

Vibrio Control Plan
June 1 – August 31, 2019



New Jersey Department of Environmental Protection
Division of Water Monitoring and Standards / Division of Fish and Wildlife

and

New Jersey Department of Health
Public Health and Food Protection Program

A. Introduction

New Jersey's *Vibrio* Control Plan (*VCP*) addresses program coordination; response to potential outbreak; post-harvest time and temperature controls; hours of harvest for tidal, intertidal, and tide dependent harvest; and Hazard Analysis and Critical Control Points (HACCP) plan requirements. In addition, the *VCP* recommends additional best management practices to be implemented to further minimize risk from *Vp* and *Vv*.

The *Vibrio parahaemolyticus* (*Vp*) nationally reported illness rates per 100,000 population have tripled since 1996. *Vp* has become a significant problem for both regulators and the shellfish industry. Despite the implementation of *Vp* Control Plans by States and industries and diligent efforts to implement such plans, shellfish related illnesses continue to occur and are on the increase, specifically in the northeast and northwest States.

Vibrio parahaemolyticus (*Vp*) is an organism that occurs naturally in coastal waters. It is not related to pollution, which means that traditional controls for shellfish sanitation related to growing water classification are not effective. Instead, the occurrence of this pathogen in elevated levels generally appears to be related to water temperature and post-harvest handling. *Vp* levels increase rapidly. Scientific studies have determined that when shellfish are exposed to temperatures greater than sixty 60 degrees Fahrenheit the doubling of *Vp* occurs within 7.24 hours.

Vp is a curved, rod-shaped, Gram-negative bacterium found in the marine and estuarine environment. When shellfish, usually oysters, are eaten raw or undercooked with high levels of *Vp* it may result in gastrointestinal illness in humans. Symptoms typically resolve within 72 hours, but can persist for up to 10 days in immunocompromised individuals.

Vibrio vulnificus (*Vv*) illnesses also occur in marine and estuarine environments, and from shellfish consumption, but these illnesses are not as common. Mortality rate from shellfish consumption is approximately 50 percent in healthy people, 70 percent in people with liver disease and if not treated with in 72 hours of infection and septicemia occurs, death is likely.

Procedures for dealing with *Vp* and *Vv* have been developed over the past several years through the Interstate Shellfish Sanitation Conference (ISSC, <http://www.issc.org/>) and are part of the National Shellfish Sanitation Program's Guide for the Control of Molluscan Shellfish (NSSP Guide).

B. Overview - 2018 *Vibrio* Season

New Jersey shellfish were implicated in twelve (12) cases of *Vp* illnesses in 2018; eight (8) multiple source cases and four (4) single source cases. A multiple source case is when the consumer eats a mixed plate of oysters from variety of states and includes an oyster that may have been harvested from NJ waters. In these cases it is impossible to accurately determine which state is responsible for the illness unless directly linked to an outbreak. Seven (7) multiple source cases involved oysters harvested from the Delaware Bay, including both dredge harvest and aquaculture harvest. Four (4) multiple source cases were attributed to oysters from the Barnegat Bay. Barnegat Bay oysters were implicated in two (2) potential single source cases, but

one single source case was not confirmed as *Vp* by a state laboratory. A single source illness was reported from clams harvested from the area behind Brigantine.

New Jersey was implicated in three (3) cases of *Vibrio vulnificus*, two (2) were single source cases of oysters harvested from the Delaware Bay Shellrock and Bennies Sand oyster beds, one (1) case was from Ship John oyster bed, but also was included with clams from multiple states. Each single source *Vp* case attributed to NJ waters was considered a sporadic illness, as defined by the NSSP Guide, and therefore did not result in an outbreak or closure of a harvest area. In the two (2) *Vv* cases, there was a common New Jersey Certified Dealer, and common harvesters. Multiple harvesters and dealers received a large amount of product from the implicated location on the same harvest dates with no illnesses. The 2018 routine *vibrio* monitoring data showed no anomaly results compared to annual data, dating back to 2014. This implies an issue with a harvester or the dealer in post harvest handling practices.

With the occurrence of the two (2) *Vv* illnesses, as per the NSSP Guide, the State must use the USFDA time/temperature calculator to evaluate both the harvest and dealer cooling times and the time of harvest to cooldown, and ensure that there is a risk of less than two (2) illnesses per 100,000 servings. This evaluation was conducted, to meet the requirements of the risk calculator, and there will be changes to the time requirements to cool the shellfish to 50 degrees after harvest at the dealer. No changes will be made to the harvest hours.

During the 2018 *vibrio* season, the New Jersey Department of Environmental Protection's Bureau of Marine Water Monitoring (BMWM) conducted sampling for *vibrio*'s and *halobacteriovorax* in oyster tissue, sediment, and water from the Delaware Bay. Samples were collected weekly from May through October from the sub-tidal harvest areas being used by the shellfish industry. Samples collected were immediately placed on ice, to represent the ambient *vibrio* levels in the harvest areas.

Oyster tissue, sediment, and water samples were analyzed for total *Vp*, the virulent genes of *Vp* (*trh* and *tdh*), and *Vibrio vulnificus* (*Vv*), using PCR. Strain identification was performed using Pulsed-Field Gel Electrophoresis (PFGE). The laboratory also analyzed for *halobacteriovorax*, a *vibrio* predatory bacteria. The data suggests that *vibrio* levels in oyster tissue are not always the highest during months with the warmest water and air temperatures, but high levels may occur when there is a quick rise in water temperature. Following the increase in *vibrio*'s, there is an increase and constant presence of *halobacteriovorax* through the late summer season, explaining the lower *vibrio* levels during the warmer water months. In New Jersey, a quick rise in water temperature is commonly observed during the month of June. Highest levels of the virulent *trh* and *tdh* genes occurred during late June and early July, consistent with previous sampling.

C. Coordination of New Jersey Agencies Responsible for Shellfish Sanitation

The requirements for the Authority set forth in the NSSP Guide are accomplished through a coordinated effort of four agencies in New Jersey. These agencies, their physical locations, their role in shellfish sanitation, and their relationship to one another are shown below.

Implementation of the *VCP* requires cooperation and communication among these agencies.

New Jersey Department of Environmental Protection (NJDEP)

Bureau of Marine Water Monitoring
Division of Water Monitoring and Standards
P.O. Box 405
929 Stoney Hill Road
Leeds Point, NJ 08220
609-748-2000
(Water monitoring, shellfish classification charts, and permits)

Bureau of Shellfisheries
Division of Fish and Wildlife
P.O. Box 418
360 North Route 9
Port Republic, NJ 08241
609-748-2020
(Licensing, shellfish leases, and resource management)

Bureau of Law Enforcement – Marine Region
Division of Fish and Wildlife
P.O. Box 418
360 North Route 9
Port Republic, NJ 08241
609-748-2050
(Patrols, enforcement, and inspections)

New Jersey Department of Health (NJDOH)

Public Health and Food Protection Program Division of Consumer Environmental and Occupational Health
P.O. 369
Trenton, NJ 08625-0369
609-826-4935
(Inspections, certified dealers, depuration, illness reporting and investigation)

The following agencies have primary responsibility for decision making and implementation of the following aspects of the *V*CP:

NJDEP Bureau of Marine Water Monitoring

- Develop and coordinate the *V*CP.
- Analyze water and air temperature data and conduct sampling, in to order conduct a risk assessment as the basis for developing a *V*CP to control a naturally occurring pathogen.
- Develop control strategies to minimize potential *vibrio* illnesses.
- Close affected growing areas if outbreaks are epidemiologically associated.

NJDEP Bureau of Law Enforcement – Marine Region

- Prevent illegal harvest by enforcing closure of implicated growing areas.
- Ensure compliance with Harvest, Transport, and Temperature Control Measures in Section F below, including harvest hours and maximum hours to refrigeration.
- Enforce vessel requirements including, but not limited to, shading and icing of harvested oysters.

NJDOH – Public Health and Food Protection Program

- Ensure compliance with time and temperature restrictions including, but not limited to, harvester landings, certified dealer handling, processing and transport.
- Inspect and enforce certified dealers operations and ensure required cooling times and temperatures are met and all HACCP plans are updated and implemented.
- Epidemiologically confirm, document, and conduct trace back for each *vibrio* Species illness consumption case as reported in State or from other authorities. Initiate, communicate, and monitor shellfish recall(s) if a growing area is implicated as a result of an illness or due to post harvest mishandling, initiating a firm specific related recall.
- Notification to NJDEP and USDA of a confirmed *vibrio* illness.
- Notify the shellfish industry and local health jurisdictions in the State of the potential for illnesses due to *vibrio* prior to historical times of onset or at a minimum of once a year.
- Issue a health advisory to the public about the potential problem and advise the industry to educate wholesalers, retailers, and consumers about the potential problem.

D. Outbreak Response (*Vibrio parahaemolyticus* and *Vibrio vulnificus*)

In the event of confirmed cases of shellfish related food borne illnesses caused by the naturally occurring marine bacterium *Vp* and *Vv*, the New Jersey Department of Environmental Protection (NJDEP) and the New Jersey Department of Health (NJDOH) shall comply with N.J.A.C. 7:12, N.J.A.C.8:13 and the latest version of the National Shellfish Sanitation Program’s Guide for the Control of Molluscan Shellfish and the *VCP*.

E. NJDEP – Bureau of Marine Water Monitoring *Vibrio* Sampling

In 2019, BMWM will continue to sample and run analysis on oyster tissue from the Delaware Bay harvest areas during the *vibrio* season to evaluate the levels of *vibrio* (*Vp* and *Vv*) in oyster tissue and the water column, and levels of *Vp* predatory bacterium (*e.g. Halobacteriovorax* and *Bdellovibrio*) in oyster tissue and the water column. PFGE analysis will be performed to evaluate the different genetic strains present in the Delaware Bay. There will also be periodic oyster samples collected from the Barnegat Bay. This data will provide information on whether specific *Vp* genetic strains identified in isolates from illness investigations were also found in oysters harvested from implicated harvest areas.

F. Harvest, Transport, and Temperature Control Measures

N.J.A.C. 7:12-8.6 *Vibrio parahaemolyticus* Control Plan time to temperature control requirements for harvesting oysters

1. SUBTIDAL HARVEST

If a shellfish license holder is conducting subtidal harvesting of oysters, the shellfish license holder shall comply with the following hours from harvest to refrigeration:

Dates of harvest	Maximum hours to refrigeration ¹	Start of harvest ²
June 1 - June 14	7	Sunrise
June 15 - July 14	6	Sunrise
July 15 - August 31	7	Sunrise

¹ Hours to refrigeration means the total number of hours (inclusive of any transport time) from the start of harvest until the oysters are placed in refrigeration. "Refrigeration" means a mechanical unit that is chilled to a temperature of 45 degrees Fahrenheit (7.2 degrees Celsius) or colder at the time shellfish are placed in the unit and maintained at that temperature thereafter.

² For purposes of the start of harvest under this subsection, sunrise shall mean the time of sunrise in Trenton, New Jersey. The sunrise time shall apply regardless of where a harvester intends to harvest or is harvesting shellfish. The Trenton sunrise timetable is included in the NJ Hunting and Trapping Digest available from the NJDEP's Division of Fish and Wildlife and on-line at <http://www.state.nj.us/dep/fgw>.

- a) A shellfish license holder conducting subtidal harvesting who places harvested oysters directly in refrigeration on the vessel is not subject to the maximum hours to refrigeration in the table at (a) above. However, the shellfish license holder shall:
 - i. Shall have an NJDOH approved refrigeration unit
 - ii. Notify the NJDEP's Division of Fish and Wildlife, Bureau of Law Enforcement, Marine Region, at 609-748-2050 prior to June 1 that the harvester will be using, on the vessel, refrigeration that is approved by the Department of Health; and
 - iii. Fly a flag that is a minimum size of 18 inches by 18 inches, orange, and bearing a black diagonal stripe.

2. INTERDITAL HARVEST

If a shellfish license holder is conducting intertidal harvesting of oysters from June 1 through August 31, the maximum hours to refrigeration (inclusive of any transport time) is four hours, starting when the first oysters to be harvested are exposed to the air by the receding tide.

3. TIDE DEPENDENT HARVEST

If a shellfish license holder is conducting tide-dependent harvesting of oysters from June 1 through August 31, the maximum hours to refrigeration (inclusive of any transport time) is four hours, starting when harvest begins. On each harvest day prior to any harvest activity, the shellfish license holder shall notify the NJDEP's Division of Fish and Wildlife, Bureau of

Law Enforcement, Marine Region, at 609-748-2050 to provide the name of the shellfish license holder, location of harvest, and harvest start time.

4. ALL HARVEST

Each shellfish license holder harvesting oysters shall record on each harvest day, in a journal with permanently bound pages, the harvest start time, the time the last-harvested shellfish was placed in refrigeration, and the shell temperature of the shellfish in one container from the day's harvest at offloading, including the time the temperature was measured.

a) To measure the shell temperature, the shellfish license holder shall use a handheld laser thermometer that is accurate and properly calibrated per the manufacturer's specifications. The shellfish license holder shall provide each harvest day's information to the certified dealer on the transaction record.

b) The shellfish license holder shall submit to the BMWM at the address in N.J.A.C. 7:12-1.1(l) a copy of the journal by September 15 of each year.

G. Additional Required Control Measures

1. No product may be shipped the same day as harvest without prior approval from NJDOH.
2. The NJDOH will require mechanical refrigeration or icing when transporting to the certified dealer.
3. Oyster vessels actively harvesting oysters during the *vibrio* season with adequate and approved refrigeration may, within a one hour interval, utilize and fill up to 24 individual bushel baskets on the shaded deck of the harvest vessel prior to placing the oysters into a refrigeration unit in an appropriately tagged oyster cage as required by N.J.A.C. 7:25A-2.3, for the purpose of limiting the number of times the unit doors are opened and closed to maximize cooling.
4. Proper shading of the shellfish product must be in place on the boat (N.J.A.C. 8:13).
5. For subtidal aquaculture activities, notification of landing location must be supplied to NJDOH Public Health and Food Protection Program, Virginia Wheatley at 609-826-4935 or virginia.wheatley@doh.nj.gov.

H. Additional Recommended Best Management Practices

The following Best Management Practices are recommended, but not required by the 2019 VCP.

*Method, if used, is required to be validated, inspected and approved by NJDOH.

1. Evaporative Cooling* – Wet or mist oysters with water (from Approved classification), stored under required shading to reduce temperatures through evaporative cooling.
2. Rapid Chilling* – In between dredges, cool oysters in a container of ice from a potable water source and sea water (from Approved classification). Proper drainage should be provided. Monitor water quality to prevent sediment buildup. The slurry is the most effective way of

rapidly cooling shellfish. When the next dredge is brought in, transfer oysters in the slurry to a shaded area or into a refrigerated unit.

3. Icing* – Layer bushel baskets, bushel bags, or oysters in cages with ice to reduce shell temperatures during transport to landing.
4. Reduce time to refrigeration to 5 hours – Keeping the time to refrigeration to a maximum of 5 hours, especially when air temperatures exceed 70 degrees Fahrenheit, is the most effective way to maintain *vibrio* levels low without direct refrigeration.
5. If using onboard refrigeration, limit the number of times the refrigeration unit doors are opened and closed to maximize cooling.
6. Offload boats quickly, get product on a pre-chilled refrigerated vehicle efficiently, and get the product to the certified dealer as soon as possible.

I. Prohibitions for all Harvesters and Certified Dealers

1. Off-loading of oysters from boats directly onto interstate trucks intended for same day interstate shipment is prohibited.
2. No product shall be shipped the same day it was harvested without prior approval from NJDOH.

J. Certified Dealers - Annual Evaluation of the Forced-Air Unit

1. Certified dealers shall annually conduct an evaluation of their forced-air unit operation.
2. The annual evaluation shall ensure the following:
 - a) Unit is operating and in good repair;
 - b) Unit is capable to hold a maximum day's harvest amount while providing adequate circulation of cold air;
 - c) Unit is capable to hold day's harvest while holding other products;
 - d) Compressor is sized adequately and can cool product down to fifty (50) degrees F or less (40 degrees F is optimum) in 8 hours in June, and 6 hours in July and August;
 - e) Time to temperature requirements are met. NJDOH wholesale temperature requirement is 45 degrees F in 10 hours (overnight), to ship from a certified dealer. Due to 2018 *Vv* cases, oysters shipped from a certified dealer will be required to be cooled down to fifty (50) degrees F or less (40 degrees F is optimum) in 8 hours in June, and 6 hours in July and August. To meet this requirement cooldown should start at the dock with no unrefrigerated overland transport. No product may be shipped the same day as harvest without prior approval from NJDOH;
 - f) NJDOH verification of adequate refrigeration and cooling prior to certification for *vibrio* season is required; and
 - g) The continuous temperature recording unit at the initial certified dealer is able to continuously record the ambient temperature of the product with back-up alarm.
3. The NJDOH has resource information in order to assist the purchase and installation of a recording thermometer on your forced air unit. The cost is inexpensive to install this device.
 - a) The NJDOH will not certify the Certified Dealer operation unless a continuous recording thermometer is installed on your forced air unit. This will allow NJDOH to inspect and ensure that your forced air unit is operational and maintaining appropriate temperatures.

K. Hazard Analysis and Critical Control Points (HACCP) Plans

1. Certified Dealers shall record the time and the temperature of the product when it is offloaded and received by the Certified Dealer. This can be done by utilizing a laser (infrared) thermometer (gun type) and “shooting” the temperature of the shell or by placing a probe thermometer between the shells and checking the meat. Thermometers must be calibrated and manufacturer’s directions must be followed.
2. After being held overnight and before releasing the product for interstate shipment the time released and the temperature of the product must be recorded. Product shall not be released for intrastate and/or interstate shipment until 5am after overnight holding. No product may be shipped the same day as harvest without approval from the NJDOH.
3. The implementation of the HACCP Plans includes monitoring records to indicate the time and temperature as indicated above, the establishment of Critical Limits, and corrective actions when Critical Limits are not met.
 - a) HACCP plans must be altered to state that this will be performed.