Seacoast Reliability Project

Request to reduce water quality monitoring during hand jetting

November 22, 2019

1.0 Introduction and Summary of Effort to Date

Eversource has been conducting cable installation via diver burial/hand jetting on the east cable end for nine days and for eight days on the west cable end since November 11, 2019 for the Seacoast Reliability Project (SRP). Water quality monitoring has been conducted daily according to the Hand Jetting section of the Water Quality Monitoring Plan, Revised Final (Oct 15, 2019). To date, turbidity levels have remained low at the near-field stations, even when sampling a visible plume. Prior to hand jetting, water quality data was collected in conjunction with the jet plow trial (one day), and jet plow cable installation (eight days). Each of these sampling events included in situ measurements (turbidity, DO, temperature, salinity, pH) using probes and laboratory analysis of TSS, dissolved and total metals (arsenic and copper), nitrogen species (nitrates, nitrites, ammonia, total nitrogen and total Kjeldahl nitrogen), and fecal coliforms. In total, over 11,000 measurements and samples have been collected for this project through November 17 (Table 1).

Table 1. Number of water quality measurements and samples collected by activity through November 17, 2019.

	Jet Plow Trial	Jet Plow Installation			Hand Jetting*		Total
		Cable 1	Cable 2	Cable 3	East (no silt curtain)	West (with silt curtain)	
Field Measurements							
Turbidity, DO, temperature, salinity, pH	189	647	544	505	154	192	2,231
Turbidity profiles			2	8	3	4	17
Analytical Samples							
TSS	189	645	544	493	154	192	2,217
Total metals	188	348	286	259	154	192	1,427
Dissolved metals	188	348	286	259	154	192	1,427
Nitrate, nitrite	188	348	286	259	154	192	1,427
Total nitrogen, TKN, ammonia	188	348	286	259	154	192	1,427
Fecal coliforms	66	233	193	179	80	100	851
Total	1,196	2,917	2,427	2,221	1,007	1,256	**11,024**

*hand jetting has not been initiated on the eastern tidal flat (within silt curtains)

Results of laboratory analyses from the jet plow trial and the jet plow installation of the first two cables show that concentrations of dissolved and total arsenic, fecal coliforms, nitrates, nitrites and ammonia were not increased as a result of the jet plowing. While we don't have all of the corresponding data for

the hand jetting, this method inherently causes less sediment disturbance than jet plowing for several reasons. Hand jetting is conducted by one diver using a hand tool equipped with one nozzle penetrating the sediment, compared to a series of nozzles on the jet plow blade. Water volume required by the hand jet is considerably lower than that required by the jet plow. The advance rate for the hand jet is on the order of 10 - 15 ft per hour compared to approximately 300 ft per hour for the jet plow. As a result, the daily volume of sediment affected by hand jetting is likely to be substantially smaller than for the jet plow.

Based on these observations and data, Eversource respectfully requests to modify the hand jetting monitoring effort to reduce the frequency of sampling and to eliminate some of the water quality parameters where no elevated levels have been associated with the jet plow activities. Our rationale for the request is presented below.

2.0 Hand Jet Monitoring Results

2.1 Turbidity

On the east shore in the channel (no turbidity barriers), the turbidity results collected during hand jetting show that sediment plumes have been diffuse and minimal by the time they reach the nearfield stations. The boat crews actively search for the plume both visually and using the turbidity meter to attempt to ensure they are sampling within it. Data indicates that the plume is very narrow, ephemeral and variable in sediment quality. Mean turbidity values were very similar between "before" and during hand jetting (Table 2). Even with guidance from the drone, a "visible" plume in the channel typically registered less than 10 NTUs. See turbidity profiles (Figure 1). We have not yet observed a turbidity exceedance at the near-field stations approximately 500 feet from the cables.

Table 2. Mean, minimum and maximum turbidity values in the east channel (no turbidity barrier) and western tidal flat (with turbidity barrier) before hand jetting started and during hand jetting for November 11 – 20, 2019.

Date	East (no silt barrier)				West (with silt barrier)			
	Background Mean NTU	During			Background Mean NTU	During		
		Max.	Mean	Station*		Max.	Mean	Station*
11/11/19	3.85	6.0	4.2	14A	-	-	-	-
11/12/19	2.75	6.3	3.4	14A	-	-	-	-
11/14/19	8.5	19.5	6.5	19A	5.85	6.4	5	15
11/15/19	5.55	9.0	5.5	19A	3.3	4.9	3.9	15
11/16/19	8.1	10.1	6.8	19A	5.6	5.1	4.4	15
11/17/19	-	-	-	-	3.6	3.8	3.5	10
11/18/19	4.26	5.7	4.3	19A	3.2	5.1	4.1	15
11/19/19	3.25	10.7	4.3	19A	3.05	4.1	3.5	10
11/20/19	3.1	6.0	3.5	14A	8.4	12.3	10.1	15

*where maximum value occurred

Hand jetting on the west tidal flat began November 15, enclosed within the prescribed turbidity barriers. Outside of the barriers, turbidity levels at the near-field stations (Station 10 and 15), show no effect from the hand jetting. Only once did maximum turbidity levels exceed the BSAL (at Station 19A) and results are typically similar to the background data (Table 3). Turbidity profiles inside and outside of the

turbidity barrier soon after the divers completed hand jetting for the day clearly show the effectiveness of the turbidity barriers (Figure 2). Turbidity levels ranged from 27 to 73 NTU within the barrier, while outside of the barrier, turbidity levels ranged between 3 and 4 NTUs, which are essentially equivalent to background turbidity levels. Turbidity profiles were collected in visible plumes near western nearfield stations on several occasions and also showed low values (Figure 3).

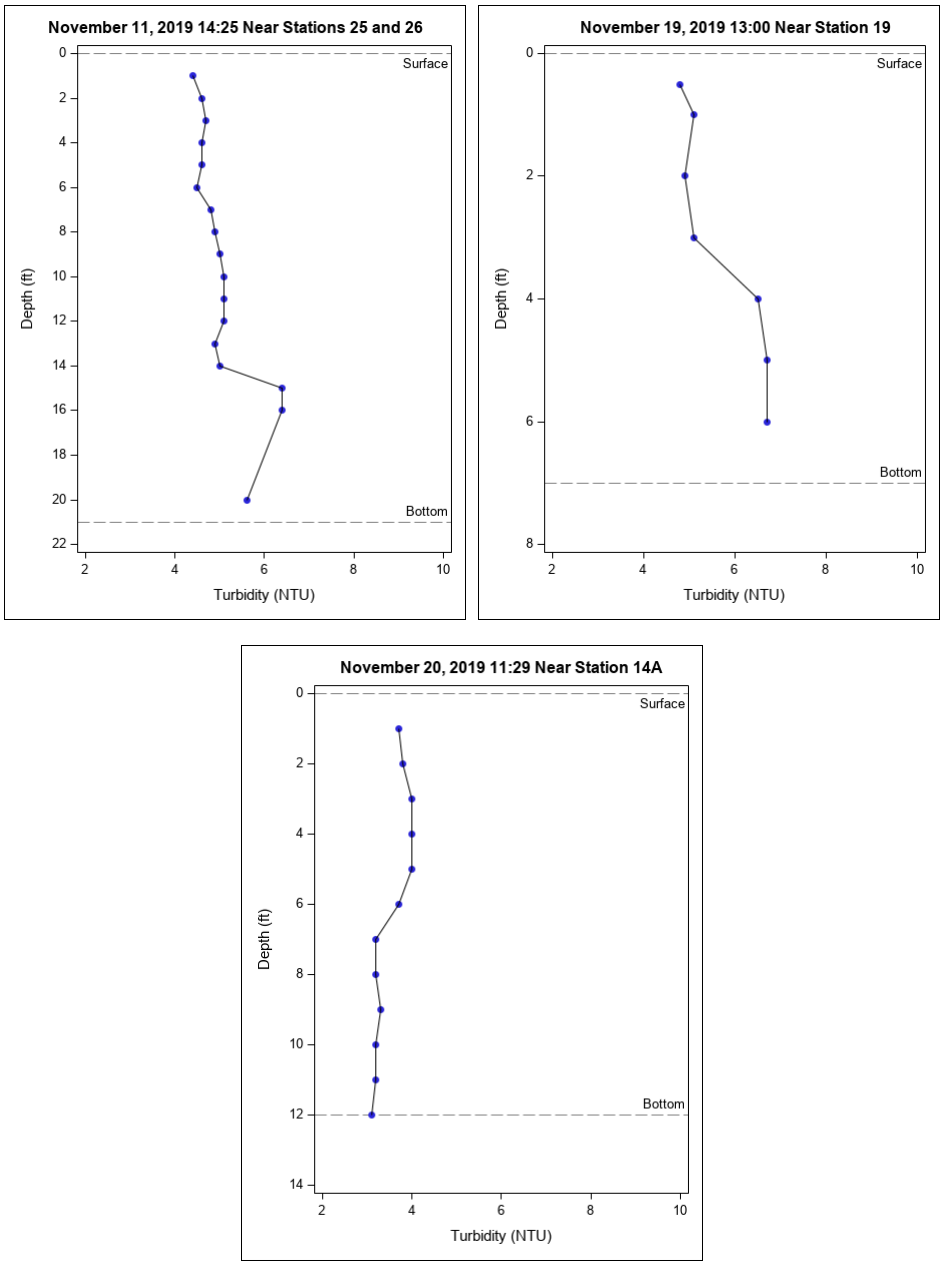

Figure 1. Turbidity profiles for three plumes identified during hand jetting in the east channel (no turbidity barrier).

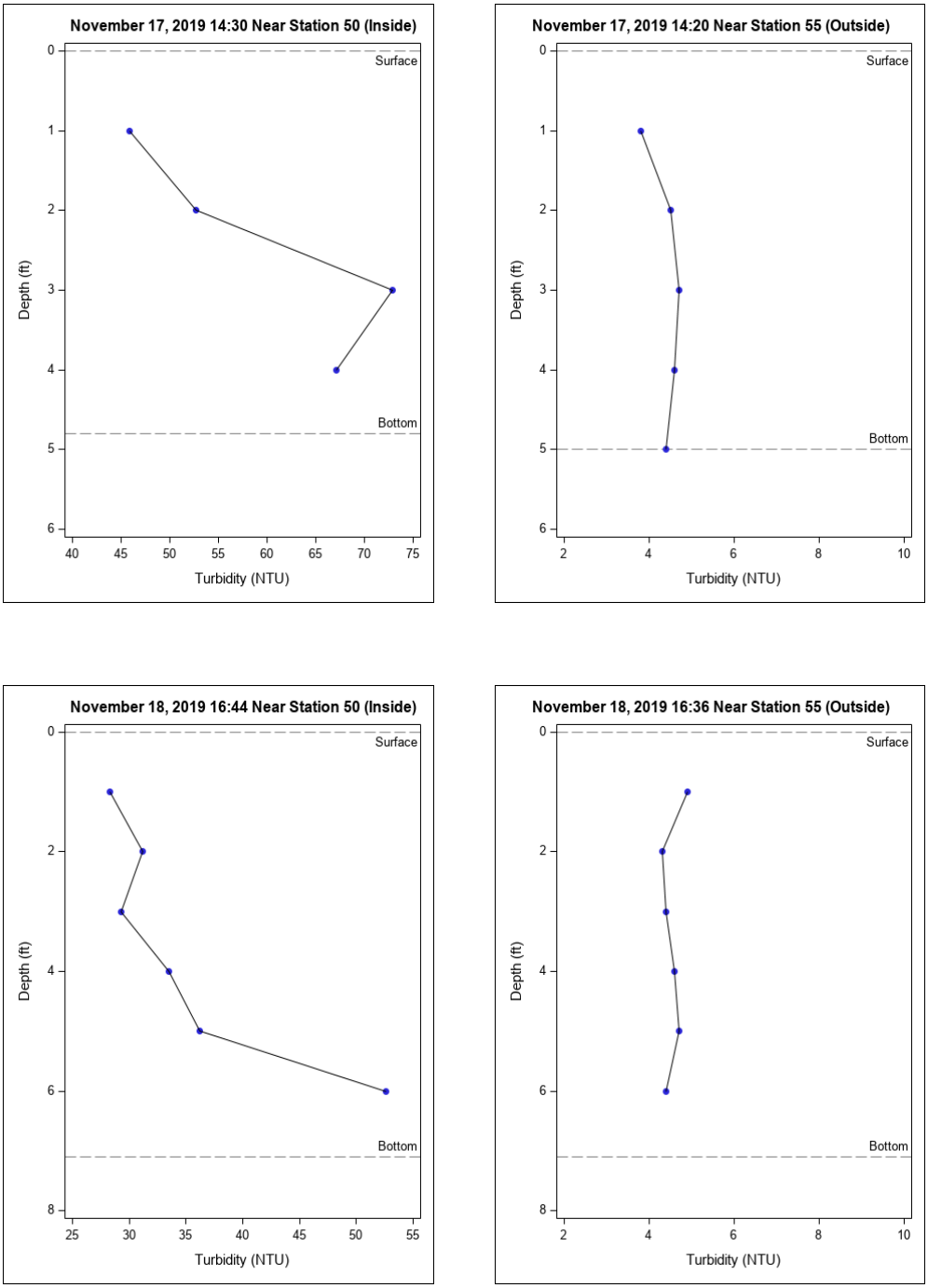

Figure 2. Vertical profiles comparing turbidity levels within the turbidity barrier, and adjacent to and outside of the barrier.

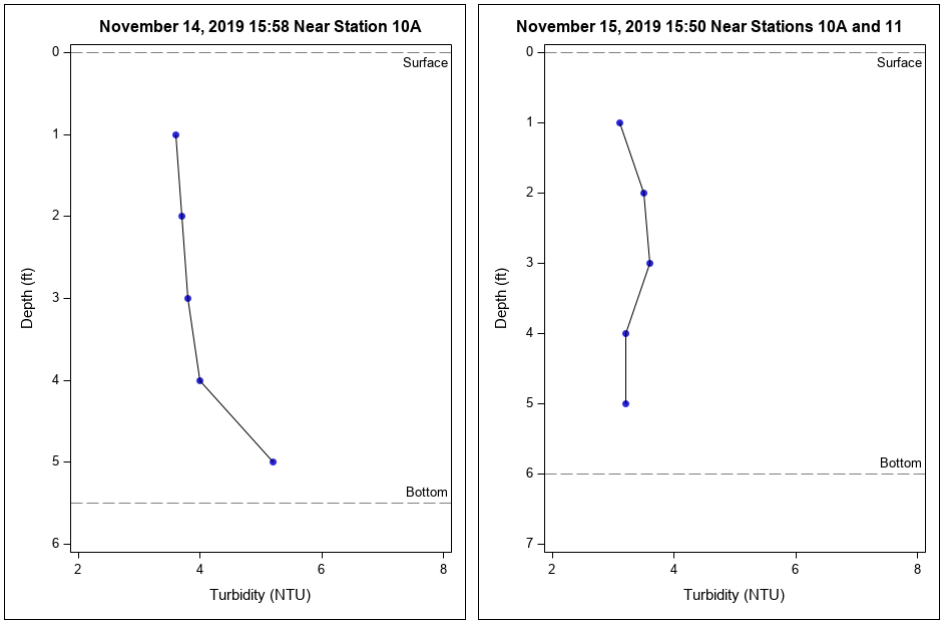

Figure 3. Turbidity profiles for two plumes identified during hand jetting in the western tidal flat (with turbidity barrier).

2.2 Boundary Station Action Level

The boundary station action level (BSAL) has been dropping slightly due to low background turbidity. At the start of hand jetting on Nov 11, the BSAL was 15 for both the tidal flats and the channel. Based on background values observed to date during hand jetting, we anticipate that the BSAL may drop as low as 13 for the tidal flats and the channel.

2.3 Total Suspended Solids

Results for total suspended solids (TSS) are available for November 11 and 12, 2019. At this time, hand jetting was only occurring in the east channel (no turbidity barrier). The data indicate that TSS ranged from 3.5 to 12 mg/L prior to the start-up of the jet plow. During hand jetting, values at the near-field stations ranged from 3.9 to 23 mg/L (Table 3).

2.4 Fecal Coliform

New Hampshire's fecal coliform standards for tidal waters used for growing or taking of shellfish for human consumption are based on the National Shellfish Program guidance (USFDA 2017). The SRP activities do not fall neatly into any of the sampling schemes addressed in the guidance document. This states that the fecal coliform median or geometric mean most probably number (MPN) shall not exceed fourteen (14) per 100 ml and not more than 10 percent of the samples shall exceed an MPN of 43 MPN per 100 for a five-tube decimal dilution test; 49 MPN per 100 ml for a three-tube decimal dilution test; or 28 MPN per 100 ml for a twelve-tube decimal dilution test.

Fecal coliform results from hand jetting through November 17, 2019 were predominantly (62%) non-detect or 10 MPN/100mL. The highest single reading was 108 MPN/100mL. A total of 8 samples out of 186 field samples were above 31 MPN/mL, most of which were on the west shore, including 3 at Station 21 which is a reference station. The 90th percentile is 31 MPN/100mL. These results are similar to those observed during the cable installations, lower than Cable 1, and higher than Cables 2 and 3.

2.5 Nitrogen

Preliminary data from Enthalpy also show that all nitrogen species were low during the east channel hand jetting during the first two days of hand jetting. Total nitrogen ranged from <0.5 to 2.28 mg/L. Ammonium, the only nitrogen species for which the State of New Hampshire has an exceedance threshold, was Non-Detect during both days, as was nitrite. Nitrate ranged from 1.26 mg/L early in the day on November 11, 2019, and then dropped to 0.337 mg/L or lower. On November 12, 2019, the maximum nitrate level (0.132 mg/L) occurred shortly after hand jetting began but this value was only slightly higher than concentrations observed prior to hand jetting (0.963-0.127 mg/L). Total Kjeldahl nitrogen is not yet available from Enthalpy, but because it forms a component of Total Nitrogen, it will not exceed Total Nitrogen levels.

2.6 Metals

Data for metals are available for the jet plow trial and the first two cable installations. Because the copper results from the jet plow installations showed some fluctuations and possible exceedances, the hand jetting results will be reviewed closely. Arsenic levels were consistently low in the first two jet plow installations, never exceeding 6.1 µg/L compared to a chronic toxicity level of 36 µg/L and an acute toxicity level of 69 µg/L.

2.7 Drone

When weather permits, the drone continues to fly hourly to assess the hand jetting efforts and to search for visible plumes. Depending on water surface conditions, cloud cover and sun angle, the plume may or may not be visible from the drone, but it is more so than from the sampling boat. On several occasions the drone has guided the sampling crew to the center of a plume to collect water quality samples. See Figure 1.

3.0 Conclusions

Water quality monitoring to date for hand jetting has indicated minimal turbidity in both the eastern channel and the western tidal flat. The laboratory data received to date for hand jetting is incomplete but indicates that the data are similar to, or lower than, the jet plowing events for cable installation.

- Turbidity results in the eastern channel have been consistently low, with a maximum turbidity level of 19.5 NTU reported on November 14, 2019. Typically the highest values have been below 10 NTU. Turbidity plumes have been visible primarily by the drone. Direct observations by the monitoring crew indicate that they are low concentration and highly variable within a small area, with tendrils of turbidity appearing and disappearing. Turbidity profiles indicate a diffuse plume and the limited ability to see these plumes from the water reinforce the idea that they are very limited in space and concentration.

- On the western tidal flat, the turbidity barrier appears to be very effective, as has been demonstrated by turbidity profiles showing turbidity levels that are up to 10 times higher inside the barrier than outside. Turbidity at the nearfield stations exhibited no levels above BSAL. Conditions on western tidal flat are not likely to change from an environmental or operational standpoint so long as the turbidity barrier is maintained properly. Therefore, there appears to be a very low risk of events that would lead to exceedances of NH WQ standards.

- Once hand jetting begins on the eastern shore, the turbidity barrier is expected to perform equally well as that on the western shore. High levels of containment are expected, resulting no water quality violations.

4.0 Recommendations

Given that all of the hand jetting water quality results received to date have indicated no exceedances and are similar to, or lower than the jet plowing results, Eversource is requesting that the water quality monitoring program be modified to reduce the sampling frequency and eliminate several analytes.

Reduce sampling frequency: Eversource is proposing to continue sampling on all active hand jetting sites (east channel [no turbidity barrier], west tidal flat, east tidal flat when it begins). Currently sampling is conducted hourly at each site. Eversource is proposing to reduce the effort so that each site is sampled every two hours. This would be conducted using a single boat moving between stations. We will continue to collect one round of water quality measurements immediately before hand jetting begins. Subsequent monitoring would start no sooner than 15 minutes after hand jetting begins. If turbidity levels are elevated above 10 NTUs, monitoring will continue approximately an hour after hand jetting has ended for the day.

Reduce analytes: Eversource is proposing to continue sampling turbidity, temperature, salinity, TSS and copper. The remaining parameters, fecal coliform, the nitrogen species, arsenic, dissolved oxygen, and pH, will be halted. When the laboratory results come in, Eversource will share with DES and the Independent Environmental Monitor. Any findings contrary to this proposal will be discussed with DES, and may result in adding the suspect parameter(s) back in.

The revised hand jetting monitoring effort is provided in Table 3.

East Shore: Hand jetting within the turbidity barrier on the east shore is expected to begin on November 25. Eversource proposes to monitor the east shore as described above to assess the effectiveness of the turbidity barrier. If water quality remains high, as has been observed on the west shore and in the east channel, Eversource requests to halt water quality monitoring on the east shore after three days.

Eversource will continue to provide DES with a daily report of results.

5.0 Schedule

Assuming no major delays, the remaining hand jetting effort is currently predicted to run through December 6 on the east shore. The west tidal flat and east channel are expected to wrap up this weekend (November 23 or 24). Both the east and west tidal flat turbidity barriers will be removed on or around December 7. Removal of silt barriers will be monitored for water quality compliance and the plan for this monitoring will be provided to DES no later than November 26. Concrete mattresses are currently scheduled to be laid on December 8-12.

Table 3. Description of Hand Jet Water Quality Monitoring Stations with Proposed Modifications

Type	Purpose	Location	Monitoring Protocols			
			Stations[a]	Frequency	Depths[b]	Parameters
Boundary/ Near-field	Compliance with mixing zone	500 ft from activity = edge of mixing zone	West – 10, 15 East - 14, 19	Sample all stations one time no more than one hour before hand jet; every two hours during hand jetting starting no sooner than 15 minutes after start activity; continue an additional sample set if turbidity levels are elevated.	Near surface (-1 ft) Near bottom (1 ft above)	***In situ* measurements:** Turbidity Salinity Temperature **Water samples:** TSS, Cu,
Fixed	Continuous turbidity monitoring	Edge of mixing zone; near shellfish reference station	32, northern shellfish reference station	Continuous (15 minute intervals) from 1 week before to 1 week after installation complete	Near-bottom	***In situ* measurements:** Turbidity DO Salinity Temperature pH
Reference	Ambient condition	Beyond extent of plume	West – 21 East – 26, 30	Sample all stations one time no more than one hour before hand jet; every two hours during hand jetting; continue an additional sample set if turbidity levels are elevated	Near surface (-1 ft) Near bottom (1 ft above)	***In situ* measurements:** Turbidity Salinity Temperature **Water samples:** TSS, Cu)

[a] Exact locations of sample stations may be adjusted depending on location of divers conducting hand jetting.

[b] When water depths are less than 7 feet, water sampling will decrease to a near-surface and near-bottom sample. When water depths are less than 3 feet, a single near-bottom sample will be collected. No samples will be collected when water depths are less than 2 feet to avoid disturbing bottom sediments with the motor propeller.