

2007 WATER POLLUTION CONTROL PROGRAM EXECUTIVE SUMMARY

The Water Program is active in both public and environmental health. Public health activities include those mandated by the Safe Drinking Water Act, the Private Well Testing Act, the migrant farm testing program, and the Cooperative Coastal Monitoring Program. Environmental health is represented by our continuing efforts in our Ambient Water Quality Monitoring Program, targeted water quality studies and investigations, participation in reviewing and commenting on both regional and municipal stormwater management plans, and oversight of the sewage pumpout boat program. Response to citizen and NJDEP complaints regarding fish kills, algae blooms or discharges into waterbodies, to name a few of a large variety, is another core priority. Global positioning system (GPS) capabilities coupled with geographic information systems (GIS) round out our ability to provide easily grasped visual information displays of investigations and activities. Continuing education to update skill sets, program knowledge and cross-over training is also a major factor to deliver expected services. A brief synopsis follows, with more detailed program information and analyses appended.

Public Non-Community Wells: 112 inspections were conducted, including 9 Notices of Violation. Penalties in the amount of \$750 were collected, and 7 new or previously unknown well systems were added to the program. Local health authorities were updated with known wells.

Private Well Testing Act: Wells in Monmouth County are generally acidic and rich in minerals such as iron and manganese, while low in pH. Wells that involve realty transfers are required to be analyzed. Eighty letters were sent to residents within 200' of wells exceeding gross alpha activity standards to advise particularly those on shallow wells of possible risks to their drinking water.

Migrant Farms: Mid-season water sampling of 7 farms for bacteria and nitrates found 3 farms were out of compliance with bacteria standards and required re-sampling. All farms requiring re-sampling were brought into compliance following treatment.

Cooperative Coastal Monitoring: Sixty-one sites are monitored weekly during the recreational bathing season, with 18 sites monitored monthly during the winter months. Water quality was generally exceptional this year, with no ocean closures and only 2 bay beach closures due to bacteria counts. There were 102 rainfall provisional closures at one bay and 4 ocean beaches. Details of the season may be found as Appendix A. Results and seasonal updates may also be found on the web at www.njbeaches.org.

Sewage Pumpout Boat: *Royal Flush* pumped out 57,765 gallons of sewage from 1,778 boats. A \$2,500 grant for operations and maintenance was submitted to the Marine Trades Association for re-imbusement of costs. An additional grant of \$8,500 was submitted for hull refurbishment for the 6-year old vessel. A survey of marinas in the county was conducted to ascertain convenience of area pumpout facilities.

Ambient Surface Water Quality: Sixty-six sites were sampled quarterly for a variety of parameters, depending on their salinity and classification. An ongoing study for total suspended solids (TSS) versus turbidity measurements, attached as Appendix B, shows sites in glauconitic soil are more likely to exceed SWQS for TSS. Results are sent to NJDEP for inclusion on the USEPA Integrated List of Water Quality Limited Segments and may be found at <http://co.monmouth.nj.us/ambients.asp>. Forty bacteria samples were taken for NJDEP in summer during a five week period.

Manasquan River: Thirty-eight samples were collected quarterly by Monmouth and Ocean counties at low or incoming tide, mainly at stormwater outfalls in areas with little tidal flushing. Appendix C details results and trends in Monmouth County. Bacteria results have been consistent with comparable areas of the county.

Monmouth Park: Baseline sampling and after significant rainfall continued. Presentations were given to environmental groups and health officials regarding fecal contamination in Branchport Creek. A penalty in the amount of \$35,000 was assessed by NJDEP for permit violations. Upgrades to the sanitary sewer system and other best management practices are currently under review by NJDEP and the park. Appendix D contains further details.

Infrastructure Studies: Bacteria and optical brightener samples were collected to determine inputs from infrastructure in conjunction with NJDEP and Monmouth University (MU) studies. Two malfunctioning septic systems were found and corrected in Red Bank, while no significant bacterial inputs were noted in the Wreck Pond, Deal Lake and Shark River areas studied in the NJDEP and MU reports. Additional information may be found as Appendices E, F and G.

Watershed Management Initiatives: Staff participates with the Monmouth County Planning Board, other county agencies and stakeholders with input on municipal and regional stormwater management plans in the area of water resources. Thirty three plans were reviewed and approval or conditional approval was recommended to the Planning Board for final decision.

Complaints: A total of 57 environmental and 4 drinking water complaints were received. The majority of complaints involved fish kills, beach wash-ups, sewage spills into waterbodies and algae blooms. Further details are available as Appendix H.

Geographic Information Systems (GIS): Over 100 GIS mapping projects were generated for MCHD programs during 2007. Several upgrades and improvements to existing hardware and software were implemented, most notably the introduction of new Trimble GeoXH GPS units for field data collection. Additional information on mapping projects and data collection/creation is available as Appendix I.

Website: The website was upgraded during the fall and went live in early December. The new site is designed to provide an easier navigation interface and better integration with other county departments.

APPENDIX A

Cooperative Coastal Monitoring Program:

Monitoring was performed at 61 stations during the recreational bathing season. Re-samples for ocean and bay waters occurred 58 times in 2007, compared to 53 in 2006. A record twenty seven of these re-samples occurred in a single day and were due to a rainfall of 1.25 inches prior to Monday sampling. All beaches were below bathing standards the following day. Signs were posted at potentially impacted beaches following a sewage spill into the ocean off Asbury Park that same day. Allenhurst beach was closed for that one day.

Water quality was exceptional. No ocean beaches and only 2 bay beaches were closed for bacterial exceedences, while in 2006 there were 25 bacterial closings.

Brown and York Avenue beaches in Spring Lake were closed 22 times each due to rainfall, while the Terrace and Beacon Boulevard in Sea Girt were provisionally closed 20 times each. L Street in Belmar was provisionally closed 18 times for rainfall and once for a bacterial exceedence.

qPCR study

A USEPA study in cooperation with NJDEP and Monmouth and Ocean counties was undertaken to compare quantitative polymerase chain reaction (qPCR) results to current membrane filter results. Samples were collected over a 10 week period by health department staff at 10 beaches in each county, analyzed for enterococcus, then filtered at the respective laboratories for qPCR analysis by USEPA. Results will be compared to determine correlation of the methods.

APPENDIX B

Total Suspended Solids (TSS) Versus Turbidity

Surface Water Quality Standards (SWQS) are defined by waterbody category. Ambient sampling results are interpreted using these categories and standards, which may not be adequately representative of waterbodies in our Atlantic Coastal Plain area. Figure 1 below details the various types of waterbody characterizations included in our ambient sampling.

Figure 1

Category	Description	SWQS TSS Standard (mg/l)*	SWQS Turbidity Standard (NTU)**
FW2-NT	General fresh water, non-trout production	40	50 NTU
FW2-TM	General fresh water, trout maintenance	25	Avg 15, maximum 50
SE	Saline estuary	Suitability	30 NTU

* Milligrams per liter

** Nephelometric units

Total suspended solids (TSS) versus turbidity samples have been analyzed quarterly over the past 3 years. For study purposes, a mean value of greater than 15 NTU was utilized to interpret data from sampling events. Monmouth County glauconitic soil areas have more results exceeding the 30-day mean average SWQS for turbidity compared to results in sandy soils for these parameters. Mean results of sites with the highest values, taken over the course of 4 sampling events in 2007, are depicted in the table below and include soil types.

Figure 2

SITE_#	SITE LOCATION	Turbidity	SWQS CAT	Soil Type
77	West Side Lake Alberta	25.50	FW2-NT	Kirkwood sand
23	Mingamahone Brook	20.67	FW2-TM	Kirkwood/glauconite
70	Shark River	19.50	FW2-TM/C1	Cohansey
24	Marsh Bog Brook	18.96	FW2-NT	Kirkwood/glauconite
47	Troutman's Creek	18.20	FW2-NT/SE1	Glauconitic soil
36	Chingarora Creek	17.70	FW2-SE1	Merchantville
35	Waackcaack Creek	17.15	FW2-SE1	Woodbury
76	East Side Lake Alberta	15.40	FW2-NT	Kirkwood sand
69	Wemrock Brook	15.30	FW2-NT	Glauconitic sand

Anomalous spikes were attributed to unusual and visually noticeable environmental events.

- A heavy algae bloom of *Mycrocystis spp.* at a lake site was noted
- High wind and wave action caused bottom sediment to re-suspend at an estuarine site
- Normally high iron content, indigenous to Monmouth County soils, resulted in an iron bacteria biomass and attributed to a TSS and turbidity spike on a stream.

That only one site exceeded the TSS standard in 2007, yet sedimentation continues to be a biologic and habitat issue, emphasizes the need for NJDEP to re-evaluate the relevancy of using TSS as the parameter of choice for watershed and best management practice evaluation in streams in this region.

Although turbidity and TSS levels during 2007 were both uncharacteristically lower than in previous years, turbidity levels still generally continue to exceed TSS levels in freshwater.

A TSS/Turbidity map and report are at http://co.monmouth.nj.us/documents/121/tss_turbidity_2k5finalrpt.pdf.

Ambient Surface Water Quality

Fifty-eight surface water sites are sampled quarterly and an additional 8 lake sites are sampled 3 times a year. Parameters are specific to our 3 waterbody categories: streams (FW2, TM and TP), lakes, and saline estuary. Results are sent to NJDEP for inclusion on the USEPA Integrated List of Water Quality Limited Segments and may be found at <http://co.monmouth.nj.us/ambients.asp>.

One of the new parameters for lakes and saline estuary waterbodies is phytoplankton. Samples are taken when algae is suspected to be abundant, as evidenced visually. A heavy bloom of *Eutreptia lanowii* was identified and enumerated in the MCHD Environmental Laboratory when Lanes Creek was noted to have a green appearance in mid-November.

Seven sites, 4 in the western part of the Bayshore in September, significantly exceeded surface water quality standards for enterococcus and fecal coliform bacteria. Follow-ups were performed with sanitary surveys and re-sampling. Elevated counts were attributed to a heavy concentration in the water column. Bacteria levels were found to have decreased following re-sampling with the exception of fecal coliform at one site with nearby construction.

Dissolved oxygen (DO) at one site was less than 4.0 milligrams per liter (mg/l) in mid-June; in late September the same site, along with 4 others in the western Bayshore area,

was again below 4.0 mg/l. A large recruitment of juvenile menhaden combined with these low DO levels combined to bring about several fishkills in this area.

Figure 3 – Dissolved Oxygen

Date	Bottle #	Site	Result (mg/l)
6/12/2007	36	Chingarora Creek	2.4
9/18/2007	65	Lake Matawan	3.33
9/26/2007	8	Matawan Creek	1.81
9/26/2007	35	Waackcaack Creek	3.26
9/26/2007	36	Chingarora Creek	2.19
9/26/2007	51	Luppatatong Creek	3.15

Forty bacteria samples were taken for NJDEP in summer during a five week period. Samples were analyzed by the state Department of Health and Human Services Laboratory for *E. Coli* and fecal coliform bacteria.

APPENDIX C

Manasquan River 2007

Quarterly sampling by the Monmouth-Ocean County Alliance of the Manasquan Estuary continued in 2007. Sampling takes place at low tide in order to best measure the impact of fresh-water tributaries and storm drains on the Manasquan River. An effort is made to ensure that both county health departments sample on the same day during the same low tide. A total of 38 sites were sampled, 25 in Monmouth County and 13 in Ocean County. In addition to collecting bacteria samples (fecal coliform and enterococcus), water temperature, salinity, and dissolved oxygen are also measured in the field.

Monmouth County results from the first quarter sampling event were all below surface water standards. Fecal coliform and enterococcus results during dry weather were elevated at seven sites in the second quarter, eleven sites in the third quarter, and four sites in the fourth quarter. Historically, elevated fecal coliform results have been an issue of concern at seven sites which continued in 2007. Follow-up sampling and field investigations have been conducted in previous years to determine the source of the historic elevated numbers. Elevated results at these sites are believed to be due to large water fowl populations and the location of these sites in estuarine areas that do not fully flush with the change of tides.

The additional elevated sites from this years sampling were investigated and follow-up sampling was conducted. No confirmed point sources of bacteria were found. Non-point source pollution includes waterfowl, suspension of sediment in the water caused by bridge construction, and sites with very little tidal flushing.

APPENDIX D

Monmouth Park 2007

Sampling and monitoring of Monmouth Park and Branchport Creek was performed 5 times in 2007. Samples were collected following significant rainfall for indicator bacteria and physical parameters.

Sampling from April 12, 2007 indicated that the Monmouth Park infrastructure needed additional maintenance prior to receiving horses for 2007 season. June 4, 2007 sampling indicated a significant bacteria discharge which violated their Confined Animal Feeding Lot (CAFO) permit. Cautionary health advisory signs were posted at public access points along Branchport Creek. Based on MCHD sampling and monitoring, NJDEP issued the park a \$35,000 penalty for exceeding their discharge limit on June 22, 2007. Subsequent sampling plus additional infrastructure investigations confirmed that Monmouth Park's collection system is inadequate to adhere to their CAFO permit.

A PowerPoint presentation chronologically detailing pollution issues at Monmouth Park was developed and presented to local officials and concerned citizens at several meetings.

During a conference call with the NJDEP Commissioner, 2 state senators, Oceanport officials and MCHD, NJDEP announced that the NJ Sports and Exposition Authority will put out a request for proposal to remediate the bacteria discharge. It was also agreed that MCHD will perform additional, limited sampling when a significant improvement to Monmouth Park's infrastructure is completed.

Sampling and inspection of Monmouth Park following the departure of all boarded horses indicated that the infield pond overflow and stormwater contaminated by residual manure did not warrant the removal of cautionary health advisory signs along Branchport Creek.

APPENDIX E

Red Bank Infrastructure Study

The Navesink River is impacted by high levels of bacteria which have prevented the expansion of shellfishing. The NJDEP completed its bacteria source tracking project in the Navesink River. Their findings have located areas with elevated bacteria counts with a possible human origin. The Health Department worked in conjunction with the Monmouth Regional Health Commission, Red Bank Department of Public Works, T&M Associates and the NJDEP to investigate four of these areas to determine and eliminate the source of the elevated counts.

Four sampling events and field investigations were conducted in 2007. Results from these events led to the discovery of two failing septic systems that were impacting the Navesink River. One of the homes was connected to public sewer, and the second is required to pump out their septic system daily until a solution is reached. The investigation is ongoing.

APPENDIX F

Infrastructure Study

A study of the use of optical brighteners (OBs) as a human indicator continued in 2007. Optical Brighteners are fluorescent white dyes that are added to laundry soaps, detergents, paper products, and textiles that make such items whiter. The department's primary objective is to use this technology as a "first cut" in detecting infrastructure failures and illicit connections, as opposed to labor and time intensive bacteria tests.

During 2007 OB samples were collected and analyzed in conjunction with routine and investigative sampling events in order to generate a comprehensive value that would indicate if a body of water was being impacted by an illicit connection. Approximately 100 OB samples have been collected in conjunction with fecal coliform and enterococcus samples. Our findings indicate that OB values greater than 75 suggest a possible infrastructure problem. In addition, work has been done to determine the role of confounders that may give false elevated OB results. Some of these confounders were found to be common items such as paper products, organic matter, and cigarette butts.

APPENDIX G

Microbial Source Tracking (MST) Follow-up 2007

Monmouth University conducted a Microbial Source Tracking Study (MST) in the Shark River, Wreck Pond, and Deal Lake Watersheds. In this study, they concluded that stations in these water bodies were being impacted by human sources of bacterial contamination. Surface water summaries, site descriptions, and ambient water quality were prepared for each station sampled in the watersheds. These summaries divided the data (isolates) into a source category, i.e., the percent of sampling events the source was detected, the relative abundance range and mean, and the percent of sampling events with relative abundance greater than 50%. The relative abundance is defined as the number of isolates at a source over the total number of isolates. No analytical data was included in the reports.

MCHD's Water pollution program staff performed a follow-up investigation. Stations from each watershed studied by Monmouth University were plotted on Hagstrom maps and compared with sampling data from historical ambient stream and coastal monitoring programs. Water quality data from these programs did not indicate any potential sources of human bacteria.

The MST sample sites from the Monmouth University study were put in order with human relative abundance greater than 50% in order of highest to lowest by MCHD water pollution program staff and conducted follow-up bacteria and optical brightener sampling and perform sanitary surveys at selected sites.

The first site, Station 8 in the Wreck Pond watershed, was reported as having a 100% relative abundance of human input. Bacteria and Optical Brightener (OB) results did not indicate any evidence of a human source. A sanitary survey was conducted via digital images and then by field verification. No abandoned or malfunction septic systems, failing infrastructure, or new sources of non-point pollution were located.

The second site, Station 2 in the Wreck Pond watershed, was reported as having a 71% relative abundance of human input. This site, although the 5th highest for relative abundance, was selected due to infrastructure concerns, and a consultant had already performed some preliminary sampling. Again, the bacteria and OB results did not indicate any evidence of a human source.

In the Deal Lake watershed, Stations 9 & 10 were reported as having a 75% and 86%, respectively, relative abundance of human input. As at Wreck Pond, the bacteria and OB results did not indicate any evidence of a human source. The sanitary survey did not point to any point sources of pollution.

It should be noted that MST, although in its infancy, may prove to be a viable and useful tool to isolate sources of bacteria in conjunction with other analytical methods, particularly when environmental factors and processes have been taken into account.

APPENDIX H

Complaints

Fifty seven environmental and 4 drinking water complaints were received. Summarized is a selected subset of the most notable.

Fish kills: An unprecedented 17 complaints of fish kills were received from June to October. Kills mainly involved juvenile menhaden present in the Bayshore area following a year of highly successful recruitment. Field sampling indicated acute toxicity levels of dissolved oxygen as the juveniles schooled tightly together. In several cases it is believed predator fish, such as bluefish, drove them beyond saline areas and into fresh water. Kills ranged from as high as at least a million fish in the Keyport-Matawan area to several hundred in the Middletown area.

Algae blooms: Complaints regarding several incidences of discolored water were received, with samples taken for analysis. An early heavy diatom bloom consisting mainly of *Dactyliosolen fragilissimus* and the dinoflagellate *Prorocentrum minimum* caused several complaints of discolored brown water from Raritan Bay to the Manasquan Inlet in late May.

Beach wash-ups: Medical waste and greaseball wash-ups were reported, however only one report was confirmed. Four of the complaints were later determined, with assistance from Rutgers and National Marine Fisheries Service at Sandy Hook, to be a marine sponge, *Craniella sp.*, about which is little known. The majority of the sponges were found in the Bayshore area, with sporadic wash-ups also noted in Deal and Bradley Beach.

Illicit connections: A complaint from NJDOT resulted in a penalty for an area restaurant with a septic overload. The connection installed from their dishwasher to a storm drain was disabled and the septic system pumped and enlarged to reflect their capacity.

Fuel oil complaint: Two feet of fuel oil was found in a potable well when the well pump failed and was removed. It was determined the fuel had been inadvertently introduced through the well cap. Soil borings and sampling of neighborhood wells were inconsistent with groundwater contamination. A new well was permitted by NJDEP, drilled, and the old well was remediated and sealed.

Several additional complaints involved sewage discharges into waterbodies, mainly caused by grease blockages within the collection system. The majority of these were small spills, which were quickly repaired. Sampling results indicated little to no environmental impact on receiving waterbodies.

APPENDIX I

Geographic Information Systems

Data for all ambient stream monitoring sites was mapped, submitted to NJDEP and posted on the website. Each site's Surface Water Quality Standard (SWQS) classification was incorporated into the feature class to assist water quality studies conducted by staff. A map of total suspended solids versus turbidity at these sites was submitted to NJDEP as part of an ongoing County Environmental Health Act (CEHA) grant.

GIS was utilized for the Cooperative Coastal Monitoring Program (CCMP) to graphically depict elevated enterococcus levels and assist in identifying areas of beach closures.

Geologic data and contour elevations were utilized to determine aquifer depths in several well investigations conducted by the Water Pollution Control Program. Well aquifer sources found using this technique were located primarily in Howell and Millstone.

Several projects this year focused on stormwater and watershed management. A Category-1 stream buffer analysis was mapped in Neptune City, and NJDEP shellfish classifications for coastal waters around Monmouth County were updated assist in review of municipal stormwater management plans.

A GIS map of storm drains in Manalapan was generated to assist in an illicit connection investigation.

GIS mapping was used to display wet weather sampling results from Monmouth Park sampling following each sampling event. These maps were made available to the public via the website.

Maps were generated on a site-by-site basis to assist with noise and odor complaints in several municipalities including Tinton Falls, Asbury Park, and Manalapan.

A GIS mapping project analyzing land use changes for Class B Recycling Facilities from 1995 to 2006 was conducted. This set of maps has been used by the Solid Waste Enforcement Team to identify changes in onsite operation and stockpile locations of each facility. Thirteen sites were analyzed in this project.

A new feature class identifying historic and current landfills in Monmouth County began this year. This project has utilized multiple sources of data to create one comprehensive list that will identify historic landfills based on use (municipal, construction debris, industrial, military, etc.) Existing data for monitoring wells at known sites, as well as additional historical site data provided by the Monmouth County Planning Board, will ultimately contribute to the final product. Approximately 86 historic landfills have been identified and mapped.

GIS data was utilized to assist in the response to an accident and subsequent gasoline spill during heavy rainfall in Millstone along I-195. Contour data was used to determine if contaminated surface runoff impacted Ivanhoe Brook.

Topographic mapping for the area of Ryan Rd and Route 9 was also generated to assist Hazmat in determining the direction of surface runoff of hazardous chemicals in order to provide effective containment.

A new feature class showing locations of Monmouth County Medical Reserve Corps (MRC) members was generated in 2007. The intention of this mapping is to locate areas in need of more focused recruitment from our Volunteer Coordinator, as well as a resource tool for deploying volunteers efficiently throughout the county. Over 225 MRC member locations were mapped in this project.

Several existing feature classes for MCHD's Local Information Network and Communications System (LINCS) program were updated this year. Data updates included the addition of 63 faith based organizations and 45 daycare centers which participate in the NJLINCS program.

A point feature class for nearly 70 physical rehabilitation centers within Monmouth County was generated to assist the Public Health program in the planning process.

Staff attended several User-Group meetings to remain current with GIS technology trends. Among these include the Monmouth County GIS Users Group, New Jersey Geospatial Forum, MAC-URISA, and the CEHA GIS Users Group.

In addition to meetings, several GIS and IT related trainings and workshops this year were attended, including a LiDAR Remote Sensing Workshop, and a Net/Java/AJAX web application development training course.

The MCHD Geodatabase underwent major changes in 2007. Several datasets, ranging from county data to data encompassing the entire northeast United States, were created based on geographic size (county, state, or regional for example.) The reduction of the overall size of each dataset has significantly increased stability and processing speed.

Several new feature classes were created including Classification Exemption Areas, Deed Notices Polygons, Groundwater Contamination Areas, and updated Municipal Boundaries.

Hardware and software improvements were made as follows:

- Three flatbed ADF scanners were received and deployed.
- An upgrade to Electronic Field Study version 2.7, a GIS software program utilized with Monmouth County's Pictometry data. The new version features several interface improvements, as well as increased flexibility to display digital

data in conjunction with oblique aerial images.

- Upgrades of GPS field units to two Trimble GeoXH models. Each unit was upgraded to ArcPad 7.1 software. Initial field testing was performed, which included methods of data transfer and ways to maximize precision of data collection in the field. This entailed developing a detailed basemap for each unit. The basemap features scalable data which allows users to easily locate features in their area of interest.
- Fifteen new computer systems were configured. Thirteen of these new systems are “Toughbook” tablet PCs, and are intended for future field use by staff. Registry maintenance was conducted on the new Toughbook units to activate their internal GPS capability. The remaining two are desktop replacements for outdated units.