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Environmental Consultants

Eversource Energy

Seacoast Reliability Project
Shellfish Tissue Monitoring Plan

FINAL

Prepared For:
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1.0 Introduction

Eversource's Seacoast Reliability Project (SRP) will involve burying three cables in the sediments crossing Little Bay north of Adams Point within a corridor previously identified as "Cable Area" on navigation charts. The planned installation methods, primarily jet plow and hand burial, will release sediments into the water column creating a turbidity plume that will move with the tides and with the progress of installation along the route. Analysis of the sediments along the route indicated that, while various organic and inorganic contaminants are present they are typically within the ranges observed elsewhere in Little Bay. With the exception of arsenic, all contaminants were below the concentrations likely to cause ecological impairment.

Eversource's consultant RPS prepared a model predicting the extent of the resulting turbidity plume based on construction conditions described by representatives of a firm highly experienced with the operation of a jet plow. Models were run for two operating scenarios that differed primarily on the rate at which the jet plow advanced across Little Bay (RPS 2016, 2017). The two models estimated that each cable installation via jet plow could take between 7 and 13 hours; this was then combined with tidal conditions to show the likely range of the resulting suspended sediment plume. For the shellfish tissue monitoring, the maximum extent of the plume models for the two rates were combined to define the limits of the potential impact are for the Project (Figure 1). Based on these modeling results and the sediment contaminant analysis, Eversource concluded that the plume has the potential to cross portions of some aquaculture sites at very low concentrations of suspended sediments (~20 mg/L, roughly equivalent to 10 NTUs turbidity) for short periods of time (minutes to a few hours). Comparisons to studies investigating response of oysters to suspended sediments indicated that the short duration and low concentrations expected would be unlikely to elicit lethal or sublethal (e.g., reduced filtering) effects (Wilber and Clarke 2001). In addition, Eversource assessed the potential dissolution of metals (specifically copper and arsenic) from the suspended sediments and concluded that the likelihood of exposure to toxic levels of dissolved constituents was nil.

Given that recreational and commercial shellfishing is allowed in Little Bay, NHDES wanted field confirmation that exposure to the suspended sediment plume did not result in bioaccumulation of contaminants in organisms that would be consumed by people. NHDES is required by the FDA under the National Shellfish Sanitation Program (NSSP) to demonstrate on a regular basis that commercially sold shellfish meet consumption standards. Based on the perceived potential for suspended sediments associated with cable installation to affect shellfish quality, NHDES has, therefore, required that Eversource conduct a monitoring program during cable installation that measures the tissue concentrations of all of the contaminants of concern by the NSSP as well as those that are monitored periodically by the Gulfwatch program (Conditions 46 of the NHDES's final recommendation; see Appendix A).

Briefly, Condition 46 includes two components:

- Notification of NHDES with the planned schedule of sediment-disturbing activities (including jet plowing and hand jetting) at least two weeks prior to the start of jet plowing so that NHDES can assess possible changes in fecal coliform concentrations that could trigger temporary harvest closures

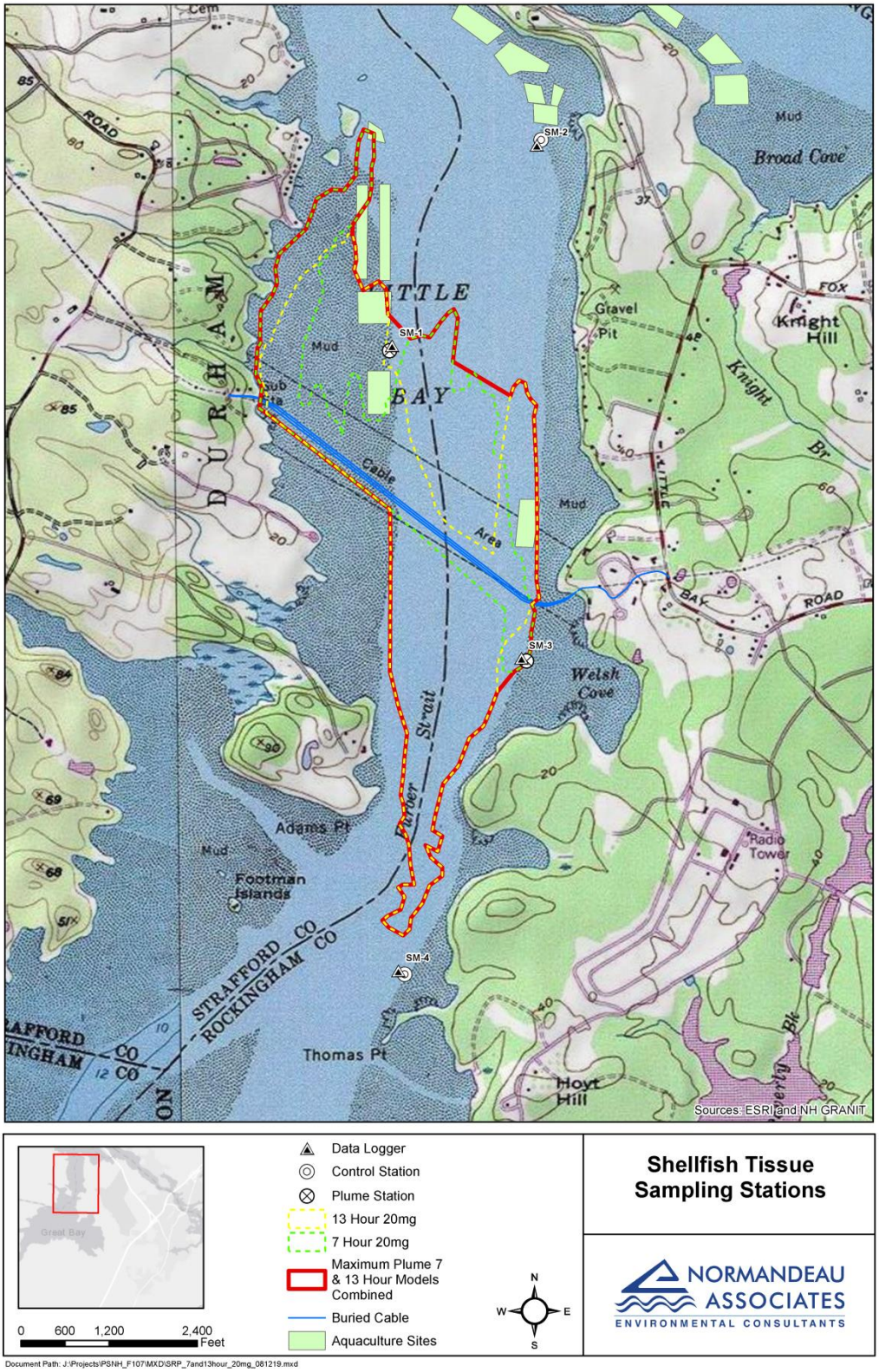


Figure 1. SRP Shellfish Monitoring Overview.

  - Eversource understands this to mean that NHDES will adjust their standard fecal coliform monitoring program to capture cable installation events and that Eversource has no responsibility beyond communicating the schedule initially and as the installation progresses

- Development and implementation (after NHDES approval) of a shellfish bioaccumulation study during the cable installation process
  - Eversource understands this to include preparation of a detailed study plan that includes all of the provisions in Condition 46 in terms of species to be included, locations for test organisms, parameters to be analyzed, and data reporting
  - Eversource further understands that the proposed study plan shall be presented to NHDES at least six months prior to any sediment-disturbing in-water work for their review and concurrence
  - And further, Eversource understands that it is their responsibility to implement this plan.

The purpose of this document is to describe the specific approaches to conducting the shellfish bioaccumulation study. The study design is described in Section 2. Field protocols are provided in Section 3. Analytical protocols are provided in Section 4 and data reporting and analysis protocols are provided in Section 5.

2.0 Study Design

2.1 Species to Be Tested

Blue mussels (*Mytilus edulis*) will be collected by hand from the intertidal bed under the General Sullivan Bridge on Dover Point (approximately 43°07.09'N, 70°49.39'W), the location from where this species is obtained for the Gulfwatch program. A primary purpose for using blue mussels is to ensure comparability to historic Gulfwatch data. Historically sufficient blue mussels have been available at the Dover Point location to support the Gulfwatch program and Eversource assumes that is still the case. Eversource conducted reconnaissance surveys at this site to evaluate the status of the mussel bed under the north end of the new bridge on January 14 and May 21, 2019. Counts of individuals at least 2 inches in shell length in random quadrats on May 21 indicate that the number of mussels (roughly 134,000 individuals greater than 2 inches) available at the site is more than sufficient for the SRP study.

Eversource has obtained a scientific collection permit from NH Fish and Game for this purpose. American oysters (*Crassostrea virginica*) will be purchased from Bay Point Oysters and Fat Dog Oysters, commercial farms located in Little Bay north of the project area. Per recommendations from NHDES and NHFG, Eversource will request that these oysters measure approximately 2.5-4 inches in shell length. A primary purpose for using locally-farmed market-size oysters is to ensure that organisms targeted for human consumption are tested. Because of differences in physiology between the two species (e.g., blue mussels are likely to feed more actively in cooler water temperatures than oysters, based on the differences in their reproductive cycles) we believe that Gulfwatch data on blue mussels is not necessarily indicative of oysters.

Sufficient numbers of each species will be collected to ensure that the requisite tissue is available for all laboratory testing assuming a 25% mortality factor.

2.2 Station Locations

Eversource will place cages containing test organisms in four locations within Great Bay and upper Little Bay. Two locations will be within areas predicted to be affected by the plume and two stations will be located outside of areas predicted to be affected by the plume (Figures 1 – 3). Two stations, one plume-affected and one not plume-affected, will be located north of the project area and two will be placed south of the project area.

Jet plow operations are expected to occur during three consecutive weeks at five to seven-day intervals starting in mid-September. As a result of this timing, Eversource anticipates that both spring and neap tides will be encountered during the jet plow installation. Modeling assumed spring tide conditions in order to identify the farthest extent of the plume and these conditions are assumed for the purposes of selecting station locations. In addition, many factors can influence the duration of each crossing. Modeling examined the likely extremes in terms of duration – as short as seven hours and as long as thirteen hours. Under the semi-diurnal tidal conditions existing in the bay and the logistical requirement that jet plowing be initiated at about slack high tide, the crossing is likely to occur primarily on an ebbing tide with a northerly flowing plume (shorter duration), however the crossing could encounter a change from ebb to flood tide at some point. Because it is impossible to predict the actual duration of the jet plow crossing, Eversource assumed that both scenarios were possible and overlaid the position of the 20 mg/L contour line (roughly equivalent to 10 NTUs) above ambient from the maximum time integrated plan for both crossing durations to assist in identifying station locations.

Shellfish resources of concern to NHDES are generally located in shallow waters rather than in the channel. We propose to place the cages in depths less than 10 ft MLLW to reflect this concern, but in sufficient depth to ensure that the organisms are always submerged. In addition, the plume-affected stations will be located within the vicinity of commercial aquaculture facilities.

Coordinates for the monitoring stations are provided in Table 1. Plume-affected stations are Station SM-1 (located just south of Fat Dog Oysters) and Station SM-3 (located just south of the southernmost cable on the eastern side of Little Bay). Non-plume affected stations are Station SM-2 (located just south of aquaculture leases at Fox Point) and Station SM-4 (located in Great Bay, just north of Thomas Point). Field reconnaissance conducted on June 7, 2019 with Chris Nash (NHDES) indicated that water depths are sufficient to ensure that cages will be submerged at low tide.

Table 1. Location of shellfish monitoring stations.

Station	Purpose	Latitude	Longitude
SM-1	North plume-affected	43.1072	70.8635
SM-2	North non-affected	43.1150	70.8556
SM-3	South plume-affected	43.0955	70.8566
SM-4	South non-affected	43.0839	70.8630

2.3 Monitoring Frequency

Shellfish will be placed at the monitoring stations about one month prior to the planned start of sediment-disturbing activities, the jet plow trial run, to allow organisms to acclimate to the new conditions. Shellfish will be collected for laboratory analysis three times:

- One week before the jet plow trial run (estimated early September),
- Within one week following the completion of the jet plow installation of the third cable (estimated mid-October), and
- Within one week after the completion of final installation by hand jetting (estimated early November).

2.4 Replication

Eversource will adhere to GulfWatch protocols (Sowles and Crawford 1994) in terms of replication. Sufficient shellfish of each species will be deployed at each survey location to allow for analysis of four replicates for each of the three survey periods. An additional 25% will be deployed to allow for natural mortality.

2.5 Ancillary Data

Water temperature, salinity and turbidity will be monitored with continuous data loggers (15-minute interval) at all sites.

3.0 Field Procedures

3.1 Permits

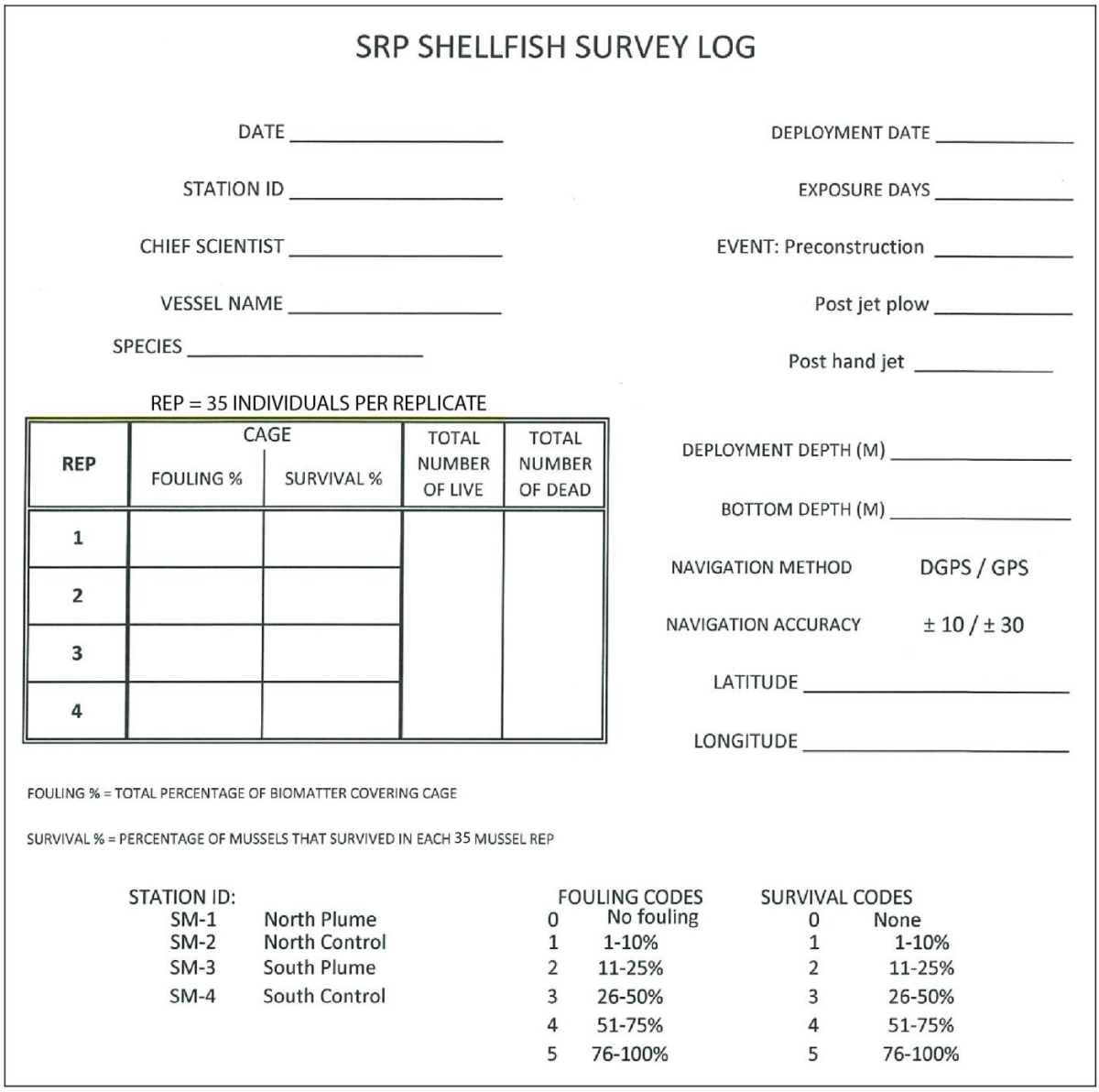
Eversource will work with NHFG to acquire the appropriate permits for collection of indigenous mussels and deployment of test organisms in cages in Little Bay and Great Bay well in advance of initiating this monitoring program.

3.2 Acquisition of test organisms

Blue Mussels

- Obtain collection permit from New Hampshire Fish and Game
- Collect 2,800 5-6.5 cm long (about 2-2.5 inches) blue mussels by hand from bed under General Sullivan bridge abutment (Dover Point) at low tide no more than 24 hours before planned deployment
    - Contact NHDES Shellfish Program and NHFG prior to collection to notify them that scientific harvest will take place
    - Take care not to disturb the byssal threads
    - Use a ruler to estimate the length of mussels until your eyes are “calibrated” to the shell length needed
    - Confirm mussels are alive (lightly squeeze shells along the valve interface)
    - Measure the length (umbo to leading edge) of 10% of the mussels (randomly selected) and record results on field data sheet
- Record coordinates of collection site on field data sheet (Figure 2)

- Gently rinse any debris from the mussels using salt water from the site
- Place the mussels on a bed of seaweed in a cooler with cool packs (not wet ice) for temporary storage until deployment into cages



SRP SHELLFISH SURVEY LOG

DATE _____ DEPLOYMENT DATE _____

STATION ID _____ EXPOSURE DAYS _____

CHIEF SCIENTIST _____ EVENT: Preconstruction _____

VESSEL NAME _____ Post jet plow _____

SPECIES _____ Post hand jet _____

REP = 35 INDIVIDUALS PER REPLICATE

REP	CAGE		TOTAL NUMBER OF LIVE	TOTAL NUMBER OF DEAD
	FOULING %	SURVIVAL %		
1				
2				
3				
4				

DEPLOYMENT DEPTH (M) _____

BOTTOM DEPTH (M) _____

NAVIGATION METHOD DGPS / GPS

NAVIGATION ACCURACY ± 10 / ± 30

LATITUDE _____

LONGITUDE _____

FOULING % = TOTAL PERCENTAGE OF BIOMATTER COVERING CAGE

SURVIVAL % = PERCENTAGE OF MUSSELS THAT SURVIVED IN EACH 35 MUSSEL REP

STATION ID:

SM-1	North Plume
SM-2	North Control
SM-3	South Plume
SM-4	South Control

FOULING CODES	
0	No fouling
1	1-10%
2	11-25%
3	26-50%
4	51-75%
5	76-100%

SURVIVAL CODES	
0	None
1	1-10%
2	11-25%
3	26-50%
4	51-75%
5	76-100%

Figure 2. Shellfish Survey Field Log.

Oysters

- Purchase 2,100 market-size (6-10 cm long [2-4 inches]) oysters from Fat Dog Oysters and Bay Point Oysters no more than 24 hours before planned deployment
    - Notify NHFG in advance to determine whether special tagging is required (e.g., "not for consumption" or "for lab testing only"); NHDES Shellfish Program has placed no

restrictions on this purchase even during a harvest closure
    - Identify the number of oysters purchased from each aquaculture site on field data sheet
    - Measure (umbo to leading edge) a minimum of the oysters and record results on field data sheet
- Gently rinse any debris from the oysters using salt water
- If purchased from multiple sources, combine the oysters into one batch so that source of individual oysters is not known
- If necessary to store oysters overnight, place in precleaned coolers with cool packs.

3.3 Deployment

Test organisms will be deployed at the four stations about one month prior to the planned jet plow trial run to allow time for acclimation to site conditions. Check cages every two weeks for biofouling. Clean if necessary.

Cages

Eversource will use commercially-available cages similar to those used by local aquaculturists for cage culture of near-market size oysters. These cages are approximately 4 ft x 4 ft x 3 ft with legs (approximately 6 inches long) to keep them from contacting the substrate directly. Mussels and oysters will be deployed in mesh bags in the same cages. Each bag will contain 100 individuals of one species. This density is the same as density as is commonly used by Little Bay oyster farmers for harvestable-sized oysters. Each cage can accommodate 8 bags which will be more than sufficient to provide the number of individuals needed for testing.

For the initial deployment, the field crew will:

- Label each cage with station identification
- Carefully place appropriate number of organisms into each cage ensuring that individuals are placed so pumping is not obstructed. Lower cages into position on and anchor or moor as appropriate for local conditions
- Fill out field data sheet to document deployment

3.4 Collection during study

Shellfish will be collected three times during this monitoring program:

- One week prior to the jet plow trial run
- Within one week after the completion of cable installation using jet plow, and
- Within one week after the completion of hand jetting (final coverage of the cables).

For each event the field crew will:

- Lift cages from mooring
- Fill out field data sheet to document condition of organisms in all cages, including fouling and mortality
- Remove sufficient number of individuals (25 per species per replicate) from cages for each of four replicates per site
    - Gently rinse debris from organisms using salt water

- Randomly separate individuals into four replicates per species per site and label with date, station identification, and survey period (preconstruction, post jet plow or post hand jet)
- Fill out Chain-of-Custody form (Figure 3)

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Chain of Custody Form

Project Name: ______
Project Number: ______
Originating Contact: ______
Originator Location: ______
Final Destination: ______
Sampler(s): ______

Page ___ of ___

Method of Shipment:

Comments Below:

Sample		Collection		Containers		Grab.	Comp.	Presv.	Parameters			
No.	Identification	Date	Time	No.	Type							
			Total									

Relinquished by: (signature)	Received by: (signature)	Relinquished by: (signature)	Received by: (signature)	Relinquished by: (signature)	Received by: (signature)
Printed Name:	Printed Name:	Printed Name:	Printed Name:	Printed Name:	Printed Name:
Date:	Date:	Date:	Date:	Date:	Date:

Chain of Custody Form.doc 12/8/06

Figure 3. Chain of Custody.

- Place samples in cooler with cool packs for transport to field office or local laboratory
- If being shipped to laboratory, place the organisms in a freezer for 24 hours before packing with dry ice and shipping to the laboratory.

The analytical laboratory will be responsible for shucking the shellfish and preparing composites following "Clean Room" protocol.

3.5 Water Quality Data

During the initial deployment of shellfish, install a continuous data logger at each station. The logger shall be capable of recording water temperature, salinity, and turbidity at 15-minute intervals. Data will be downloaded and sondes will be cleaned weekly. Specific procedures for downloading data and managing the instruments are provided in Appendix B.

4.0 Laboratory Procedures

Laboratories contracted (to be determined) to analyzed shellfish tissues will be required to adhere to standard good laboratory practices in terms of sample tracking, clean room techniques, and QA/QC protocols. They will be required to adhere to analytical methods and detection limits specified by NSSP and GulfWatch.

The laboratory will open the individual mussels or oysters forming each replicate and allow water to drain prior to shucking. Each of the four composite replicates will consist of shucked meat from 25 individuals. The tissue will be thoroughly homogenized and distributed into sample containers. Each 25-organism composite sample will be treated as an individual replicate by the laboratory. Replicates for chemical analysis will be created as 4 composites of 25 mussels or oysters each at each of the four site locations plus the baseline location after each sampling event.

Each individual mussel will be cleaned of attached material, all byssal threads removed from mussels, and all soft tissue excluding fluids placed directly into an appropriate container (500-ml I-Chem Certified clean bottle). Shellfish composite samples will be prepared for chemical analyses by homogenization using stainless steel equipment that has been rinsed with methanol and deionized water prior to use. Sample homogenates will then be split into appropriate containers for metals and organic analyses. Each composite will be placed in a sample container clearly identified with the unique sample identifier and maintained frozen until analyzed. Any portion of the composites not required for analysis will be frozen and archived at the laboratory in the event that results indicate the need to reanalyze any samples.

Each tissue replicate will be tested for the parameters shown on Table 2.

Table 2. Parameters to be tested in mussel and oyster tissue

Parameter	NSSP	GulfWatch	Analytical Method (USEPA 2016)	MDL
Physical				
Lipids (% wet weight)		x	EPA Method 9071B	
Percent Solids		x		
Metals (µg/ wet g [mg/L])				
Aluminum		x	EPA Method 6020A	10.0
Cadmium		x	EPA Method 6020A	0.2
Chromium		x	EPA Method 6020A	0.1
Copper		x	EPA Method 6020A	5.0
Iron		x	EPA Method 6020A	50.0
Lead		x	EPA Method 6020A	0.1
Mercury		x	EPA Method 245.7	0.01
Nickel		x	EPA Method 6020A	0.5
Silver		x	EPA Method 6020A	0.3
Zinc		x	EPA Method 6020A	50.0
PAHs (ng/wet g [µg/L])				
Acenaphthene		x	EPA Method 8270D SIM	2.0
Acenaphthylene		x	EPA Method 8270D SIM	2.0
Anthracene		x	EPA Method 8270D SIM	2.0
Benzo(A)anthracene		x	EPA Method 8270D SIM	2.0
Benzo(A)pyrene		x	EPA Method 8270D SIM	2.0
Benzo(B)fluoranthene		x	EPA Method 8270D SIM	2.0
Benzo(E)pyrene		x	EPA Method 8270D SIM	2.0
Benzo(GHI)perylene		x	EPA Method 8270D SIM	2.0
Benzo(K)fluoranthene		x	EPA Method 8270D SIM	2.0
Biphenyl		x	EPA Method 8270D SIM	2.0
Chrysene		x	EPA Method 8270D SIM	2.0
Dibenzo(AH)anthracene		x	EPA Method 8270D SIM	2.0
Dibenzothiophene		x	EPA Method 8270D SIM	2.0
Fluoranthene		x	EPA Method 8270D SIM	2.0
Fluorene		x	EPA Method 8270D SIM	2.0
Indeno(123CD)pyrene		x	EPA Method 8270D SIM	2.0
Naphthalene		x	EPA Method 8270D SIM	2.0
Perylene		x	EPA Method 8270D SIM	2.0
Phenanthrene		x	EPA Method 8270D SIM	2.0
Pyrene		x	EPA Method 8270D SIM	2.0
Cl-Chrysene		x	EPA Method 8270D SIM	2.0
Cl-Dibenzothiophene		x	EPA Method 8270D SIM	2.0
Cl-Fluoranthene		x	EPA Method 8270D SIM	2.0
Cl-Fluorene		x	EPA Method 8270D SIM	2.0
Cl-Naphthalene		x	EPA Method 8270D SIM	2.0
Cl-Phenanthrene		x	EPA Method 8270D SIM	2.0
C2-Chrysene		x	EPA Method 8270D SIM	2.0
C2-Dibenzothiophene		x	EPA Method 8270D SIM	2.0
C2-Fluoranthene		x	EPA Method 8270D SIM	2.0
C2-Fluorene		x	EPA Method 8270D SIM	2.0
C2-Naphthalene		x	EPA Method 8270D SIM	2.0

(continued)

Table 2. (Continued)

Parameter	NSSP	GulfWatch	Analytical Method	MDL
C2-Phenanthrene		x	EPA Method 8270D SIM	2.0
C3-Naphthalene		x	EPA Method 8270D SIM	2.0
C3-Chrysene		x	EPA Method 8270D SIM	2.0
C3-Phenanthrene		x	EPA Method 8270D SIM	2.0
C3-Dibenzothiophene		x	EPA Method 8270D SIM	2.0
C3-Fluorene		x	EPA Method 8270D SIM	2.0
C4-Chrysene		x	EPA Method 8270D SIM	2.0
C4-Fluorene		x	EPA Method 8270D SIM	2.0
C4-Naphthalene		x	EPA Method 8270D SIM	2.0
C4-Phenanthrene		x	EPA Method 8270D SIM	2.0
Total PAHS		x	EPA Method 8270D SIM	2.0
Pesticides (ng/wet g [µg/L])				
A_BHC (Alpha Lindane)		x	EPA Method 8270D	2.0
A-Endosulfan		x	EPA Method 8270D	0.5
Aldrin	x	x	EPA Method 8270D	0.5
B-Endosulfan		x	EPA Method 8270D	0.5
Chlordane	x		EPA Method 8270D	0.5
Chlordecone (Kepone)	x		EPA Method 8270D	0.5
CIS-Chlordane		x	EPA Method 8270D	0.5
Dieldrin	x	x	EPA Method 8270D	0.5
Endrin		x	EPA Method 8270D	0.5
G-Chlordane		x	EPA Method 8270D	0.5
Heptachlor	x	x	EPA Method 8270D	0.5
Heptachlor Epoxide	x	x	EPA Method 8270D	0.5
Hexachlorobenzene		x	EPA Method 8270D	0.5
Lindane (G-HCH)		x	EPA Method 8270D	0.5
Methoxychlor		x	EPA Method 8270D	0.5
Mirex	x	x	EPA Method 8270D	0.5
O,P'-DDD		x	EPA Method 8270D	0.5
O,P'-DDE		x	EPA Method 8270D	0.5
O,P'-DDT		x	EPA Method 8270D	0.5
P,P'-DDD		x	EPA Method 8270D	0.5
P,P'-DDE		x	EPA Method 8270D	0.5
P,P'-DDT		x	EPA Method 8270D	0.5
DDE	x		EPA Method 8270D	0.5
Total DDT	x	x	EPA Method 8270D	0.5
Transnonachlor		x	EPA Method 8270D	0.5
TDE	x		EPA Method 8081B	2.0
PCBs (ng/wet g [µg/L])				
101		x	EPA Method 8082 SIM	2.0
90		x	EPA Method 8082 SIM	2.0
105		x	EPA Method 8082 SIM	2.0
118		x	EPA Method 8082 SIM	2.0
126		x	EPA Method 8082 SIM	2.0
128		x	EPA Method 8082 SIM	2.0
138		x	EPA Method 8082 SIM	2.0
153		x	EPA Method 8082 SIM	2.0

Table 2. (Continued)

Parameter	NSSP	GulfWatch	Analytical Method	MDL
132		x	EPA Method 8082 SIM	2.0
169		x	EPA Method 8082 SIM	2.0
170		x	EPA Method 8082 SIM	2.0
190		x	EPA Method 8082 SIM	2.0
18		x	EPA Method 8082 SIM	2.0
15		x	EPA Method 8082 SIM	2.0
180		x	EPA Method 8082 SIM	2.0
187		x	EPA Method 8082 SIM	2.0
195		x	EPA Method 8082 SIM	2.0
208		x	EPA Method 8082 SIM	2.0
206		x	EPA Method 8082 SIM	2.0
209		x	EPA Method 8082 SIM	2.0
28		x	EPA Method 8082 SIM	2.0
29		x	EPA Method 8082 SIM	2.0
44		x	EPA Method 8082 SIM	2.0
50		x	EPA Method 8082 SIM	2.0
52		x	EPA Method 8082 SIM	2.0
66		x	EPA Method 8082 SIM	2.0
95		x	EPA Method 8082 SIM	2.0
77		x	EPA Method 8082 SIM	2.0
8		x	EPA Method 8082 SIM	2.0
5		x	EPA Method 8082 SIM	2.0
87		x	EPA Method 8082 SIM	2.0
Sum PCBs	x	x	EPA Method 8082 SIM	2.0

5.0 Data Interpretation

Eversource plans to conduct the shellfish bioaccumulation monitoring in order to evaluate whether installation of cables in the sediments of Little Bay have exposed oysters and blue mussels to water-borne contaminants at an exposure level (duration and concentration) that allowed accumulation in tissues.

Eversource will review the tissue data with the purpose of answering these questions:

- Are there exceedances of tissue criteria (Table 3) present that can be attributed to the activity?
- If no criteria exist or there are widespread criteria exceedances, how do the tissue levels compare between the pre-construction levels and the post-construction levels at a given station?

Are there exceedances of tissue criteria present that can be attributed to the project activity?

Eleven pesticides, total PCBs, and methyl mercury have federally mandated action levels related to human consumption of fish or shellfish (Table 3). The results of tissue testing for each of these constituents will be compared to these federal action levels. Sediments along the project route were tested for several of these constituents (aldrin/dieldrin, chlordane, DDT/DDE, mercury [precursor to methylmercury], heptachlor epoxide, and total PCBs). None of the pesticides tested were

detectable at levels about three orders of magnitude or more below the federal action levels. The action level for methyl mercury is 24 times the highest level of mercury found in sediments anywhere along the route and most sediment levels were lower than that. Total PCBs (calculated using the RIM protocol of using half of the MDL for nondetectable compounds) in the sediments were about two orders of magnitude below the action level and most individual PCBs were not detectable. The results of the sediment testing suggest that the potential for bioaccumulation of some compounds is possible, however the anticipated short duration of exposure suggests bioaccumulation to action levels is unlikely.

Tissue concentrations from pre-exposure, post-jet plow, and post-hand jet shellfish will be compared to the action levels. If the post-construction concentrations at Stations SM-1 and SM-3 (within the anticipated plume) are below these thresholds, then no further analysis will be required. If tissue concentrations are above the action level for any constituent at either of these stations, comparisons will be made to the pre-exposure concentrations at these sites to evaluate whether a trend is evident during the construction process suggesting that cable installation could have affected body burdens.

For parameters with no regulatory tissue thresholds, are there differences in body burdens after cable installation compared to pre-construction levels?

Regulatory thresholds for human consumption have not been established for most of the compounds being tested for bioaccumulation in fish or shellfish. For these compounds, the initial analysis will focus on whether there are changes in body burdens at a specific station over time and if there is consistency among the replicates. For each parameter for which there are one or more replicates above the method detection limit (MDL), data will be presented graphically showing mean and standard deviation over time. Where appropriate, results will be tested statistically using a one-way ANOVA (before-after design). Analysis of similar data examining changes in body burdens associated with the operation of the Massachusetts Water Resources Authority's offshore wastewater discharge (Kane-Driscoll et al. 2008) showed that log-transformation of the chemistry data normalized the data sufficiently for ANOVA to be suitable. Reference stations will be treated in a similar fashion to the impact stations. Ability to use statistical methods will be limited to parameters for which most replicate data is above the MDL.

Eversource will also prepare a report summarizing the results and statistical analyses. The report will include tables comparing the results to existing GulfWatch data and to regulatory levels available for the constituents for which NSSP has provided guidance (Table 3; USFDA 2015). There are no human health standards for the other parameters being tested in this program.

Eversource has established a claims resolution process through which aquaculturists could seek restitution if installation of the SRP cables is shown to have caused bioaccumulation of toxic substances rendering them unsuitable for human consumption.

All data will be digitally provided to the NHDES Shellfish Program in Microsoft Excel files in a format consistent with NHDES Environmental Monitoring Database protocols, procedures, and reporting formats.

Table 3. Action Levels, Tolerances and Guidance Levels for Poisonous or Deleterious Substances in Seafood

Class of Substance	Substance Level	Food Commodity	Reference
Deleterious Substance			
Aldrin/Dieldrin	0.3 ppm	All Fish	CPG sec 575.100b
Chlordane	0.3 ppm	All Fish	CPG sec 575.100b
Chlordecone (Kepone)	0.3 ppm	All Fish	CPG sec 575.100b
DDT, DDE, TDE	5.0 ppm	All Fish	CPG sec 575.100b
Methyl mercury*	1.0 ppm	All Fish	CPG sec 540.600
Heptachlor/heptachlor epoxide	0.3 ppm	All Fish	CPG sec 575.100
Mirex	0.1 ppm	All Fish	CPG sec 575.100
PCBs	2.0 ppm	All Fish	21 CFR 109.30
2,4-D	0.1 ppm	Fish	40 CFR 180.142
2,4-D	1.0 ppm	Shellfish	40 CFR 180.142

Source: National Shellfish Sanitation Program (NSSP) Guide for the Control of Molluscan Shellfish: 2015 Revision

*to be tested as organic mercury

6.0 Literature Cited

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Appendix A

NHDES Permit Conditions Pertaining to Shellfish Monitoring

Condition 46:
NH DES Shellfish Program Monitoring and Reporting Requirements:

Two-week Prior Notification:

At least two-weeks prior to the start of jet plowing activities, the Applicant shall notify the NH DES Shellfish Program of the dates and times of all activities that will resuspend sediments and introduce turbidity to the water column of Little Bay, so that NH DES may assess possible changes in water column fecal coliform concentrations that may warrant temporary closure of shellfish harvest areas

Plan to Assess Shellfish Tissue Before and After Little Bay Cable Crossing:

At least six months prior to the start of jet plowing activities (or other time frame acceptable to NHDES) the Applicant shall submit a plan to the NH DES Shellfish Program for approval for assessing molluscan shellfish tissue concentrations of selected chemical contaminants before and after the project. The Applicant shall then implement the approved plan. Unless otherwise authorized by NH DES, the plan shall include provisions for the following:

Species to be tested: Blue mussels and American oysters shall be the primary species to be tested. To the extent practical, native species shall be used at all sites. If transplanted species must be used, NH DES Shellfish Program and the NH Fish and Game Department will need to approve the source of the shellfish, and the contractor will need to include provisions for additional shellfish tissue testing to document contaminant levels in the shellfish prior to transplant.

Location of testing sites: A total of at least four sites shall be monitored, with two sites inside the area affected by the plume, and two sites outside of the area affected by the plume.

Sites Affected by the Plume: At least two sites in areas that the Applicant believes will be affected by the sediment plume created by jet plowing will be identified. One of these sites shall be on the upstream side of the project, and the other shall be on the downstream side of the project. At least one of these two sites shall be in the vicinity of subtidal commercial oyster aquaculture farms in Little Bay. Water temperature and salinity shall be monitored with continuous data loggers (15-minute interval) at all sites.

Sites Not Affected by the Plume: At least two sites in areas that the Applicant believes will not be affected by the sediment plume created by jet plowing will be identified. One of these sites shall be on the upstream side of the project, and the other shall be on the downstream side of the project. To the extent practical, these sites shall be located at or near sites used for the NH GulfWatch program so that data generated from this monitoring program can be compared to historical data.

Water temperature and salinity shall be documented with continuous data loggers (15-minute interval) at all sites. QA procedures to quantify data logger performance, accuracy, and precision shall be included in the plan and reported.

Timing of Sample Collection: All sites shall be sampled 1-2 two weeks before dredging or jet plowing begins and within one week of the completion of all dredging or jet plowing activities.

A final round of sampling shall be completed within one week of the completion of all dredging activities.

All collected samples shall be immediately transported to the analytical laboratory(ies). The Applicant and/or its contractor shall assure the analytical laboratory completes testing as soon as possible, and report the results as soon as they are completed.

Constituents for Tissue Analysis:

Parameters Specified in the National Shellfish Sanitation Program shall be tested:

Deleterious Substances

Aldrin/Dieldrin, Chlordane, Chlordecone, DDT, DDE, TDE, Diquat, Glyphosate, Carbaryl, Endothall and its Monomethyl ester, Methyl Mercury, Heptachlor /Heptachlor Epoxide, Mirex, Polychlorinated Biphenyls (PCBs), 2,4-D.

Chemotherapeutics

Chloramphenicol, Clenbuterol, Diethylstilbestrol (DES), Demetridazole, lpronidazole and other nitroimidazoles, Furazolidone and other nitrofurans, Fluoroquinolones, Glycopeptides.

Additional Parameters that are part of the NH GulfWatch Program (note that some of the parameters below are also in the NSSP list).

Metals:

Aluminum, Cadmium, Chromium, Copper, Iron, Lead, Mercury, Nickel, Silver, Zinc.

Physical:

Lipid Content, Percent Solids.

PAHs:

Acenaphthene, Acenaphthylene, Anthracene, Benzo(A)anthracene, Benzo(A)pyrene, Benzo(B)fluoranthene, Benzo(E)pyrene, Benzo(GHl)perylene, Benzo(K)fluoranthene, Biphenyl, Chrysene, Dibenzo(AH)anthracene, Dibenzothiophene, Fluoranthene, Fluorene, lndeno(123CD)pyrene, Naphthalene, Perylene, Phenanthrene, Pyrene, Cl-Chrysene, Cl-Dibenzothiophene, Cl-Fluoranthene, Cl-Fluorene, Cl-Naphthalene, Cl-Phenanthrene, C2-Chrysene, C2-Dibenzothiophene, C2-Fluoranthene, C2-Fluorene, C2-Naphthalene, C2-Phenanthrene, C3-Naphthalene, C3-Chrysene, C3-Phenanthrene, C3-Dibenzothiophene, C3-Fluorene, C4-Chrysene, C4-Fluorene, C4-Naphthalene, C4-Phenanthrene, Total PAHS.

Pesticides:

A_BHC (Alpha Lindane), A-Endosulfan, Aldrin, B-Endosulfan, CIS-Chlordane, Dieldrin, Endrin, G-Chlordane, Heptachlor, Heptachlor Epoxide, Hexachlorobenzene, Lindane (G-HCH), Methoxychlor, Mirex, O,P'-DDD, O,P'-DDE, O,P'-DDT, P,P'-DDD, P,P'-DDE, P,P'-DDT, Total DDT, Transnonachlor, Permethrin, Cypermethrin, Deltamethrin.

Polychlorinated Biphenyls (PCBs):

101; 90; 105; 118; 126; 128; 138; 153; 132; 169; 170; 190; 18; 15; 180; 187;195;208;206;209;28;29;44;50;52;66;95;77;8;5;87;Sum PCBs.

Field and Laboratory Methods and Protocols: Field and laboratory methods and protocols shall be consistent with methods and protocols specified in the *National Shellfish Sanitation Program,* Guide

for the Control of Molluscan Shellfish (2015 Revision) and in documentation describing the NH GulfWatch Program, including number of organisms in each sample, and number of duplicates as specified in the GulfWatch program documentation.

Data Management and Communication of Results: All data will be digitially provided to the NHDES Shellfish Program in Microsoft Excel files and in a format consistent with NHDES Environmental Monitoring Database protocols, procedures, and reporting formats. Compliance with all laws: The Applicant and/or its contractor shall be responsible for complying with all applicable local, state, and federal laws to execute this monitoring program, including but not limited to a NH Fish and Game Department permit to collect and test shellfish.

Appendix B

SOP for Water Quality Monitoring During Shellfish Bioaccumulation Monitoring

1. Arrive on site, retrieve sonde, remove PVC housing. Note retrieval time and water depth on field data sheet
2. Connect sonde to computer, open Ecowatch Lite
3. Stop Active Logging
    a. In Ecowatch Lite select File > New Connection > Com Port 1
    b. Press enter until pound sign is shown
    c. Type "menu" for main menu
    d. Select Run>Unattended sample>Stop logging
    e. Confirm logging is shown as inactive
4. Upload data file to computer
    a. From main menu select file>upload>filename
    b. Save as .txt file, not filename on field data sheet
5. Take 1st QC sample.
    a. Fill 5 gallon bucket with water from sample station
    b. From Ecowatch main menu select Run>Discrete Sample for a live reading
    c. Allow sonde to stabilize in sample then record pre-calibration QC sample values on field data sheet
6. Clean sonde
    a. Gently remove fouling from sensors with paper towels and Q-tips
    b. Fill sample cup with clean water, attach to sonde, agitate to rinse sensors, repeat 3 x
7. Calibrate DO sensor
    a. Dry DO sensor membrane gently with Q tip, then loosely attach sample cup with a small amount of water in it. You only need enough water to saturate the air in the sample cup and the cup needs to be engaged loosely to vent any air pressure build up as the sample cup warms. Allow to stabilize 5-10 minutes and monitor with live readings. Record pre-calibration DO reading on field data sheet
    b. From main menu select Calibrate>Dissolved Oxygen>%Saturation
    c. Enter barometric pressure from YSI 650 MDS handheld.
    d. The sensor will stabilize for 80 seconds and then accept the new calibration setting. Record the post-calibration DO reading on field data sheet. If there is no live reading on the screen return to main menu and select Run>Discrete Sample for a live reading
8. Calibrate Conductivity sensor
    a. From main menu select Calibrate>conductivity>specific conductance
    b. Enter calibration standard value 1.413 mS/cm (should automatically default to this value)

c. Rinse plastic vial with clean water and dry with paper towel. Fill plastic vial with Cond solution and immerse sensor in solution. Allow readings to stabilize then record pre-calibration Sp. Cond. Reading on field data sheet.
d. Press enter to accept the new calibration setting. Record the post-calibration Sp. Cond. reading on field data sheet. If there is no live reading on the screen return to main menu and select Run>Discrete Sample for a live reading
e. Rinse sensor and plastic vial with clean water, dry plastic vial with paper towel

9. Calibrate pH sensor
    a. From main menu select Calibrate>pH>3 Point
    b. Enter 1st pH standard – 7. Fill plastic vial with pH 7 buffer solution and immerse sensor in solution. Allow readings to stabilize then record the pre-calibration pH reading on the field data sheet.
    c. Press enter to accept the new calibration setting. Record the post-calibration pH reading on field data sheet.
    d. Rinse pH sensor and plastic vial thoroughly with clean water. Fill plastic vial with pH 4 buffer solution and immerse sensor in solution. Enter 2nd pH standard – 4. Allow readings to stabilize then record the pre-calibration pH reading on the field data sheet.
    e. Press enter to accept the new calibration setting. Record the post-calibration pH reading on field data sheet.
    f. Rinse pH sensor and plastic vial thoroughly with clean water. Fill plastic vial with pH 10 buffer solution and immerse sensor in solution. Enter 3rd pH standard – 10. Allow readings to stabilize then record the pre-calibration pH reading on the field data sheet.
    g. Press enter to accept the new calibration setting. Record the post-calibration pH reading on field data sheet. Thoroughly rinse pH sensor and plastic vial with clean water
10. Calibrate Turbidity sensor
    a. Rinse sample cup with clean water then wipe clean and dry with a paper towel to remove any potential contamination. You can remove the black portion of the sample cup to clean and dry that more easily.
    b. From main menu select Calibrate>Turbidity>2 Point
    c. Enter 1st standard – 0. Fill Sample cup with approximately 1.5 oz. of 0 NTU solution. This is just enough solution to fill the black portion of the sample cup to the bevel in the center of the sample cup. The turbidity sensor will fit into the center recession in the sample cup so you need enough solution to immerse the sensor optics but not much more.

d. Keep the probe upright and attach the sample cup but only engage the first thread. The idea is to immerse the optics in solution but keep the bottom of the sample cup as far away from the optics as possible to reduce interferences from the cup.
e. Press 3 to activate the sensor wiper. Allow readings to stabilize, then record the pre-calibration 0 NTU reading on the field data sheet.
f. Press enter to accept the new calibration setting. Record the post-calibration 0 NTU reading on field data sheet.
g. Enter 2nd standard – 123. Clean and dry sample cup as above in 10.a. Fill Sample cup with approximately 1.5 oz. of 123 NTU solution. Keep the probe upright and attach the sample cup but only engage the first thread, as above.
h. Press 3 to activate the sensor wiper. Allow readings to stabilize, then record the pre-calibration 123 NTU reading on the field data sheet.
i. Press enter to accept the new calibration setting. Record the post-calibration 123 NTU reading on field data sheet.

11. Take 2nd QC sample.
    a. From Ecowatch main menu select Run>Discrete Sample for a live reading
    b. Attach guard to sonde and place in same bucket of water used for 1st QC sample. Allow sonde to stabilize in sample then record post-calibration QC sample values on field data sheet.
12. Start new unattended sample
    a. Select Run>Unattended sample. Review each line and make sure it is correct. It will default to the previous settings so the only thing you should have to do is enter a new filename which is SRP_T_xx with "xx" increasing by 1 at each deployment. Also make sure the sample interval is 15 minutes and the start time is at the next quarter hour (e.g. 10:00, 10:15, 10:30, 11:00, etc.)
    b. Select start logging and press enter to begin logging. Check that the logging status is "active." Check that the file you just created is stored and has 0 samples (from main menu select file>directory to view files).
13. Attach PVC housing to sonde, redeploy from submerged buoy. Note time of deployment and water depth on field data sheet.
14. Collect TSS sample using pump and tubing from 3 ft. off bottom and adjacent to sonde.