NOAA/NOS/CO-OPS Configuration and Standards: Anti-Fouling Procedures for Current Meters

Procedure Number: SOP # 5.3.3.3
Created: August xx, 2010; Updated January, 2011
Created By: Kasey Hall
Approved By: Scott Mowery, Engineering Division, Systems Support and Evaluation Branch Chief

1. **Title:** Guidelines for preventing the accumulation of biofouling on Current meters.

2. **Purpose:** The purpose of this document is to describe the processes and procedures necessary to prevent, delay, or reduce the accumulation of biofouling on the CO-OPS inventory of current meters (Sontek YSI ADP, TRDI Workhorse Sentinel, and Nortek Inc. Aquadopp). This SOP covers only those meters listed above, and no others.

3. **Background/History:** Biofouling or biological fouling is the undesirable accumulation of microorganisms, plants, algae, and/or animals on wetted structures. Biofouling is especially economically significant on sensor's surfaces where even low levels of fouling can reduce the performance of the sensor and increase maintenance requirements. CO-OPS uses current meters in both real time applications (PORTS) and in current surveys to collect data for use in providing oceanographic observations and predictions. Prior to being deployed, it is important that current sensors undergo a biofouling prevention procedure.

4. **Scope/Applicability** This SOP shall be used by all CO-OPS personnel and contractors working with current meters.

5. **Main Processes** CO-OPS presently employs 3 types of current meters for specific applications in gathering current data. These meters need to be protected by biofouling using the following methods. Do not apply antifouling methods more than 48 hours from deployment.

   Nortek Aquadopp: used primarily on USCG ATON buoys in a downward looking fashion. The instrument casings are made of Delrin or similar thermoplastic. These instruments are mounted in a manner that leaves only the transducer heads exposed to the elements. These systems are typically visited every 6 months for cleaning and replacement. ***Trinidad SR Red anti-fouling paint shall be used on the transducer heads of this instrument to prevent biofouling.*** The tube in which the instrument is mounted shall also be painted with anti-fouling paint, providing protection for the body of the instrument. Areas other than the transducer heads shall not be painted. This application is also detailed in the ATON Hands document (insert here.). Apply only **one** coat of anti-fouling paint to the transducers. Each layer of paint will cause

some loss in signal strength and multiple layers can potentially affect system performance. Ensure that the paint has a smooth, even surface with no air bubbles.

IMPORTANT: Do not paint the sacrificial zinc anode. Doing so will remove all corrosion protection.

Sontek YSI ADP: used primarily for real time current measurement for PORTS. These units are deployed horizontally or upward facing. CO-OPS currently has two types of Sontek ADPs in inventory. One type of unit has a thermoplastic body similar to the Nortek and TRDI meters. The other type has an aluminum body.

Plastic body Sontek YSI ADP: Based on manufacturer's guidance, any type of readily available, application-specific, commercial off-the-shelf anti-fouling paint can be used. ***For the transducers, an anti-fouling paint approved for urethane transducers shall be used.*** These special types of paints approved for use on transducers are available from most marine supply stores. One suitable type of paint is MDR Transducer Anti-Fouling Paint, available from West Marine. (See West marine contact information is below). Apply only **one** coat of anti-fouling paint to the transducers. Each layer of paint will cause some loss in signal strength and multiple layers can negatively affect system performance. Ensure that the paint has a smooth, even surface with no air bubbles.

IMPORTANT: Do not paint the sacrificial zinc anode. Doing so will remove all corrosion protection.

Aluminum body Sontek YSI ADP: Based on manufacturer's guidance, ***Interlux Tri-Lux II shall be used on all areas except transducers.*** A copolymer anti-fouling paint, it is specifically formulated for aluminum and related surfaces. Bare aluminum shall be properly prepped and primed prior to paining. (See Interlux paint contact information below). Apply only **one** coat of anti-fouling paint to the transducers. Each layer of paint will cause some loss in signal strength and multiple layers can negatively affect system performance. Ensure that the paint has a smooth, even surface with no air bubbles.

IMPORTANT: Do not paint the sacrificial zinc anode. Doing so will remove all corrosion protection.

TRDI ADCP: used primarily for current surveys to update predictions in the Tides and Current Tables, CO-OPS also has some units used in real time applications. These instruments are deployed upward facing and horizontally. The upward facing instruments have a thermoplastic body. The horizontal instruments have an aluminum body.

Plastic body TRDI ADCP (Long-Term Deployments): For instruments that will be deployed **greater than 120 days**, based on manufacturer's guidance, any type of readily available, application-specific, commercial off-the-shelf anti-

fouling paint can be used. ***For the transducers, an anti-fouling paint approved for urethane transducers shall be used.*** These special types of paints approved for use on transducers are available from most marine supply stores. One suitable type of paint is MDR Transducer Anti-Fouling Paint, available from West Marine. (See West marine contact information is below). Apply only **one** coat of anti-fouling paint to the transducers. Each layer of paint will cause some loss in signal strength and multiple layers can negatively affect system performance. Ensure that the paint has a smooth, even surface with no air bubbles.

IMPORTANT: Do not paint the sacrificial zinc anode. Doing so will remove all corrosion protection.

Plastic body TRDI ADCP (Short-Term Deployments): For instruments that will be deployed **120 days or less** (such as a survey), the unit's body shall be wrapped in plastic wrap (e.g., Saran Wrap), then wrapped with PVC tape. This helps to streamline the cleaning process. The plastic wrap prevents the PVC tape from sticking to the instrument body and leaving a sticky residue when removed. The instrument head (including transducers) shall be covered with a thin coat (~4 mm; ~0.16 in.) of either: 50:50 mix of chili powder and Vaseline; or chili powder and silicone grease. The chili powder should be the hottest that can be found. Water flowing across the transducers will wash this mix away over time. The silicone mixture tends to last longer. Diaper rash ointment (e.g., Desitin) may also be used.

Aluminum body TRDI: ***Interlux Tri-Lux II or equivalent shall be used on all areas except transducers.*** An anti-fouling paint specifically formulated for aluminum and related surfaces shall be used. Bare aluminum shall be properly prepped and primed prior to paining. Apply only **one** coat of anti-fouling paint to the transducers. Each layer of paint will cause some loss in signal strength and multiple layers can negatively affect system performance. Ensure that the paint has a smooth, even surface with no air bubbles.

IMPORTANT: Do not paint the sacrificial zinc anode. Doing so will remove all corrosion protection.

6. Detailed Sub-Processes/Checklists:

a. Plastic Body Nortek Aquadopp: Petit Trinidad SR Red anti-fouling paint shall be used on the transducer heads of this instrument to prevent biofouling (75.8% cuprous oxide). Follow the instructions on the paint container with the following **exceptions:**

i. Apply only **one** coat of anti-fouling paint to the transducers. Each layer of paint will cause some loss in signal strength and multiple layers can potentially affect system performance. Ensure that the paint has a smooth, even surface with no air bubbles.

ii. If anti-fouling protection is desired for some portion of the cable, the paint can be applied directly to the polyurethane jacket without primer.

iii. **IMPORTANT**: Do not paint the sacrificial zinc anode. Doing so will remove all corrosion protection.

b. **Plastic body Sontek ADP**: Any type of readily available, application-specific, commercial off-the-shelf anti-fouling paint can be used. ***For the transducers, an anti-fouling paint approved for urethane transducers shall be used.*** Follow the instructions on the paint container with the following exceptions:

i. Apply only **one** coat of anti-fouling paint to the transducers. Each layer of paint will cause some loss in signal strength and multiple layers can potentially affect system performance. Ensure that the paint has a smooth, even surface with no air bubbles.

ii. If anti-fouling protection is desired for some portion of the cable, the paint can be applied directly to the polyurethane jacket without primer.

iii. **IMPORTANT**: Do not paint the sacrificial zinc anode. Doing so will remove all corrosion protection.

c. **Aluminum body Sontek YSI ADP:** Interlux Tri-Lux II shall be used on all areas except transducers. Bare aluminum shall be properly prepped and primed prior to paining. (See Interlux paint contact information below). Follow the instructions on the paint container with the following exceptions:

i. Apply only **one** coat of anti-fouling paint to the transducers. Each layer of paint will cause some loss in signal strength and multiple layers can potentially affect system performance. Ensure that the paint has a smooth, even surface with no air bubbles.

ii. If anti-fouling protection is desired for some portion of the cable, the paint can be applied directly to the polyurethane jacket without primer.

iii. **IMPORTANT**: Do not paint the sacrificial zinc anode. Doing so will remove all corrosion protection.

d. **Plastic body TRDI – Long-Term Deployments**: For instruments that will be deployed **greater than 120 days**, any type of anti-fouling paint may be used. ***For the transducers, an anti-fouling paint approved for urethane transducers shall be used.*** For instruments that will be deployed **less than or equal to 120 days**, the units shall first be wrapped in plastic wrap, then wrapped with PVC tape – anti-fouling paint for short-term deployments is not necessary.

i. For long-term deployments, apply only **one** coat of anti-fouling paint to the transducers. Each layer of paint will cause some loss in signal strength and

multiple layers can negatively affect system performance. Ensure that the paint has a smooth, even surface with no air bubbles.

ii. If anti-fouling protection is desired for some portion of the cable, the paint can be applied directly to the polyurethane jacket without primer.

iii. **IMPORTANT**: Do not paint the sacrificial zinc anode. Doing so will remove all corrosion protection.

e. **Plastic body TRDI – Short-Term Deployments**: For instruments that will be deployed **less than or equal to 120 days**, the units shall first be wrapped in plastic wrap, then wrapped with PVC tape – anti-fouling paint for short-term deployments is not necessary.

i. The plastic wrap prevents the PVC tape from sticking to the instrument body and leaving a sticky residue when removed.

ii. The instrument head (including transducers) shall be covered with a thin coat (~4 mm; ~0.16 in.) of either: 50:50 mix of chili powder and Vaseline; or chili powder and silicone grease. The chili powder should be the hottest that can be found. Water flowing across the transducers will wash this mix away over time. The silicone mixture tends to last longer. Diaper rash ointment (e.g., Desitin) may also be used.

f. **Aluminum body TRDI:** Interlux Tri-Lux II shall be used on all areas except transducers. Bare aluminum shall be properly prepped and primed prior to paining. (See Interlux paint contact information below). Follow the instructions on the paint container with the following exceptions:

i. Apply only **one** coat of anti-fouling paint to the transducers. Each layer of paint will cause some loss in signal strength and multiple layers can potentially affect system performance. Ensure that the paint has a smooth, even surface with no air bubbles.

ii. If anti-fouling protection is desired for some portion of the cable, the paint can be applied directly to the polyurethane jacket without primer.

iii. **IMPORTANT**: Do not paint the sacrificial zinc anode. Doing so will remove all corrosion protection.

7. **Important Notes:**

a. Aluminum requires paints such as Vivid, Trilux 33, Trilux Prop and Drive Paint and Alumaspray that do not contain cuprous oxide. Cuprous Oxide and aluminum react electrochemically (galvanically) in sea water, causing rapid corrosion of the aluminum housings. Copper-based paints are safe for use on properly primed stainless

and bronze.

b. Zinc anodes must be left unpainted to keep their effectiveness.

c. Good preparation and priming are the groundwork for any paint job and antifouling paints are no different. Solid prep ensures acceptable adhesion and better performance over time.

8. When painting metal housings, a suitable conversion layer must be applied to the metal for adhesion and to isolate the metal from the anti-fouling paint. Powder coating (as the ADP transducers, head, and housing are) acts as an excellent conversion layer. If no powder coat is present, or if the powder coat has been damaged, a primer (such as Interlux 360 Underwater Metal Primer) must be applied to all exposed metal surfaces **except** sacrificial zinc anodes. The primer must not be applied to the transducers, and should not be applied the cable or to areas where the powder coat is intact. Apply the anti-fouling paint to all surfaces of the instrument that require protection.

9. **Paint Removal:** CO-OPS is currently researching methods for best antifouling paint removal. Until then all personnel shipping equipment can keep the antifouling paint on. When shipping it is required that an MSDS for the paint be included. No instrument will be accepted without an MSDS.

10. **Quality Assurance/Control:** Anti-fouling paint other than those explicitly listed or implicitly approved herein must be immediately removed and the units returned to CO-OPS for evaluation. Information about what paint was removed must accompany the returned equipment. The contractor/appropriate personnel are required to maintain Material Safety Data Sheets (MSDS) on all antifouling. In case of emergency, consult the MSDS for recommended procedures.

11. **Management/Responsibility** Contractors must report all antifouling problems to their Task Manager. Personnel using incorrect painting procedures or antifouling paint will be liable for all repair / replacement costs of damaged instruments.

Contact Information for Vendors

Courtaulds Coatings
2270 Morris Avenue
Union, NJ 07083 USA
Phone (908) 686-1300
Fax (908) 686-8545

Fisheries Supply
1900 N Northlake Way
Seattle, WA 98103
1-800-426-6390
http://www.fisheriessupply.com

West Marine
P.O. Box 50050
Watsonville, CA 95077-5050 USA
Phone (800) 538-0775 / (408) 728-4430
Fax (408) 728-4360
http://www.westmarine.com