

**NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATER MONITORING AND STANDARDS ELEMENT
BUREAU OF FRESHWATER AND BIOLOGICAL MONITORING
P.O. Box 420; Mail Code 35-01
TRENTON, NEW JERSEY**

**Quality Assurance/Quality Control Project Plan
2019 Summer Ambient Surface Water Bacterial Monitoring Program**

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1.0 Project Name: 2019 New Jersey Summer Ambient Surface Water Bacterial Monitoring Program

2.0 Requesting Agencies: United States Environmental Protection Agency (USEPA), and New Jersey Department of Environmental Protection (NJDEP), Division of Water Monitoring and Standards.

3.0 Date of Project: May-September, 2019

4.0 Project Fiscal Information: Job Number 3334000, Activity Code V38A

5.0 Project Oversight:

Project Officer: Coleen C. Makuszewski (Coleen.Makuszewski@dep.nj.gov), NJDEP-BFBM

Project Supervisor: Dean Bryson (Dean.Bryson@dep.nj.gov), NJDEP-BFBM

Project Data Manager: Leigh Lager (Leigh.Lager@dep.nj.gov), NJDEP-BFBM

6.0 Quality Assurance Officer

Marc Ferko (Marc.Ferko@dep.nj.gov), NJDEP-Office of Quality Assurance (OQA)

7.0 Project Background

The monitoring design aligns with current water quality criteria and the current recreational use assessment approach. Beginning in 2012, sampling was focused regionally, with all sites being in one or two Water Regions. Sampling for 2019 will be in the Northeast Water Region. This is the second consecutive year of sampling at the Northeast Water Region sites. Collection of samples for two years and the regional sampling approach is consistent with the rotating basin approach as described in the 2016 New Jersey Integrated Water Quality Methods Document (http://www.nj.gov/dep/wms/bears/docs/2016_methods.pdf).

8.0 Project Description

This project collects ambient bacterial water quality data from freshwater rivers and streams of New Jersey. The current primary contact recreation use standard for freshwater in New Jersey is based on *Escherichia coli* (*E. coli*) levels. *E. coli* counts shall not exceed a geometric mean of 126 per 100 ml. To assess this criterion, at least 5 samples collected over a 30-day period, between the months of May and September, are needed to calculate the geometric mean.

9.0 Project Objectives

The objective of the ambient bacterial monitoring program is to (1) assess whether primary contact recreation standards are being met, as defined in New Jersey's Surface Water Quality Standards (NJSWQS), N.J.A.C. 7:9B, re-adopted October, 2016, last amended January, 2011, (2) evaluate status of bacterial concentrations, as specified in the NJDEP/USEPA Performance Partnership Agreement (PPA), (3) expand our ambient *E. coli* database, and (4) supplement NJDEP's database of ambient stream water temperatures.

This data will be used to report water quality conditions in the biennial "Integrated Water Quality Monitoring and Assessment Report" (Integrated Report), pursuant to sections 305(b) and 303(d) of the federal Clean Water Act, specifically to assess the fresh (FW2) waters, which are designated for primary contact recreational use, and to focus watershed management initiatives in areas with violations of surface water quality criteria.

10.0 Monitoring Network Design

The site list is based on the request provided by NJDEP's Bureau of Environmental Analysis, Restoration, and Standards (BEARS). Data is needed at these sites to assess the respective Assessment Unit, where existing data is insufficient to determine recreational use attainment, or additional data is needed for listing or delisting purposes, or to update TMDLs. The complete site list, which includes GPS coordinates, can be found in Attachment A.

To conform to NJSWQS and the Integrated Report Methods Document, each site will be sampled five (5) times over thirty (30) days. Monitoring will occur during the primary contact recreation season (May-September). NJSWQS has adopted *E. coli* as the public health sanitary indicator in all freshwater (FW2) in New Jersey. Because this is an ambient monitoring program, no attempt will be made to target or avoid rainfall impacted conditions. Ambient water temperature of the stream will be recorded concurrent with sample collection.

11.0 Special Training Needs

All external organizations assisting in collecting samples for this project will be trained in the proper techniques. The training will entail safety measures, collection of a representative sample, measuring temperature, sample labeling, completing paperwork, sample storage, and decontamination of sampling gear. The Project Officer will be responsible for coordinating all training. GIS maps showing the proper location of each sampling site and GPS coordinates, will be provided to the sampler.

12.0 Collection of Samples

12.1 Assistance of External Organizations

To facilitate the collection of the samples and to ensure that the samples are received at the laboratory within the 8-hour holding time, NJDEP-BFBM will make use of external partners in collecting the samples. Coleen Makuszewski of NJDEP-BFBM will be responsible for coordination of sample collections and courier service for all participating organizations. Copies of this signed QAPP will be forwarded to each county and other external partners.

12.2 Sampling Procedure

Collecting samples at the correct site locations is required. Detailed aerial photography maps and GPS coordinates of each site location will be made available to all samplers. To obtain consistent data, samplers must collect samples at the correct and same site location for each of the five sampling events. To ensure the locational accuracy, GPS verification will be required.

Critical to the success of this project is that all sample collectors are properly trained to collect a representative grab sample, correctly label the sample complete the laboratory sample submission form, measure accurate water temperature, and maintain the integrity of the sample by placing in a cooler of ice. Sample collection will follow guidance provided in NJDEP's Field Sampling Procedures Manual, 2005. Samples will be collected directly into sterile, plastic single-use bacteriological containers. The samples will be collected as a center-of-flow grab sample by carefully wading into the stream to avoid disturbing the stream bottom upstream of the collection point. Containers will not be rinsed. Wearing protective gloves, the closure of the sample container is removed. Facing upstream, the sample container will be inverted to avoid any surface scum and submerged to a depth of 15 to 30 cm (6 to 12 inches) below the surface, or mid-depth if stream is shallow. The opening of the sample container will then be turned into the current, allowing water to enter and air to exit. If the water body is slowly moving or stagnant, an artificial current can be created by moving the container at the sample depth in the upstream direction. An air space will be left in the container to enable the sample to be properly mixed before analysis.

Containers will be filled to the shoulder, slightly above the 100ml line which will provide the minimum volume (101ml) for the laboratory to analyze the sample at the required dilutions. The sample container will then be tightly closed, labeled, and placed in a cooler of ice for transport to the laboratory. If a stream cannot be safely waded due to steep or slippery stream banks, fast moving or high water, collecting the sample from a bridge is allowable using a weighted sampler attached to a rope. Samples must be received at the NJDOH laboratory to allow for the initiation of analyses within eight (8) hours of collection.

NJDEP-BFBM will provide samplers a digital thermometer to obtain a water temperature at each site concurrent with each sample. Samplers will only use a NJDEP-supplied thermometer to take temperature measurements. The sample collection time and the time of temperature reading are the same unless otherwise noted.

12.3 Field Precautions for Invasive Species

If more than one site is sampled on a given day, sampling gear, such as waders, will be decontaminated after each site to prevent possible transport of invasive aquatic species. A new set of disposable gloves will be used at each site. Decontamination will consist of thoroughly rinsing gear with clean, fresh water.

12.4 Additional Samples

Any samples which cannot be collected by an external organization will be collected by NJDEP-BFBM personnel.

13.0 Data Quality/ Quality Control Requirements

13.1 Field Measurements

NJDEP-BFBM (#11896) is certified by the Office of Quality Assurance (OQA) for measuring water temperature (N.J.A.C 7:18 "Regulations Governing the Certification of Laboratories and Environmental Measurements"). NJDEP-BFBM will obtain and provide each sampler with a digital thermometer which has an accuracy of at least $\pm 1^{\circ}$ C. These thermometers will be calibrated against a NIST-certified thermometer prior to distribution and again at the end of each five-week sampling period to ensure accuracy. Records of calibration will be maintained by BFBM.

13.2 Sample Analysis

Samples will be analyzed by the New Jersey Department of Health's (NJDOH) Public Health and Environmental Laboratory using method SM 9223B (Colilert) for *E. coli*. Quality control procedures (including required calibrations and quality control procedures required by regulation or by the method) shall be defined in the laboratory's Quality Manual for Sanitary Bacteriology (QM), or Standard Operating Procedures (SOPs). The QM and SOPs must be approved by the OQA.

To sufficiently quantify the range for all streams, the suggested dilutions are as follows. Using *E. coli* method SM 9223 B (Colilert), no dilution is required to quantify the range <1-2419.6 MPN/100 ml. A 1:100 dilution is required to quantify the range 2,419.6-241,960 MPN/100 ml. These dilutions will allow for the quantification of *E. coli* at concentrations typically found in New Jersey streams. Also, as per the laboratory's QM, a sample collected in a larger volume bottle (290 ml) will be provided for internal laboratory quality control procedures for 5% of samples submitted per week.

14.0 Data Analysis

Final data tabulation will occur at the end of the sampling season and geometric means will be calculated. In addition, a copy of the laboratory results will be provided to the participating counties for review. The data will also be made available to NJDEP-Bureau of Environmental Analysis, Restoration, and Standards (BEARS) for inclusion in the biennial Integrated Water Quality Monitoring and Assessment Report.

15.0 Sampling Schedule

Five (5) samples collected over a 30-day period, between May 1st and September 30th, are needed to calculate the geometric mean.

16.0 Resource Needs: BFBM will utilize hourly staff to complete this project.

17.0 Quality Assurance

17.1 Laboratory

NJDOH's Public Health and Environmental Laboratory- Sanitary Bacteriology will use method SM 9223B (Colilert) for *E.coli*. The NJDOH laboratory (#11036) is certified by OQA for this method for the analysis of ambient freshwater samples. The NJDOH laboratory is located at 3 Schwarzkopf Drive, Ewing, NJ.

17.2 Sample Containers, Preservation, and Holding Times

Sterile 150 ml single-use plastic sampling containers will be provided by NJDOH laboratory. Immediately after collection, samples will be placed in a cooler of ice and kept below 10°C. Samples will be delivered to the laboratory to allow for initiation of analyses within the eight-hour holding time. Larger volume (290 ml) sterile single-use plastic bottles will be utilized in providing additional sample volume at 5% of sites weekly, per the laboratory's internal quality control procedures.

17.3 Sample Custody Procedures

All persons collecting, handling, or transporting the samples to the NJDOH laboratory will complete the appropriate section at the bottom of the Bact-44 form, prior to relinquishing the samples, with name, signature, and date/time of sample transfer.

18.0 Data Validation

The NJDEP Project Officer and Project Supervisor are responsible for all initial data validation. If apparent anomalous data is suspected, the Project Officer and/or the Project Supervisor will review the sampling procedures with the field sampler to make sure the proper collection and preservation procedures were followed. If the data is still suspect, the NJDOH laboratory will be contacted. An internal review of the laboratory analytical procedures and/or calculations used in the analysis of the suspect sample, with special emphasis on transcription of data to assure that no transposition of figures occurred, will be conducted. If no problems are found in the analytical laboratory procedures, the data may then be compared to any historical data that might have been collected at the same site prior to the most recent sampling event to see if similar anomalies might have been found previously. The suspect data may also be compared to literature values or standard analytical treatises to verify whether the results are within the limits of accuracy of the test method.

If no obvious problems are found after these reviews, the complete data set will be reported with the suspect data identified as such. The BFBM will then conduct its own review of the data, as it relates to the objectives(s) and data accuracy required in this project.

19.0 Data Storage

Data will be stored locally in electronic format (MS Access). Water quality data will be entered into New Jersey's Water Quality Data Exchange (WQDE) and will be accessible through the USEPA, USGS and National Water Monitoring Council's Water Quality Portal June the following year from when results are received from the analytical laboratory. All raw data records shall be maintained for a period of no less than five years. See Appendix A for Data Management information.

20.0 Performance System Audits

20.1 Field Audits

BFBM will conduct at least one field audit of each external organization providing assistance in sample collection for this project. This field audit will focus on: (1) are the correct locations being sampled, (2) are the correct sample collection procedures being used and (3) is the field paperwork being completed correctly with all necessary information being entered.

20.2 Laboratory Audits

All New Jersey certified laboratories are subject to audits and to the requirements of the OQA Laboratory Certification Program, as well as internal performance evaluations.

21.0 Data Reporting

21.1 Preliminary Reports

Preliminary analytical data will be reported to BFBM from the NJDOH laboratory in either electronic format or by verbal communications to the Project Officer, within 21 calendar days from receipt of sample. Samples which yield results considered anomalous by the Project Officer and/or Project Manager will be validated as specified in section 18.0, Data Validation.

21.2 Final Reports

Final analytical data will be reported to BFBM, from the NJDOH laboratory, in electronic format and hard copies of the lab sheets, within 40 calendar days from receipt of sample. All data shall be reported in a complete and concise fashion and shall meet the reporting requirements of NJAC 7:18. Routine quality control results must be retained on file for possible review by the NJDEP-BFBM and the OQA. Final data tables, along with calculated geomeans, will be forwarded to NJDEP-BEARS for use in generation of the biennial New Jersey Integrated Water Quality Monitoring and Assessment Report.

22.0 Corrective Action

The Project Officer will be responsible for the oversight of all activities related to this project. The Project Officer will assess field collection functions and make corrections when necessary to maintain the data accuracy as defined in this plan. If any changes or modifications are made to this plan regarding data collection, as it relates to the objective(s) and data accuracy required in this project, all original signees of the QAPP will be notified.

Appendix A Data Management Tables

For Data Management purpose, Water Chemistry is defined as parameters analyzed by a laboratory; Field measurements are defined as analyze-immediately parameters.

Table 1 Site List

Station ID(WQDE compliant and referenced)	Waterbody/Location	Latitude-dd	Longitude-dd	County	Site exists in WQDE already?	Location Type
01387500	RAMAPO RIVER NEAR MAHWAH	-74.16549954380	41.09678037480	BERGEN	YES	River/stream
01387811	RAMAPO RIVER AT OAKLAND	-74.24126800990	41.03667091490	BERGEN	YES	River/stream
01390610	HOHOKUS BK AT DE YOE POND OUTLET AT CAMPGAW	-74.19359668250	41.02595608700	BERGEN	YES	River/stream
0138749205	Mahwah River at mouth at West Mahwah	-74.15541285970	41.10401102200	BERGEN	YES	River/stream
AN0267J	Pond Brook at Rt 202 and Franklin Ave	-74.23658710530	41.02916186720	BERGEN	YES	River/stream
BFBM000121	Hirshfeld Brook On River Road	-74.02011233800	40.94739887390	BERGEN	YES	River/stream
AN0275A	PECKMAN RIVER AT BRADFORD AVENUE	-74.23423052940	40.84821914680	ESSEX	YES	River/stream
BA150	CANOE BK IN RESERVOIR FACILITY OFF RTE 649 (JFK PARKWAY)	-74.35369647700	40.74478723030	ESSEX	YES	River/stream
01379615	Russia Brook at Russia	-74.53147784810	41.03861493140	MORRIS	YES	River/stream
01379680	ROCKAWAY R AT LONGWOOD VALLEY NJ	-74.57099260380	40.95398599370	MORRIS	YES	River/stream
01380320	STONY BROOK AT BOONTON NJ	-74.43754308370	40.92886118380	MORRIS	YES	River/stream
01381480	Watnong Brook at Central Ave at Morris Plains NJ	-74.49388889000	40.82916667000	MORRIS	YES	River/stream
01382720	Stone House Brook at Butler NJ	-74.36000014490	40.99416699340	MORRIS	YES	River/stream
AN0216	PRIMROSE BK LEES MILL RD BRIDGE 569	-74.51541850320	40.72869429530	MORRIS	YES	River/stream
AN0237	TROY BK BEAVERWYCK RD	-74.38988922780	40.85441558490	MORRIS	YES	River/stream
AN0239	UNT TO ROCKAWAY RIVER DOVER RD	-74.52755472640	41.01972293390	MORRIS	YES	River/stream
AN0242	GREEN POND BK MT PLEASANT RD AND RT 15	-74.56783177630	40.90438981910	MORRIS	YES	River/stream

AN0247	DEN BROOK AT MT PLEASANT TPK IN DEN BROOK PARK	-74.51719376800	40.86851006570	MORRIS	YES	River/stream
AN0248	ROCKAWAY R POCONO RD AT ST CLAIR HOSPITAL	-74.46312481900	40.89436562310	MORRIS	YES	River/stream
BFBM000089	Whippany River Tributary On East Main Street	-74.56046029440	40.79577787540	MORRIS	YES	River/stream
BFBM000170	Rockaway River at off Blackwell Road	-74.56570464480	40.88514578500	MORRIS	YES	River/stream
BFBM000186	Hibernia Bk	-74.48684521620	40.93067280410	MORRIS	YES	River/stream
01384500	RINGWOOD CREEK NEAR WANAQUE NJ	-74.26583324700	41.12722116850	PASSAIC	YES	River/stream
01388100	RAMAPO RIVER	-74.27962493030	40.98568754800	PASSAIC	YES	River/stream
01389895	PASSAIC RIVER AT OUTWATER LANE AT GARFIELD NJ	-74.12027726300	40.87916805270	PASSAIC	YES	River/stream
AN0256A	MEADOW BROOK AT HIGHLAND AVENUE	-74.28569194770	41.04283373550	PASSAIC	YES	River/stream
AN0259	PEQUANNOCK RIVER AT RT 23 (abv res)	-74.48907066310	41.07805693390	PASSAIC	YES	River/stream
AN0261	CLINTON BROOK AT LaRUE ROAD	-74.44046564080	41.05970091930	PASSAIC	YES	River/stream
AN0262	KANOUSE BK KNOUSE RD	-74.42958506360	41.04743346350	PASSAIC	YES	River/stream
AN0276	MOLLY ANN BK BRIDGE IN W SIDE PK OFF TOTOWA AVE	-74.19038862540	40.91447157370	PASSAIC	YES	River/stream
AN0292	THIRD R OUTLET OF YANTACAW POND KINGLAND RD	-74.14163740190	40.82663756120	PASSAIC	YES	River/stream
BFBM000204	Belcher Creek off Dockerty Hollow Rd	-74.39175616720	41.11003486420	PASSAIC	YES	River/stream
BFBM000205	West Brook on Westbrook Rd	-74.33731509960	41.08716092350	PASSAIC	YES	River/stream
AN0226	DEAD R OFF SOMERVILLE RD OPP SHANNON HILL RD	-74.59308193750	40.65930439650	SOMERSET	YES	River/stream
AN0227A	HARRISON BROOK AT VALLEY ROAD	-74.57479549470	40.65908984920	SOMERSET	YES	River/stream
BFBM000125	Franklin Pond Creek On Route 23	-74.58071534160	41.10298782360	SUSSEX	YES	River/stream

BFBM000127	Pequannock River On Route 515	-74.51378827310	41.11539175820	SUSSEX	YES	River/stream
BFBM000132	Pacock Brook On Canistear Road	-74.47235216740	41.13650691060	SUSSEX	YES	River/stream
AN0229	PASSAIC R STANLEY AVE	-74.38977627460	40.72608433790	UNION	YES	River/stream

Table 2 Sample Types

STATION ID	Field Msr/Obs	Flow	Water Chemistry	Continuous Monitoring	Biological Sampling	Sediment Collection	Bacteria Collection	Habitat	Metrics	Indices
All Sites	Yes	No	No	No	No	No	Yes	No	No	No

Table 3 Partners

STATION ID	Field Msr/Obs	Flow	Water Chemistry	Continuous Monitoring	Biological Sampling	Sediment Collection	Bacteria Collection
01387500	BCHD	No	No	No	No	No	BCHD
01387811	BCHD	No	No	No	No	No	BCHD
01390610	BCHD	No	No	No	No	No	BCHD
0138749205	BCHD	No	No	No	No	No	BCHD
AN0267J	BCHD	No	No	No	No	No	BCHD
BFBM000121	BCHD	No	No	No	No	No	BCHD
AN0275A	GSWA	No	No	No	No	No	GSWA
BA150	GSWA	No	No	No	No	No	GSWA
01379615	NJDEP	No	No	No	No	No	NJDEP
01379680	NJDEP	No	No	No	No	No	NJDEP
01380320	NJDEP	No	No	No	No	No	NJDEP
01381480	NJDEP	No	No	No	No	No	NJDEP
01382720	NJDEP	No	No	No	No	No	NJDEP
AN0216	GSWA	No	No	No	No	No	GSWA
AN0237	GSWA	No	No	No	No	No	GSWA
AN0239	NJDEP	No	No	No	No	No	NJDEP
AN0242	NJDEP	No	No	No	No	No	NJDEP
AN0247	NJDEP	No	No	No	No	No	NJDEP
AN0248	NJDEP	No	No	No	No	No	NJDEP
BFBM000089	GSWA	No	No	No	No	No	GSWA
BFBM000170	NJDEP	No	No	No	No	No	NJDEP
BFBM000186	NJDEP	No	No	No	No	No	NJDEP
01384500	PCHD	No	No	No	No	No	PCHD
01388100	PCHD	No	No	No	No	No	PCHD
01389895	PCHD	No	No	No	No	No	PCHD
AN0256A	PCHD	No	No	No	No	No	PCHD
AN0259	PCHD	No	No	No	No	No	PCHD
AN0261	PCHD	No	No	No	No	No	PCHD
AN0262	PCHD	No	No	No	No	No	PCHD
AN0276	PCHD	No	No	No	No	No	PCHD
AN0292	PCHD	No	No	No	No	No	PCHD
BFBM000204	PCHD	No	No	No	No	No	PCHD
BFBM000205	PCHD	No	No	No	No	No	PCHD
AN0226	GSWA	No	No	No	No	No	GSWA
AN0227A	GSWA	No	No	No	No	No	GSWA
BFBM000125	NJDEP	No	No	No	No	No	NJDEP
BFBM000127	NJDEP	No	No	No	No	No	NJDEP
BFBM000132	NJDEP	No	No	No	No	No	NJDEP
AN0229	GSWA	No	No	No	No	No	GSWA

BCHD- Bergen Co. Health Department

PCHD- Passaic Co. Health Department

GSWA- Great Swamp Watershed Association

Table 4 Field Measures

<u>Field Name</u>	<u>WQDE Name</u>	<u>Media</u>	<u>Units</u>
Water Temp	Temperature, Water	Water	deg C

Table 5 Chemical Parameter Table

Analysis (lab name)	EPA Characteristic Name	Method Speciation Name	Result Sample Fraction	Result Measure Unit	Result Value Type	Sample Collection Type	Sample Collection Equipment
E. Coli	Escherichia coli			#/100ml	Actual	Grab	Water Sampler (Other)

Table 6 Laboratory Worksheet

Parameter	Laboratory	Lab Number	Method	Method ID Context	Lower Reporting Limit	units	Method Detection Limit	units	Upper Reporting Limit (MPN/100 ml)	units	Holding Time	Preservative
E. coli	New Jersey Department of Health	11036	9223-B	APHA	1 MPN/100ml	#/100ml			241960	#/100ml	8 hours	Ice to <10 °C

Table 7 Data Inventory Supplement

Geographic Regions	River Basins: Highlands; Upper Passaic, Whippany & Rockaway; Lower Passaic and Saddle; Pompton, Pequannock, Wanaque, & Ramapo; Hackensack, Hudson, & Pascack;
Counties	Sussex, Morris, Bergen, Passaic, Essex, Somerset, and Union
Dates	May 1- September 30, 2019
Status	In progress- discrete
Sample Frequency	Periodic
Seasons Sampled	Spring; Summer; Fall;
Waterbody Type	River/Stream
Salinity Category	Fresh
Tidal Influence	Non-tidal;
Project Description	<p>This project collects ambient bacterial water quality data for freshwater rivers and streams of New Jersey. The current primary contact recreation use standard for freshwater in New Jersey is based on Escherichia coli (E. coli) levels. E. coli counts shall not exceed a geometric mean of 126 per 100 ml. To assess this criterion, at least 5 samples collected over a 30-day period, between the months of May and September, are needed to calculate the geometric mean.</p>
Parameters analyzed type	Microbiological/pathogenic

Table 8 Data Management Supplement

QAPP network path file location?	V:\LUM\BFBM\Bfbm\Quality Assurance Plans\Calendar Year 2019 QAPPS\
Where will data be recorded in field (media)	Paper
If on tablets or phones, will download at office occur or will you connect wirelessly?	N/A
If on tablets or phones, who will do the download?	N/A
If data collected electronically, where will it be stored?	N/A
Format to be received from Lab	Data Feed
Method of receipt from lab/s	Electronic
Personnel receiving outside lab data	BFBM
Is data expected to go to WQDE/STORET?	Yes
Data manager - (Bureau and Name)	BFBM, Leigh Lager

Appendix B Project Partner Contacts

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Appendix C QAPP Acknowledgement Form