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WATER MONITORING AND STANDARDS
BUREAU OF MARINE WATER MONITORING
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QUALITY ASSURANCE PROJECT PLAN

for

SHELLFISH GROWING WATER CLASSIFICATION PROGRAM

January 2017

Robert Schuster, NJDEP *NJDEP Chief*	4-24-17 Date
Mark Ferko, NJDEP *NJDEP QA Officer*	4/25/17 Date
Bill Heddendorf, NJDEP *NJDEP Laboratory Manager*	4-24-17 Date

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1.0 **Project Name:** Shellfish Growing Water Classification Program

2.0 **Requesting Agency:** Bureau of Marine Water Monitoring

3.0 **Date Requested:** Jan, 2017

4.0 **Date of Project Initiation:** Ongoing

5.0 **Project Fiscal Information:**

6.0 **Project Officer:** Robert Schuster, Bureau Chief

7.0 **Quality Assurance:**

7.1 Office of Quality Assurance - Marc Ferko

7.2 Microbiological Parameters – Bill Heddendorf

7.3 Inorganic Parameters – Eric Ernst

8.0 **Project Description:**

8.1 Objective and Coverage++++++

Estuarine and near shore waters and molluscan shellfish are sampled and analyzed for various microbiological and chemical parameters. This monitoring is performed pursuant to the authority of N.J.S.A. 13:1D-9 *et seq.*, and N.J.S.A. 58:24-1 *et seq.* with revisions concerning the reclassification of certain shellfish beds made in N.J.A.C 7:12-1 *et seq.*

The investigatory work consists of the collection and analysis of water samples and molluscan shellfish, the inventory of actual and potential sources of pollution, and hydrographic studies of flow patterns which distribute pollution. The analysis of these samples is conducted in The Leed's Point Laboratory which has NJDEP laboratory certification (ID# 01179). These surveys are conducted in accordance with applicable State and Federal Food and Drug Administration, (FDA) guidelines and regulations as described in the National Shellfish Sanitation Program (NSSP) Guide for the Control of Molluscan Shellfish. The FDA further requires that each State annually appraise the quality of waters classified as "Approved", "Seasonally Approved", and those "Special Restricted" waters used for relay and depuration. New Jersey conducts scientific investigatory work and research and pursuant to N.J.S.A. 58:24-1 *et seq.*, revises the rules annually.

8.2 Established in 1912 as part of New Jersey's commitment to monitoring shellfish growing waters, the Bureau of Marine Water Monitoring (BMWM) has continually provided New Jersey with consistent, long-term monitoring and reporting of coastal water quality. In the past the state of New Jersey had been using fecal coliform criteria for its ocean waters and total coliform criteria for its back bays using a multiple tube fermentation process. As of February 2012, the BMWM has switched all state shellfish growing areas over to the criteria for fecal coliform using a membrane filtration method. This method allows for expedited results, increased efficiency and reduced laboratory costs. The use of Fecal

coliform as a new standard in New Jersey has been approved and endorsed by the US FDA, NJDEP Office of Science and NJDEP Office of Quality Assurance.

8.3 Data Usage:

Data from this monitoring program will be used by the Bureau of Marine Water Monitoring to classify the shellfish growing waters of the State. This data will also be placed in the EPA's STORET computerized database. It will assist individuals investigating estuarine water quality in the State. This data is also used to create reports on shellfish classification that are sent to the US FDA. These reports include a Sanitary Survey which is required every 12 years, a Reappraisal report, which is required every 3 years and an Annual report which is required every year. These reports are used to upgrade or downgrade the classification of each shellfish growing area. The data can also be used to facilitate shellfish bed closures and seasonal restrictions. The BMWM is responsible for the shellfish bed restrictions.

8.4 Sampling:

8.4.1 Sampling stations:

Sampling sites have been chosen to provide representative data for all the State's major bodies of saline waters including the Atlantic Ocean to within 3 nautical miles of the coastline. All sites are put onto GIS maps by our shellfish assessment team using GPS coordinates. Sites (approx. 4,000 state-wide) were selected to monitor major inputs to the estuaries and to determine exports from the estuaries through the inlets. To this end, sampling is performed during adverse hydrographic conditions whenever possible. Sites were also chosen near potential sources of pollution, such as outfalls or polluted streams. Sample sites may change location due to a change in the shoreline making it harder for the sampler to reach certain sample sites over time. The frequency of sampling at certain locations may rise due to elevated data results or lessen due to consistent or lower data results. All sampling is performed by NJDEP trained staff and no outside staff or contractors perform sampling for the program. A list of all sampling stations is in the Captain's NSSP Sampling Schedule.

8.4.2 Sample Parameters:

Sample parameters include:

Microbiological –Fecal coliform bacteria analyses will be performed in accordance with NJDEP's Leeds Point Bacteriology Laboratory SOP, 2014.

The FDA does not permit laboratories to used fecal coliform data that is generated from the Standard Method's 9222D (mFC) because of problems that the method has with poor recovery from chlorinated sewage effluents, low selectivity, and the general inability to resuscitate stressed organisms. The FDA requires any laboratory that is generating data to be used to classify shellfish growing water to use the EPA 1103.1 method for the

determination of *Escherichia coli* in Water by Membrane Filtration using membrane-Thermotolerant E coli Agar (mTEC). Fecal coliform counts are determined by counting the colonies before the transferring the filter to urea substrate.

Inorganic - See Quality Assurance Project Plan for New Jersey Coastal Monitoring Network.

Field measurements at each site will include: water temperature, air temperature and weather conditions. Tide stage will be determined from sample collection time. Preservation and Holding Times are found in the table below:

PARAMETER	SAMPLES/YR.	ANALYTICAL METH.	REF.	PRESERVATION METH.	REF.	HOLDING TIME
*Escherichia coli (Fedcal Coliform)	15,000	EPA1103.1	10	** P-1	5	6 hrs.

*FDA requires laboratories to use the mTEC method (EPA1103.1) to be used for the enumeration of fecal coliforms when the results are used classify shellfish growing waters.
**P-1 Samples are stored on ice until analysis.

A bottle of plain DI water is put in each cooler along with the samples to make sure the sample temperature is within the parameters of the method. The temperature is measured by the laboratory when the samples are analyzed to make sure that the temperature is below the temperature recorded at sample collection. These results are on file in the laboratory.

8.4.3 Sampling Frequency:

Water sampling will be performed a minimum of 5 times per year and a summer and winter sampling program will be utilized to identify seasonal trends in the data.

8.4.4 Sample Methods:

All water quality sampling will be performed by a surface grab sampling method using a dip pole with a bottle attached to it. Sampling will be performed in accordance with NJDEP's Field Sampling Procedures Manual, 2005.

8.4.5 Sample Containers:

Sample containers will be provided by the Bureau of Marine Water Monitoring. New 250mL polypropylene sample containers are purchased and used until there is visual signs of deterioration on the bottle (approximately 5 years). They are washed, sanitized and reused as needed for sampling. Every new lot of bottles that is made is tested for sterility by adding Lauryl Tryptose Broth to a bottle from the lot and putting it into an incubator overnight to check for turbidity. The container types will be according to NJDEP's Field Sampling Procedures Manual, 2005.

8.4.6 Sample Identification Forms:

The following forms will be used for sample identification: A modified, updated version of form VST-012 8/91 (Shellfish Growing Waters-Bacteriological Analysis), Form VSI-001 10/79 (Sample Analysis: Shellfish and Shellfish Growing Waters), Form Water Monitoring Management (Bacteriological Analysis Work Sheet), Form VST-010 (Inorganic Parameters).

9.0 Schedule of Tasks:

Sampling assignments are given to the field sampling personnel and the laboratory staff biannually (summer and winter runs). These assignments contain; area to be sampled, location of stations, number of runs required and any special instructions for the area. The following table is a schedule of tasks and products.

ACTIVITY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Sampling	X	X	X	X	X	X	X	X	X	X	X	X
Analysis	X	X	X	X	X	X	X	X	X	X	X	X
QA Review	X	X	X	X	X	X	X	X	X	X	X	X
Data Storage	X	X	X	X	X	X	X	X	X	X	X	X
Final Report (regs.)	X											

10.0 Project Organization and Responsibilities:

Sampling Operations and QA (Inorganics)	Robert Schuster
Sampling Operations and QA (Microbiology)	Robert Schuster
Lab Analysis and QA (Inorganics)	Bill Heddendorf
Lab Analysis and QA (Microbiology)	Bill Heddendorf
Data Processing and QC	Michael Kusmiesz
Data Quality Review	Bill Heddendorf
Lab Performance Auditing	NJDEP OQA; FDA
Lab Systems Auditing	NJDEP OQA; FDA
Field Systems Auditing	NJDEP OQA
Overall Quality Assurance	Robert Schuster
Project Coordination	Robert Schuster

11.0 Data Validation:

Laboratory results will be validated by the Quality Assurance Officer according to the Standard Operating Procedures of the Leeds Point Laboratory and according to NJDEP(2014).

11.1 Data Quality Requirements and Assessments:

11.1.1 Laboratory QC

Detection Limits

PARAMETER	MATRIX	DETECTION LIMIT
Fecal coliform	Water	1 colony forming unit/100mL (MF)
Inorganics		See Quality Assurance Workplan - New Jersey Estuarine Monitoring Program

11.2 Data Representativeness:

In accordance with the National Shellfish Sanitation Program's Guide for the Control of Molluscan Shellfish, samples are collected during adverse hydrographic conditions. This includes during ebbing tidal conditions and subsequent to rainfall events. An exception to this is Systematic Random Sampling (SRS), where areas that are not impacted by point sources are assigned 6 sampling events a year.

11.3 Data Comparability:

This monitoring program is similar in design to programs of other States participating in the National Shellfish Sanitation Program (NSSP). Overall monitoring design, field sampling procedures and analytical procedures are detailed in the NSSP Guide for the Control of Molluscan Shellfish and the American Public Health Association (APHA) Recommended Procedures for the Examination of Seawater and Shellfish. All data is reported in standard units. All analytical methods used are widely used standardized procedures.

11.4 Data Completeness:

Sufficient data will be collected and analyzed to produce statistically valid classifications of New Jersey's shellfish growing waters that meet the requirements of the (NSSP).

12.0 Chain of Custody:

A legal chain of custody will not be required for this study since it is considered to be a routine monitoring program. However, the tracking of each sample from acquisition to analysis is well documented. Sample bottles are marked with a number which corresponds to information entered on a field sampling form. This information along with analytical results is entered on the EPA's STORET system.

13.0 Performance System Audits:

Internal performance and systems audits are performed by the laboratory as described in NJDEP (2014). Performance and systems audits are also performed by the USEPA, the N. J. Laboratory Certification Program and by the FDA Shellfish Sanitation Program. Results of these audits are on file at the Leeds Point Laboratory.

13.1 Field Audits:

Field audits will consist of the collection and analysis of field replicates, field blanks, and trip blanks on a monthly basis and temperature controls on a daily basis. Values will be interpreted according to NJDEP. New samplers are trained and audited by senior samplers and their supervisor. All samplers are audited annually by their supervisor and a representative from the FDA.

14.0 Corrective Actions:

Any changes to this Work/Quality Assurance Project Plan will be approved by the requesting agency and the Project Manager and amended accordingly.

15.0 Data Reporting:

When laboratory analysis and data validation are completed, field data and laboratory data are entered into the NJ STORET database and periodically uploaded to EPA's national STORET database computer system in North Carolina. The data that is entered into NJ STORET is checked manually and visually at the time that it is entered into the system. There is a system validation built into the program that checks the remarks and results fields as the data is being entered.

15.1 Field Data Records:

Sampling personnel within the Bureau are responsible for recording field data. This data includes; collection date, collector ID, assignment number, weather code, air temperature, water temperature, wind direction, wind velocity, collection time and tidal stage. This information is entered on the Shellfish Growing Waters - Field Sampling Log.

15.2 Laboratory Data Documentation and Reduction:

Laboratory records and data reduction is performed according to the Standard Operating Procedures of the Leeds Point Laboratory.

16.0 Calibration Procedures and Preventive Maintenance:

16.1 Field Equipment Calibration and Record Keeping:

Thermometers used in the field will be calibrated annually against a NIST certified thermometer. This information is maintained in the Laboratory's Quality Assurance Book.

16.2 Laboratory Equipment Calibration and Record Keeping:

Laboratory equipment calibration will be performed according to the Standard Operating Procedures of the Leeds Point Laboratory.

16.3 Laboratory Preventive Maintenance:

Laboratory equipment maintenance will be performed according to the NJDEP (2014).

References

1. APHA, AWWA, WEF, 1995. Standard Methods for the Examination of Water and Wastewater. 19th ed., Washington: American Public Health Association.

2. APHA,1979; 1984. Recommended Procedures for the Examination of Seawater and Shellfish, 4th and 5th editions, APHA, Washington, D.C.

3. NSSP, 2011 Revision. National Shellfish Sanitation Program. Guide for the Control of Molluscan Shellfish. Model Ordinance. Interstate Shellfish Sanitation Conference. US Public Health Service, Food and Drug Administration, Washington, DC

4. NJDEP, 2014. Standard Operating Procedures Manual, Leeds Point Bacteriology Laboratory, Trenton: Water Monitoring and Standards, New Jersey Department of Environmental Protection

5. NJDEP. 2005. New Jersey Department of Environmental Protection, Field Sampling Procedures Manual, Trenton, NJ.

6. US EPA,2002. EPA QA/G8. Guidance on Environmental Data Verification and Data Validation, Environmental Protection Agency, Office of Environmental Information, Washington, D.C. United States

7. NJDEP Shellfish Growing Area Report Guidance Document, 2012. New Jersey Department of Environmental Protection, Marine Water Monitoring, Leeds Point, NJ.

8. N.J.A.C. (New Jersey Administrative Code), Department of Environmental Protection. Chapter 7:12.

9. N.J.S.A. (New Jersey Statutes Annotated), New Jersey. Title 58, Waters and Water Supply.