

These procedures will be used to collect water samples, measure dissolved oxygen (DO) and temperature, and record aesthetics at previously selected locations in each SWMA. Each SWMA will have at least three dry weather sampling locations. *Table 1* and *Figure 1* include the sampling locations by SWMA that have been determined to date.

Dry weather surveys will be planned for May through October in each year. However, slight extensions to this period may be necessary based on dry weather conditions. The 15 surveys will be divided over three, 30-day periods. Each 30-day period will include five surveys, weather and scheduling permitting. The decision to collect samples is dependent on the river level prior to and following rain events, and typically requires at least 3 days of dry weather prior to the day of the survey. Dry weather is defined as no measurable change in the river level or less than 0.10 inches per day for 48 to 72 hours preceding the dry weather sampling. Coordination with the laboratory and bottle pick-up should occur prior to dry weather sampling.

The required activities as part of the dry weather survey are to collect a grab sample at each sampling site, measure and record DO and temperature, record the staff gage reading (if staff gage present), and record aesthetic observations. Any additional comments that might be applicable to the quality of the sample results should also be recorded. All samples will be delivered to an approved laboratory, where they will be analyzed for five water quality parameters: 5-day carbonaceous biochemical oxygen demand (CBOD₅), total suspended solids (TSS), ammonia (NH₃), total phosphorous (P_T), and *E.coli*. Table 2 summarizes the sampling and laboratory requirements for each parameter.

2.0 Definitions

Dry Weather Survey – an independent sampling event during which ambient water quality grab samples and/or measurements are taken at predetermined sites throughout the Rouge River watershed during dry flow conditions.

Dry Weather – defined as less than or equal to 0.10 inches per day of rain during a 48 to 72-hour period preceding the dry weather survey or no measurable change in the river level.

Grab Sample – A single volume of sample collected manually.

3.0 Equipment

The following equipment must be maintained throughout the sampling event:

- Latex gloves
- Safety glasses
- Orange traffic vests
- Traffic cones

- Cell phone
- Pen with waterproof ink
- Chain of custody forms – Paragon and RTI laboratories
- Sampling bucket and rope
- Cooler
- Distilled water
- Ice
- Field observation worksheet for recording DO, temperature, aesthetics, etc.
- Winkler DO field kit
- Thermometer
- YSI 95 or 550 hand-held DO/Temperature meter (cable will need to be marked off in 1-foot increments for use at Jefferson Ave.)
- BOD Sampler (for use at Jefferson Ave.)

In addition, one set of the following sampling bottles (or as supplied by Paragon Laboratory) are needed per sampling site:

- One bottle (1 L) with no preservative
- One bottle (1 L) with H₂SO₄ preservative
- One 100 ml sterile bottle with no preservative

QA/QC sampling bottles should also be obtained from Paragon Laboratory. All sampling supplies and equipment should be prepared at least one day prior to a scheduled event.

4.0 Procedures. (Note: the Jefferson Avenue Bridge (M14) site will require a separate set of procedures due to the volume of flow at this location and the backwater effect of the Detroit River. See item 5 below)

The field team should be at their first sampling site at sunrise on the day of the survey. The following steps should be performed:

1. The field crews will follow the health and safety procedures of their office of employment. See Appendix B. Park the vehicle in a safe location near the sampling site, using traffic control where appropriate. In some locations the shoulder of the road may be minimal and it will be necessary to park the vehicle so that the sampling team is protected from approaching traffic. The vehicle should be parked on the shoulder between traffic and the sampling team. Traffic cones and flashing lights on the vehicle should be used. Orange traffic vests should be worn.
2. **DO/Temperature Measurement.** Complete the Field Observation Worksheet (see Appendix A for example). Record all measurements on this worksheet.

- a. See Appendix C for meter setup and operation and Lamotte Kit instructions. Prior to daily use, and anytime the meter is turned off and on, the meter should be calibrated and verified. The LaMotte Winkler kit for DO is used to verify the meter DO and a calibrated thermometer is used to verify the meter temperature. For meter DO measurement to be accepted the meter and Winkler kit should agree to within 0.5 mg/L. If they do not the meter should be recalibrated and/or the Winkler test should be repeated. At times it may be necessary to troubleshoot problems with the meter. A troubleshooting guide is provided in Appendix C. For meter temperature measurement to be accepted the meter and the calibrated thermometer should agree to within 0.5 degrees C.
 - b. Three DO and temperature measurements should be taken at each location whenever possible (on occasion this may be prevented by low flow in the river), at the center of the stream and at left and right one-quarter locations of the stream. All measurements should occur at mid-depth in a well-mixed portion of the stream. At higher flow in the river it may be necessary to attach a weight towards the end of the meter line to prevent the probe from being carried downstream.
 - c. All meter DO readings less than 5.0 mg/L should be verified with the Winkler method.
3. **Sample Collection.** Rinse the sampling bucket twice with distilled water before using at a new location and drain completely.
- a. The bottles should be labeled prior to filling. Often the label will become wet on filling and the pen will not write on the label. Use a waterproof pen to write on the label. The labels will become wet once the bottles are placed in ice. Label each sample with the appropriate Sample ID number (see Appendix A for sample labeling procedure from the RPO Field Sampling Plan). Both bottles are considered ONE sample, and will be labeled with the same Sample ID. However, the analytical tests requested must be indicated on each bottle as follows (or as labeled on the bottles supplied by the laboratory):
 - CBOD₅ and TSS on the 1 L bottle with no preservative.
 - P_T and NH₃ on the 1 L bottle with H₂SO₄ preservative.
 - *E. coli* on the 100 ml sterile bottle with no preservative.
 - b. Obtain samples by lowering the sampling bucket into the stream in a well-mixed portion of the river or stream (nearest to the middle when possible) and at mid-depth (samples should not contain sediment from the bottom or scum from the top), raising the bucket, and carefully pouring the water into the following sample containers:
 - One 1 L bottles with no preservative, and
 - One 1 L bottle with H₂SO₄ preservative.

(**DO NOT collect** samples in the bottle with preservative directly. If the sample bottle is prepared with preservative **DO NOT overfill** the bottle with sample or the preservative will be diluted.)

- One 100 ml sterile bottle with no preservative.
(The *E.coli* sample should be collected directly into the sterile container. Do not collect a sample for *E.coli* in a non-sterile container unless absolutely necessary. If this is done it must be recorded on the field log and on the Chain of Custody (COC))

All equipment used to obtain grab samples should be rinsed with distilled water after each use.

- c. Record each sample on the COC form (see Appendix A for sample COC form completion directions).
 - d. Store all sample bottles in a cooler in ice. The ice should completely surround all sample bottles.
 - e. Proceed to the next sampling site.
4. **QA/QC Sample Collection.** In addition, duplicate, split and field blank samples shall be taken at sample sites as specified in the Quality Assurance section.
- a. One duplicate and one split sample are to be collected for every one in 20 samples collected. Therefore, duplicates and splits are not necessarily collected during each survey. One field blank is to be collected for each sampling survey.
 - b. Following the collection of all samples and duplicate samples, the sampling team shall transport them to Paragon Laboratories. Split samples shall be delivered to RTI Laboratories. All COCs shall be completed (see Appendix A) and signed appropriately and copies returned for filing.
5. **Jefferson Avenue Bridge Sampling.** A composite sample will be developed from grab samples collected at three defined locations across the width of the channel. Flow from the Detroit River on occasion travels up the Rouge River channel above Jefferson Ave. However, complete mixing of the two waters often does not occur. Water samples at Jefferson Ave. will only be collected from selected portions of the cross section that can be attributed to the Rouge River. The selection will be based on readings of temperature and DO. Past sampling has indicated that water from the Detroit River has a lower temperature and higher DO. The Rouge is expected to layer on the top of the Detroit River prior to mixing because the Detroit River water is denser. Therefore, the grabs will normally be collected in the upper portion of the water column at each of the three sampling locations.

- a. Lower the YSI hand-held meter into the water one foot below the surface. Record the DO and temperature. Lower the probe another 5 feet and record the readings. Continue lowering the probe at 5-foot intervals until a sharp change in readings is measured or the bottom is reached.
- b. Review the recorded data for a sharp change in the recorded data for both parameters or no change at all.
- c. Note the depth where changes start to occur. Grab samples and DO and temperature measurements should be collected and recorded one-third to one-half between the surface and this distance. If no change is seen collect grab samples approximately 10 feet below the water surface.
- d. The Bottle-on-Demand (BOD) sampler will be used to ensure that the samples are collected at the desired depth. Rinse the sampler out with distilled water. Lower the sampler to the desired depth and collect a sample.
- e. Each grab sample at each of the three sites represents one-third of the contents of a sample bottle (determine the volume of the sample bottle and fill appropriately using a graduated cylinder rinsed between uses with distilled water).
- f. Bottle labels should be identified with the time of the first grab sample collected at the first site.
- g. *E. coli* samples may not be collected at this location. This will be determined on an event-by-event basis.

5.0 Health and Safety

All personnel are governed by the rules, regulations, policies, and procedures that have been established by their employer. For these rules, regulations, policies, and procedures each individual must read and is referred to the Health and Safety Manual and officer of their individual employment.

In addition to the guidance of the Health and Safety Manual, field personnel should be aware of the following basic safety issues:

- Traffic Protection – Since some sampling is to be done at or near bridge locations where vehicular traffic may occur, safety precautions to avoid accidents and injury should be observed. The use of traffic cones, vehicle flashing lights, and vehicle placement to protect sampling personnel might be necessary.
- Sampling Location – Some sample sites may require travel through brush and rough or uneven terrain. Appropriate boots and protective clothing should be worn.
- Insects, Rodents and Other Small Animals – Encounters with insects or animals at the sample sites are always a possibility. Field personnel should always keep alerted to their

presence to avoid stings or bites. If encounter with one of the above is possible, then insect spray or repellent should be carried.

- Preservatives – Some of the bottles provided by the laboratories contain preservative. Internal and external contact with the preservative should be avoided. Skin and/or eyes may become irritated or burned if exposed to these chemicals. Protective eyeglasses and disposable rubber gloves should be worn while collecting and handling samples. If exposure or contact does occur flush the area with large amounts of distilled water. Perform all sample collection outside of the vehicle to avoid inhalation of fumes. For first aid procedures specific to each method or reagent see the MSDS sheets provided in Appendix B.

All injury accidents should be reported to the sampling coordinator regardless of the extent of the injury.

6.0 Quality Assurance

The quality assurance objective for the dry weather survey is to obtain representative grab samples at each sample location.

One duplicate and one split sample shall be taken for every one in 20 samples collected (i.e. two duplicates and two splits required for 21 samples). One field blank sample shall be collected per survey.

1. A duplicate sample is an additional sample (two bottles for each parameter) taken at any given sample site that is also sent to the primary laboratory and is recorded on the same primary laboratory COC. The sample shall be given a Sample ID according to the attached sample labeling procedure.
2. A split sample is an additional sample (two bottles for each parameter), taken at the same site as the duplicate that is sent to the QC laboratory and is recorded on a separate QC laboratory COC. The sample shall be given a Sample ID according to the attached sample labeling procedure.
3. A field blank sample is an additional sample taken at any given sample site that is filled with distilled water. Field blanks are delivered to primary laboratory.

An original sample, a duplicate sample, and a split sample shall all be taken at the same sample site. **All samples for the same parameter should come from the same volume of the sampling bucket (i.e. raise the sampling bucket from the river and fill the non-preserved bottle from the original, duplicate and split sample; obtain another sample from the river and fill the bottle with H₂SO₄ preservative for each of the three samples). If any settling has occurred in the collection bucket, it should be thoroughly mixed before distributing**

into the sample containers. This is to ensure that the unique water sample being used for comparison is the same for each analytical test.

The field blank sample bottles shall be filled with distilled water at the sample site following collection of the original sample. The bottles shall be handled and processed as if they were an actual sample.

7.0 Personnel

Field sampling and monitoring shall be performed using a two-person crew. Other field survey personnel include the sampling coordinator, the project manager, and the two laboratory contacts. Table 3 is a list of all personnel involved in the project and includes contact information.

Table 1
Dry Weather
2003 – 2007 SWMA Sampling and Monitoring Locations
(Within SWMA, station order is upstream to downstream.)

SWMA	Field ID	Site ID	Location Description	Year to be Sampled
Main 1-2	G45	M1003545	Maple, W. of Southfield Rd.	2003,2004
	M03	M1003503	Lasher Road (N. of 12 Mile Rd.)	2003,2004
	US5	M1007261	Beech Rd.	2003,2004
Main 3-4	G43	M2003543	5 Mile Road, W. of Lahser Road	2007
	US7	M2003045	Plymouth Road	2007
	US8	M3009637	Rotunda Drive	2007
Lower 1	L01	L1003531	Beck Road	2006
	G93	L1003593	Fowler Creek at Beck Road	2006
	G94	L1003594	Sines Drain at Sheldon Road	2006
	L51	L1009627	McKinstry Drain at Michigan Avenue	2006
	G211	L1009591	Fellows Creek at Ford Road	2006
	L02	L2003532	Fellows Creek at Palmer Road	2006
	US9	L2009638	Hannan Road (USGS)	2006
Lower 2	L06	L2003536	Wayne Road	2006
	G98	L2003598	John Daly Road	2006
	L05D	L2009355	Military Road	2006
Middle 1	G83	D1003583	6 Mile Rd., E. of Sheldon Rd.	2005
	D60	D2009628	Willow Ck. at Lotz Rd.	2005
	US10	D2009639	Haggerty Rd.	2005
Middle 3	D32	D2007259	Canoe Livery at Newburgh	2005
	G84	D2003584	Tonquish Ck. at Wayne Rd.	2005
	D06	D3003526	Hines/Ford Rd.	2005
Upper	U16	U2007253	Farmington Rd. S. of 6 mile Rd.	2004
	U19	U2007250	6 Mile Rd., E. of Middlebelt Rd.	2004
	G71	U1003571	Inkster Rd.	2004

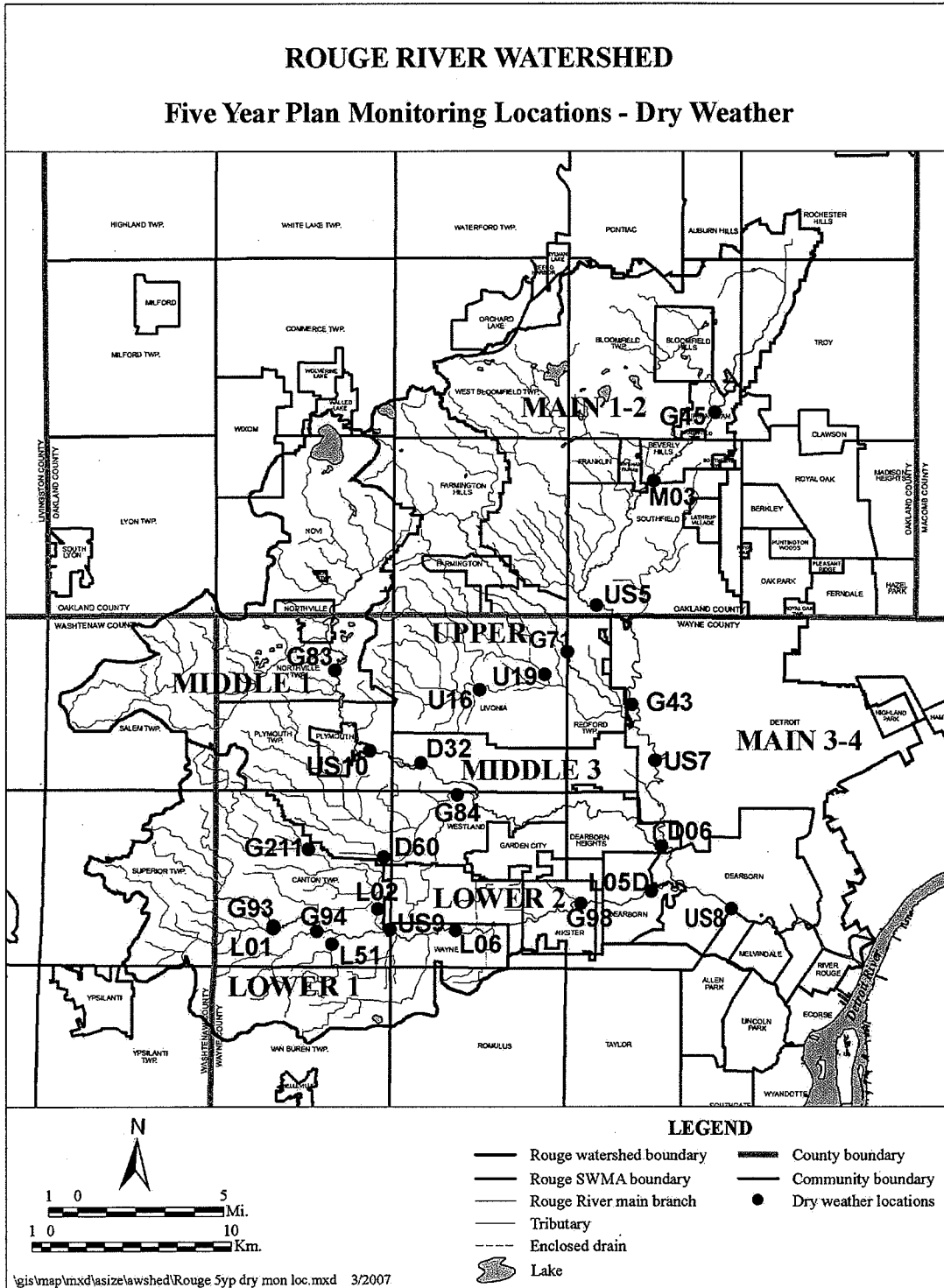
Table 2
Sample and Laboratory Requirements
(Bottles with preservative are supplied by Primary Laboratory)

Parameter	Bottle Type	Bottle Volume	Preservative	Hold Time	Laboratory
CBOD ₅	Polyethylene	1 L	None	48 hours	Primary (splits to QC laboratory)
TSS			None	48 hours	
NH ₃	Polyethylene	1 L	H ₂ SO ₄	48 hours	
P T			H ₂ SO ₄	48 hours	
<i>E.coli</i>	Polyethylene	100 ml sterile	none	6 hours	

**Table 3
Contact Information**

Titles/Roles	Name	Office Phone	Office Fax	Pager / Cell	Home Phone
Work Plan Manager	Colleen Hughes, CDM	(734) 213-5444	(734) 213-5775	(734) 353-0138	
Monitoring Task Manager	Chris Catalfo, CDM	(734) 326-3936	(734) 326-4421		(734) 453-1023
Monitoring Technical Advisor	Ed Kluitenberg, CDM	(734) 213-5444	(734) 213-5775	(734) 476-1108	(734) 485-5714
Wayne County Department of Environment	Patrick Cullen	(734) 326-3936	(734) 326-4421	(313) 999-6267	
	Sue Thompson	(734) 326-3926	(734) 326-4421	(313) 999-6266	
	Noel Mullett	(734) 326-3936	(734) 326-4421	(313) 999-6260	
	Matt Best	(734) 326-3926	(734) 326-4421	(313) 999-6264	
Applied Science Inc.	Andy Wood	(313) 567-3990	(313) 567-3750	(517) 214-1621	(734) 812-4979
Paragon Laboratory	John Spurr	(734) 462-3900	(734) 462-3911		
e-Lab Analytical, Inc.	Ann Preston	(616) 399-6070 x 525	(616) 399-6185	(616) 218- 5574	

Figure 1



Appendix A
Labels and Forms

Sample Designation. All sample bottles should be pre-labeled on the bottle, not the cap, to identify the sample for laboratory analysis. Sample labels should include type of sample (grab or composite), Sampler's name, date, time, and location. Sample identification will use the following format:

Sample Numbering Scheme:

SSSYMMDDHHmmTTT

Where:

- SSS = Station Number/Location Identifier
(Can be up to 8 identifiers, typically 3-4) Example G45 Maple, G461 14 Mile @ Franklin.
- Y = Last digit of Year
- MM = Month two digits (01-12)
- DD = Day two digits (01-31)
- HH = Hour (Military Time) two digits (01-24)
- mm = Minute two digits (00-59)
- TTT = Type of sample (Note: ## denotes sample number, series, or set)
 - G## = Grab Water Sample
 - A## = Automatic Sampler Water Sample
 - S## = Soil/Sediment Sample
 - L## = Landfill/Leachate Sample
 - #81 = Field Duplicate
 - #86 = Field Blank
 - #87 = Split Sample

Example: L05806081025G00

This sample is from monitoring site number L05 (Military Rd.), collected on June 8, 1998. It is a grab sample taken at 10:25 a.m.

Example: G91806130330G87

This sample is from grab sampling site G91 (Venoy Road), collected on June 13, 1998. It is a quality control split sample taken at 3:30 a.m.

The chain-of-custody form has a column for indicating the sample designation. It is very important that the number is entered correctly.

SAMPLE BOTTLE LABEL
ANALYSIS
BACTERIAL/LABORATORY

SAMPLE SITE: MAPLE ROAD
SAMPLE I.D.: 645309151420600
SAMPLE DATE: 9/15/03 TIME: 14:20
SAMPLED BY: CHC
ANALYSES: NH3, P.T.

PRESERVATIVE: H2S24

Appendix B

Health and Safety Information

Refer to the Health and Safety Manual and Officer of Individual Employment

Appendix C

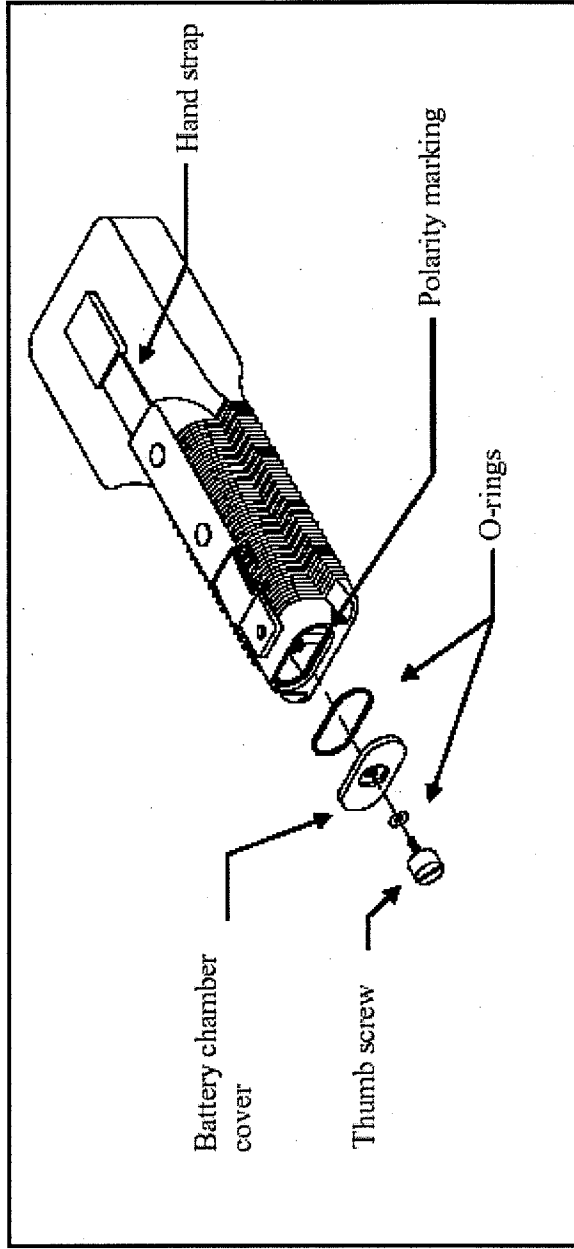
YSI 95 Meter Operation YSI 550 Meter Operation Lamotte Winkler Kit and MSDS sheets

YSI Incorporated Model 95

PREPARING THE METER BATTERIES

There are a few things you must do to prepare your YSI Model 95 for use. First, locate the six AA sized alkaline batteries that were included. Use a screwdriver or a small coin to remove the thumbscrew on the bottom of the instrument (see figure below). This thumbscrew holds the battery chamber cover in place. The battery-chamber cover is marked with the words "OPEN" and "CLOSE."

NOTE: On some models, the battery cover thumbscrew may be unscrewed by hand (a screwdriver may not be required).



There is a small molded insert inside each of the two battery-chamber sleeves. These labels illustrate the correct way to install the batteries into each sleeve of the battery-chamber. **CAUTION:** It is very important that the batteries be installed ONLY as illustrated. The instrument will not function and may be damaged if the batteries are installed incorrectly.

Turn the instrument on by pressing and releasing the **ON/OFF** button on the front of the instrument. The liquid crystal display (LCD) should come on. Allow a few seconds for the instrument to complete its diagnostic routine. If the instrument does not operate, consult Section 8, **Troubleshooting**.

You may also want to take the instrument into a dark room and with the instrument **ON**, hold down the **LIGHT** button. The instrument back light should illuminate the LCD so that the display can be easily read.

CALIBRATION/STORAGE CHAMBER

The Model 95 has a convenient calibration/storage chamber built into the instrument's side. This chamber provides an ideal storage area for the probe during transport and extended non-use. If you look into the chamber, you should notice a small round sponge in the bottom. Carefully put about 10 drops of clean water into the sponge. Turn the instrument over and allow any excess water to drain out of the chamber. The wet sponge creates a 100% water saturated air environment for the probe that is ideal for dissolved oxygen calibration. Figure 1.

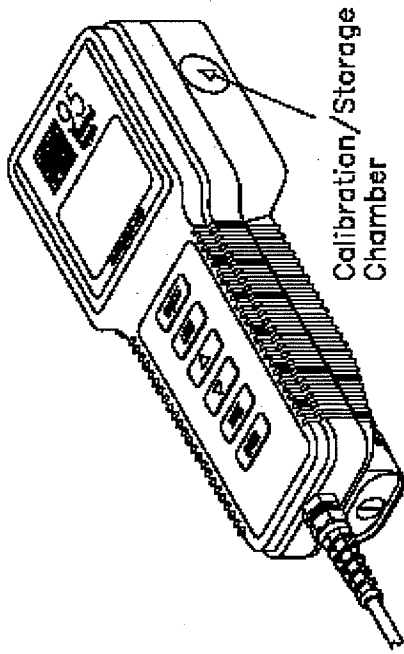


Figure 1

HAND STRAP

The hand strap (see figure on previous page) is designed to allow comfortable operation of the Model 95 with minimum effort. If the hand strap is adjusted correctly, it is unlikely that the instrument will be easily dropped or bumped from your hand. To adjust the hand strap on the back of the meter, unsnap the vinyl

cover and pull the two Velcro strips apart. Place your hand between the meter and the strap and adjust the strap length so that your hand is snugly held in place. Press the two Velcro strips back together and snap the vinyl cover back into place.

METER CASE

The meter case is sealed at the factory and is not intended to be opened, except by authorized service technicians. **Do not attempt to separate the two halves of the meter case as this may damage the instrument, break the water-proof seal, and may void the manufacturer's warranty.**

PREPARING THE PROBE

The YSI Model 95 dissolved oxygen probe is shipped wet with a shipping membrane installed. This protective membrane cap on the probe tip must be removed and replaced with a new membrane cap filled with MEA probe solution before using the probe. Follow the instructions below to install the new membrane cap.

CHOOSING THE CORRECT MEMBRANE CAP

Two different membrane caps are available for the Model 95. The **YSI Model 9501 Membrane Cap Kit** is supplied with the Model 95. This kit contains six 0.5 mil (.0005") membrane caps and a bottle of MEA probe solution (KCl). **NOTE:** YSI 9501 Membrane Caps offer the fastest response to changes in DO and are recommended by YSI for most applications. For conditions with low flow or stagnant water, a 1 mil (.001") membrane is available (YSI Model 9502 Membrane Cap Kit). This membrane requires less stirring than the 9501, but has a much slower response. Use this membrane when minimal stirring (<2"/sec) is available.

MEMBRANE CAP INSTALLATION

WARNING: Use only YSI MEA probe solution in the membrane cap. Any other solution will damage the MEA sensor. To install a new membrane cap on your YSI Model 95 dissolved oxygen probe:

1. Unscrew and remove the probe sensor guard (see Figure 2).
2. Unscrew and remove the old membrane cap.
3. Thoroughly rinse the sensor tip with distilled water.
4. Hold the membrane cap and add 8 to 9 drops of MEA probe solution (about half full).
5. Tap the bottom of the cap with your finger a few times to remove any trapped air bubbles.
CAUTION: Do not touch the membrane surface.
6. Screw the membrane cap onto the probe tightly by hand (to prevent leakage of electrolyte). A small amount of probe solution should overflow.
7. Shake off any excess probe solution and rinse the stainless steel thoroughly with distilled water to prevent corrosion.

Preparing the Probe Section 3
YSI Incorporated Model 95 5

WARNING: Use only YSI MEA probe solution in the membrane cap. Any other solution will

damage the MEA sensor.

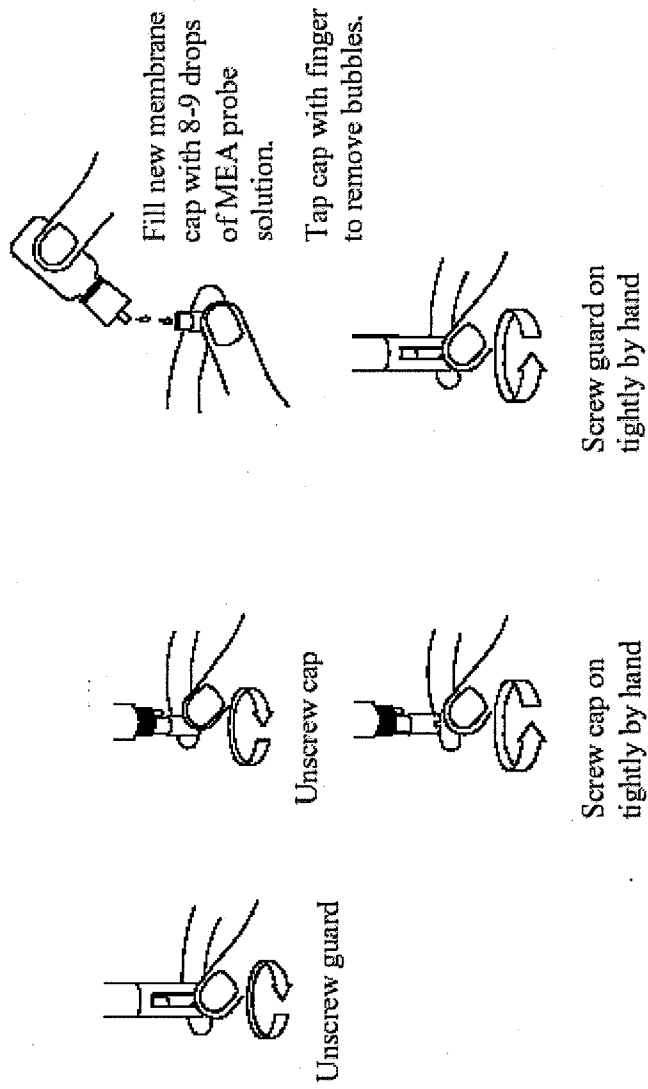


Figure 2

OPERATION - The following diagram is an overview of the operation of the Model 95. See the following sections for details of operation.

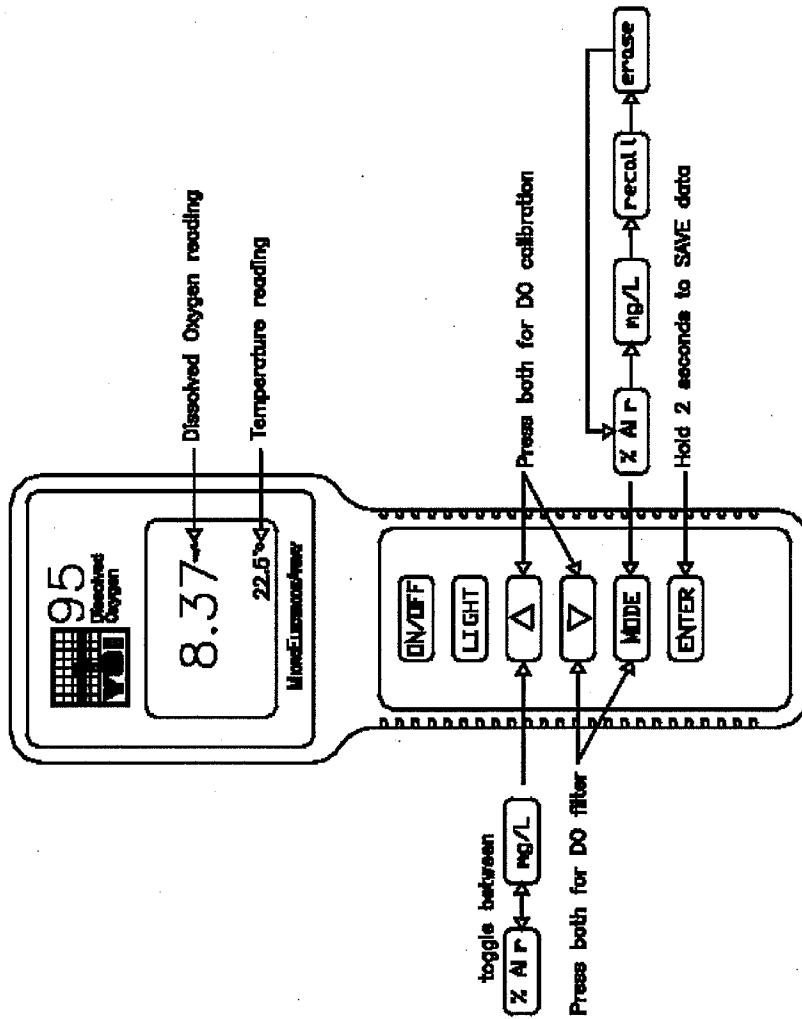


Figure 3