

SOP 1.2: Acquisition of Supplies, Repair Services, and Maintenance.

This document provides the guidelines for the acquisition of supplies which are required on a regular schedule as well as on an ad hoc basis.

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I. Equipment and Supplies

Supplies needed to complete this protocol are consumable and require restocking periodically. These consumables can be acquired from multiple suppliers in most cases. Equipment degrades and must be replaced periodically as failures occur over time.

A. Fixed Consumables

- Calibration and Power Supplies
 - pH Buffer (4, 6, 7, 10)
 - Specific Conductance Standard (1412 $\mu\text{S}/\text{cm}$, 100 $\mu\text{S}/\text{cm}$)
 - Turbidity Standard
 - Distilled water
 - AA-Batteries
 - C-Batteries
- Sensors
 - DO caps (YSI ProPlus)
 - pH probe (YSI ProPlus)
 - DO membrane (YSI 6-series)
 - pH probe (YSI 6-series)
 - DO membrane (Hydrolab)
- pH electrolyte (Hydrolab)
- pH salt tablets (Hydrolab)
- pH Teflon junction (Hydrolab)
- Maintenance
 - YSI Sondes
 - Optical sensors
 - Hydrolab Sondes
- Miscellaneous Items
 - Lint-Free Tissue
 - Toothbrushes
 - Hand-brushes
 - Etc.

B. Ad-Hoc Consumables

- Equipment Replacement and Repair
 - YSI (ProPlus, 6-Series)
 - Hydrolab

II. Schedule for ordering fixed consumables

All items listed in §I.A of this document must be acquired on a reoccurring basis as each is consumed implementing the protocol or have a specified life cycle. Many of these items have expiration dates so that the timely consumption of these supplies is critical to efficiently allocate resources. Below is the timelines in which these items should be purchased and consumed.

A. Calibration Supplies

Reordering of calibration supplies should be planned so that all standard solutions are consumed prior to their expiration date. Typically, most suppliers guarantee solutions for one year after the date of purchase. However, check with the supplier prior to placing an order to clearly understand how much volume should be ordered so that resources are efficiently used.

(1) Standard Solutions

Buffers and standard solutions are available from a variety of suppliers including chemical supply companies, environmental services companies, and equipment manufacturers. Price comparisons should be made on an annual basis prior to ordering (including shipping costs).

a. pH Buffers

i. Calibration procedures prescribe the use of 4 buffers:

1. pH 7 (yellow; Calibration)
2. pH 4 (red; Calibration)
3. pH 10 (blue; Calibration)
4. pH 6 (colorless; Sensor Check)

b. Specific Conductance Standards

i. Calibration procedures prescribe the use of 2 standards:

1. 1412 $\mu\text{S}/\text{cm}$ (Potassium Chloride)
2. 100 $\mu\text{S}/\text{cm}$ (Potassium Chloride)

(2) Distilled Water

- a. Distilled water should be sourced locally if distilled or deionized water is not available at calibration sites.

(3) Batteries

The quantity and type of batteries will vary based on available equipment. To ensure consistency in equipment operation high quality alkaline batteries should be used for deployments.

- a. Hydrolab Equipment: 8 C-Batteries/deployment
- b. YSI 6-Series Equipment: 8 AA-Batteries/deployment

(4) Frequency and Quantity of Acquisition

Table 1. Acquisition of fixed schedule buffers and standard solutions.

Item	Volume	Quantity	Frequency/ Year	Timing
pH Buffers (each)*	500 ml	12	2	August/March
Specific Conductance Standards (each)	1L	12	2	August/March
Distilled Water	Source locally as needed			All Year
Batteries	AA	140	2	August/March
	D	48	2	August/March

Quantities listed in Table 1 will change based on the number of water quality meters and sondes actively used in any given year. These are likely maximum quantities which would be needed.

(5) Miscellaneous Items

Numerous miscellaneous items are needed to successfully carryout this protocol. Review equipment and supply checklists to ensure all items are available for use on a monthly basis. Order replacement items as needed throughout the year.

B. Sensors and Maintenance

Many sensors used in water quality monitoring equipment have parts that require regular replacement. Additionally, water quality sondes and sensors should undergo regular maintenance to ensure maximum longevity of equipment. The following section will list the required equipment and maintenance by the manufacturer and model of MIDN owned equipment. See calibration and maintenance SOPs for specific maintenance intervals and guidance.

(1) YSI ProPlus

- a. Dissolved Oxygen: Membrane Cap Replacement (YSI Part #5908)
- b. pH: pH Sensor (YSI Part #1001)

(2) YSI 6-Series

- a. Replacement Parts
 - i. Dissolved Oxygen: Optical DO Membrane Kit (YSI Part #6155)
 - ii. pH Sensor (YSI Part#6589FR)
- b. Periodic Maintenance
 - i. Quad Seal for Optical Sensors
 - ii. Tune-Up

(3) Hydrolab DS5X

- a. Replacement Parts
 - i. Dissolved Oxygen: Optical DO Membrane Cap (Hydrolab Part #007460)
 - ii. pH: Reference electrolyte and Salt Pellets (Hydrolab Part #005308HY and 005376HY)
- b. Periodic Maintenance

i. Tune-Up

(4) Frequency and Quantity of Acquisition

Table 2. Acquisition of fixed schedule parts and maintenance.

Equipment	Item/Part #	Quantity	Frequency/ Year	Timing
YSI ProPlus	5908	5	1	August
	1001	5	1	August
YSI 6-Series	6155	4	1	August
	6589FR	4	1	August
	Quad Seal	4	0.5*	Rotational
	Tune-Up	4	0.5*	Rotational
Hydrolab DS5X	007460	3	1	August
	005308HY	6	1	August
	005376HY	12	1	August
	Tune-Up	7	0.5*	Rotational
	000548HY	7	1	August
Reference Thermistor	Validation**	1	1	August

* Quad seals and tune-ups should be performed on each applicable unit once every two years.

**Validation can be done by VWR

Quantities listed in Table 2 will change based on the number of water quality meters and sondes actively used in any given year. These are likely maximum quantities which would be needed.

III. Ad-Hoc Consumables

As equipment is deployed repairs will become necessary to maximize the lifespan of equipment. All replacement sensors, parts, and repairs should be obtained from the manufacturer, an authorized retailer, or qualified laboratory (e.g., [USGS Hydrologic Instrumentation Facility](#)).

A. YSI Equipment

All YSI equipment operated by MIDN has user replaceable sensors. If troubleshooting indicates that a sensor needs to be replaced it can be ordered and be serviced on site. If troubleshooting does not indicate a specific issue, ship the individual sensor or sonde to YSI or an authorized retailer for service.

B. Hydrolab Equipment

All Hydrolab sensors are tied directly to circuit boards within the sonde. Therefore all sensor replacements should be performed by the manufacturer or an authorized retailer.

C. Sonde Replacement

Over time long-term monitoring equipment is expected to degrade and be phased out. The expected life cycle for budgeting purposes for these sondes is approximately 8 years (based on consultation with experienced users). Therefore, MIDN expects invest the necessary funds on an annual basis to replace one sonde.

IV. Tracking of Supplies and Repairs

Tracking of maintenance and repairs is completed using log books associated with each piece of monitoring equipment. All maintenance and repair activities will be recorded in the log books along with relevant notes regarding the reason for the maintenance event. Additionally a digital record of the log books will be maintained on the MIDN water quality laptop. A log of all fixed consumable supplies will be maintained in the storage area for MIDN supplies.