



STATE OF CONNECTICUT

DEPARTMENT OF AGRICULTURE Office of the Commissioner



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Commissioner

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TO: Elected Officials, Shellfish Commissioners, and Oyster Harvesters

FROM: Steven K. Reviczky, Connecticut Commissioner of Agriculture

DATE: 9/5/2014

RE: Connecticut Shellfish Bed Management Modernization

The Department of Agriculture's Bureau of Aquaculture is charged with overseeing and regulating nearly all facets of shellfishing in Connecticut waters. Recently, there have been several written and verbal inquiries about modernization efforts that the Department is undertaking with respect to the revised shellfish lease document for all leaseholders and the implementation of measures to reduce the incidence of bacteria contaminated shellfish arriving to market.

The attached documents are provided in an effort to be informative about recent actions that the department has undertaken to achieve the following goals:

- Modernizing the state's management of shellfish beds through the lease document revision;
- Ensuring the safety of shellfish consumption is maximized, through best practices for shellfish handling and reducing the incidence of vibrio;
- Protecting the taxpayers' investment while simultaneously maintaining an environment for small businesses to thrive;
- Maintaining the existing policy of the Department to be open and transparent.

We hope that the information provided is informative and useful. Should you have any questions, please do not hesitate to contact Department of Agriculture Chief of Staff George Krivda at 860-713-2573 or at George.Krivda@ct.gov.



S T A T E O F C O N N E C T I C U T
 DEPARTMENT OF AGRICULTURE
 BUREAU OF AQUACULTURE & LABORATORY



SHELLFISH BED MANAGEMENT MODERNIZATION

Background:

The Department of Agriculture includes the Bureau of Aquaculture and Laboratory Services located in Milford Connecticut. The Department of Agriculture is statutorily recognized as the State Shellfish Authority for the State of Connecticut, and participates in the National Shellfish Sanitation Program (NSSP) as a shellfish producing state. The NSSP is the federal/state cooperative program recognized by the U. S. Food and Drug Administration (FDA) and the Interstate Shellfish Sanitation Conference (ISSC) for the sanitary control of molluscan shellfish produced and sold for human consumption. The Bureau’s twelve member staff carries out the responsibilities of the National Shellfish Sanitation Program Model Ordinance (NSSP-MO). It is this oversight which enables commercial shellfish dealers licensed by the Department to ship shellfish interstate. The NSSP-MO provisions require that each shellfish producing state’s shellfish program be evaluated in four categories: shellfish growing area, shellfish patrol, shellfish plant sanitation, and vibrio control, as well as an evaluation of the shellfish laboratory.

The Department licenses 40 shellfish shippers for the harvest of hard clams and oysters from Connecticut waters. Approximately 20 licensed shippers harvest oysters, and approximately 20 harvest clams. The Department administers approximately 1,000 shellfish parcels in state waters. Franchise oyster beds total 22,422.47 acres and generated \$88,809.68 in annual revenue for the State in 2014. Leased shellfish beds total 27,673.93 acres and generated \$752,470.00 in annual revenue in 2014.

History of Shellfish Lease System in Connecticut:

The oyster franchise system in state waters began in 1881 with the issuance of grants for the right to plant and cultivate shellfish. 22,422 acres of oyster franchises have been continuously operated since 1881. In 2008, the valuation of these franchise grounds was raised from \$30.00/acre to \$200.00/acre and assessed a 2% tax rate, equivalent to \$4.00 an acre.

Year	Valuation per acre	Tax Rate 2%	Tax Rate per Acre
1922	15.00	2%	\$ 0.30
1923	10.00	2%	\$ 0.20
1931	12.00	2%	\$ 0.24
1937	13.00	2%	\$ 0.25
1946	15.00	2%	\$ 0.30
1969	30.00	2%	\$ 0.60
2008	200.00	2%	\$ 4.00

The issuance of new shellfish franchises ceased in 1915, at which time the state began to lease the right to make a good faith effort to plant and cultivate shellfish. Leases were awarded to the highest responsible bidder. Initially, no minimum level bid existed. A \$1.00 minimum was established in 1969, and a \$2.00 minimum was established in 1992, which was raised to a \$4.00 minimum in 2004. These minimum bid requirements apply to all shellfish leases, transfers, or renewals.

Table 1. Annual State Revenue Associated with Leased Shellfish Beds.

Number of Leases	Total Acres	Per Acre (Average) Value	Total Annual Revenue in Year 2014
161 Historic Parcels (fixed at \$4/Acre)	10,727	\$4.00 (fixed)	\$42,908
163 Recent Parcels (subject to highest bid)	16,946.93	\$41.86	\$709,562
324 Total	27,673.93	\$24.97	\$752,470

The 324 individual parcels leased for the purpose of planting and cultivating shellfish have an average per acre value of \$24.97. The 161 historic leased parcels are fixed at \$4.00 per acre on 10,727 acres and generated \$ 42,908.00 in annual revenue. The 163 High Bidder leased parcels encompass 16,946.93 acres and generated \$ 709,562.00, or an average of \$41.86 per acre. See Table 1 for a summary of these numbers

The Shellfish lease form was initially a two page simple format from the time of the lease inception in 1915. In 2003, the State of Connecticut updated shellfish lease language to prevent a shellfish lessee from entering into agreements that would prevent the good faith effort requirement to plant and cultivate shellfish without the approval of the Department of Agriculture and the Office of the Attorney General.

Modernization of Lease Language:

As part of a modernization effort, the Department of Agriculture began a review of the existing shellfish lease language in 2012. At that time the Department was defending litigation filed by a commercial shellfish leaseholder who:

- was in default on its annual payments on ten shellfish leases,
- was in default on a subsequent payment schedule, it devised,
- refused to vacate the lease grounds; and,
- claimed its personal property (the shellfish) remain on the ten terminated leases, even after it agreed to vacate the leases under an agreed upon schedule of departure outlined in a Stipulated Judgment in court.

The taxpayers are owed contractual lease payments amounting to **\$456,364.00**; and incurred indirect costs during the lengthy litigation process.

The Department of Agriculture made the determination to modernize the shellfish lease to reduce the likelihood of a reoccurrence of this type of loss and to update State contractual provisions. The decision was based on two important goals; first, to protect taxpayers and second, to protect those members of the shellfish industry which remain current in their annual obligations to the state. As required by statute, the Attorney General's Office has approved the 2014 Lease as to its legal form.

In updating the lease language, the state obtained a shellfish lease form from a neighboring state to determine what terms were used by shellfish regulators. A review of Connecticut’s statutory requirements and executive orders was also made. The Department of Agriculture included new language to define “good faith effort” to plant and cultivate shellfish, and to include annual reporting by species and number for each shellfish lease as required by NSSP-MO changes formally adopted by the ISSC at its annual meeting in January of 2013. The ISSC is a national cooperative organization which is comprised

of shellfish harvesters, State regulators, and the FDA. According to Proposal 13-203¹, the following requirements, for the state shellfish authority have been adopted for inclusion in each producing state's Vibrio Control Plan:

- A. Assess annually *Vibrio vulnificus* and *Vibrio parahaemolyticus* illnesses associated with the consumption of molluscan shellfish. The assessment will include a record of all *Vibrio vulnificus* and *Vibrio parahaemolyticus* shellfish-associated illnesses reported within the State and from receiving States, the numbers of illnesses per event, and actions taken by the Authority in response to the illnesses.
- B. **The Department shall determine annually, and report to the Interstate Shellfish Sanitation Conference (ISSC), the volume of shellfish harvested in the State.** The report shall include the volume of shellfish harvested for each species associated with *Vibrio* illnesses, including, if available, a volume breakdown by utilization type (raw, shucked, Post-Harvest-Process, etc.).

The requirements for the State Shellfish Authority extend further than the proposed lease language, requiring a breakdown by product utilization. The public health significance of reporting the volume of shellfish harvested in the state is to more accurately assess the risk of illness associated with shellfish produced in each state. The inability of Connecticut's shellfish program to be able to supply this required information on an annual basis to the ISSC will prevent the Department of Agriculture's Bureau of Aquaculture from fully assessing the risk of illness associated with Connecticut shellfish. Non-compliance with these requirements could result in administrative action by the ISSC and/or USFDA against the State.

These lease changes have been undertaken by the State in order to modernize the management of Connecticut's shellfish bed leasing system. There has been a century's worth of changes to laws, regulations, and best practices for the shellfish industry, both at the state and federal level; however, the previous version of this lease had remained essentially unchanged. The previous lease form is outdated and does not adequately protect the State agency charged with the administration of the shellfish program, the taxpayers of the State, or other shellfish leaseholders.

¹ 2013. ISSC Summary of Actions Proposal 13-203. Downloaded from the ISSC on 08/25/14.
http://issc.org/client_resources/2013%20summary%20of%20actions/13-203%2006-10.pdf



STATE OF CONNECTICUT

DEPARTMENT OF AGRICULTURE Bureau of Aquaculture and Laboratory



Vibrio parahaemolyticus Update 09/05/14

Background:

During the summers of 2012 and 2013, *Vibrio parahaemolyticus* infections of a strain previously traced only to the Pacific Northwest were associated with consumption of oysters and other shellfish from several Atlantic Coast harvest areasⁱ. These infections were caused by the bacteria *Vibrio parahaemolyticus* which are naturally occurring in salt water. There are a number of species of *Vibrio*, including *Vibrio parahaemolyticus*, that cause wound infections via environmental exposure to waters that contain the bacteria or gastrointestinal illness via consumption of shellfish. Gastrointestinal illnesses are often associated with the consumption of raw or undercooked shellfish, or with bacteria spread by cross-contamination between raw and cooked foods.

Connecticut growing waters were the source of at least 23 confirmed cases of *Vibrio parahaemolyticus* during the summer of 2013, with another additional 15 cases potentially linked to Connecticut waters. This outbreak occurred with a *Vibrio parahaemolyticus* Control Plan in place which limited time from harvest to refrigeration to 5 hours. The 5 hour limit was not adequate to prevent the 2013 outbreak from occurring, and a more stringent control plan was required in the outbreak area during 2014. Prior to 2013, only sporadic cases had been linked to Connecticut growing areas.

The 2014 *Vibrio parahaemolyticus* Control Plan for the outbreak area was formulated with guidance of national experts in *Vibrio parahaemolyticus* and seafood safety. These experts were brought to Connecticut in December of 2013 to speak to Connecticut's industry and to visit the oyster producers to offer specific guidance to Connecticut oyster producers. These experts along with DA/BA staff gave presentations at the industry meeting to explain the science and rationale behind controls related to reducing the risk of *Vibrio parahaemolyticus* illness.

The 2014 plan required more stringent controls in the outbreak area of Westport, Norwalk, and Darien. These controls require cooling oysters to an internal temperature of 50°F on board the harvest vessel within 1 hour of harvest. The remaining growing areas in Connecticut were not linked to an outbreak and were allowed to remain under the 5 hour from harvest to refrigeration limit.

2014 *Vibrio parahaemolyticus* Illnesses

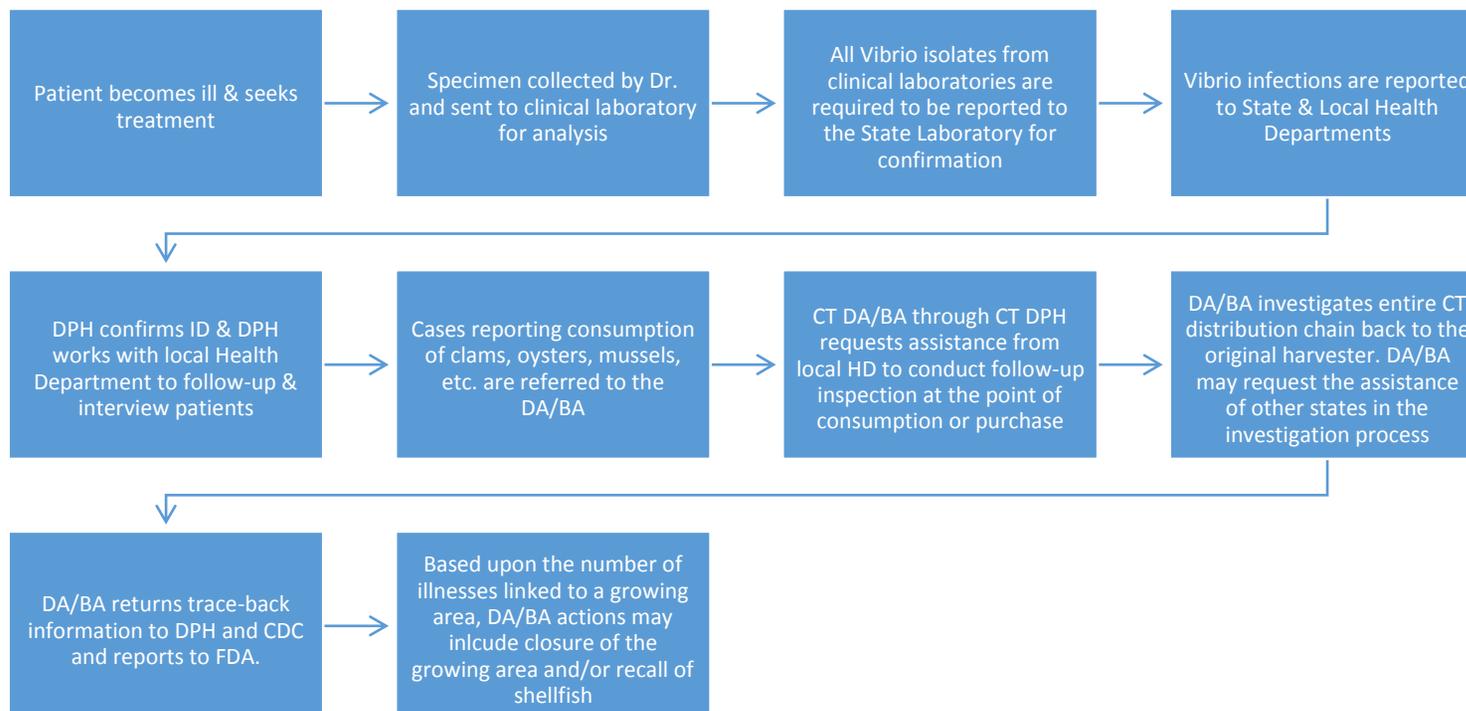
Thus far in 2014, the DA/BA has received only sporadic reports of Vp illnesses attributed to CT shellfish, and no confirmed single-source Vp cases in which CT shellfish were the sole shellfish consumed. Over the past week or so illness reports appear to be increasing in surrounding states, although total number of reported illnesses remain low at this time. One CT resident has become ill from Vp after consuming shellfish out-of-state. NY and MA have reported several Vp cases in which CT shellfish were one of a number of possible source states.

The Massachusetts Division of Marine Fisheries enacted a precautionary closure of Katama Bay in Edgartown (V:20) on September 3, 2014, due to *Vibrio parahaemolyticus* illnesses tied to oysters harvested from that growing area. The New York Department of Environmental Conservation has enacted an emergency closure of shellfish growing area NS-3/Town of Huntington effective September 5, 2014 due to documented *Vibrio parahaemolyticus* illnesses tied to shellfish harvested from those waters.

At this time, the total number of Vp illnesses linked to shellfish consumption being reported in the Northeast at this time is low compared to recent years, however water temperatures were significantly lower early in the season than is normal, and the summer in general has been unusually mild in the Northeast. The combination of favorable environmental conditions and Vibrio controls may be contributing to this apparent reduction in the rate of illness, although there may be additional factors at work.

Five companies working in Westport, Norwalk, and Darien are achieving rapid cooling of oysters at an unprecedented scale, and helping to ensure that oysters harvested from our waters are safe for consumers. Several oyster producers have also gone above and beyond the requirements of the 5 hour harvest to refrigeration requirements of the Connecticut VPCPs required for areas outside of the outbreak area by using combinations of on-vessel mechanical refrigeration, ice, and ice slurry to achieve faster than required cooling of oysters as well. The industry should be proud of the steps taken toward ensuring the safety of Connecticut shellfish.

Vibrio Illness Investigation Procedure in Connecticut



***Vibrio parahaemolyticus* Risk Evaluation**

In order to maintain compliance with the National Shellfish Sanitation Program (NSSP) requirements for oyster producing states, the DA/BA is required to perform a *Vibrio parahaemolyticus* Risk Evaluation on an annual basis. The evaluation shall consider each of the following factors, including seasonal variations in the factors, in determining whether the risk of *Vibrio parahaemolyticus* infection from the consumption of oysters harvested from an area (hydrological, geographical, or growing) is reasonably likely to occurⁱⁱ:

1. The number of *Vibrio parahaemolyticus* cases epidemiologically linked to the consumption of oysters commercially harvested from the State;
2. Levels of total and tdh+ *Vibrio parahaemolyticus* in the area, to the extent that such data exists;
3. The water temperatures in the area;
4. The air temperatures in the area;
5. Salinity in the area;
6. Harvesting techniques in the area;
7. The quantity of harvest from the area and its uses i.e. shucking, half-shell, PHP.

Again, according to the NSSP, if this evaluation determines that the risk of *Vibrio parahaemolyticus* illness is reasonably likely to occur OR if the State has a shellfish growing area that was the source of oysters that were epidemiologically linked to an outbreak of *Vibrio parahaemolyticus* within the prior five years, the State shall develop and implement a *Vibrio parahaemolyticus* Control Plan for the area. *Vibrio* Control Plans were required during 2012, 2013, and 2014 *Vibrio* seasons.

Since 2012, the DA/BA has held annual meetings for shellfish companies in order to explain the findings of the *Vibrio parahaemolyticus* Risk Evaluation and requirements of the time to temperature controls specific to Connecticut's *Vibrio parahaemolyticus* Control Plan. These meetings were held in March of 2012, April of 2013, and December of 2013. These meetings were timed to give companies adequate time to prepare for any new requirements.

In addition, recent changes to the ISSC NSSP Model Ordinance require that the State Shellfish Authority collect additional data on shellfish landings in order to assess the risk of illness per serving, so that this information will be included in each producing State's *Vibrio* Control Plan. The ISSC is the national cooperative organization which is comprised of shellfish harvesters, State regulators, and the FDA.

According to Proposal 13-203ⁱⁱⁱ, the following requirements for the State Shellfish Authority have been adopted with the intention it be included in each producing States' *Vibrio* Control Plan:

- A. Assess annually *Vibrio vulnificus* and *Vibrio parahaemolyticus* illnesses associated with the consumption of molluscan shellfish. The assessment will include a record of all *Vibrio vulnificus* and *Vibrio parahaemolyticus* shellfish-associated illnesses reported within the State and from receiving States, the numbers of illnesses per event, and actions taken by the Authority in response to the illnesses.

- B. **The Authority shall determine annually, and report to the ISSC, the volume of shellfish harvested in the State.** The report shall include the volume of shellfish harvested for each species associated with Vibrio illnesses, including, if available, a volume breakdown by utilization type (raw, shucked, post-harvest processed, etc.).

In order to meet this additional national program reporting requirement, the Department of Agriculture has incorporated new language into the shellfish lease to include of annual reporting by species and number for each shellfish lease.

Please note that the requirements for the State Shellfish Authority extend even further than the proposed lease language to additionally require a breakdown by product utilization. The public health significance of reporting to the ISSC the volume of shellfish harvested in the State is to more accurately assess the risk of illness associated with shellfish produced in each state. The inability of Connecticut's shellfish program to be able to supply this information on an annual basis to the conference as required will prevent the State Shellfish Authority from fully assessing the risk of illness associated with Connecticut shellfish. Noncompliance with these requirements could result in administrative action by the ISSC and/or USFDA against the State.

Environmental Monitoring for *Vibrio parahaemolyticus*

In order to gain a better understanding of *Vibrio parahaemolyticus* levels and their relevance to implementing meaningful Vibrio controls in Connecticut growing waters, in 2014 DA/BA began monitoring for total *Vibrio parahaemolyticus* and pathogenic indicators tdh+ and trh+ using qPCR. The monitoring program includes the collection of environmental parameters such as water temperature, air temperature, salinity and depth that may correlate to levels of Vibrio bacteria in shellfish. In addition, post-harvest time and temperature controls currently in place as required by the Connecticut 2014 *Vibrio parahaemolyticus* Control Plans have been evaluated by using continuous temperature data loggers (ACR Smart Button) to determine the effectiveness of post-harvest temperature controls and to correlate these controls to quantifiable impacts on Vibrio levels.



Figure 3. Smart Button data logger (ACR Systems). Button are placed into a plastic bag and taped closed prior to placing into oyster.

Figure 2. Worker adding oysters to slurry, and zip-tied oyster with data logger (lower right hand corner).



The data loggers have allowed us to see what is happening inside the oyster during the cooling studies. What we have found is that the rapid cooling process using the ice slurry cools oysters to an internal temperature of 50°F in between 4 and 10 minutes, both for bagged oysters or loose oysters, in quantities of up to 20 100-count bags per insulated tote. The internal temperatures may drop as low as 32°F if left in the slurry for too long, so producers need to be careful about freezing oysters at those temps. For the most part, producers have reported excellent results with the slurry, and low mortality as long as they are not getting oysters too cold. It is critical that internal temperatures are taken using a probe thermometer rather than the infrared temperature gun, as we have observed that they are not accurate when using to take temps of wet or dirty oysters coming out of the water. Figure 4 show an example of what the data logger chart looks like for a rapidly cooled oyster using ice slurry. This figure shows the temperature dropping from 71°F to 50°F in 6 minutes, and to 41°F in 11 minutes, followed by holding on ice where temperatures drop to 35°F.

Rapid Cooling Example

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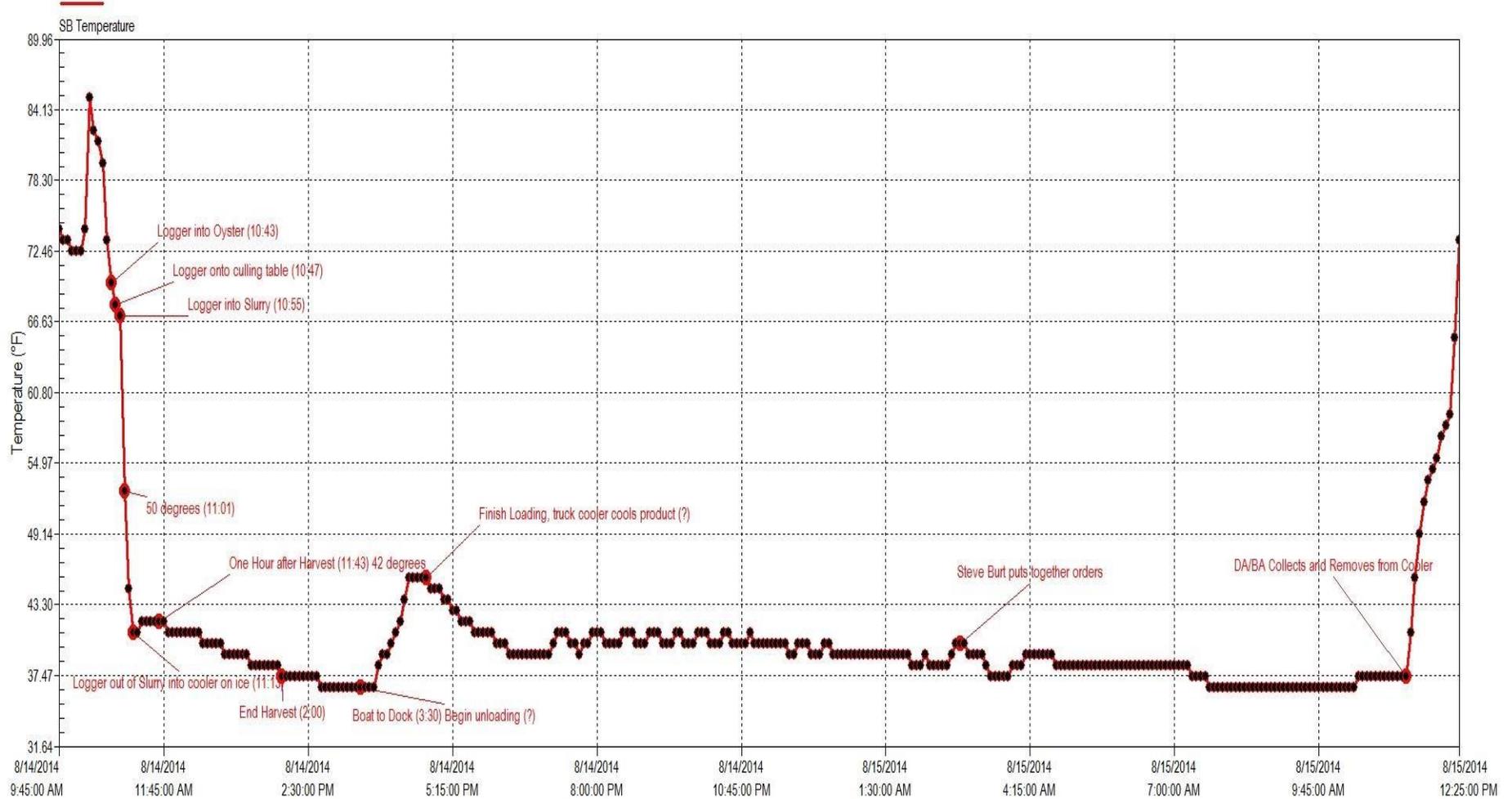


Figure 4. Rapid Cooling Example, Smart Button Data Logger, (ACS System).

What we have learned is that rapid cooling can achieve very quick cooling of the internal meat temperatures of shellfish, and is effective at limiting post-harvest growth of *Vibrio* bacteria. *Vibrio* levels following rapidly cooling of oysters using either the ice slurry process or direct ice application to loose oysters have ranged from 2.8 to 240 MPN/gm (Figure 5).

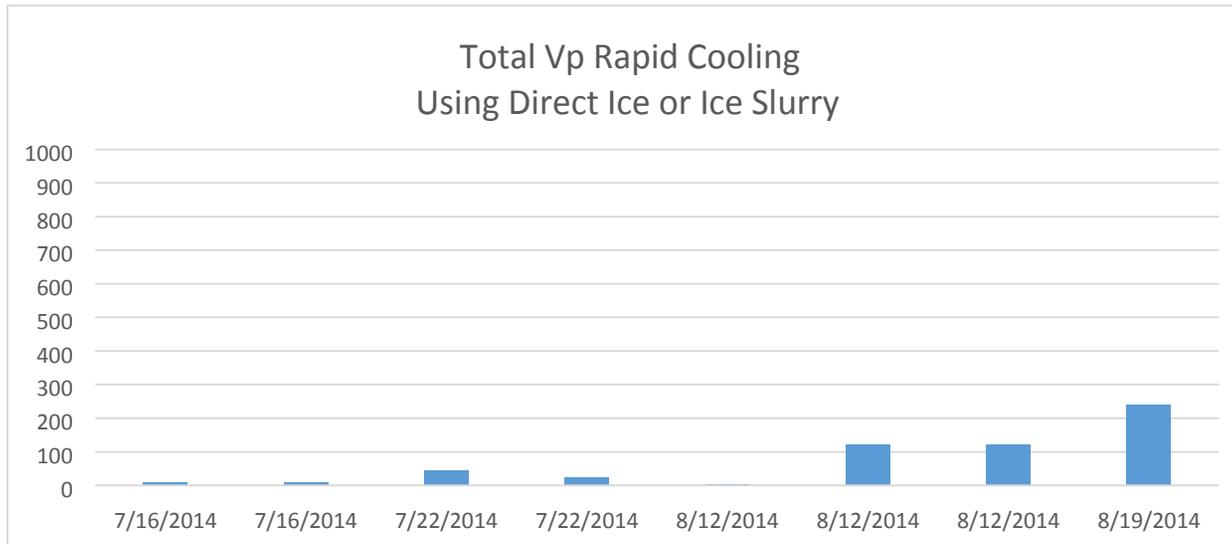


Figure 5. Total Vp in MPN/g following rapid cooling using on-vessel ice slurry or direct ice application to loose oysters.

***Vibrio parahaemolyticus* Control Plans for September**

Based upon all of the factors that we have to consider, including still-rising water temperatures, rising *Vibrio* levels, and the demonstrated effectiveness of rapid cooling at keeping *Vibrio* levels low, the DA/BA is extending the Westport/Norwalk/Darien rapid-cooling VPCP until the end of September. Also, the 5 hours from harvest to refrigeration limit will remain in effect for oyster harvest for all other harvest areas until the end of September. We understand that the continued use of ice slurry and time limits requires additional resources and is not easy for any of our producers to achieve. However, since water temperatures are now the warmest they have been this year and *Vibrio* levels are still rising, if we want to do our best to insure that Connecticut continues its success in reducing the risk of illness associated with our shellfish, the best way for us to do so is to continue rapid cooling in the outbreak areas until *Vibrio* levels have consistently come down to background levels.

DA/BA analysts have been visiting harvest vessels throughout the season to collect samples and monitor temperatures. The following are minimum standards and recommendations that all captains should be made aware of so that we can ensure that the process is effective in minimizing the risk of a *Vp* outbreak this season.

- Slurry and oyster temperatures must be monitored using calibrated **probe thermometers**. Infrared temperature guns do not return an accurate reading when used on reflective or dirty surfaces, such as wet oysters.
- Oyster temperatures rise quickly, so shuck an oyster just enough to slip probe into meat in the deepest part of the cup. Minimize bare-hand contact to avoid warming oyster and work quickly to get an accurate temperature reading.
- On vessel shading is a requirement of the 2014 *Vp*CP. Shading can decrease temperatures by at least 10°.

Westport Norwalk Darien Rapid Cooling:

- The control plan for Westport, Norwalk, and Darien requires that **oysters reach 50°** within 1 hour of harvest. **This does not mean that you have up to an hour before oysters are placed on ice, under refrigeration, or into a slurry.** Get each dredge load of oysters into the rapid cooling method you are using as quickly as possible. The 1 hour time-frame represent the maximum time to 50°. The DA/BA recommends minimizing the time that harvested oysters are exposed to ambient air temperatures as much as possible.
- If using a slurry, oysters should remain in the slurry for a minimum of 15 minutes to ensure adequate cooling before placing them on ice.
- Make sure to check the amount of ice in the slurry and add ice to your slurry throughout your harvest day.
- Make sure that there is a layer of ice on the bottom of your storage tote before adding oysters. Place oysters in a single layer and cover with ice before stacking another layer.

5 Hour Control Plan:

- The control plan for all other harvest areas requires that oysters be placed under refrigeration within 5 hours of the start of harvest, and reach 50° within 5 hours of refrigeration. These time-frames represent the maximum time to 50° the DA/BA recommends minimizing the time that harvested oysters are exposed to ambient air temperatures as much as possible.

ⁱ CDC. Increase in *Vibrio parahaemolyticus* illnesses associated with consumption of shellfish from several Atlantic coast harvest areas, United States, 2013. Atlanta, GA: US

Department of Health and Human Services, CDC; 2013. Available at <http://www.cdc.gov/vibrio/investigations/index.html>

ⁱⁱ [ISSC] Interstate Shellfish Sanitation Conference. 2011. National Shellfish Sanitation Program: Guide for the Control of Molluscan Shellfish. US Department of Health and Human Services Public Health Service Food and Drug Administration.

ⁱⁱⁱ 2013. ISSC Summary of Actions Proposal 13-203. Downloaded from the ISSC on 08/25/14.

http://issc.org/client_resources/2013%20summary%20of%20actions/13-203%2006-10.pdf