Recommended Procedures for Use of YSI Water Quality Monitoring Instruments during Oil Spills

Overview: This is a guidance document that is intended for users of YSI 6-Series sondes and handheld instruments in environments impacted by an oil spill. The specific form and impacts of oil in water on YSI's equipment can vary. These guidelines are our best practices for decontaminating and deploying equipment; however, they do not guarantee that sensors or equipment will not be impacted by the oil.

YSI encourages customers to continue to collect data during an oil spill. We ask all users who are working in oil-impacted areas to provide us with feedback on sensor performance and oil conditions, so that we can improve this document. Please send any information to environmental@ysi.com.

For the 2010 Gulf of Mexico oil spill, we will guarantee expedited (3-5 working days) repairs on equipment affected by the oil at our Ohio and Baton Rouge (USA) repair facilities.

Instrument Decontamination

If you have YSI instruments that are contaminated with crude oil, follow this decontamination procedure.

You will need:

1. Gloves
2. Eye protection (safety glasses with side shields; or goggles)
3. Cloths or lint free paper towels
4. Replacement brushes and wipers and hex wrench
5. Dawn dishwashing liquid and Simple Green (degreasing formula)
6. Buckets
7. Soft brushes for cleaning
8. Pipe cleaners and Q-Tips
9. Waste collection container

Procedure:

1. Wear gloves and eye protection when handling items contaminated with crude oil.
2. Spray all contaminated areas with Simple Green to remove as much contaminant as possible.
3. Use soft cloth or paper towels to wipe off excess oil from instruments and sensors.
    - Be careful when wiping around sensor optics or membranes.
    - Dispose of oil-saturated cloths according to local regulations *(see note below).*
4. Remove oil-coated wipers and brushes from sensors.
5. Submerge instrument in warm, soapy water.

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6. Use soft brush to wipe away remaining oil.
7. Use small brush to clean inside the conductivity cell of the temperature-conductivity probe.
8. Rinse in soapy water.
9. Repeat steps 4-7, several times if necessary.
    - Dispose of oily water according to local regulations for hazardous materials *(see note below).*
10. Do a final rinse in a fresh container of warm soapy water followed by a rinse in clean water.
11. Dry and install new wipers and brushes.

Oil Effects on Specific Water Quality Sensors

The most common problems with sensors will be related to oil fouling that will be addressed with the decontamination steps above. However, special attention should be paid to two sensors in the decontamination and calibration steps.

1. pH: The performance of the pH and pH/ORP sensors due to the sensitivity of the glass bulb and reference junction. The pH sensor may require additional cleaning steps and may benefit from elevating the soapy water temperature to (35°C) and adding rapid stirring while soaking.
2. Depth: Spray Simple Green into depth port openings and use pipe cleaners to remove any contaminant.
3. ROX DO Membranes: The optical probe DO membrane would also benefit from a warmer soapy water temperature. Stirring or gentle sweeps with a soft paint brush across the membrane should aid in cleaning.
4. Wipers: Replace all pads on a contaminated unit. Cleaning of EDS or V2-4 bristle type brushes may not be possible. If the bristles remain sticky after cleaning the brush must be replaced!

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Instrument Deployment

If you need to prepare YSI instruments to deploy into water contaminated with crude oil, YSI suggests the following procedure. Crude oil can be thick and sticky, and we cannot guarantee the same performance intervals of our sensor membranes and wipers as under normal conditions.

You will need:

1. YSI C-Spray nanopolymer coating
2. Disposable plastic bags (Grocery store type)
3. Rubber bands
4. Light weight line or cord
5. Dawn dishwashing liquid
6. Buckets
7. Soft brushes for cleaning
8. Replacement brushes and wipers and hex wrench

Procedure:

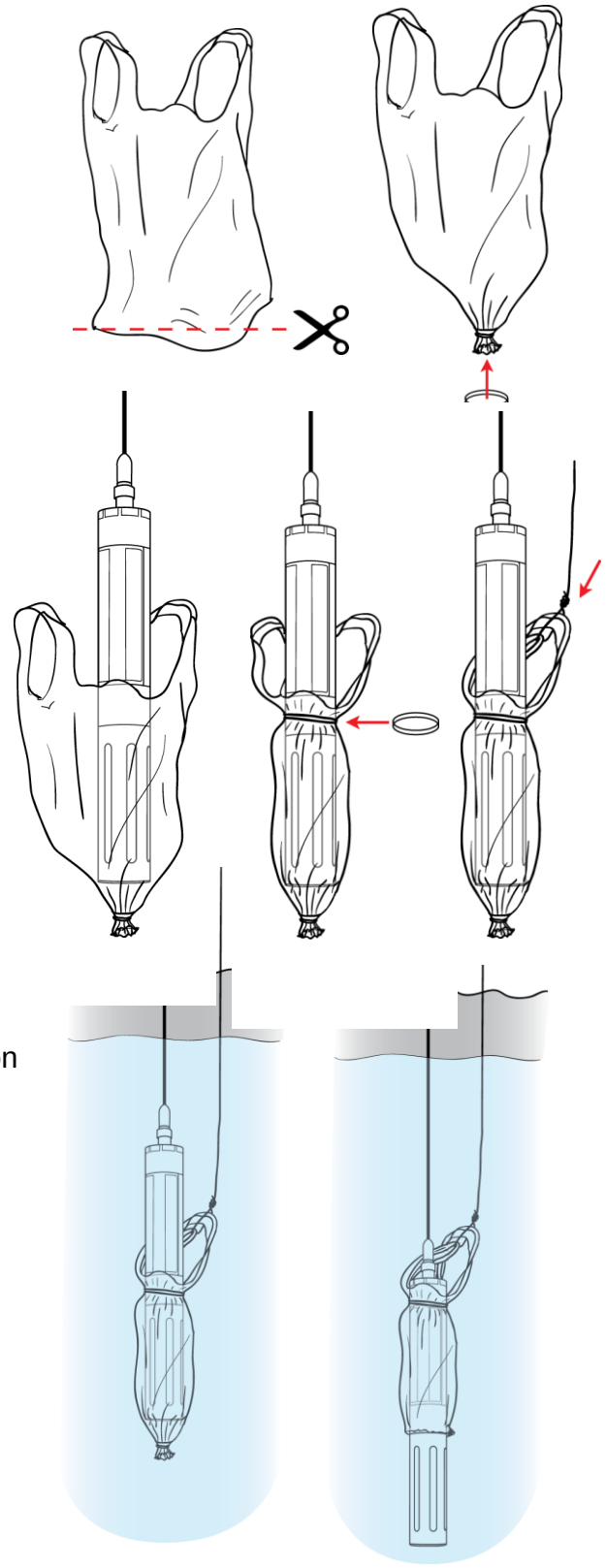
1. Apply C-Spray protective coating to exterior of instrument, sensors, and cable, according to the C-Spray instruction sheet.
    - Recent testing has demonstrated that C-Spray has no negative impacts on YSI optical sensors, ROX membranes or YSI pH probes.
    - ROX: Spray on and disperse over membrane and probe face. Allow to sit 5 minutes and wipe off excess with a Kimwipe
    - YSI pH: Spray probe body including bulb and junction area. Allow to sit 5 minutes and shake off excess.
    - All other optical sensors: Remove wiper, spray onto probe face and allow to sit for 5 minutes. Remove excess with Kimwipe and polish probe face with dry Kimwipe to remove any streaking. Reinstall wipers.
2. Calibrate the sonde after application like you normally would.
3. For sampling applications, try one of the following methods in order to deploy a sonde below a surface oil slick without impacting the sensors *(see illustrations)*:

Deployment Methods:

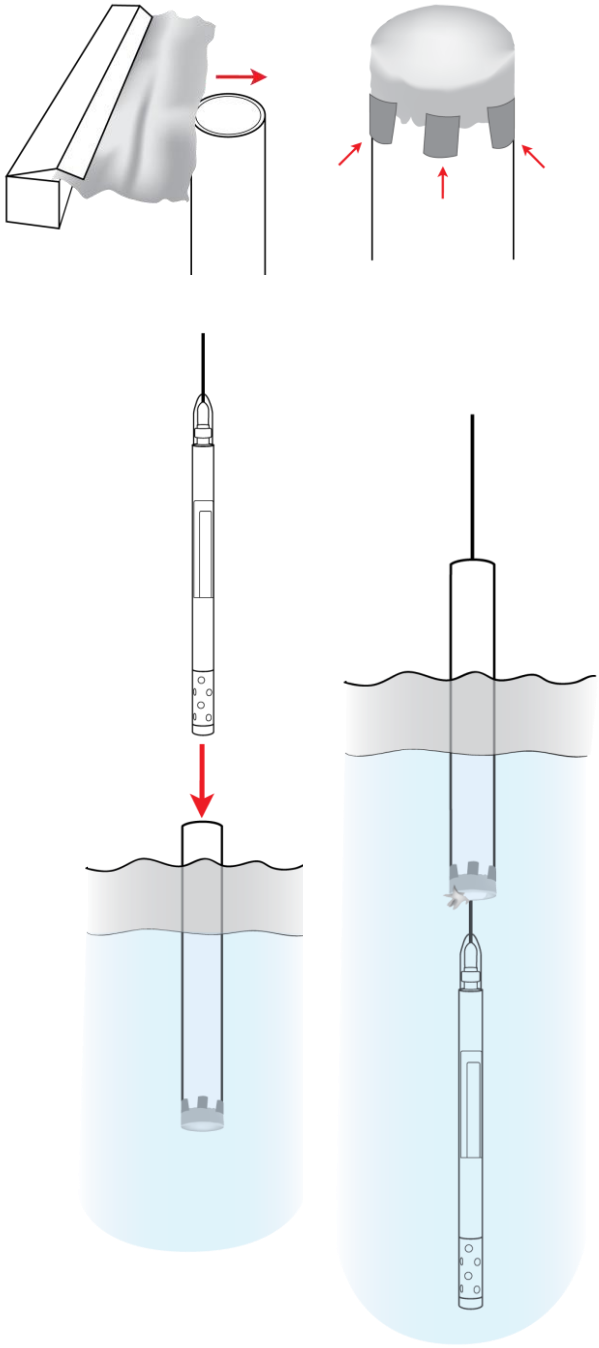
1. Dispersants
    a. If the oil film is light you can spray a dispersant onto the water surface before you lower the sonde. Mix Dawn dishwashing soap with tap water 50/50 in a squirt bottle.

See following pages for additional information…

2. Plastic Bag
    a. This method works best with heavier instruments such as YSI 6600, 6920, 6820 sondes
    b. Place sonde in disposable plastic bag.
    c. Cut off bottom of bag.
    d. Gather bottom of bag around bottom of sonde/sensor and use a rubber band to close the bag.
    e. Place second rubber band around the bag and body of sonde, below the bag handles.
    f. Attach a thin, sturdy line to bag handles.
    g. Deploy sonde vertically and lower it through and below oil layer
    h. Pull up on the line attached to the bag to pull up the bag and reveal the sensors to the water. You may need to “bounce” the line in order to push it through the opening.
    i. When finished sampling, use an oar or other object to break apart the oil on the water surface before pulling instrument out of the water
    j. Rinse instrument in bucket of soapy water. Brush clean.
    k. Remove bag and dispose properly
    l. If necessary, replace wipers and brushes on instrument
    m. Repeat process with bag for next deployment



3. PVC Tube
    a. Tape one layer of plastic or foil to the bottom of a PVC tube. The tube should be long enough to penetrate into the water below the surface oil.
    b. Place sonde or handheld sensor inside PVC tube.
    c. Deploy sonde and tube vertically and lower it through and below oil layer.
    d. Drop or push down on sonde or sensor while holding tube steady. The sonde will break through the foil, exposing the sensors to the water.
    e. When finished sampling, pull instrument up through the tube.
    f. Rinse instrument and tube in bucket of soapy water. Brush clean.
    g. If necessary, replace wipers and brushes on instrument.



Disposing of Oil-Contaminated Water or Materials

If you generate waste liquids and/or waste materials while cleaning, consult your local waste disposal contractors and waste water treatment authorities, or local regulatory agencies, for requirements associated with proper handling and disposal of these materials.

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