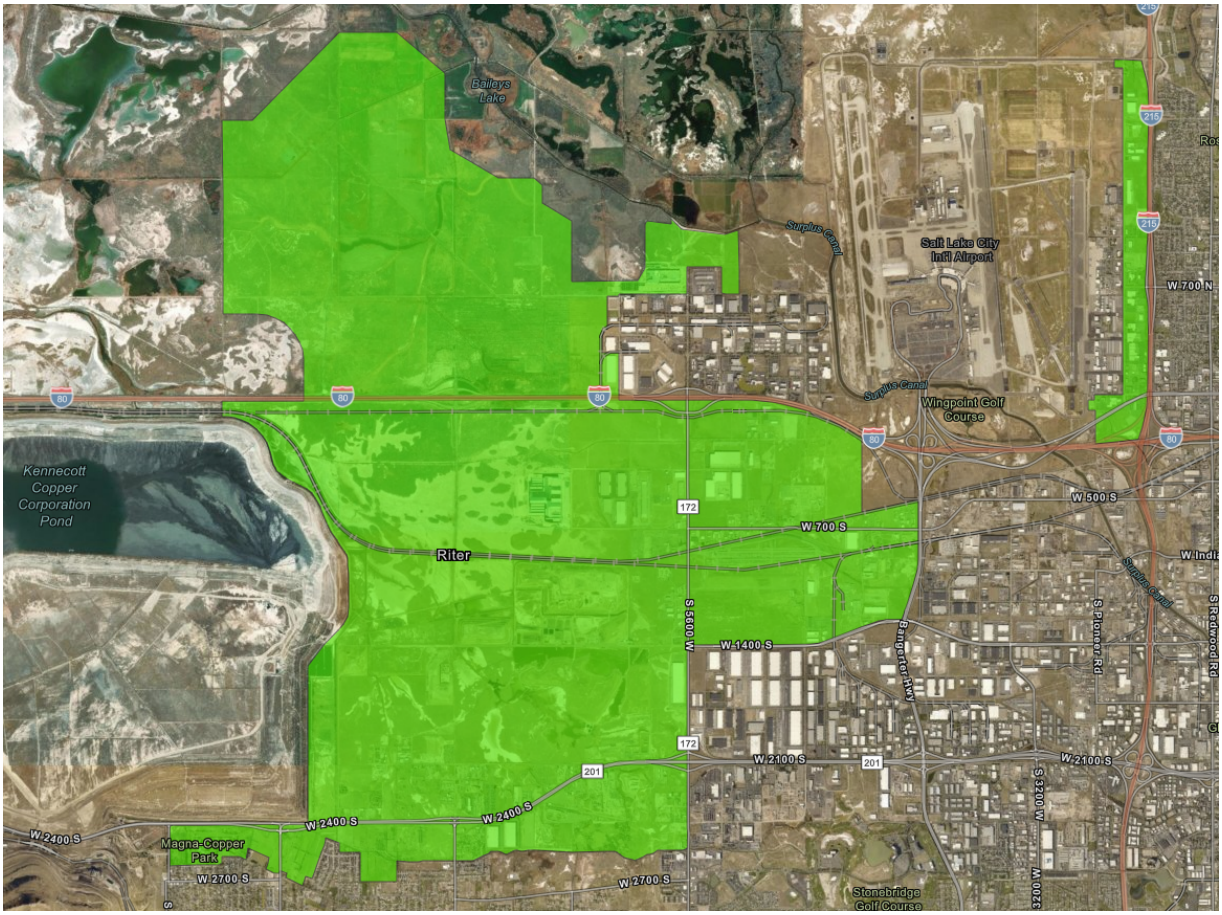
UTAH DEPARTMENT *of* ENVIRONMENTAL QUALITY

**WATER QUALITY**

# *Utah Inland Port Storm Water Sampling and Analysis Plan*

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## Acronyms and Abbreviations

| | |
|---|---|
| DEQ | Department of Environmental Quality |
| DPM | Designated Project Manager |
| DQO | Data Quality Objective |
| DWQ | Utah Division of Water Quality |
| EPA | United States Environmental Protection Agency |
| FPM | Field Project Manager |
| PARCC | Precision Accuracy Representativeness Comparability and Completeness |
| QA | Quality Assurance |
| QAPP | Quality Analysis Project Plan |
| QC | Quality Control |
| SAP | Sampling Analysis Plan |
| SOP | Standard Operating Procedure |
| TMDL | Total Maximum Daily Load |
| UIP | Utah Inland Port |
| USGS | United States Geological Survey |

# Introduction

This Sampling and Analysis Plan (SAP) was prepared by the Utah Department of Environmental Quality (UDEQ), Division of Water Quality (DWQ) for the collection of storm water samples required to establish baseline water quality conditions associated with the Utah Inland Port (UIP) and quantify any impacts to water quality associated with it. The information obtained from the implementation of this SAP will be used by DWQ staff and researchers to determine the effects of the UIP on storm water quality before, during and following development. Data characterizing pre-development water quality conditions will be used to compare against data collected during and after the development of the UIP. This is to determine the effects of the project on water quality and help direct the implementation of best management practices and mitigation measures to protect and improve water quality.

## *Background*

Water quality concerns along the southern shore of the Great Salt Lake in the vicinity of the UIP include mercury, selenium, excess nutrients, and trash/debris (DWQ 2014). In high concentrations mercury and selenium can harm wildlife populations, especially birds, through direct toxicity and cause congenital disabilities. Nutrients in excess concentrations can result in harmful algal blooms including toxic cyanobacteria. Trash and debris can directly affect wildlife and affect water management structures located throughout the wetlands by clogging inlets and outlets.

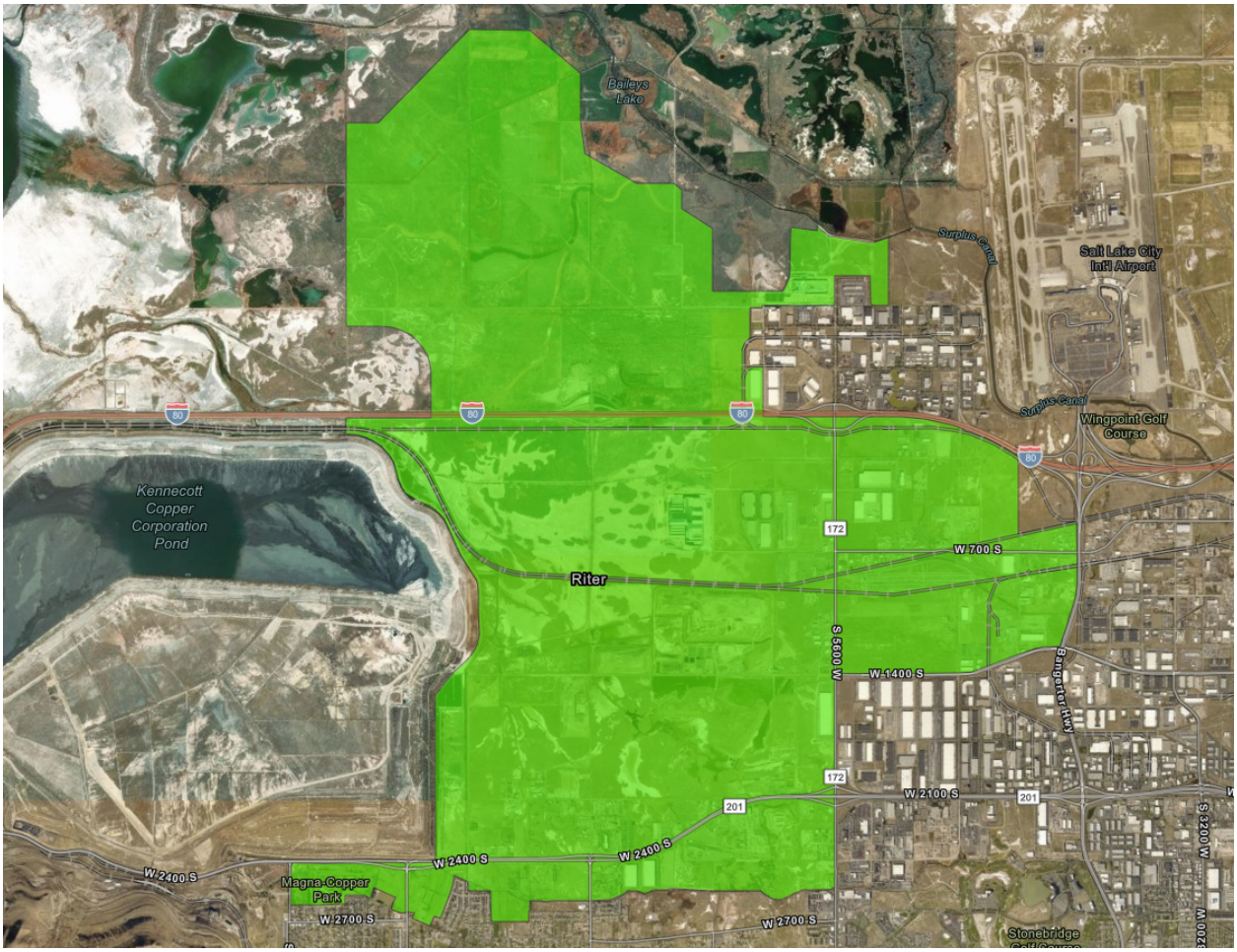
DWQ developed this SAP to evaluate the effects of the UIP on the water quality of tributaries to the wetlands that lie to the north of the project and identify appropriate management measures to mitigate these effects. Specifically, this plan will focus on the change in specific water quality parameters associated with storm water. Storm water runoff is generated from rain and snowmelt events that flow over land or impervious surfaces, such as paved streets, parking lots, and building rooftops, and does not soak into the ground. The runoff picks up pollutants such as trash, chemicals, oils, nutrients, heavy metals, pesticides, fertilizers, herbicides, and dirt/sediment. Storm water can also be contaminated by sanitary sewer overflows and cross connections. Monitoring of storm water is appropriate for determining the effects of development since it is directly related to changes in land use and the generation of pollutants listed above that is commonly associated with development.

This SAP defines the data quality objectives, sampling and analytical procedures, safety considerations, documentation and reporting requirements to be implemented by the DWQ for the collection of environmental samples.

## *Site Description*

The UIP is generally located to the west of the Salt Lake International Airport, east of the Kennecott Tailings Pond, and north of the Riter Canal (2550 South), tributary to the Surplus Canal (Figure 1). A separate part of the UIP lies along the west side of Interstate 215 from the junction with Interstate-80 to 2100 North in Salt Lake City. This area is already largely developed and significantly smaller storm water monitoring efforts will be on the portion that lies west of the airport. This area contains two perennial flowing water bodies, Lee Creek on the west side of the project area and the Surplus Canal along the east and north.

## Figure 1. Study Area of Utah Inland Port



*Summary of Project Tasks and Schedule*

The tasks associated with this study of the UIP are as follows and shown in Table 1. Project TimelineError! Reference source not found..

1. Implement SAP (spring 2020-fall 2024)
2. Validate field and laboratory results (fall 2020/winter 2024)
3. Analyze data and publish findings (fall 2020/winter 2024)

## Table 1. Project Timeline

| Task | 2020 Pre- Project | | | | 2022 During Project | | | | 2024 Post Project | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Months | | | | | | | | | | | | | |
| | 04 | 05 | 09 | 10 | 04 | 05 | 09 | 10 | 04 | 05 | 09 | 10 | 11 | 12 |
| Sample collection (grab and/or composite) | X | X | X | X | X | X | X | X | X | X | X | X | | |
| Data Validation | | | | X | | | | X | | | | X | | |
| Data Analysis | | | | X | | | | X | | | | X | X | |
| Report Writing | | | | | | | | | | | | | X | X |
| Final Review | | | | | | | | | | | | | | X |

# Objectives and Design of the Study

The United States Environmental Protection Agency's (EPA's) seven-step data quality objective (DQO) process (EPA, 2006) is used to guide the rationale for the Utah Inland Port SAP. The DQO process defines the type, quantity, and quality of data and establishes performance and acceptance criteria to make sure that the collected data supports the goals of the study.

## *Specific Objectives of the Study*

The specific objective of this study is to collect water quality data in order to characterize the condition of storm water quality associated with the UIP prior to, during and following the development. This is to help identify and prioritize water quality protection and improvement efforts. Project-level data quality objectives (DQOs) for this study are to collect data of the appropriate type, quality, and quantity to test and improve upon current sampling methods. Thus, this SAP will support the assessment of environmental impacts and mitigation measures associated with the UIP, including:

- Characterize the current (pre-development) quality of storm water within the UIP area;
- Track changes in storm water quality during the course of development;
- Use storm water quality data to evaluate best management practice effectiveness and provide information on need for additional measures and/or mitigation.

DQOs are qualitative and quantitative statements derived from systematic planning that clarify the study objective(s), determine the most appropriate type of data to collect, determine the most appropriate conditions from which to collect the data, and specify the level of uncertainty allowed in the collected monitoring data while still meeting the project objectives (EPA, 2006). This information is summarized in

Table 2.

## Table 2. Data Quality Objectives.

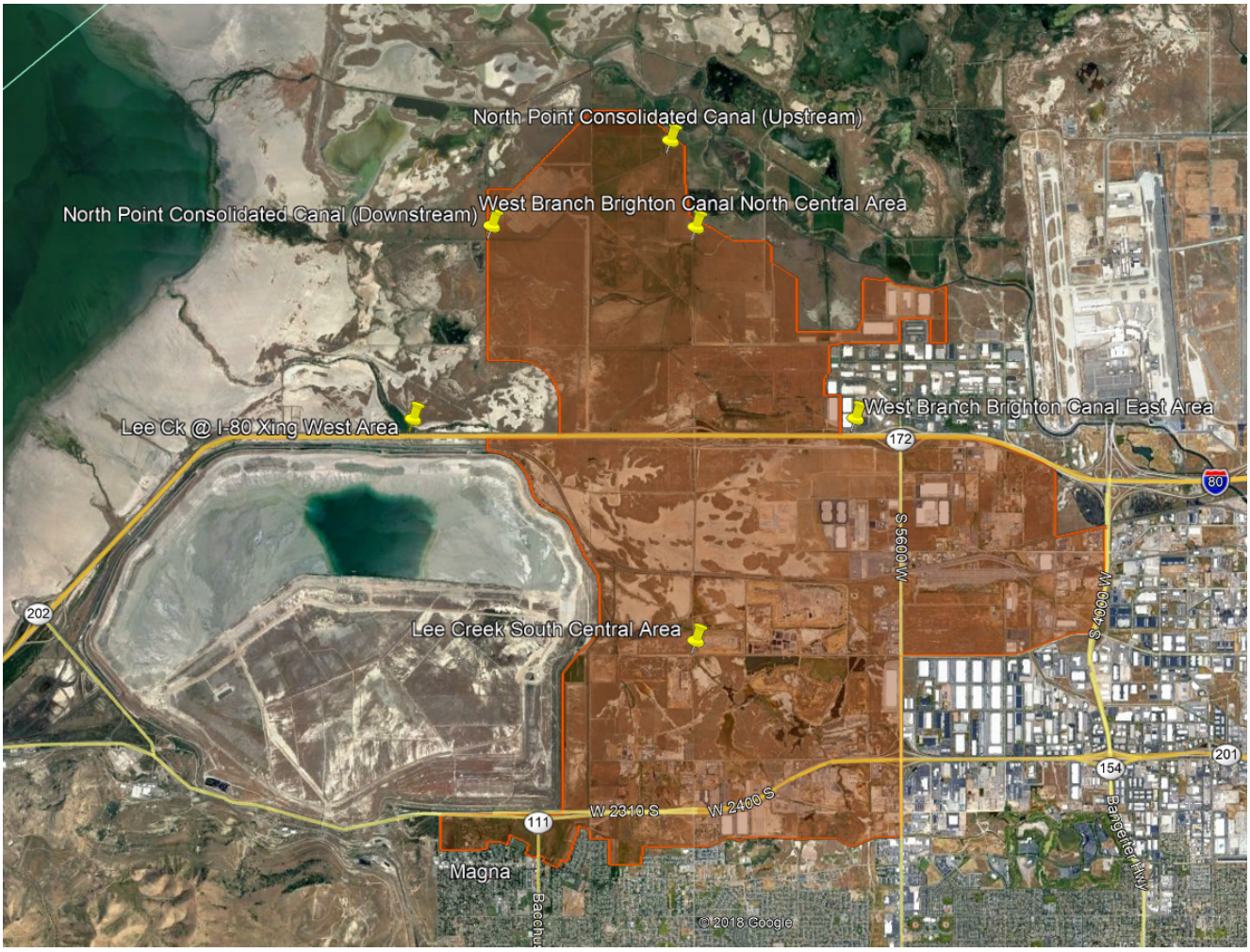
| Step | DQOs for Utah Inland Port Storm water Assessment |
|---|---|
| 1. Problem Statement | Development of the UIP is expected to intensify land uses within its project boundaries including large scale commercial facilities engaged in warehousing and shipping goods. To ensure that appropriate measures are implemented to mitigate development impacts on the sensitive wetland environment along the Great Salt Lake, a long term (5 year) monitoring program is proposed to assess current (pre-development) and future water quality conditions of storm water originating from the UIP area.<br><br>This baseline information will be compared to future water quality conditions as development progresses to identify the effectiveness of best management practices designed to protect water quality as well as identify any potential impacts and appropriate mitigation measures required to offset those impacts. |
| 2. Goal of Study / Decision Statements | **Key Question[s]**<br>1. What are the current water quality conditions of storm water in the UIP area and how does it change over time as development occurs? What trends do the water quality parameters indicate?<br>2. Are there correlations among the water quality parameters and stages of UIP development? If so, how do these correlations relate to on the ground activities such as land clearing, road and building construction?<br>3. How can correlations between land use activity and storm water quality help identify and locate appropriate best management practices and / or mitigation measures?<br><br>**Potential Outcomes**<br>1. Information is adequate to characterize the water quality of storm water over time as land use intensifies from agricultural to industrial and commercial uses.<br>2. If information is not adequate to characterize the condition of storm water DWQ will evaluate results and provide further recommendations on how to improve the data collection process in 2022. |
| 3. Inputs to Decision | **The following information will be collected:**<br>Field sampling will be conducted with grab samples, portable samplers and multi-parameter data sondes on a continual basis for four months of each year when precipitation is more consistent (April-May and September-October) at 6 sites (see<br><br>).<br>❑ Water chemistry analytes:<br>Total Dissolved Solids, Total Suspended Solids, Volatile and Semi-Volatile Organic Compounds, Total metals, and Total Petroleum Hydrocarbons.<br>❑ Storm water sampling will be conducted at representative locations. Due to the episodic nature of storm water flows, deployment of portable samplers will be required. |

| Step | DQOs for Utah Inland Port Storm water Assessment |
|---|---|
| 4. Study Boundaries | The study area for this project is shown in Figure 1.<br>**Practical Constraints on Data Collection**<br>1. Permission for sonde/sampler deployments will need to be obtained from landowners.<br>2. Staff and funding availability will need to be provided.<br>3. Availability of field equipment, as well as equipment functionality, may limit some activities.<br>4. Weather is a significant constraint for all sampling and monitoring activities. This is because storms can limit the ability to safely conduct sampling and measurement activities in the study area.<br>5. The presence of ice and/or lack of water could limit the ability to collect samples. |
| 5. Decision Rules | The data collected under the scope of this SAP will support the goals of the study. They will guide the DWQ on how to decide whether the available data is sufficient to characterize changes in storm water quality associated with the UIP, assess the effectiveness of best management practices used, and determine appropriate measures to mitigate any negative effects.<br>If information is not adequate the DWQ will evaluate results and provide recommendations for the 2022 SAP. |
| 6. Acceptance Criteria | ▪ **Precision**—field replicates will be collected for all water chemistry parameters at least once per each site per monitoring season.<br>▪ **Accuracy**—special efforts will be made to minimize contamination of water chemistry samples through proper collection of field samples, monitoring of sampling bottle blanks, and the use of appropriate laboratories for analysis.<br>▪ **Representativeness**—the sampling locations have been selected based on a review of aerial photos. The sites were chosen due to their accessibility and setting along major drainages within the UIP. Sites were chosen to encompass potentially unique characteristics of different conditions, such as water sources and potential pollutant inputs. Field sampling will occur following appropriate sample collection procedures as described in SOPs for each method. Site photos and field notes will be collected at each site and can be used to describe any unusual conditions that may occur.<br>▪ **Completeness**—to ensure the sampling goal of 100 percent completeness at the end of the season, we will use field reconnaissance to verify that sites have the proper hydrologic conditions.<br>▪ **Comparability**—all field sampling and analytical procedures will be completed following both previously tested and newly developed SOPs for each metric. They will be performed by the same field crew to the extent possible throughout the sampling season.<br>● DWQ's QAPP specifies the minimum QA/QC objectives for sample measurement. |
| 7. Sampling Plan and Design | The baseline sampling program includes the following:<br>Field observations, collection and analysis of water for chemical and physical attributes, as appropriate. |

### *Sampling Design*

The objective of this SAP is to assess the condition of storm water before, during and after UIP development through the analysis of chemical data collected from 6 key monitoring locations (Figure 2).

**Figure 2. Utah Inland Port Storm Water Monitoring Sites.**




summarizes the list of sampling sites. Sites are listed in the sequence they will be sampled. DWQ will collect grab samples at the storm water and receiving water sites at least once during April, May, September and

October of 2020 through 2024. Composite storm water samples will be collected from portable samplers during these same months and are contingent on precipitation events of at least 0.1 inch to generate runoff. Qualifying storm events that generate runoff for sample analysis will include those greater than 0.1 inch and at least 72 hours from the previously measurable—greater than 0.1 inch rainfall—storm event. Samples will be collected throughout the duration of the runoff event and will be integrated into a composite on a flow weighted basis for analysis.

## Table 3. Utah Inland Port Monitoring Sites

| Site ID | Source | Site Name | Latitude | Longitude |
|---|---|---|---|---|
| 4991440 | South-Central Area | Lee Creek AB CNFL / C-7 Ditch | 40.740366 | -112.063581 |
| 4991297 | North-Central Area | West Branch Brighton Canal at T1N, R2W, Sec. 28 NE corner | 40.798175 | -112.063605 |
| 4991430 | West Area | Lee Creek at I-80 Crossing | 40.771331 | -112.115776 |
| 4991305 | East Area | West Branch Brighton Canal at North Temple Frontage Rd xing | 40.771470 | -112.034116 |
| 4991293 | Northern area Downstream | North Point Consolidated Canal at T1N, R2W, Sec. 19, SE corner road xing (Downstream of UIP) | 40.798330 | -112.101283 |
| 4991295 | Northern area Upstream | North Point Consolidated Canal below confluence with West Branch Brighton Canal (Upstream of UIP) | 40.810290 | -112.068292 |

### *Measured Parameters*

Water quality monitoring activities will aim to understand the temporal and spatial condition of storm water within and leaving the UIP area. They will be characterized by collection and analysis of environmental samples that will help managers understand the temporal and spatial condition of storm water before, during, and after Utah Inland Port development.

### Environmental Sample Collection

DWQ's resources will be dedicated to collecting environmental samples that describe the condition of storm water flows and receiving waters. This data will be critical in benchmarking the present condition and identifying changes in water quality associated with the development of the Utah Inland Port project. This section provides a detailed summary of the approach the DWQ will use beginning in 2020.

#### *Sampling Receiving Waters*

DWQ will sample two locations on each of the three receiving waters within and downstream of the project area, Lee Creek, West Branch Brighton Canal, and North Point Consolidated Canal (

).

Receiving water sites will be sampled for water chemistry in the spring (April and May) and fall (September and October) using grab sample techniques. Composite storm water samples will be collected within these same months during qualifying storm induced runoff events through the use of portable samplers. Water chemistry samples will help determine the temporal and spatial conditions of these waters before, during and after project development.

Table 4 shows the chemical analytes that will be collected at these sites and the estimated budget for analysis costs. Table 5 shows the sampling equipment required to complete this monitoring effort and the estimated budget for acquiring this equipment. Sampling procedures, analytical methods, and quality assurance requirements are found in the QAPP in Appendix F.

## Table 4. Parameters to Be Measured and Analysis Budget.

| Description | Collection Method | Details | Parameters | Cost per sample* | Total Cost** (144 samples) |
|---|---|---|---|---|---|
| General Chemistry | Grab Sample and Portable Sampler Composite Sample | One 500 mL plastic bottle unpreserved | Total suspended solids<br>Volatile suspended solids<br>Total dissolved solids | $15<br>$20<br>$15 | $2,160<br>$2,880<br>$2,160 |
| Total Nutrients | Grab Sample and Portable Sampler Composite Sample | One 500 mL plastic bottle with $H_2SO_4$ preservative to pH <2 | Ammonia<br>Nitrate/Nitrite<br>Total Phosphorus<br>Total Nitrogen | $38<br>$13<br>$40<br>$53 | $5,472<br>$1,872<br>$5,760<br>$7,632 |
| Total Metals | Grab Sample and Portable Sampler Composite Sample | One 250 mL plastic bottle with $HNO_3$ preservative to pH <2 | Zinc<br>Lead<br>Cadmium<br>Arsenic<br>Copper<br>Selenium<br>Mercury | $108 for all | $15,552 |
| Total Petroleum Hydrocarbons, MBTEXN, DRO (diesel fraction TPH-Dx) and ORO (oil fraction TPH-Ox) | Grab Sample | Three 40 mL vials | | $75 | $10,800 |
| Grand Total of Estimated Cost for Analysis | | | | | $54,288 |

* Costs are provided for estimating purposes only and do not necessarily reflect current rates at private analytical laboratories.

** Total sample analysis estimate assumes 1 grab sample and 1 composite portable sampler storm water sample collected each month (April, May, September, and October) at all 6 monitoring locations for three years for a total of 144 samples analyzed.

## Table 5. Portable Sampler Equipment Budget Table.

| Description | Quantity | Unit Price | Total Cost |
|---|---|---|---|
| Portable Sampler<br><br>Includes controller, top cover, center section, base, distributor arm, instruction manual, and pocket guide. | 6 | $2,974.09 | $ 17,844.54 |
| Signature® Area Velocity flow meter system includes base meter, TIENet 350 area velocity sensor with 10m cable, manual, and pocket guide. | 6 | $3759.00 | $22,554.00 |
| CDMA LTE cellular modem with magnetic mount antenna for Signature® meter. | 6 | $883.87 | $5,303.22 |
| Sample bottles<br><br>24-bottle Configuration for 3700 Full Size Portable Sampler. Includes 24 polypropylene 1-liter bottles with caps, bottle retaining ring, and two pump tubes. | 6 | $202.27 | $ 1,213.62 |
| Solar Panel Assembly and 12V Regulator Controller<br><br>Includes PLM50P -50-Watt Solar Panel with 20' lead and PM50U Pole Mount Bracket | 6 | $345 | $ 2,070.00 |
| Miscellaneous cables, tubing, strainers, and couplers | 6 | $248.90 | $ 1,493.40 |
| Sampler Housing | 6 | $1,636.25 | $ 9,817.50 |
| Grand Total | | | $ 60,296.28 |

## Project Team and Responsibilities

As defined by DEQ's Quality Management Plan (QMP), any monitoring activity conducted or overseen by DWQ must have a Designated Project Manager (DPM), a staff member who is responsible for a specific project and has immediate managerial or technical control of the project (see Error! Reference source not found.). The DPM is responsible for specifying the quality of the data required for each project and initiating corrective actions when quality control is not being met. The DPM may also be a program manager. The DPM is responsible for designing monitoring strategies, setting project-specific data quality objectives (DQOs), and developing project-specific SAPs. DPMs are responsible for making sure all personnel involved with the project are briefed and/or trained on the procedures to be used.

Any monitoring activity conducted or overseen by DWQ must also have a Field Project Manager (FPM). The FPM will be responsible for checking the field note forms, data collection sheets, field lab sheets/Chain of Custody (COCs) forms for completeness. These sheets will be checked for completeness within 72 hours (or within a week of sample collection). Field notes will be filled out in the field for all sites whether samples were taken. Any information missing from field forms will be verified by the field crew. A list of missing samples or data will be provided to the DPM for data tracking purposes. After the data sheets are reviewed for completeness, all data will be scanned and entered into an electronic worksheet files for storage in the "Utah Inland Port Project\Utah Inland Port Project Management Files\2_Data Management & Monitoring" folder in DWQ's "Storm water" folder on the shared drive, which is backed up daily. When entered into an electronic worksheet, the person who enters the data will double check the information for errors and save the files, so they can be reviewed by the FPM and/or QA Project Manager for quality.

Implementation of the SAP will require an interdisciplinary effort. The team that will implement the SAP consists of various members from UDWQ (see Error! Reference source not found.). Error! Reference source not found. also lists and identifies the key project personnel and their responsibilities. The overall efforts will be coordinated closely with other ongoing research groups and stakeholders.

### Table 6. Project Team Members and Contact Information.

| Title | Name | Affiliation | Key Tasks or Responsibilities | Contact Information | |
|---|---|---|---|---|---|
| | | | | E-mail | Phone |
| Designated Project Manager | Carl Adams | DWQ | Oversees direction of project, data analysis, reporting | carladams@utah.gov | w: 801-536-4330 |
| Field Project Manager | Alex Anderson | DWQ | Directs day-to-day work of project, performs field data collection | aranderson@utah.gov | 435 760 4286 |
| Quality Assurance (QA) Project Manager | Toby Hooker | DWQ | Oversees QA for Division, responds to QA issues, supervises monitoring team | tobyhooker@utah.gov | w: 801-536-4289 |

### *Field Activities*

Field operations will be overseen by Alex Anderson, an experienced member of the DWQ Monitoring Section.

### *Field/Lab Sheets and Chain Of Custody Forms*

Preprinted field note sheets, associated lab sheets, Chain of Custody forms, and the Portable Sampler Field Form (Appendix A, Appendix B, Appendix C and Appendix E respectively) will be used on the monitoring run. Field measurements will be recorded in the field sheets and used to correct drift of the deployed data sondes that are programmed to record continuously. Hard copies of field notes are kept in a binder at UDWQ.

All field and lab data and paperwork will include a unique Trip ID: IPP (YYMMDD) or IPP 200314, which reflects a sample trip that began on March 14th, 2020. The Project Code for this study will be 303.

# Field Sampling Methods

This section summarizes the methodology for environmental sample collection at the sites and incorporates the DQOs outlined in previous sections, the safety precautions, and workflow.

## *Field protocols*

This section provides a brief overview of the field sampling activities to be performed at each site. Specific instructions, including required equipment and procedures, are located in the SOPs.

### SOP for Water Chemistry Sample Collection

https://deq.utah.gov/ProgramsServices/programs/water/wetlands/docs/2014/05May/SOP_WaterChem-SampleCollection_091011_WetL.pdf

### SOP For Calibration, Maintenance, and Use Of Hydrolab Multiprobes

https://deq.utah.gov/Compliance/monitoring/water/docs/2014/05May/SOP_Hydrolabs_5.1.14_Rev0.pdf

### SOP For Portable Samplers

https://documents.deq.utah.gov/water-quality/monitoring-reporting/SOP/DWQ-2020-008444.pdf

### SOP For Chain of Custody Samples

https://documents.deq.utah.gov/water-quality/monitoring-reporting/sop/DWQ-2019-001920.pdf

## *Health and Safety*

Safety must be a primary concern at all times and in all sampling situations for field sampling personnel. In any marginal or questionable situation, monitoring personnel (monitors) are required to assume worst case conditions and use safety precautions and equipment appropriate to that situation. Monitors who encounter conditions which in their best professional judgment may exceed the protection of their safety equipment or may in any way represent a potential hazard to human health and safety, should immediately leave the area and contact their supervisor.

There must be a minimum of two sampling personnel present in the field. To avoid direct contact with contaminated water, latex or rubber gloves will be worn when sampling surface water. Monitors will wash hands and arms thoroughly with bacterial soap after sampling or before eating and drinking. Monitors should be familiar with basic first aid and cardiopulmonary resuscitation (CPR).

Monitors are strongly encouraged to carry a cell phone. Monitors will inform a supervisor when they leave for the field and their estimated time of return. The supervisor will initiate an emergency action plan if the samplers have not returned to the office within the allocated time. To avoid unnecessary worry and concern, samplers will call the office if they are behind schedule.

### *Safety Precautions and Plan*

Field personnel will take appropriate precautions when operating watercraft and working on, in, or around water; possibly steep or unconsolidated banks; or edges of ponds. All field crews will follow appropriate safety procedures and be equipped with safety equipment such as proper wading gear, gloves, first aid kits, cellular phone, etc. All boats should be equipped with safety equipment such as personal floatation devices, oars, air horn, etc. Utah's Boating Laws and Rules shall be followed by all field personnel.

Field personnel will be aware that hazardous conditions potentially exist at every water body. If unfavorable conditions are present at the time of sampling, it is recommended for staff to reschedule the sample visit. If hazardous weather conditions arise during sampling, such as lightning or high winds, personnel should cease sampling and move to a safe location.

Most often, sample bottles are prepared by the State Lab and already contain preservative. During packing and handling of bottles, the field personnel must be careful and should confirm that caps are tightly sealed in order to avoid contact with preservative (acid). If minor skin contact occurs, field personnel should rinse with copious amounts of water. If major skin or internal contact occurs, affected personnel should seek medical attention.

Monitors should take care to reduce the possibility to contracting diseases carried by insect vectors such as West Nile virus (mosquitoes) and tularemia (horse flies). Other factors to consider are dehydration, weather exposure, stings, and potential site access issues such as barbed-wire fences, broken glass, steep slopes, and mud.

# Equipment

### *Equipment Testing, Inspection, and Maintenance*

DWQ field monitors will inspect all sampling equipment before every sampling event. Equipment maintenance will be scheduled and completed based on these inspections and review of the collected data. The QA Project Manager will regularly review all calibration and maintenance records, so the minimum required maintenance occurs. Detailed procedures for the maintenance of equipment are provided in the corresponding SOPs.

The designated laboratories for this project will be responsible for and expected to follow their standard procedures for preventative/unscheduled maintenance, calibration, and correction action for all laboratory instruments. DWQ is not responsible for the maintenance of the designated laboratories' equipment.

### *Equipment Calibration and Frequency*

Each instrument will be calibrated according to in-house and manufacturer recommendations and at the frequency recommended by the manufacturer. However, water quality probes will also be calibrated before each sampling event and in the field if any errors occur while sampling. Calibration procedures will be documented on a calibration sheet (see Appendix D) , which includes the location, date, and time of calibration, initials of the person performing the calibration, reference standard used (if applicable), readings taken and adjustments to attain a proper reading, and any corrective action. Records of calibration sheets will be stored electronically and backed up daily; hardcopies will be filed in the project binder in the Field Project Manager's office.

**Table 7. Sample Quality Control.**

| Parameter | QC Check | Frequency | Acceptable Range | Correction Actions |
|---|---|---|---|---|
| Field Duplicates | Repeatability of sample collection and analysis, and measure of sample heterogeneity | 1/10 sites | Relative percent difference of ± 20% | Notify staff if missing; audit and train; decide to allow or reject data |
| Equipment Blank | Cross contamination between samples | 1/ 10 sites or at end of sampling day | Non-detect | Notify staff, repeat procedure, find contamination source, decide to accept or reject data |
| Dissolved Oxygen (DO) | Written record of calibration | Daily before use | Instrument specific | Verify altitude; if not correct return meter to manufacturer for repair |
| pH | 2 point meter check calibration; written record of calibration | Daily before use | ± 5% | Repeat field check; if incorrect return meter for repair |
| Temperature | Annual calibration against NIST thermometer | Annually | On the calibration mark | Repeat measurement with different thermometer; if not correct return meter to manufacturer for repair |
| Specific Conductance | 1-point calibration and 1-point check; Written record of calibration | Daily before use | ± 5% | Repeat field check; if incorrect return meter for repair |

# Laboratories and Sample Handling Procedures

### *Laboratories*

A variety of sample types will be collected during this study, requiring multiple analyzing laboratories.

Water chemistry samples will be analyzed by the Chemical and Environmental Services Bureau of the State of Utah's Public Health Laboratories (hereafter referred to as the State Lab). The State Lab maintains an in-house QAPP, available from the QAO (Toby Hooker).

DWQ will use American West Analytical Laboratories (AWAL) for analysis of MBTEXN, the Diesel Range Organics (DRO), and the Oil Range Organics (ORO) of total petroleum hydrocarbons. Error! Reference source not found.8 summarizes the laboratories, the analyses conducted, and their points of contact for this study.

**Table 8. Analysis and Laboratories.**

| Analysis | Laboratory | Contact | Phone |
|---|---|---|---|
| Water Chemistry (and metals) | UPHL | David Dick | 801-965-2405 |
| Total Petroleum Hydrocarbons (MBTEXN, DRO and ORO) | AWAL | Pat Noteboom | 801-263-8686 |
| Field Readings (Hydrolab Reading) | On site | Alex Anderson | 435-760-4286 |

### *Sample Handling*

It is the responsibility of the field crew to coordinate with laboratory staff to obtain their own sample bottles at least one week in advance. Samples should not be shipped or delivered to the labs unless they have been informed two days in advance. Water chemistry samples will be stored in coolers in the field or in refrigerators at the TSC when not in the field. After sample collection and compilation, it is the responsibility of the field crew to turn in samples to the appropriate laboratories for analysis.

American West Analytical Laboratories requires a Chain of Custody form to be filled out after sample collection (Appendix C). Sample bottles used in this study need to be handled with care in order to protect the integrity of the sample. All bottles and paperwork shall be reviewed for discrepancies and corrected before leaving samples in the laboratory's custody.

UDWQ's laboratory coordinator, Toby Hooker, works directly with UPHL Sample Receiving and analytical staff regarding water samples and sample data submitted by DWQ. Ryan Parker is the database manager and will coordinate data management practices and storage. All data results from the laboratory will be reviewed and stored by the database manager. This includes chemistry data master logs, electronic lab sheets (from submitted samples), and analysis reports. Data from water samples take approximately 4-6 weeks from submittal to reporting.

# Data Management

## *Data Review and Validation*

UDWQ's Designated and/or Field Project Manager will be responsible for receiving the lab and field data sheets, checking for omissions in identification, decimal placement, dates, times, units reported, and comments. Water quality technical staff collecting data will be contacted immediately if there are data gaps or if scheduled sampling times were missed.

It is the water quality technical staff's responsibility to evaluate raw data generated by the contract laboratories for appropriate data summary, data quality, and accuracy. All data will be reviewed and reported in units specified at the detection level of the analysis methods used. To reduce data point loss, data that is reported as "less than" detection level will be considered in subsequent analyses by the Designated Project Manager at a value of 1/2 the detection level. Once data is generated, it will be compiled in a database file. During this data transfer, the information will be reviewed and verified in accordance with data quality objectives.

Data generated in the laboratory will be validated by performance checks such as duplicates and blanks. Data will be reported in the units that have been designated to each parameter in the Analytical Methods, Holding Times, Parameters, and Sample Collection Methods section tables. Scientific notation will be used, and significant figures will correlate with detection levels.

## *Data Management and Analysis*

UDWQ staff proficient in water quality monitoring will organize and all lab reports and field data. DWQ Project Manager will be responsible for analyzing the data and prepare as necessary, annual reports. The findings of the annual report will be utilized to determine if the goals and objectives of the monitoring program are being met and what, if any, modifications to the sampling analysis plan are necessary.

## *Quality Control*

QA/QC samples will be collected as part of UDWQ's monitoring run. It will consist of an Equipment Blank, Trip Blank and a replicate sample. A Trip Blank will only be collected when a VOC and/or an SVOC sample is collected at the beginning of the run by filling deionized water in the appropriate bottles.

The equipment blank for the portable samplers will be collected once per site in the field to ensure no contamination from the equipment between samples. The equipment blank will have an assigned MLID 4991307 EQUIPMENT BLANK-Inland Port Stormwater Monitoring and will be treated identically to the samples collected in the field.

# References

1. DWQ. 2014. A Great Salt Lake Water Quality Strategy. State of Utah, Department of Environmental Quality, Division of Water Quality (https://documents.deq.utah.gov/water-quality/standards-technical-services/gsl-website-docs/gsl-wq-strategy/DWQ-2019-000535.pdf)

2. EPA. 2006a. *Guidance on Systematic Planning Using the Data Quality Objectives Process.* EPA QA/G-4, EPA/240/B-06/001, U.S. Environmental Protection Agency, Office of Environmental Information, Washington DC.

# Appendices

# Appendix A: ***Field Form***

Monitoring Run Sample Summary

Trip ID :

Samplers:

Please note that some bottles come in sets

Sampler Contact Information (name and phone number):

Trip Comments:

| Seq. # | Project/ Cost Code | Monitoring Location | Station Desc. | Date | Time | W Temp units: °C | pH | SpC uS/cm | DO mg/L | DO % sat | Flow CFS | Estim. or Meas. (E or M |
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| 22 | | | | | | | | | | | | |

# Appendix B: ***Lab Sheet***

Utah Division of Water Quality

Monitoring Run _____ Sequence Number
Trip ID _____ Agency
Collector _____ Project Code

Sampler Contact Information (name and phone number): _____

Monitoring Location ID: _____ 1234571 Time: _____

Description: _____ Date: _____
MM - DD - YY

Field Specific Conductance (µS/cm): _____ . _____ Sample Type _____

TEST REQUESTS:

Chlorophyll-a Temp: _____ pH: _____ Comments: _____

Site Notes

FIELD COMMENTS: Weather Conditions: _____ _____ _____ _____
Field Conditions: _____ _____ _____ _____

Sheen present?: ☐ Y ☐ N Trash near sampling site? ☐ Y ☐ N Algal mat at site? ☐ Y ☐ N

Wildlife/Livestock near sampling site? ☐ Y ☐ N Recent rain or other precip. in the past 48 hours? ☐ Y ☐ N

Anthropogenic disturbances present at site that may affect sample results? ☐ Y ☐ N
(i.e. construction; car-bodies on stream bank; swimming, etc.)
If yes to any above, explain here:

Were all lab samples collected at this site as indicated on lab sheet? ☐ Y ☐ N
If no, explain which samples were not collected and why:

Were all sonde parameters collected at site? ☐ Y ☐ N
If no, which ones were NOT collected and why:

Were any photos taken at site this visit? ☐ Y ☐ N

# Appendix C: ***Chain of Custody Forms***

**American West Analytical Laboratories**

3440 S. 700 W. Salt Lake City, UT 84119

Phone # (801) 263-8686 Toll Free # (888) 263-8686

Fax # (801) 263-8687 Email awal@awal-labs.com

www.awal-labs.com

## CHAIN OF CUSTODY

All analysis will be conducted using NELAP accredited methods and all data will be reported using AWAL's standard analyte lists and reporting limits (PQL) unless specifically requested otherwise on this Chain of Custody and/or attached documentation.

AWAL Lab Sample Set #

Page _____ of _____

**QC Level:** 1 2 2+ 3 3+

**Turn Around Time:** 1 2 3 4 5 Stnd

Unless other arrangements have been made, signed reports will be emailed by **5:00 pm** on the day they are due.

Due Date:

Client:

Address:

City, State, Zip:

Contact:

Phone #: Cell #:

E-mail:

Project Name:

Project #:

PO #:

Sampler Name:

☐ Report down to the MDL
☐ Include EDD:
☐ Lab Filter for:
☐ Field Filtered For:

**For Compliance With:**

☐ NELAP
☐ RCRA
☐ CWA
☐ SDWA
☐ ELAP / A2LA
☐ NLLAP
☐ Non-Compliance
☐ Other:

| | Sample ID: | Date Sampled | Time Sampled | # of Containers | Sample Matrix | | | | | | | | | | Known Hazards & Sample Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | |
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| 14 | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | |

**Laboratory Use Only**

COC Tape Was:
1 Present on Outer Package Y N NA
2 Unbroken on Outer Package Y N NA
3 Present on Sample Y N
4 Unbroken on Sample Y N NA

Samples Were:
1 Shipped or hand delivered
2 Ambient or Chilled
3 Temperature _____ °C
4 Received Intact Y N
5 Properly Preserved Y N Checked at bench
6 Received Within Holding Times Y N

Sample Labels and COC Record Match? Y N

| Relinquished by: Signature | Date: | Received by: Signature | Date: |
|---|---|---|---|
| Print Name: | Time: | Print Name: | Time: |
| Relinquished by: Signature | Date: | Received by: Signature | Date: |
| Print Name: | Time: | Print Name: | Time: |
| Relinquished by: Signature | Date: | Received by: Signature | Date: |
| Print Name: | Time: | Print Name: | Time: |

Special Instructions:

*By signing this Chain of Custody you are agreeing to permit AWAL to subcontract any analyses not normally performed at AWAL.*

REV 11-21-18

UTAH DEPARTMENT OF HEALTH

Utah Public Health
Chemical and Environmental Laboratory

4431 S 2700 W Taylorsville, UT 84129-8600

801 965 2400 Fax 801 969 3238

http://health.utah.gov/lab/chemistry

# CHAIN OF CUSTODY

Test Requests

☐ #1 ☐ #2 ☐ #3 ☐ #4 ☐ #5

☐ #1 ☐ #2 ☐ #3 ☐ #4 ☐ #5

☐ #1 ☐ #2 ☐ #3 ☐ #4 ☐ #5

☐ **RUSH SAMPLES**

AUTHORIZED BY

○ State Drinking Water Compliance Samples
○ Private Investigative Samples

Date and Time Stamp

**Please fill out this form using block letters and with a black or blue pen.**
**Do not attach this form to the sample.**

System/Agency Name

Customer Number

Public Water System: U T A H

Cost/Project Code

**Sample Matrix**
○ Drinking Water
○ Other Water
○ Soil/Sludge

Sample Receipt Conditions
Documentation complete ○ Yes ○ No
Proper containers and in-date ○ Yes ○ No
Containers intact ○ Yes ○ No
Within holding time ○ Yes ○ No
Coolant ○ Yes ○ No
Temperature within-range ○ Yes ○ No ○ N/A
Acceptable pH ○ Yes ○ No ○ N/A
Acceptable mrem ○ Yes ○ No ○ N/A
○ Hand Delivered
○ Shipped Samples

First Name **REPORTING/CONTACT** Last Name Email

Address City State Zip

Phone Fax Submitted By ☐ New Information Update Account

First Name **BILLING** ☐ **SAME AS REPORTING** Last Name

Address City State Zip

Phone Fax Submitted By

#1 Site Description | Collector's Initials | Bottle | Qty | Temperature | pH | LAB NUMBER

Site Description - Continued | Collection Date 2 0 | Collection Time

#2 Site Description | Collector's Initials | Bottle | Qty | Temperature | pH | LAB NUMBER

Site Description - Continued | Collection Date 2 0 | Collection Time

#3 Site Description | Collector's Initials | Bottle | Qty | Temperature | pH | LAB NUMBER

Site Description - Continued | Collection Date 2 0 | Collection Time

#4 Site Description | Collector's Initials | Bottle | Qty | Temperature | pH | LAB NUMBER

Site Description - Continued | Collection Date 2 0 | Collection Time

#5 Site Description | Collector's Initials | Bottle | Qty | Temperature | pH | LAB NUMBER

Site Description - Continued | Collection Date 2 0 | Collection Time

M M D D Y Y 24 Hour Clock

| | | | |
|---|---|---|---|
| Dispatched By: | Date / Time | Courier Company Name: | Invoice/Air bill #: |
| Relinquished By: | Date / Time | Received by: | Date / Time |
| Relinquished to USL:PH By: | Date / Time | Received at USL:PH by: | Date / Time |

# Appendix D: ***Multi-Parameter Probe Calibration Sheet***

Sonde-Cal-Report: U:\PERMITS\MONITORS\Forms\Calibration Sheets

Updated: 11/26/2019

UTAH DEPARTMENT of ENVIRONMENTAL QUALITY
WATER QUALITY

**DWQ Multi-Parameter Probe Calibration Report**

Run (Trip ID): _____ Analyst: _____

Date: _____ Instrument Make & Model: _____

Time: _____ Instrument ID Number: _____

| Specific Conductance (SpC) | | | | | |
|---|---|---|---|---|---|
| CALIBRATION | | QA/QC | | | |
| SpC Calibration Standard Solution Value: | SpC Calibration Standard Solution Expiration Date: | SpC Reference Solution Value: | SpC Reference Solution Expiration Date: | SpC Measured Value: | Measured Value ±10% of Reference Solution Value? |
| | | | | | ☐ Yes ☐ No[1] |

| pH | | | | | | | |
|---|---|---|---|---|---|---|---|
| CALIBRATION | | | | QA/QC | | | |
| pH Calibration Solution 1 Value[2]: | pH Calibration Solution 1 Expiration Date: | pH Calibration Solution 2 Value[2]: | pH Calibration Solution 2 Expiration Date: | pH Reference Solution Value: | pH Reference Solution Expiration Date: | pH Measured Value: | Measured Value ±5% of Reference Solution Value? |
| | | | | | | | ☐ Yes ☐ No[1] |

| Dissolved Oxygen (DO) | | | | Equipment QA/QC | | | |
|---|---|---|---|---|---|---|---|
| CALIBRATION | | | QA/QC | | | | |
| Barometric Pressure (BP) Used to Calibrate DO? | Calibration Value (%): | Displayed Value (%): | Displayed Value ±5% of Calibration Value? | Instrument Date: | Instrument Time: | Instrument Date and Time Correct? | Does Instrument Battery Have Adequate Charge? |
| ☐ Probe auto-accounts for BP | 100.0 | | ☐ Yes ☐ No[1] | | | ☐ Yes ☐ No | ☐ Yes ☐ No |

| General Comments: |
|---|
| |

| Calibration Checks | | | | | |
|---|---|---|---|---|---|
| MLID | Which Probe is Being Checked? | Reason for Calibration Check? | Calibration Value | Measured Value[3] | Measured Value Within Range of Calibration Value? (i.e., SpC, pH, or DO) |
| | ☐ SpC ☐ pH ☐ DO | | | | ☐ Yes ☐ No |
| | ☐ SpC ☐ pH ☐ DO | | | | ☐ Yes ☐ No |
| | ☐ SpC ☐ pH ☐ DO | | | | ☐ Yes ☐ No |
| | ☐ SpC ☐ pH ☐ DO | | | | ☐ Yes ☐ No |
| | ☐ SpC ☐ pH ☐ DO | | | | ☐ Yes ☐ No |
| | ☐ SpC ☐ pH ☐ DO | | | | ☐ Yes ☐ No |
| | ☐ SpC ☐ pH ☐ DO | | | | ☐ Yes ☐ No |
| | ☐ SpC ☐ pH ☐ DO | | | | ☐ Yes ☐ No |
| | ☐ SpC ☐ pH ☐ DO | | | | ☐ Yes ☐ No |
| | ☐ SpC ☐ pH ☐ DO | | | | ☐ Yes ☐ No |

[1] If no, use a different probe or perform maintenance

[2] When using a Hydrolab brand probe, be sure to correct for temperature when calibrating pH (see chart on back)

[3] If measured value is not within acceptable range of calibration value, perform a recalibration using a new calibration sheet

# Appendix E: ***Portable Sampler Field Form***

Utah DWQ, April 2020

**Utah DWQ Portable Sampler**
**Installation, Inspection and Maintenance Form**

Site Name:_____ STORET:_____
Latitude:_____ Longitude:_____
Site Description:_____
Portable Sampler Make/Model/Serial Number:_____
Portable Sampler Calibration Date:_____ Installation/Deployment Date:_____
Installation Personnel:_____
Notes from Installation:_____

| Date | Monitor Initials | Visual Inspection Performed (Y or N) | Visual Inspection Okay (Y or N) | Data Retrieval Performed (Y or N) | Battery Life Remaining | Memory Remaining | Maintenance Performed (Y or N) | Flow Measurement Performed (Y or N) | Equipment Condition, Comments, Describe Maintenance |
|---|---|---|---|---|---|---|---|---|---|
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Page _____ of _____

## Appendix F: ***Quality Assurance Project Plan***

**https://deq.utah.gov/Compliance/monitoring/water/docs/2014/05May/DWQ_QAPP_5.1.14_Rev0.pdf**

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