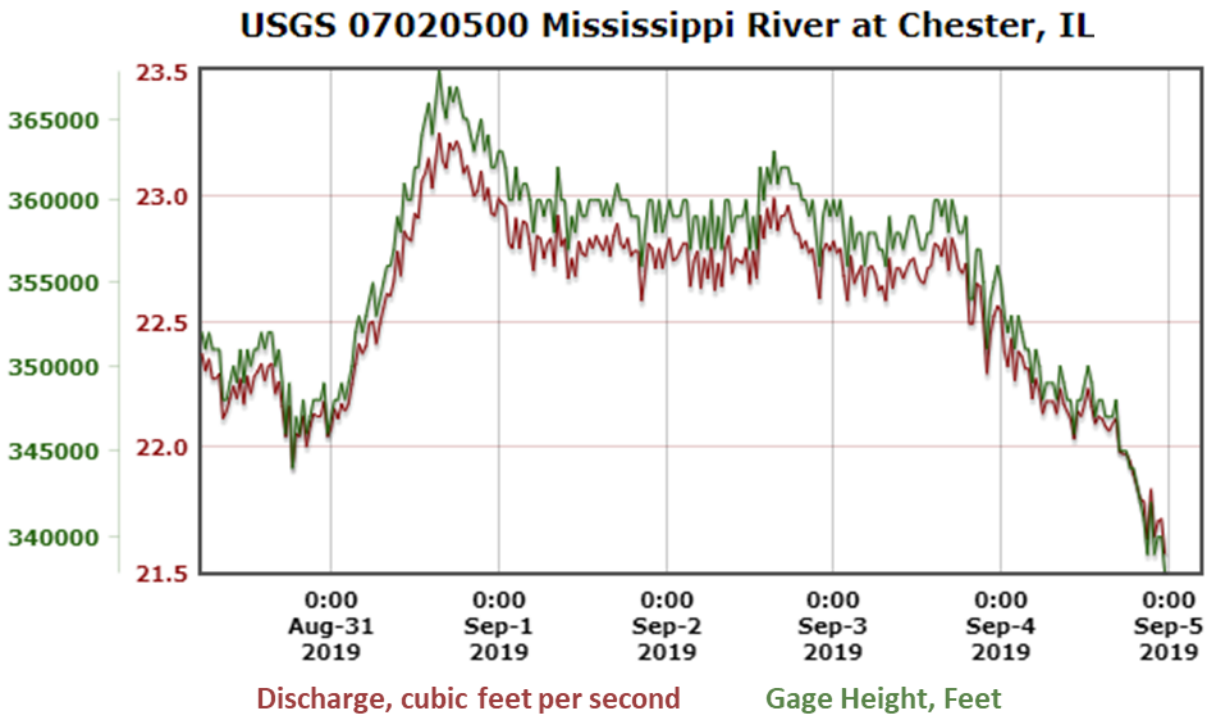
Samples from SLH were collected on 09/03/2019 and 09/09/2019 by Travis Schepker, Ben Greeling, and Grace Rodgers. All samples were collected from the navigation channel, with exception to SLH 2 which was collected from the USACE port. No major issues to report.



- 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

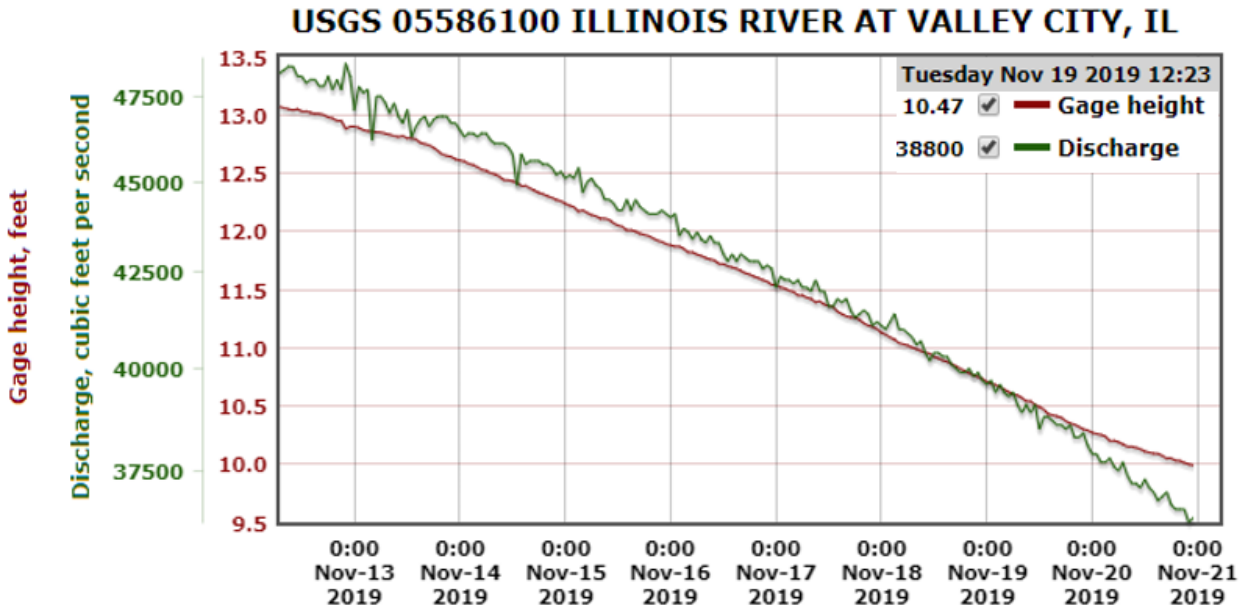
SUBJECT: River Water Quality Sampling (Fall Event 4/4)

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)

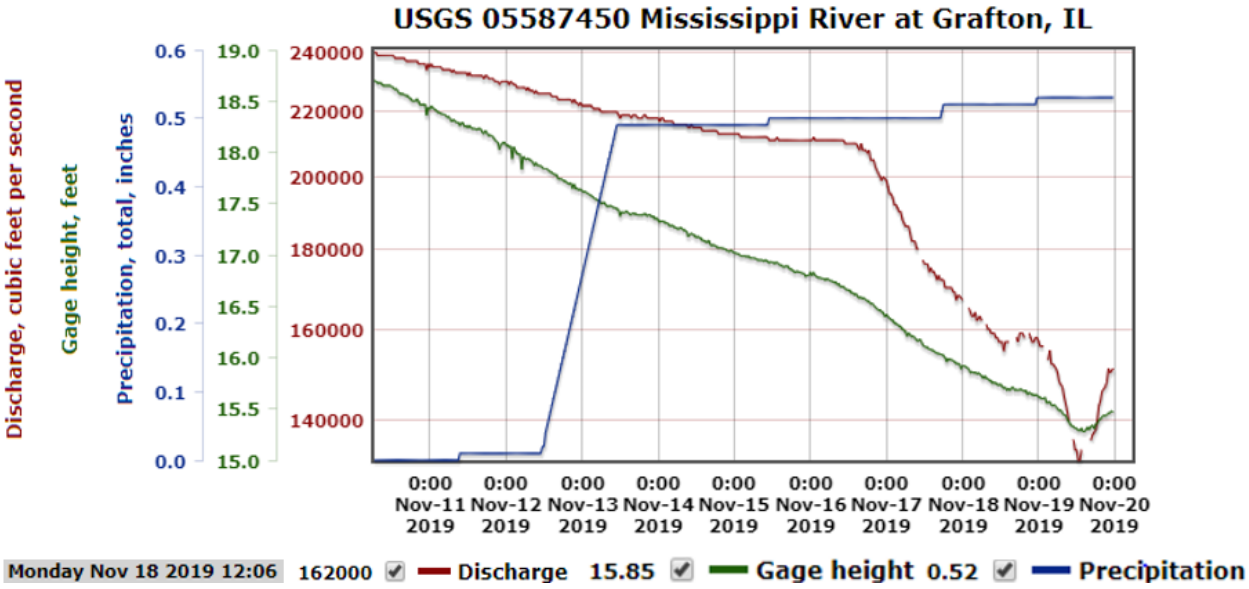
Samples for the ILR were collected on 11/19/2019 by Travis Schepker and Grace Rodgers. All samples were collected from the navigation channel. Weather was cloudy/sunny with 16mph winds and 50 degrees F at noon. No reported issues.



- 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)

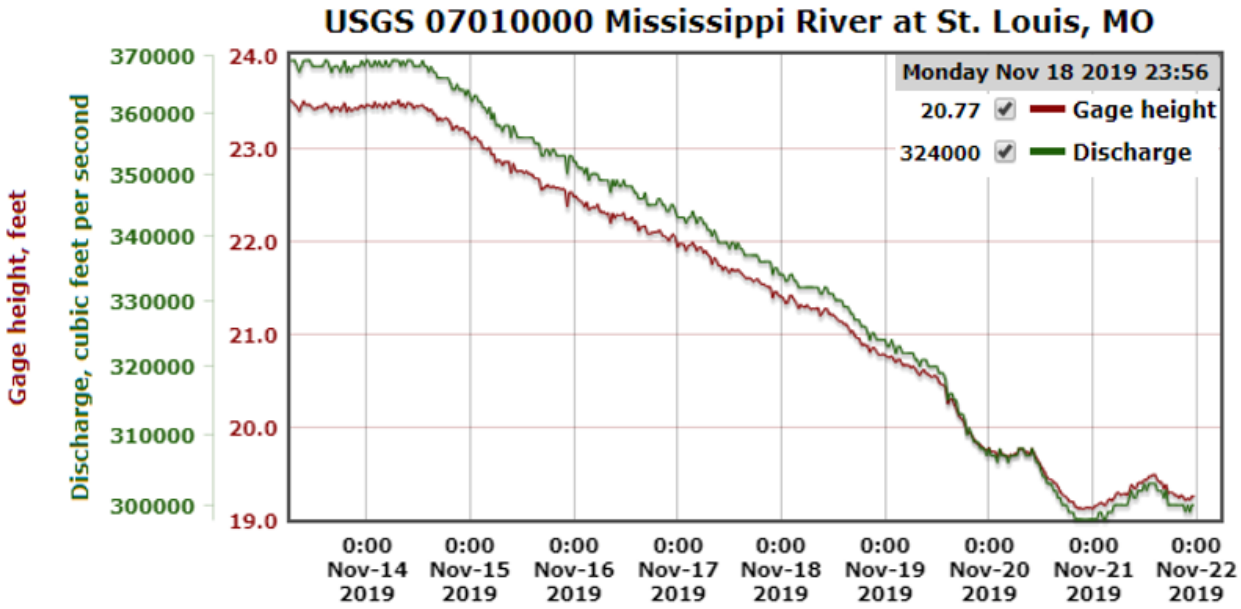
Samples for UMR were collected on 11/18/2019 by Travis Schepker and Ben Greeling. Some boat ramps were silted in, thus several samples were collected from the shoreline. The YSI turbidity sensor was not functioning properly, therefore turbidity samples are not available. Weather was partly cloudy, wind 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)

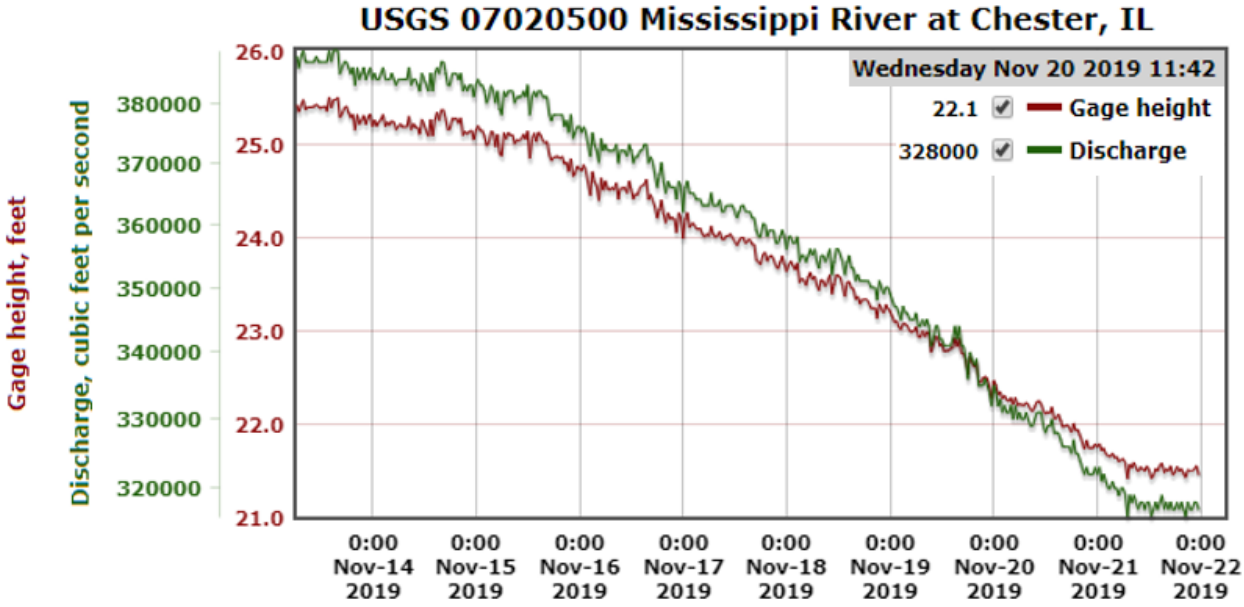
Samples from SLH were collected on 11/19/2019 and 11/20/2019 by Travis Schepker, Ben Greeling, and Grace Rodgers. Weather during both days were fair skies, average temperatures in the mid-40s, and wind speeds of 8 mph. Some boat ramps were silted in, thus several samples were collected from the shoreline. 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 B: 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 C: LABORATORY DATA

ARDL Inc.
Environmental | Analytical | Management | Safety

PO Box 1566
400 Aviation Drive
Mt. Vernon, IL 62864
618-244-3235
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	Analyses 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. RPD of the duplicate analyses met criteria.

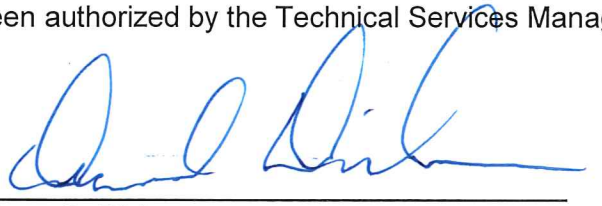
CASE NARRATIVE (Continued)

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008462-01 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: IL-2 Sampling Date: 03/11/2019 Moisture: NA
Received: 03/12/2019 Sampling Time: 1410

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008462-02 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: IL-6 Sampling Date: 03/11/2019 Moisture: NA
Received: 03/12/2019 Sampling Time: 1330

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

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

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008462-04 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: IL-8 Sampling Date: 03/11/2019 Moisture: NA
Received: 03/12/2019 Sampling Time: 1200

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008462-05 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: IL-9 Sampling Date: 03/11/2019 Moisture: NA
Received: 03/12/2019 Sampling Time: 1050

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008462-06 Sampling Loc'n: MISSISSIPPI RIVER Matrix: WATER
Field ID: UMR-1 Sampling Date: 03/11/2019 Moisture: NA
Received: 03/12/2019 Sampling Time: 1716

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008462-07 Sampling Loc'n: MISSISSIPPI RIVER Matrix: WATER
Field ID: UMR-2 Sampling Date: 03/11/2019 Moisture: NA
Received: 03/12/2019 Sampling Time: 1742

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008462-08 Sampling Loc'n: MISSISSIPPI RIVER Matrix: WATER
Field ID: UMR-3 Sampling Date: 03/11/2019 Moisture: NA
Received: 03/12/2019 Sampling Time: 1630

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008462-09 Sampling Loc'n: MISSISSIPPI RIVER Matrix: WATER
Field ID: SLH-3 Sampling Date: 03/11/2019 Moisture: NA
Received: 03/12/2019 Sampling Time: 1654

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.

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

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

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	RPD	RPD 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

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	ND	10.1	--	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

Sample Receipt Information

Including as appropriate:

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

8462

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) Boeling, Arcieski, Schepker

SAMPLE NUMBER	DATE	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N	* TKN	* TOC, T-PO4	O-PO4	* NO3-N, NH3-N	MS/MSD	Chlor/Pheo	REMARKS OR SAMPLE LOCATION	PRESERVATION: ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
IL-2	3/11/19	1410		X		X	X	X	X	X	X	X		X	
IL-6	"	1330		X		X	X	X	X	X		X		X	
IL-7	"	1250		X		X	X	X	X	X		X		X	
IL-8	"	1200		X		X	X	X	X	X		X		X	
IL-9	"	1050		X		X	X	X	X	X		X		X	
[redacted]															
UMR-1	3/11/19	1716		X		X	X	X	X	X		X	MS/MSD Container Received		
UMR-2	"	1742		X		X	X	X	X	X		X			
UMR-3	"	1630		X		X	X	X	X	X		X			
SLH-3	"	1654		X		X	X	X	X	X	X	X	NO MS/MSD Container Received		

Relinquished by: (Signature)	Date	Time	Received by: (Signature)
[signature]	3/11/19	1815	Valerie Jenkins
Valerie Jenkins	3/11/19	1950	Received by: (Signature)
Received for Laboratory by: (Signature) L Hackman	3/12/19	0530	Shipping Ticket No.

REMARKS/SPECIAL INSTRUCTIONS:

*Preserved with H_2SO_4

PURCHASE ORDER NO: _____

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8462 Cooler # 1 of 2

Number of Coolers in Shipment: 2

Project: Illinois River (See Comments Date Received: 3-11-19 by raj

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 3-12-19 (Signature) LDLachnicht

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Couriers

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 See Comments ..... YES (NO) N/A
9. Was a separate container provided for measuring temperature? YES____ NO✓ Observed Cooler Temp. 1.2 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 3-12-19 (Signature) LDLachnicht

10. Describe type of packing in cooler: Loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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? ..... See Comments ..... YES NO
15. Were correct containers used for the tests indicated? ..... (YES) NO
16. Was pH correct on preserved water samples? ..... (YES) 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

Comments and/or Corrective Action:
8) first 5 site ID's had Containers marked as Illinois River
Last 4 site ID's had Containers marked as Mississippi River
(By: Signature) dlw Date: 3/12/19

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dlw	By:
On: 3-12-19	On:

Chain-of-Custody # N/A

M:\ADMIN\FORMS\COOLER RECEIPT REPORT.doc Rev. 02/22/17

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8462. Cooler # 2 of 2

Number of Coolers in Shipment: 2

Project: Illinois River (see Comments) Date Received: 3-11-19 by vaf

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 3-12-19 (Signature) DSLockrum

1. Did cooler come with a shipping slip (airbill, etc.)? YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? (YES) NO
5. Were custody papers sealed in a plastic bag? YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? (YES) 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 See Comments YES (NO) N/A
9. Was a separate container provided for measuring temperature? YES____ NO ✓ Observed Cooler Temp. 0.7 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 3-12-19 (Signature) DSLockrum

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? YES (NO) N/A
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? See Comments YES NO
15. Were correct containers used for the tests indicated? (YES) NO
16. Was pH correct on preserved water samples? (YES) 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

Comments and/or Corrective Action:
9) first 5 Site ID's had Containers marked as Illinois River. Last 4 Site ID's had Containers marked as Mississippi River.
CofC indicate MS/MSD for SLH-3 [None Received] and NO MS/MSD for TMR-1
[Received 1 Container]. Noted on CofC.
(By: Signature) dlc Date: 3/12/19

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dlc	By:
On: 3-12-19	On:

Chain-of-Custody # N/A

M:\ADMIN\FORMS\COOLER RECEIPT REPORT.doc Rev. 02/22/17

ARDL Inc.
Environmental | Analytical | Management | Safety

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

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. RPD of the duplicate analyses met criteria, with exception of chlorophyll.

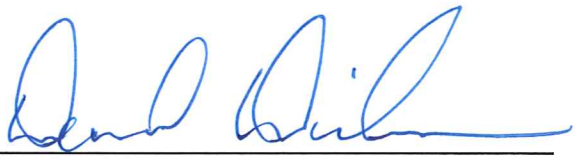
CASE NARRATIVE (Continued)

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008463-01 Sampling Loc'n: LOWER RIVER Matrix: WATER
Field ID: OPR-2 RM 44 Sampling Date: 03/12/2019 Moisture: NA
Received: 03/13/2019 Sampling Time: 0946

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008463-02 Sampling Loc'n: LOWER RIVER Matrix: WATER
Field ID: OPR-3 RM 80 Sampling Date: 03/12/2019 Moisture: NA
Received: 03/13/2019 Sampling Time: 0915

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008463-03 Sampling Loc'n: LOWER RIVER Matrix: WATER
Field ID: OPR-4 RM 110 Sampling Date: 03/12/2019 Moisture: NA
Received: 03/13/2019 Sampling Time: 1330

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.

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
Field ID: OPR-5 RM 150
Received: 03/13/2019

Sampling Loc'n: LOWER RIVER
Sampling Date: 03/12/2019
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		0.158	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.

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008463-06 Sampling Loc'n: LOWER RIVER Matrix: WATER
Field ID: SLH-1 RM 162 Sampling Date: 03/12/2019 Moisture: NA
Received: 03/13/2019 Sampling Time: 1530

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.

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.

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

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

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

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 Receipt Information

Including as appropriate:

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

8463

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: Lower River

SAMPLERS: (Signature) T. Schepker, B. Groeling

SAMPLE NUMBER	DATE 2019	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N	* TKN	* TOC, T-PO4	O-PO4	* NO3-N, NH3-N	NP Pest	MS/MSD	Chlord/Pheo							REMARKS OR SAMPLE LOCATION	PRESERVATION ICED	PRESERVATION SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
OPR-2 RM 44	3-12	946		x		X	X	X	X	X			X								X	
OPR-3 RM 80	3-12	915		x		X	X	X	X	X			X								X	
OPR-4 RM 110	3-12	1330		x		X	X	X	X	X			X								X	
OPR-5 RM 150	3-12	1430		x		X	X	X	X	X			X								X	
SLH-2 RM 177 1630	3-12	1630		x		X	X	X	X	X			X								X	
SLH-1 RM 162 1530	3-12	~~1530~~ 1500		x		X	X	X	X	X		X	X								X	
SLH-15 RM 120	3-12	830		x		X	X	X	X	X			X								X	

	Date	Time		
Relinquished by: (Signature)	3/12/19	5:15	Received by: (Signature)	REMARKS/SPECIAL INSTRUCTIONS:
Relinquished by: (Signature)	3/12/19	6:50	Received by: (Signature)	*Preserved with H_2SO_4
Received for Laboratory by: (Signature)	3/13/19	0530	Shipping Ticket No.	

PURCHASE ORDER NO: _____

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8463 Cooler # 1 of 2

Number of Coolers in Shipment: 2

Project: Lower River Date Received: 3-12-19 hup-vaj

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 3-13-19 (Signature) LK Cochrum

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO ✓ Observed Cooler Temp. 0.3 C Correction factor 0.0 C

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

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

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

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dlc	By:
On: 3-13-19	On:

Chain-of-Custody # N/A

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8463

Cooler # 2 of 2

Number of Coolers in Shipment: 3

Project: Lower River

Date Received: 3-12-19 Luy Vaj

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 3-13-19 (Signature) DLackrum

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Couriers

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO ✓ Observed Cooler Temp. 0.1 C
   Correction factor 0.0 C

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

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

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

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dlc	By:
On: 3-13-19	On:

Chain-of-Custody # N/A

M:\ADMIN\FORMS\COOLER RECEIPT REPORT.doc Rev. 02/22/17

ARDL Inc.
Environmental | Analytical | Management | Safety

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

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, 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		1.42	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 Suspen	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.

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 Sampling Loc'n: UPPER MISSISSIPPI RIVER Matrix: WATER
Field ID: UMR-15 Sampling Date: 03/13/2019 Moisture: NA
Received: 03/14/2019 Sampling Time: 0945

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.

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 Analysis: Inorganics
Project No: 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.

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.

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 Matrix: WATER
Field ID: UMR-9 MILE 273 Sampling Date: 03/13/2019 Moisture: NA
Received: 03/14/2019 Sampling Time: 1250

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.

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
Field ID: UMR-LA RM 283
Received: 03/14/2019

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

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008464-08 Sampling Loc'n: UPPER MISSISSIPPI RIVER Matrix: WATER
Field ID: UMR-DP RM 294 Sampling Date: 03/13/2019 Moisture: NA
Received: 03/14/2019 Sampling Time: 1030

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

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

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 Receipt Information

Including as appropriate:

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

8464

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: Upper Mississippi River

SAMPLERS: (Signature) Schepker & Greeling

SAMPLE NUMBER	DATE 2019	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N	* TKN	* TOC, T-PO4	O-PO4	* NO3-N, NH3-N	Chlor/Pheo	REMARKS OR SAMPLE LOCATION	PRESERVATION ICED	PRESERVATION SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
~~UMR-1 Chain of Rocks Canal~~				X		X	X	X	X	X	X		X	
~~UMR-2 Confluence~~				X		X	X	X	X	X	X		X	
~~UMR-3 Mile 200~~				X		X	X	X	X	X	X		X	
UMR-5 Mile 212.5	3-13	1645		X		X	X	X	X	X	X			
UMR-6 Mile 231	3-13	1600		X		X	X	X	X	X	X			
UMR-15	3-13	945		X		X	X	X	X	X	X			
UMR-7 Mile 241	3-13	1515		X		X	X	X	X	X	X			
UMR-LM RM 251	3-13	1430		X		X	X	X	X	X	X			
UMR-9 Mile 273	3-13	1250		X		X	X	X	X	X	X			
UMR- LA RM 283	3-13	1200		X		X	X	X	X	X	X			
UMR- DP RM 294	3-13	1030		X		X	X	X	X	X	X			
~~SLH-3~~				X		X	X	X	X	X	X		X	

Relinquished by: (Signature)	Date	Time	Received by: (Signature)
[signature]	3-13	1810	Valerie Jenkins
Relinquished by: (Signature) Valerie Jenkins	Date 3-13-19	Time 2030	Received by: (Signature)
Received for Laboratory by: (Signature) [signature]	Date 3/14/19	Time 0530	Shipping Ticket No.

REMARKS/SPECIAL INSTRUCTIONS:

*Preserved with H_2SO_4

PURCHASE ORDER NO: _____

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8464 Cooler # 1 of 2

Number of Coolers in Shipment: 2

Project: Upper Mississippi River Date Received: 3-13-19 lug vap

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 3-14-19 (Signature) LDLockrum

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)
   If YES, enter carrier name and airbill number here: Courier
2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO ✓ Observed Cooler Temp. 1.3 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 3-14-19 (Signature) LDLockrum

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

Comments and/or Corrective Action:
NOTE: Changes on CofC not initialed or dated.
(By: Signature) dlc Date: 3-14-19

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dlc	By:
On: 3-14-19	On:

Chain-of-Custody # N/A

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COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8464

Cooler # 2 of 2

Number of Coolers in Shipment: 2

Project: Upper Mississippi River

Date Received: 3-13-19 hyvaj

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 3-14-19 (Signature) DBlackburn

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO✓ Observed Cooler Temp. 0.3 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 3-14-19 (Signature) DBlackburn

10. Describe type of packing in cooler: bare ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

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

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dlc	By:
On: 3-14-19	On:

Chain-of-Custody # N/A

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ARDL Inc.
Environmental | Analytical | Management | Safety

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

Customer Sample No.	Date Collected	Lab ID Number	Analyses Requested
UMR-1 CHAIN OF ROCKS CANAL	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-2	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. RPD 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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

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

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		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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008485-02 Sampling Loc'n: UPPER MISSISSIPPI RIVER Matrix: WATER
Field ID: UMR-2 CONFLUENCE Sampling Date: 07/02/2019 Moisture: NA
Received: 07/02/2019 Sampling Time: 1234

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.

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
Field ID: UMR-3 MILE 200
Received: 07/02/2019

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

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	07/08/19	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.

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	LOD	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.

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.

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
Field ID: UMR-9 MILE 273
Received: 07/02/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER
Sampling Date: 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.

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.

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.

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	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		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.

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	LOD	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.

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 Analysis: Inorganics
Project No: 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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008485-13 Sampling Loc'n: UPPER MISSISSIPPI RIVER Matrix: WATER
Field ID: SLH-15 Sampling Date: 07/01/2019 Moisture: NA
Received: 07/02/2019 Sampling Time: 0940

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.

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

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

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.

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

[redacted]

Sample Receipt Information

Including as appropriate:

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

8485

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: Upper Mississippi River

SAMPLERS: (Signature) T Scherker

SAMPLE NUMBER	DATE	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N	* TKN	* TOC, T-PO4	O-PO4	* NO3-N, NH3-N	Chloro/Pheo	MS/MSD	REMARKS OR SAMPLE LOCATION	PRESERVATION: ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
UMR-1 Chain of Rocks Canal	7-1	915		x		X	X	X	X	X	X	←	have ms/msd Container dle 7/3/19	X	
UMR-2 Confluence	7-2	1234		x		X	X	X	X	X	X			X	
UMR-3 Mile 200	7-1	1100		x		X	X	X	X	X	X			X	
UMR-5 Mile 212.5	7-1	1230		x		X	X	X	X	X	X			X	
UMR-6 Mile 231	7-2	1215		x		X	X	X	X	X	X			X	
UMR-15	7-2	1120		x		X	X	X	X	X	X			X	
~~UMR-7 Mile 241~~	X	X		x		X	X	X	X	X	X			X	
~~UMR-LM RM 251~~	X	X		x		X	X	X	X	X	X			X	
UMR-9 Mile 273	7-2	940		x		X	X	X	X	X	X			X	
UMR- LA RM 283	7-2	9:10		x		X	X	X	X	X	X			X	
UMR- DP RM 294	7-2	8:15		x		X	X	X	X	X	X			X	
SLH-3	7-1	1015		x		X	X	X	X	X	X			X	
SLH-2	7-01	715		X		X	X	X	X	X	X			X	
SLH-1	7-1	800		X		X	X	X	X	X	X	X		X	

Relinquished by: (Signature)	Date	Time	Received by: (Signature)
T [signature]	7-2	1530	
Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Received for Laboratory by: (Signature)	Date	Time	Shipping Ticket No.
[signature]	7-2	~~1530~~ 1430 JY 7-2-19	

REMARKS/SPECIAL INSTRUCTIONS:

*Preserved with H_2SO_4

PURCHASE ORDER NO: ______________

Original in 8486 dlc 7-3-19

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) TSchepker

SAMPLE NUMBER	DATE	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N 32	* TKN 14	* TOC, T-PO4 15	O-PO4 4	* NO3-N, NH3-N 2	MS/MSD	Chlor/Pheo	REMARKS OR SAMPLE LOCATION	PRESERVATION ICED	PRESERVATION SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
IL-2	7-1	1500		X		X	X	X	X	X	X	X		X	
IL-6	7-1	1655		X		X	X	X	X	X		X		X	
IL-7	7-1	1736		X		X	X	X	X	X		X		X	
IL-8 1830	7-1	[illegible]		X		X	X	X	X	X		X		X	
IL-9	7-1	1900		X		X	X	X	X	X		X		X	
~~IL-15~~	[illegible]	[illegible]													
SLH 15	7-1	940		X		X	X	X	X	X		X		X	

	Date	Time		
Relinquished by: (Signature)	7-2	1530	Received by: (Signature)	REMARKS/SPECIAL INSTRUCTIONS:
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	*Preserved with H_2SO_4
Received for Laboratory by: (Signature) Emily Fulton	7-2	1430	Shipping Ticket No.	

PURCHASE ORDER NO: _____

COOLER RECEIPT REPORT
ARDL, INC.

original in 8486 dlc 7/3/19

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

Cooler # —

Number of Coolers in Shipment: 1 of 5

Date Received: 7/2/19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 7/2/19 (Signature) JT

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: ARDL Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)

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

5. Were custody papers sealed in a plastic bag? ..... YES (NO)

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

9. Was a separate container provided for measuring temperature? YES____ NO✓ Observed Cooler Temp. 0.8 C
   Correction factor 0.0 C

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

10. Describe type of packing in cooler: wet ice

11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A

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 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)

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

Sample Transfer	
Fraction: All	Fraction:
Area #: Cool 17	Area #:
By: AD	By:
On: 7/2/19	On:

Chain-of-Custody # N/A

COOLER RECEIPT REPORT
ARDL, INC.

Aliquots in 8486 dlc 7-3-19

ARDL #: 8485/8486

Project: Upper Miss River / IL River

Cooler # —

Number of Coolers in Shipment: 2 of 5

Date Received: 7/2/19

A. PRELIMINARY EXAMINATION PHASE: Date cooler was opened: 7/2/19 (Signature) TS TY DRS 7/2/19

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: ARDL Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)

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

5. Were custody papers sealed in a plastic bag? ..... YES (NO)

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

9. Was a separate container provided for measuring temperature? YES____ NO✓____ Observed Cooler Temp. 0.4 C
   Correction factor 0.0 C

B. LOG-IN PHASE: Date samples were logged-in: 7-3-19 (Signature) DLCackum

10. Describe type of packing in cooler: Wet ice

11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A

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 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)

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

Sample Transfer	
Fraction: AM	Fraction:
Area #: cool/17	Area #:
By: DRS	By:
On: 7/2/19	On:

Chain-of-Custody # N/A

COOLER RECEIPT REPORT
ARDL, INC.

original in 8486 dlc 7-3-19

ARDL #: 8485/8486 Upper Miss River

Project: IL River

Cooler # —

Number of Coolers in Shipment: 3 of 5

Date Received: 7/2/19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 7/2/19 (Signature) JY

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: ARM Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO ✓ Observed Cooler Temp. 0.4 C
   Correction factor 0.0 C

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

10. Describe type of packing in cooler: wet ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

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

Sample Transfer	
Fraction: Air	Fraction:
Area #: Cooler	Area #:
By: DLS	By:
On: 7/2/19	On:

Chain-of-Custody # N/A

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COOLER RECEIPT REPORT
ARDL, INC.

Aliquot in 8486 dlc 7-3-19

ARDL #: 8485 / 8486

Project: Upper Miss River / SL River

Cooler # —

Number of Coolers in Shipment: 4 & 5

Date Received: 7/2/19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 7/2/19 (Signature) JV

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: ARDL Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)

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

5. Were custody papers sealed in a plastic bag? ..... YES (NO)

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

9. Was a separate container provided for measuring temperature? YES____ NO✓ Observed Cooler Temp. 0.7 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 7-3-19 (Signature) LR Cackowski

10. Describe type of packing in cooler: Wet ice

11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A

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 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)

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

Sample Transfer	
Fraction All	Fraction
Area # Cooler	Area #
By DMS	By
On 7/2/19	On

Chain-of-Custody # N/A

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COOLER RECEIPT REPORT
ARDL, INC.

aliquots in 8486 dlc 7-3-19

ARDL #: 8485 / 8486

Project: Upper Miss River IL River

Cooler # —

Number of Coolers in Shipment: 5 of 5

Date Received: 7/2/19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 7/2/19 (Signature) JY

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: ARDL Transport

2. Were custody seals on outside of cooler? ..... YES NO (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 (N/A)

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

5. Were custody papers sealed in a plastic bag? ..... YES (NO)

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

9. Was a separate container provided for measuring temperature? YES ____ NO ✓ Observed Cooler Temp. 0.7 C
   Correction factor 0.0 C

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

10. Describe type of packing in cooler: wet ice

11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A

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 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)

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

Sample Transfer	
Fraction: All	Fraction:
Area #: cooler	Area #:
By: DS	By:
On: 7/2/19	On:

Chain-of-Custody # N/A

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ARDL Inc.
Environmental | Analytical | Management | Safety

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

Customer Name: SLCOE **Date: 7/31/19**

Project Name: Illinois River **Lab Name: ARDL, Inc.**

Samples Received at ARDL: 7/2/19 **ARDL Report No.: 8486**

CASE NARRATIVE

Customer Sample No.	Date Collected	Lab ID Number	Analyses Requested
IL-2	7/1/19	8486-01	Inorganics(1)
IL-6	7/1/19	8486-02	Inorganics(1)
IL-7	7/1/19	8486-03	Inorganics(1)
IL-8	7/1/19	8486-04	Inorganics(1)
IL-9	7/1/19	8486-05	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.

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. RPD 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

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008486-01 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: IL-2 Sampling Date: 07/01/2019 Moisture: NA
Received: 07/02/2019 Sampling Time: 1500

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

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

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

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008486-04 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: IL-8 Sampling Date: 07/01/2019 Moisture: NA
Received: 07/02/2019 Sampling Time: 1830

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008486-05 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: IL-9 Sampling Date: 07/01/2019 Moisture: NA
Received: 07/02/2019 Sampling Time: 1900

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

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	NA	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	0.20	ND	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	NA	07/09/19	07244731	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
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 008486

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

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

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

[redacted]

Sample Receipt Information

Including as appropriate:

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

8485 + 8486

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) TSchepker

SAMPLE NUMBER	DATE	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N 32	* TKN 14	* TOC, T-PO4 Ls	O-PO4	* NO3-N, NH3-N	MS/MSD	Chlor/Pheo	REMARKS OR SAMPLE LOCATION	PRESERVATION: ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
IL-2	7-1	1500		X		X	X	X	X	X	X	X		X	
IL-6	7-1	1655		X		X	X	X	X	X		X		X	
IL-7	7-1	1736		X		X	X	X	X	X		X		X	
IL-8 1830	7-1	[illegible]		X		X	X	X	X	X		X		X	
IL-9	7-1	1900		X		X	X	X	X	X		X		X	
~~IL-10~~	[illegible]	[illegible]													
SLH 15	7-1	940		X		X	X	X	X	X		X		X	

Relinquished by: (Signature)	Date 7-2	Time 1530	Received by: (Signature)
Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Received for Laboratory by: (Signature)	Date 7-2	Time 1430	Shipping Ticket No.

REMARKS/SPECIAL INSTRUCTIONS:

*Preserved with H_2SO_4

PURCHASE ORDER NO: _____

COOLER RECEIPT REPORT
ARDL, INC.

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

Cooler # —

Number of Coolers in Shipment: 1 of 5

Project:

Date Received: 7/2/19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 7/2/19 (Signature) JT

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: ARDL Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)

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

5. Were custody papers sealed in a plastic bag? ..... YES (NO)

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

9. Was a separate container provided for measuring temperature? YES____ NO✓ Observed Cooler Temp. 0.8 C
   Correction factor 0.0 C

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

10. Describe type of packing in cooler: wet ice

11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A

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 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)

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

Sample Transfer	
Fraction: All	Fraction:
Area #: Cool 17	Area #:
By: AD	By:
On: 7/2/19	On:

Chain-of-Custody # N/A

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COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8485/8486 — Upper Miss River

Project: IL River

Cooler # —

Number of Coolers in Shipment: 2 of 5

Date Received: 7/2/19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 7/2/19 (Signature) TS IV

1. Did cooler come with a shipping slip (airbill, etc.)? 7/2/19 ..... YES (NO)

   If YES, enter carrier name and airbill number here: ARDL Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)

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

5. Were custody papers sealed in a plastic bag? ..... YES (NO)

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

9. Was a separate container provided for measuring temperature? YES____ NO✓____ Observed Cooler Temp. 0.4 C
   Correction factor 0.0 C

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

10. Describe type of packing in cooler: wet ice

11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A

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 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)

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

Sample Transfer	
Fraction: AM	Fraction:
Area #: cooler	Area #:
By: DJS	By:
On: 7/2/19	On:

Chain-of-Custody # N/A

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COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8485/8486

Project: Upper Miss River / IL River

Cooler # —

Number of Coolers in Shipment: 3 of 5

Date Received: 7/2/19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 7/2/19 (Signature) JY

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: ARDL Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)

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

5. Were custody papers sealed in a plastic bag? ..... YES (NO)

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

9. Was a separate container provided for measuring temperature? YES____ NO✓ Observed Cooler Temp. 0.4 C
   Correction factor 0.0 C

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

10. Describe type of packing in cooler: wet ice

11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A

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 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)

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

Sample Transfer	
Fraction: Air	Fraction:
Area #: Cooler	Area #:
By: DLS	By:
On: 7/2/19	On:

Chain-of-Custody # N/A

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8485 / 8486 — Cooler #: –

Project: Upper Miss River / IL River — Number of Coolers in Shipment: 4 of 5

Date Received: 7/2/19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 7/2/19 (Signature) JY

1. Did cooler come with a shipping slip (airbill, etc.)?....YES **(NO)**
   If YES, enter carrier name and airbill number here: ARDL Courier
2. Were custody seals on outside of cooler?....YES **(NO)** 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 **(NA)**
4. Did you screen samples for radioactivity using a Geiger Counter?....**(YES)** NO
5. Were custody papers sealed in a plastic bag?....YES **(NO)**
6. Were custody papers filled out properly (ink, signed, etc.)?....**(YES)** 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....**(YES)** NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO ✓ Observed Cooler Temp. 0.7 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 7-3-19 (Signature) [signature]

10. Describe type of packing in cooler: wet ice
11. Were all samples sealed in separate plastic bags?....YES **(NO)** N/A
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 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)**

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

Sample Transfer	
Fraction All	Fraction
Area # Cooler	Area #
By DHS	By
On 7/2/19	On

Chain-of-Custody # N/A

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COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8485 / 8486 Upper Miss River

Project: IL River

Cooler # —

Number of Coolers in Shipment: 5 of 5

Date Received: 7/2/19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 7/2/19 (Signature) JY

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: ARDL Transport

2. Were custody seals on outside of cooler? ..... YES NO (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 (NA)

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

5. Were custody papers sealed in a plastic bag? ..... YES (NO)

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

9. Was a separate container provided for measuring temperature? YES____ NO✓ (Observed Cooler Temp. 0.7 C
   Correction factor 0.0 C)

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

10. Describe type of packing in cooler: wet ice

11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A

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 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)

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

Sample Transfer	
Fraction: Al	Fraction:
Area #: Cooler	Area #:
By: DS	By:
On: 7/2/19	On:

Chain-of-Custody # N/A

ARDL Inc.
Environmental | Analytical | Management | Safety

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

Customer Sample No.	Date Collected	Lab ID Number	Analyses Requested
OPR-2 RM 44	7/11/19	8489-01	Inorganics(1)
OPR-3 RM 80	7/11/19	8489-02	Inorganics(1)
OPR-4 RM 110	7/11/19	8489-03	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.

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 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. RPD 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.

X - 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

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	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 008489-02, Inorganic Analyses

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008489-03 Sampling Loc'n: LOWER RIVER Matrix: WATER
Field ID: OPR-4 RM 110 Sampling Date: 07/11/2019 Moisture: NA
Received: 07/11/2019 Sampling Time: 1415

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

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

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	97	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

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 Receipt Information

Including as appropriate:

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

8489

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: Lower River

SAMPLERS: (Signature) Rodgers, Grace; Greeling, Ben

SAMPLE NUMBER	DATE	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N	* TKN	* TOC, T-PO4	O-PO4	* NO3-N, NH3-N	NP Pest	MS/MSD	Chloro/Pheo							REMARKS OR SAMPLE LOCATION	PRESERVATION: ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
OPR-2 RM 44	7/11	1045		x		X	X	X	X	X			X								X	
OPR-3 RM 80	7/11	1313		x		X	X	X	X	X			X								X	
OPR-4 RM 110	7/11	1415		x		X	X	X	X	X			X								X	
~~OPR-5 RM 150~~	~~7/11~~	~~1515~~		x		X	X	X	X	X			X							could not access	X	

Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Ben Greeling	7/11/19	1710	Valerie Jenkins
Relinquished by: (Signature) Valerie Jenkins	Date 7/11/19	Time 1845	Received by: (Signature)
Received for Laboratory by: (Signature)	Date	Time	Shipping Ticket No.
[illegible] Lachrum	7/12/19	053	

REMARKS/SPECIAL INSTRUCTIONS:

*Preserved with H_2SO_4

PURCHASE ORDER NO: _____

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8489 Cooler # None

Number of Coolers in Shipment: 1

Project: Lower River Date Received: 7-11-19 hyway

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 7-12-19 (Signature) DSCochrum

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Carrier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? Changes not initialed or dated ..... YES (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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO✓ Observed Cooler Temp. 0.5 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 7-12-19 (Signature) DSCochrum

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES NO (N/A)
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 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)

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

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dle	By:
On: 7-12-19	On:

Chain-of-Custody # N/A

ARDL Inc.
Environmental | Analytical | Management | Safety

PO Box 1566
400 Aviation Drive
Mt. Vernon, IL 62864
618-244-3235
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 Sample No.	Date Collected	Lab ID Number	Analyses Requested
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	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.

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. RPD 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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008515-01 Sampling Loc'n: LOWER RIVER Matrix: WATER
Field ID: OPR-2 RM 44 Sampling Date: 09/03/2019 Moisture: NA
Received: 09/03/2019 Sampling Time: 1038

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
Nitrate as Nitrogen	0.800	1.00		1.04	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		0.252	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

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, 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		0.631	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 Suspen	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.

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

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	LOD	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.

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

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.

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	LOD	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.

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	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	09/04/19	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

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

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	RPD	RPD 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

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 Receipt Information

Including as appropriate:

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

8515

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: Lower River

SAMPLERS: (Signature) Schepker/Rodgers

SAMPLE NUMBER	DATE	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N	* TKN	* TOC, T-PO4	O-PO4	* NO3-N, NH3-N	NP Pest	MS/MSD Chloro/Pheo							REMARKS OR SAMPLE LOCATION	PRESERVATION: ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
	9-3-19																				
OPR-2 RM 44	9-3	1038		x		X	X	X	X	X			X							X	
OPR-3 RM 80	9-3	0856		x		X	X	X	X	X			X							X	
OPR-4 RM 110	9-3	1230		x		X	X	X	X	X			X							X	
OPR-5 RM 150	9-3	1405		x		X	X	X	X	X			X							X	
SLH-2 RM 177	9-3	1330		x		X	X	X	X	X			X							X	
SLH-1 RM 162	9-3	1530		x		X	X	X	X	X			X							X	
SLH-15 RM 120	9-3	1600		x		X	X	X	X	X			X							X	

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	REMARKS/SPECIAL INSTRUCTIONS:
	9-3	1650	Valerie Jenkins	
Relinquished by: (Signature) Valerie Jenkins	Date 9/3/19	Time 1820	Received by: (Signature)	*Preserved with H_2SO_4
Received for Laboratory by: (Signature)	Date 9/3/19	Time 1820	Shipping Ticket No.	

PURCHASE ORDER NO: _____

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8515 Cooler # 1 of 2

Number of Coolers in Shipment: 2

Project: Lower River Date Received: 9-3-19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 9-3-19 (Signature) DSlackrum

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES ____ NO ✓ Observed Cooler Temp. 0.9 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 9-4-19 dlw 9-4-19 (Signature) DSlackrum

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

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

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dlw	By:
On: 9-4-19	On:

Chain-of-Custody # NA

M:\ADMIN\FORMS\COOLER RECEIPT REPORT.doc Rev. 02/22/17

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8515 Cooler # 2 of 2

Number of Coolers in Shipment: 2

Project: Lower River Date Received: 9-3-19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 9-3-19 (Signature) DKaehrum

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO✓ Observed Cooler Temp. 2.7 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 9-4-19 (Signature) DKaehrum

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

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

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dlc	By:
On: 9-4-19	On:

Chain-of-Custody # N/A

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ARDL Inc.
Environmental | Analytical | Management | Safety

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

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

[redacted]

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	LOD	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

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008516-02 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: IL-6 Sampling Date: 09/04/2019 Moisture: NA
Received: 09/05/2019 Sampling Time: 1145

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.

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008516-04 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: IL-8 Sampling Date: 09/04/2019 Moisture: NA
Received: 09/05/2019 Sampling Time: 0950

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

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008516-05 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: IL-9 Sampling Date: 09/04/2019 Moisture: NA
Received: 09/05/2019 Sampling Time: 0900

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.

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

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

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

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

[redacted]

Sample Receipt Information

Including as appropriate:

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

8516

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) Schekter Greeling

SAMPLE NUMBER	DATE	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N	* TKN	* TOC, T-PO4	O-PO4	* NO3-N, NH3-N	MS/MSD	ChloroPheo	REMARKS OR SAMPLE LOCATION	PRESERVATION: ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
IL-2	9-4	1137		X		X	X	X	X	X	X	X		X	
IL-6	9-4	1145		X		X	X	X	X	X		X		X	
IL-7	9-4	1103		X		X	X	X	X	X		X		X	
IL-8	9-4	950		X		X	X	X	X	X		X		X	
IL-9	9-4	0900		X		X	X	X	X	X		X		X	
IL-15 NA	NA	NA													

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	REMARKS/SPECIAL INSTRUCTIONS:
	9-4-19	1505	Valerie Jenkins	
Relinquished by: (Signature) Valerie Jenkins	Date 9-4-19	Time 1900	Received by: (Signature)	*Preserved with H_2SO_4
Received for Laboratory by: (Signature)	Date 9/5/19	Time 0550	Shipping Ticket No.	

PURCHASE ORDER NO: _____

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8516 Cooler # 1 of 2

Number of Coolers in Shipment: 2

Project: Illinois River Date Received: 9-5-19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 9-5-19 (Signature) DS Cackrum

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES ✓ NO ____. Observed Cooler Temp. 0.2 C Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 9-5-19 (Signature) DS Cackrum

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

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

Sample Transfer	
Fraction: all	Fraction
Area #: Walkin	Area #
By: dlc	By
On: 9-5-19	On

Chain-of-Custody # N/A

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COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8516 Cooler # 2 of 2

Number of Coolers in Shipment: 2

Project: Illinois River Date Received: 9-5-19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 9-5-19 (Signature) DS Lackum

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? Changes not initialed + dated ..... YES (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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO ✓ Observed Cooler Temp. 0.4 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 9-5-19 (Signature) DS Lackum

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

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

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dlc	By:
On: 9-5-19	On:

Chain-of-Custody # N/A

ARDL Inc.
Environmental | Analytical | Management | Safety

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

Customer Sample No.	Date Collected	Lab ID Number	Analyses Requested
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. RPD 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
Field ID: UMR-5 MILE 212.5
Received: 09/06/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER
Sampling Date: 09/05/2019
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		0.0376	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

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
Field ID: UMR-6 MILE 231
Received: 09/06/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER
Sampling Date: 09/05/2019
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		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

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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: 008518-03
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.

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 Matrix: WATER
Field ID: UMR-7 MILE 241 Sampling Date: 09/05/2019 Moisture: NA
Received: 09/06/2019 Sampling Time: 1345

Analyte	LOD	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

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Mt. Vernon, Illinois 62864

Lab Report No: 008518 Report Date: 10/01/2019

Project Name: UPPER MISSISSIPPI RIVER Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008518-05 Sampling Loc'n: UPPER MISSISSIPPI RIVER Matrix: WATER
Field ID: UMR-LM RM 251 Sampling Date: 09/05/2019 Moisture: NA
Received: 09/06/2019 Sampling Time: 1245

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

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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	LOD	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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008518-07 Sampling Loc'n: UPPER MISSISSIPPI RIVER Matrix: WATER
Field ID: UMR-LA RM 283 Sampling Date: 09/05/2019 Moisture: NA
Received: 09/06/2019 Sampling Time: 0940

Analyte	LOD	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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008518-08 Sampling Loc'n: UPPER MISSISSIPPI RIVER Matrix: WATER
Field ID: UMR-DP RM 294 Sampling Date: 09/05/2019 Moisture: NA
Received: 09/06/2019 Sampling Time: 1037

Analyte	LOD	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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008518-09 Sampling Loc'n: UPPER MISSISSIPPI RIVER Matrix: WATER
Field ID: UMR-1 CHAIN OF ROCKS CA Sampling Date: 09/09/2019 Moisture: NA
Received: 09/09/2019 Sampling Time: 0910

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.

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008518-11 Sampling Loc'n: UPPER MISSISSIPPI RIVER Matrix: WATER
Field ID: UMR-3 MILE 200 Sampling Date: 09/09/2019 Moisture: NA
Received: 09/09/2019 Sampling Time: 1000

Analyte	LOD	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.

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	LOD	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.

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

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

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	RPD	RPD 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

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	008518-01D1

* indicates that agreement between duplicates is greater than 20%. See Case Narrative for exceptions.
(a) DOD and/or NELAC Accredited Analyte

Sample Receipt Information

Including as appropriate:

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

ARDL Data Package 8518 - Inorganic

8518

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: Upper Mississippi River

SAMPLERS: (Signature) Schepker/Grealing

SAMPLE NUMBER	DATE	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N	* TKN	* TOC, T-PO4	O-PO4	* NO3-N, NH3-N	Chlor/Pheo	REMARKS OR SAMPLE LOCATION	PRESERVATION: ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
UMR-1 Chain of Rocks Canal				X		X	X	X	X	X	X		X	
UMR-2 Confluence				X		X	X	X	X	X	X		X	
UMR-3 Mile 200				X		X	X	X	X	X	X		X	
UMR-5 Mile 212.5	9-5	1600		X		X	X	X	X	X	X		X	
UMR-6 Mile 231	9-5	1500		X		X	X	X	X	X	X		X	
UMR-15	9-5	1630		X		X	X	X	X	X	X		X	
UMR-7 Mile 241	9-5	1395		X		X	X	X	X	X	X		X	
UMR-LM RM 251	9-5	1245		X		X	X	X	X	X	X		X	
UMR-9 Mile 273	9-5	0900		X		X	X	X	X	X	X		X	
UMR- LA RM 283	9-5	0940		X		X	X	X	X	X	X		X	
UMR- DP RM 294	9-5	1037		X		X	X	X	X	X	X		X	
SLH-3				x		X	X	X	X	X	X		X	

	Date	Time	
Relinquished by: (Signature)	9-5	1710	Received by: (Signature) Valerie Jenkins
Relinquished by: (Signature) Valerie Jenkins	9/5/19	1845	Received by: (Signature)
Received for Laboratory by: (Signature)	9/6/19	0525	Shipping Ticket No.

REMARKS/SPECIAL INSTRUCTIONS:

*Preserved with H_2SO_4

PURCHASE ORDER NO: _____

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: Upper Mississippi River

SAMPLERS: (Signature) TS & BG

SAMPLE NUMBER	DATE	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N	* TKN	* TOC, T-PO4	O-PO4	* NO3-N, NH3-N	Chlor/Pheo	REMARKS OR SAMPLE LOCATION	PRESERVATION: ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
UMR-1 Chain of Rocks Canal	9-9	9-10		X		X	X	X	X	X	X	8518-1 -9	X	
UMR-2 Confluence	9-9	9:30		X		X	X	X	X	X	X	-2 -10	X	
UMR-3 Mile 200	9-9	1000		X		X	X	X	X	X	X	-3 -11	X	
SLH-3	9-9	845		X		X	X	X	X	X	X	-4 -12	X	

DP 9/9/14

Relinquished by: (Signature)	Date	Time	Received by: (Signature)
TS BG	9-9	1010	
Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Received for Laboratory by: (Signature)	Date	Time	Shipping Ticket No.
LD Lackrum	9/9/14	1340	

REMARKS/SPECIAL INSTRUCTIONS:

*Preserved with H_2SO_4

PURCHASE ORDER NO: _____

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8518 Cooler # 1 of 2

Number of Coolers in Shipment: 2

Project: Upper Mississippi River Date Received: 9-6-19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 9-6-19 (Signature) DKeckeisen

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO ✓ Observed Cooler Temp. 1.3 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 9-6-19 (Signature) DKeckeisen

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

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

Sample Transfer	
Fraction: all	Fraction:
Area #: Wilkin	Area #:
By: dlb	By:
On: 9-6-19	On:

Chain-of-Custody # N/A

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8518 Cooler # 2 of 2

Number of Coolers in Shipment: 2

Project: Upper Mississippi Reuse Date Received: 9-6-19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 9-6-19 (Signature) DKackeem

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Caesers

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES_____ NO ✓ Observed Cooler Temp. 0.9 C Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 9-6-19 (Signature) DKackeem

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

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

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dlc	By:
On: 9-6-19	On:

Chain-of-Custody # N/A

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8518 Cooler # None

Number of Coolers in Shipment: 1

Project: Upper Miss. River Date Received: 9-9-19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 9-9-19 (Signature) DLackrum

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO✓ Observed Cooler Temp. 2.0 C Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 9-9-19 (Signature) DLackrum

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

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

Sample Transfer	
Fraction: all	Fraction:
Area #: walkin	Area #:
By: dlc	By:
On: 9-9-19	On:

Chain-of-Custody # N/A

ARDL Inc.
Environmental | Analytical | Management | Safety

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

Customer Sample No.	Date Collected	Lab ID Number	Analyses Requested
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. RPD 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
Field ID: UMR-5 MILE 212.5
Received: 11/18/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER
Sampling Date: 11/18/2019
Sampling Time: 1546

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	0.19	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.

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008573-03 Sampling Loc'n: UPPER MISSISSIPPI RIVER Matrix: WATER
Field ID: UMR-15 Sampling Date: 11/18/2019 Moisture: NA
Received: 11/18/2019 Sampling Time: 1215

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.

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.

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.

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
Field ID: UMR-9 MILE 273
Received: 11/18/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER
Sampling Date: 11/18/2019
Sampling Time: 1151

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		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.

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
Field ID: UMR-LA RM 283
Received: 11/18/2019

Sampling Loc'n: UPPER MISSISSIPPI RIVER
Sampling Date: 11/18/2019
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		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.

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.

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

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

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	RPD	RPD 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.

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 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

8573

CHAIN OF CUSTODY RECORD

PROJECT: Upper Mississippi River

SAMPLERS: (Signature) Schepker & Greeling

	SAMPLE NUMBER	DATE 2019	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N	* TKN	* TOC, T-PO4	O-PO4	* NO3-N, NH3-N	Chloro/Pheo	REMARKS OR SAMPLE LOCATION	PRESERVATION: ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
	UMR-1 Chain of Rocks Canal	X	X		X		X	X	X	X	X	X		X	
	UMR-2 Confluence	X	X		X		X	X	X	X	X	X		X	
	UMR-3 Mile 200	X	X		X		X	X	X	X	X	X		X	
1	UMR-5 Mile 212.5	11-18	1546		X		X	X	X	X	X	X		X	
2	UMR-6 Mile 231	11-18	1430		X		X	X	X	X	X	X		X	
3	UMR-15	11-18	1215		X		X	X	X	X	X	X		X	
4	UMR-7 Mile 241	11-18	1340		X		X	X	X	X	X	X		X	
5	UMR-LM RM 251	11-18	1317		X		X	X	X	X	X	X		X	
6	UMR-9 Mile 273	11-18	1151		X		X	X	X	X	X	X		X	
7	UMR- LA RM 283	11-18	1100		X		X	X	X	X	X	X		X	
8	UMR- DP RM 294	11-8	1060		X		X	X	X	X	X	X		X	
9	SLH-3	X	X		X		X	X	X	X	X	X		X	
10	11-19-19														

	Date	Time		
Relinquished by: (Signature)	11/18/19	1719	Received by: (Signature) Valerie Jenkins	REMARKS/SPECIAL INSTRUCTIONS:
Relinquished by: (Signature) Valerie Jenkins	11/18/19	1945	Received by: (Signature)	*Preserved with H_2SO_4
Received for Laboratory by: (Signature)	11/19/19	0535	Shipping Ticket No.	

PURCHASE ORDER NO: _____

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8573 Cooler # 1 of 2

Number of Coolers in Shipment: 2

Project: Upper Mississippi River Date Received: 11-18-19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 11-18-19 (Signature) DKlaehsen

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)

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

5. Were custody papers sealed in a plastic bag? ..... YES (NO)

6. Were custody papers filled out properly (ink, signed, etc.)? Cross outs not initialed/dated dlc 11-19-19 ..... YES (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 ..... (YES) NO N/A

9. Was a separate container provided for measuring temperature? YES____ NO ✓ Observed Cooler Temp. 0.3 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 11-19-19 (Signature) DKlaehsen

10. Describe type of packing in cooler: loose ice

11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A

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 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

Comments and/or Corrective Action:
Note: Sample UMR-DP RM294 Shows sample date as 11-8 on C of C. Logged in as 11-19.
(By: Signature) dlc Date: 11-19-19

Sample Transfer	
Fraction: All	Fraction:
Area #: Walker	Area #:
By: dlc	By:
On: 11-19-19	On:

Chain-of-Custody # N/A

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COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8573 Cooler # 2 of 2

Number of Coolers in Shipment: 2

Project: Upper Mississippi Lewis Date Received: 11-18-19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 11-18-19 (Signature) D Lockrum

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? Crossaudit not initialed/dated ..... YES (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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES ____ NO ✓ Observed Cooler Temp. 0.1 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 11-19-19 (Signature) D Lockrum

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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

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

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dlc	By:
On: 11-19-19	On:

Chain-of-Custody # N/A

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ARDL Inc.
Environmental | Analytical | Management | Safety

PO Box 1566
400 Aviation Drive
Mt. Vernon, IL 62864
618-244-3235
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 Number	Analyses Requested
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. RPD 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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008574-01 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: IL-2 Sampling Date: 11/19/2019 Moisture: NA
Received: 11/19/2019 Sampling Time: 1415

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.

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008574-03 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: IL-7 Sampling Date: 11/19/2019 Moisture: NA
Received: 11/19/2019 Sampling Time: 1222

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.

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008574-05 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: IL-9 Sampling Date: 11/19/2019 Moisture: NA
Received: 11/19/2019 Sampling Time: 0730

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

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008574-06 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: UMR-1 Sampling Date: 11/19/2019 Moisture: NA
Received: 11/19/2019 Sampling Time: 1620

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008574-07 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: UMR-3 Sampling Date: 11/19/2019 Moisture: NA
Received: 11/19/2019 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		0.14	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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008574-08 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: UMR-2 Sampling Date: 11/19/2019 Moisture: NA
Received: 11/19/2019 Sampling Time: 1700

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008574-09 Sampling Loc'n: ILLINOIS RIVER Matrix: WATER
Field ID: SLH-3 Sampling Date: 11/19/2019 Moisture: NA
Received: 11/19/2019 Sampling Time: 1635

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.

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

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.

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	008574-01D1
Solids, Volatile Suspend	4.4	5.2	--	MG/L	17	--	12035067	008574-01D1

(a) DOD and/or NELAC Accredited Analyte

Sample Duplicates for 008574

Sample Receipt Information

Including as appropriate:

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

8574

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)

	SAMPLE NUMBER	DATE 11-19-19	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N	* TKN	* TOC, T-PO4	O-PO4	* NO3-N, NH3-N	MS/MSD	Chlora/Phos	REMARKS OR SAMPLE LOCATION	PRESERVATION ICED	PRESERVATION SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
1	IL-2	11-19	1415		X		X	X	X	X	X	X	X		X	
2	IL-6	"	1315		X		X	X	X	X	X		X		X	
3	IL-7	"	1222		X		X	X	X	X	X		X		X	
4	IL-8	"	1100		X		X	X	X	X	X		X		X	
5	IL-9	"	930		X		X	X	X	X	X		X		X	
	IL-15	"	1015		X		X	X	X	X	X		X	Did not Receive	X	
6	UMR-1	"	1620													
7	UMR-3	"	1600													
8	UMR-2	"	1700													
9	SLH-3	"	1635													

Relinquished by: (Signature)	Date 11/19	Time 1717	Received by: (Signature)	REMARKS/SPECIAL INSTRUCTIONS:
Relinquished by: (Signature)	Date 11/19/19	Time 1910	Received by: (Signature)	*Preserved with H_2SO_4
Received for Laboratory by: (Signature)	Date 11/20/19	Time 0525	Shipping Ticket No.	

PURCHASE ORDER NO: _____

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8574 Cooler # 1 of 2

Number of Coolers in Shipment: 2

Project: Illinois River Date Received: 11-20-19 19 dle 11/20/19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 11-20-19 19 dle 11/20/19 (Signature) DLackeum

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... YES (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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO✓ Observed Cooler Temp. 0.4 C Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 11-20-19 (Signature) DLackeum

10. Describe type of packing in cooler: bubble wrap
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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

Comments and/or Corrective Action:
6) No Analysis indicated for last 4 samples. Containers indicate the same Analysis as previous samples on C of C. Will use these Analysis. Receive dle 11-20-19
14) Did not ~~Receive~~ any samples for IL-15.
(By: Signature) dle Date: 11-20-19

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dle	By:
On: 11-20-19	On:

Chain-of-Custody # NA

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COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8574 Cooler # 2 of 3

Number of Coolers in Shipment: 3

Project: Illinois River Date Received: 11-19-19

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

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... YES (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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO✓ Observed Cooler Temp. 1.0 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 11-20-19 (Signature) DLCochrum

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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

Comments and/or Corrective Action:
(6) see Cooler receipt 1 of 2.
(14) see Cooler receipt 1 of 2
(By: Signature) dlc Date: 11-20-19

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dlc	By:
On: 11-20-19	On:

Chain-of-Custody # N/A

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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

ARDL Inc.
Environmental | Analytical | Management | Safety

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

[redacted]

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008576-01 Sampling Loc'n: LOWER RIVER Matrix: WATER
Field ID: OPR-2 RM 44 Sampling Date: 11/20/2019 Moisture: NA
Received: 11/20/2019 Sampling Time: 1015

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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008576-02 Sampling Loc'n: LOWER RIVER Matrix: WATER
Field ID: OPR-3 RM 80 Sampling Date: 11/20/2019 Moisture: NA
Received: 11/20/2019 Sampling Time: 1120

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	1.00		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.

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 Analysis: Inorganics
Project No: NELAC Certified - IL100308

ARDL No: 008576-03 Sampling Loc'n: LOWER RIVER Matrix: WATER
Field ID: OPR-4 RM 110 Sampling Date: 11/20/2019 Moisture: NA
Received: 11/20/2019 Sampling Time: 1340

Analyte	LOD	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.

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

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

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

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
Field ID: SLH-15 RM 120
Received: 11/20/2019

Sampling Loc'n: LOWER RIVER
Sampling Date: 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

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

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	92	--	--	--	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

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	RPD	RPD 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

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

Sample Receipt Information

Including as appropriate:

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

8576

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: Lower River

SAMPLERS: (Signature) T. Schepker, B. Greenings

	SAMPLE NUMBER	DATE	TIME	COMP	GRAB	NO. OF CONTAINERS	TSS, TVSS, NO2-N	* TKN	* TOC, T-PO4	O-PO4	* NO3-N, NH3-N	NP Pest	MS/MSD	Chloro/Pheo							REMARKS OR SAMPLE LOCATION	PRESERVATION ICED	PRESERVATION SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
1	OPR-2 RM 44	11-2019	1015		x		X	X	X	X	X			X								X	
2	OPR-3 RM 80	11-2019	1120		x		X	X	X	X	X			X								X	
3	OPR-4 RM 110		1340		x		X	X	X	X	X			X								X	
4	OPR-5 RM 150		1440		x		X	X	X	X	X			X								X	
5	SLH-2 RM 177		1700		x		X	X	X	X	X			X								X	
6	SLH-1 RM 162		1345		x		X	X	X	X	X		X	X								X	
7	SLH-15 RM 120		1330		x		X	X	X	X	X			X								X	

Relinquished by: (Signature)	Date 11/20/19	Time 1711	Received by: (Signature)
Relinquished by: (Signature)	Date 11/21/19	Time 1846	Received by: (Signature)
Received for Laboratory by: (Signature)	Date 11/21/19	Time 0525	Shipping Ticket No.

REMARKS/SPECIAL INSTRUCTIONS:

*Preserved with H_2SO_4

PURCHASE ORDER NO: _____

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8576 Cooler # 1 of 2

Number of Coolers in Shipment: 2

Project: Lower River Date Received: 11-20-19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 11-20-19 (Signature) DLackrum

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Couriers

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO✓ Observed Cooler Temp. 0.2 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 11-21-19 (Signature) DLackrum

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

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

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dle	By:
On: 11-21-19	On:

Chain-of-Custody # N/A

COOLER RECEIPT REPORT
ARDL, INC.

ARDL #: 8576

Cooler # 2 of 2

Number of Coolers in Shipment: 2

Project: Lower River

Date Received: 11-20-19

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler was opened: 11-20-19 (Signature) DS Cochrum

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)

   If YES, enter carrier name and airbill number here: Courier

2. Were custody seals on outside of cooler? ..... YES (NO) 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 (NA)
4. Did you screen samples for radioactivity using a Geiger Counter? ..... (YES) NO
5. Were custody papers sealed in a plastic bag? ..... YES (NO)
6. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) 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 ..... (YES) NO N/A
9. Was a separate container provided for measuring temperature? YES____ NO✓ Observed Cooler Temp. 0.9 C
   Correction factor 0.0 C

B. **LOG-IN PHASE:** Date samples were logged-in: 11-21-19 (Signature) DS Cochrum

10. Describe type of packing in cooler: loose ice
11. Were all samples sealed in separate plastic bags? ..... YES (NO) N/A
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 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)

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

Sample Transfer	
Fraction: all	Fraction:
Area #: Walkin	Area #:
By: dlc	By:
On: 11-21-19	On:

Chain-of-Custody # N/A

M:\ADMIN\FORMS\COOLER RECEIPT REPORT.doc Rev. 02/22/17