

# Old Bridge Municipal Utilities Authority

Engineering Department

15 Throckmorton Lane  
Old Bridge, N.J. 08857  
(732) 679-8565

ADMINISTRATION OFFICE  
71 Blvd. West  
Cliffwood Beach, N.J. 07735  
(732) 566-2534

FAX (732) 566-5169

PLANT, SEWER DIV  
(732) 566-5557  
PLANT, WATER DIV.  
(732) 679-8442

FAX (732) 679-8532

February 25, 2013

Christina Tedesco  
Bureau of Water Systems and Well Permitting  
NJ Dept. of Environmental Protection  
Div. of Water Supply  
PO Box 426  
Trenton, NJ 08625-0426

**Re: Old Bridge Municipal Utilities Authority  
Operational Evaluation Level Report**

Dear Ms. Tedesco:

As a result of the fourth quarter testing of our Authority's disinfection by-product sites for HAA5's, an OEL exceedance required that the enclosed report be performed. Our Authority confirmed the data collection and analysis protocols to ensure that they were followed; we reviewed all of the disinfection by-product data at all eight (8) sites; we conducted a detailed operational evaluation of the treatment process and the source water of both our wholesale water company, Middlesex Water Company, as well as the Authority's groundwater WTPs; and, we performed an evaluation of our Authority's distribution system. We also identified steps to minimize future OEL exceedance on both a short term and long term basis.

Should you have any questions, please do not hesitate to contact me.

Sincerely,



Michael Roy, P.E.

MR/nla

CC: Guy Donatelli, Executive Director  
Steve Florek, Comptroller  
Dave Brogel, Middlesex Water Company  
Louis E. Granata, Esq.  
Chairman and Commissioners  
File

Doc. No. 17941

**Operational Evaluation Reporting Form**

**I. GENERAL INFORMATION**

**A. Facility Information**

Facility Name: Old Bridge MUA PWSID: 1209002  
 Facility Address: 15 Throckmorton Lane  
 City: Old Bridge State: NJ Zip: 08857

**B. Report Prepared by:**

(Print): Michael Roy Date prepared: 2/25/13  
 (Signature): [Signature]  
 Contact Telephone Number: 732-679-8565

**II. MONITORING RESULTS**

**A. Provide the Compliance Monitoring Site(s) where the OEL was Exceeded.**

(Poor Farm & Brewster) (Brandis Road) (Shelley & Cheesequake Road)

*Note: The site name or number should correspond to a site in your Stage 2 DBPR compliance monitoring plan.*

**B. Monitoring Results for the Site(s) Identified in II.A (include duplicate pages if there was more than one exceedance)**

1. Check TTHM or HAA5 to indicate which result caused the OEL exceedance.  TTHM  HAA5
2. Enter your results for TTHM or HAA5 (whichever you checked above).

	Quarter			Operational Evaluation Value
	Results from Two Quarters Ago	Prior Quarter's Results	Current Quarter	
	A	B	C	
Date sample was collected				$D = (A+B+(2*C))/4$
TTHM (mg/L)	<u>See Attachment II B.2.</u>			
HAA5 (mg/L)				

*Note: The operational evaluation value is calculated by summing the two previous quarters of TTHM or HAA5 values plus twice the current quarter value, divided by four. If the value exceeds 0.060 mg/L for TTHM or 0.060 mg/L for HAA5, an OEL exceedance has occurred.*

C. Has an OEL exceedance occurred at this location in the past?  Yes  No

If NO, proceed to item III. If YES, when did exceedance occur? \_\_\_\_\_

Was the cause determined for the previous exceedance(s)?  Yes  No

Are the previous evaluations/determinations applicable to the current OEL exceedance?  Yes  No

III. OPERATIONAL EVALUATION FINDINGS

A. Did the State allow you to limit the scope of the operational evaluation?  Yes  No  
If NO, proceed to item B. If YES, attach written correspondence from the State.

B. Did the distribution system cause or contribute to your OEL exceedance(s)?  Yes  No  
 Possibly  
If NO, proceed to item C. If YES or POSSIBLY, explain (attach additional pages if necessary):

See Attachment III. B.

C. Did the treatment system cause or contribute to your OEL exceedance(s)?  Yes  No  
 Possibly  
If NO, proceed to item D. If YES or POSSIBLY, explain (attach additional pages if necessary):

MWC experienced spikes in their treatment effluent turbidity after Super-Storm Sandy.

D. Did source water quality cause or contribute to your OEL exceedance(s)?  Yes  No  
 Possibly  
If NO, proceed to item E. If YES or POSSIBLY, explain (attach additional pages if necessary):

MWC experienced spikes in their source water turbidity after Super-Storm Sandy.

E. Attach all supporting operational or other data that support the determination of the cause(s) of your OEL exceedance(s). See Source Water and Treatment process Evaluation

F. If you are unable to determine the cause(s) of the OEL exceedance(s), list the steps that you can use to better identify the cause(s) in the future (attach additional pages if necessary):

checklists

G. List steps that could be considered to minimize future OEL exceedances (attach additional pages if necessary)

See Attachment III. G.

H. Total Number of Pages Submitted, Including Attachments and Checklists:

23 pages including cover page

**OPERATIONAL EVALUATION REPORTING FORM**

HAA5  $\geq$  0.060mg/l

<u>II B. 2.</u>	Quarter Before Previous Quarter	Previous Quarter	Current Quarter	Current Quarter	OE Exceedance (Average)
Poor Farm & Brewster Circle	92	49	93	93	82
Brandeis Road	87	48	75	75	71
Shelley & Cheesequake Road	89	53	85	85	78

III B.

Both Middlesex Water Company (MWC) and the Old Bridge MUA experienced a week long power outage due to Super-Storm Sandy. A generator malfunctioned at the MWC intake that resulted in a drawdown of their water storage tanks to very low levels. That water that was emptied from the MWC tanks was delivered to the Old Bridge MUA Water Storage Tank on Perrine Road. The interconnection with MWC was then shut due to an impending boil water advisory by MWC. The Old Bridge MUA Storage Tank on Perrine Road did not receive water from MWC during the time the interconnection with MWC was shut. The water in the Perrine Road Tank had a longer contact time than normal due to the low water demand in the aftermath of Super-Storm Sandy, and the increased reliance by the Old Bridge MUA on our groundwater treatment plants to meet the water demands in the low pressure zone. The water in the Perrine Road Water Storage Tank was utilized only for the high pressure zone during this power outage, and the water resided in the tank without an additional supply of water entering and mixing in the tank.

III G.

The Old Bridge MUA is taking both short term and long term actions to minimize future OEL exceedances. The short term solutions include examinations of our storage tank and operational procedures as well as discussions with our wholesale water company, Middlesex Water Company, to reduce the amount of organic material in the finished water purchased from them. Specifically, the short term solutions that involve the operation of our distribution system include the inspection of the inside of a 10 MG water storage tank on Perrine Road. The Old Bridge MUA recently authorized Utility Service Company to visual inspect and report on the condition of the inside of the Perrine Road Tank utilizing a remote operated vehicle camera. Utility Service Company reported that there was only a minor amount of debris that settled on the floor of the tank and a minimal amount of corrosion, and recommended cleaning and painting the inside of the tank within the next three (3) years. The Old Bridge MUA is also currently preparing bids specifications to empty the Perrine Road Tank and clean the interior and install a tank mixer. The Old Bridge MUA is also in the process leasing a continuous analyzer to be located at the Perrine Road facility in order to test various chlorine levels to optimize disinfection while utilizing the least amount of chlorine, and the same time keeping the THM levels to a minimum. The Old Bridge MUA is meeting both with the Department Personal and Middlesex Water Company Personal to discuss the surface water treatment plant and distribution operations of the finished water that is purchased by Old Bridge MUA in an attempt to minimize the organics in the finished water.

III.G. (Continued)

The long term solutions involve investigating the cost effectiveness of the following long term solutions: Installing blowers and venting in the Perrine Road 10 MG tank, installing spray aeration inside the Perrine Road 10 MG tank, adding carbon treatment at the Perrine Road site, and extending a water main from the Old Bridge MUA's groundwater distribution system to the Perrine Road Tank in order to mix surface water and groundwater in the tank to reduce the concentration of the organic material in the finished water purchased from Middlesex Water Company.

**TTHM and HAA5 Sample Collection and Handling Checklist**

Facility Name: Old Bridge MUA

Checklist Completed by:

Date: 2/25/13

Yes No

- Did you obtain appropriate sample collection vials provided from the laboratory?
- Did the sample vials contain the proper preservative and dechlorinating agents?
- Was each vial labeled using waterproof labels and indelible ink?
- Did each vial contain the following information on the label?
  - Unique sample ID
  - System name
  - Sample location
  - Sample date and time
  - Analysis required, if not already on label
- Did you remove the aerator from the tap if there was one present? *N/A curb sample stations*
- Did you open the water tap and allow the system to flush until the water temperature had stabilized (usually about 3-5 minutes)?
- Did you adjust the flow so that no air bubbles were visually detected in the flowing stream?
- Did you slowly fill the sample vial almost to the top without overflowing?
- Were you careful not to rinse out any of the preservative/dechlorinating agent during this process?
- After the bottle was filled, did you invert it three or four times to mix the sample with the preservative and dechlorinating agents?
- If you collected a TTHM sample that requires acidification, did you: *N/A HAA5 Exceedance*
  - Let the sample set for about 1 minute, allowing the dechlorinating chemical to take effect?
  - Carefully open the vial and adjust the pH of the TTHM sample to < 2 by adding approximately 4 drops of hydrochloric acid for every 40 mL of sample (amount of acid needed will depend on buffering capacity of sample)?
  - Recap the vial, and invert three or four times?

# TTM and HAA5 Sample Collection and Handling Checklist

Yes No

- Did you invert the vial and tap it to check for air bubbles?
- If bubbles were detected, did you carefully open the vial and add more sample water using the cap to achieve a headspace-free sample? *Note that air bubbles would more likely lead to a lower level of THMs or HAAs.*
- Did you immediately cool the samples to 4°C by placing them in a cooler with frozen refrigerant packs or ice, or in a refrigerator? Samples should be maintained at this temperature during shipping to the laboratory.
- Did you complete the Sample Chain of Custody provided by the laboratory and include it with the sample shipment?
- Was the sample holding time of 14 days exceeded?
- Was the extract holding time exceeded?  
*EPA Method 551.1: 14 days at a temperature less than -10°C*  
*EPA Method 552.1: 48 hours at 4°C or less*  
*EPA Method 552.2: 7 days at 4°C or 14 days at a temperature less than -10°C*  
*EPA Method 552.3: 21 days for MTBE extraction solvent at -10°C or less*  
*OR 28 days for TAME extraction solvent at -10°C or less*  
*Standard Method 6251 B: 21 days at -11°C*
- Did the laboratory invalidate the sample?

Notes/Comments

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# Old Bridge MUA Groundwater WTPs

## Treatment Process Evaluation Checklist Page 1 of 4

NO DATA AVAILABLE

Facility Name: Old Bridge MUA Groundwater WTPs

Checklist Completed by: Guy Donatelli and Mike Roy Date: 2/25/13

A. Review finished water data for the time period prior to the OEL exceedance(s) and compare to historical finished water data using the following questions:

- Were DBP precursors (TOC, DOC, SUVA, bromide, etc.) higher than normal?  Yes  No
- Was finished water pH higher or lower than normal?  Yes  No
- Was the finished water temperature higher than normal?  Yes  No
- Was finished water turbidity higher than normal?  Yes  No
- Was the disinfectant concentration leaving the plant(s) higher than normal?  Yes  No
- Were finished water TTHM/HAA5 levels higher than normal?  Yes  No
- Were operational and water quality data available to the system operator for effective decision making?  Yes  No

B. Does the treatment process include predisinfection?  Yes  No

If NO, proceed to item C. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes                                 | No                                  |   |
|-------------------------------------|-------------------------------------|---|
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Was disinfected raw water stored for an unusually long time?                          |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Were treatment plant flows lower than normal?   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Were treatment plant flows equally distributed among different trains?                |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Were water temperatures high or warmer than usual?                                    |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Were chlorine feed rates outside the normal range?                                    |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Was a disinfectant residual present in the treatment train following predisinfection? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Were online instruments utilized for process control?                                 |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Did you switch to free chlorine as the oxidant?                                       |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Was there a recent change (or addition) of pre-oxidant?                               |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Did you change the location of the predisinfection application?                       |

C. Does your treatment process include presedimentation?  Yes  No

If NO, proceed to item D. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes                                 | No                                  |  |
|-------------------------------------|-------------------------------------|--|
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Were flows low?  |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Were flows high?   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Were online instruments utilized for process control?          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Was sludge removed from the presedimentation basin?            |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Was sludge allowed to accumulate for an excessively long time? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Do you add a coagulant to your presedimentation basin?         |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Was there a problem with the coagulant feed?                   |



# Old Bridge MUA Groundwater WTPs

## Treatment Process Evaluation Checklist

Page 2 of 4

D. Does your treatment process include coagulation and/or flocculation?  Yes  No

If NO, proceed to item E. If YES, answer the following questions for the period in which an OEL exceedance occurred:

Yes No

- Were there any feed pump failures or were feed pumps operating at improper feed rates?
- Were chemical feed systems controlled by flow pacing?
- Were there changes in coagulation practices or the feed point?
- Did you change the type or manufacturer of the coagulant?
- Do you suspect that the coagulant in use at the time of the OEL exceedance did not meet industry standards?
- Did the pH or alkalinity change at the point of coagulant addition?
- Were there broken or plugged mixers?
- Were flow rates above the design rate or was there short-circuiting?

E. Does your treatment process include sedimentation or clarification?  Yes  No

If NO, proceed to item F. If YES, answer the following questions for the period in which an OEL exceedance occurred:

Yes No

- Were there changes in plant flow rate that may have resulted in a decrease in settling time or carry-over of process solids?
- Were settled water turbidities higher than normal?
- Was there any disruption in the sludge blanket that may have resulted in carryover to the point of disinfection?
- Was there any maintenance in the basin that may have stirred sludge from the bottom of the basin and caused it to carry over to the point of disinfectant addition?
- Was sludge allowed to accumulate for an excessively long time or was there a malfunction in the sludge removal equipment?

Old Bridge MUA Groundwater WTPs

Treatment Process Evaluation Checklist

F. Does your treatment process include filtration?  Yes  No

If NO, proceed to item G. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes                          | No                                  |  |
|------------------------------|-------------------------------------|--|
| <input type="checkbox"/>     | <input checked="" type="checkbox"/> | Was there an increase in individual or combined filter effluent turbidity or particle counts?  |
| <input type="checkbox"/>     | <input checked="" type="checkbox"/> | Was there an increase in turbidity or particle loading onto the filters?   |
| <input type="checkbox"/>     | <input checked="" type="checkbox"/> | Was there an increase in flow onto the filters or malfunction of the rate of flow controllers?   |
| <input type="checkbox"/>     | <input checked="" type="checkbox"/> | Were any filters taken off-line for an extended period of time that caused the other filters to operate near maximum design capacity and created the conditions for possible breakthrough? |
| <input type="checkbox"/>     | <input checked="" type="checkbox"/> | Were any filters operated beyond their normal filter run time?   |
| <input type="checkbox"/>     | <input checked="" type="checkbox"/> | Were there any unusual spikes in individual filter effluent turbidity (which may indicate particulate or colloidal TOC breakthrough) in the days leading to the excursion?                 |
| N/A <input type="checkbox"/> | <input type="checkbox"/>            | Were all filters run in a filter-to-waste mode during initial filter ripening?   |
| N/A <input type="checkbox"/> | <input type="checkbox"/>            | If GAC filters are used, is it possible the adsorptive capacity of the GAC bed was reached before reactivation occurred (leave blank if not applicable)?                                   |
| N/A <input type="checkbox"/> | <input type="checkbox"/>            | If biological filtration is used, were there any process upsets that may have resulted in the breakthrough of TOC (leave blank if not applicable)?   |

G. Does your treatment process include primary disinfection by injecting chlorine prior to a clearwell?  Yes  No

If NO, proceed to item H. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes                      | No                                  |  |
|--------------------------|-------------------------------------|--|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Was there a sudden increase in the amount of chlorine fed or an increase in the chlorine residual? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Was there an increase in clearwell holding time?   |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Was the plant shut down or were plant flows low?   |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Was there an increase in clearwell water temperature?  |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Did you switch to free chlorine recently as the primary disinfectant?                              |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Was the inactivation of <i>Giardia</i> and/or viruses exceptionally high?                          |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Was there a change in the mixing strategy (i.e., mixers not used, adjustment of tank level)?       |

H. Does your plant recycle spent filter backwash or other streams?  Yes  No

If NO, proceed to item I. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes                      | No                                  |   |
|--------------------------|-------------------------------------|---|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Did a change in the recycle stream quality contribute to increased DBP precursor loading that was not addressed by treatment plant processes? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Did a recycle event result in flows in excess of typical or design flows?   |

Treatment Process Evaluation Checklist Page 4 of 4

I. Do you inject a disinfectant after your clearwell to maintain a distribution system residual?  Yes  No  
If NO, proceed to item J. If YES, answer the following questions for the period in which an OEL exceedance occurred:  
Yes No  
  Was there a sudden increase in the amount of chlorine fed?  
  Was there a switch from chloramines to free chlorine for a burnout period?  
N/A   If using chloramines, was the chlorine to ammonia ratio in the proper range?  
N/A   Was there a problem with either chlorine or ammonia mixing?

J. Did concern about complying with a rule other than Stage 2 DBPR, such as the Lead and Copper rule, the LT2ESWTR, or any other rule constrain your options to reduce the DBP levels at this site? For example, are you limited by other treatment targets/requirements in your ability to control precursors in coagulation/flocculation?  Yes  No  
If NO, proceed to item K. If YES, explain below and consult EPA's *Simultaneous Compliance Guidance Manual* for alternative compliance approaches.

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K. Conclusion  Yes  No  
Did treatment factors and/or variations in the plant performance contribute to the OEL exceedance(s)?  Possibly

If YES or POSSIBLY, explain below.

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# Old Bridge MUA Groundwater WTPs

## Source Water Evaluation Checklist Page 1 of 2

NO DATA AVAILABLE

System Name: Old Bridge MUA Groundwater WTPs

Checklist Completed by: Guy Donnell and Mike Roy Date: 2/25/13

A. Do you have source water temperature data?  Yes  No  
 If NO, proceed to item B. If YES, was the source water temperature high?  Yes  No  
 If NO, proceed to item B. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes No

Was the raw water storage time longer than usual?

Did you place another water source on-line?

Were river/reservoir flow rates lower than usual? If yes, indicate the location of lower flow rates and the anticipated impact on the OEL exceedance.

Did point or non-point sources in the watershed contribute to the OEL exceedance?

B. Do you have data that characterizes organic matter in your source water (e.g. TOC, DOC, SUVA, color, THM formation potential)?  Yes  No  
 If NO, proceed to item C. If YES, were these values higher than normal? N/A  Yes  No  
 If NO, proceed to item C. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes No

Did heavy rainfall or snowmelt occur in the watershed?

Did you place another water source on-line?

Did lake or reservoir turnover occur?

Did point or non-point sources in the watershed contribute to the OEL exceedance?

Did an algal bloom occur in the source water?

If algal blooms were present, were appropriate algae control measures employed (e.g., addition of copper sulfate)?

Did a taste and odor incident occur?

C. Do you have source water bromide data?  Yes  No  
 If NO, proceed to item D. If YES, were the bromide levels higher or lower than normal?  Yes  No  
 If NO, proceed to item D. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes No

Has salt water intrusion occurred?

Are you experiencing a long-term drought?

Did heavy rainfall or snowmelt occur in the watershed?

Did you place another water source on-line?

Are you aware of any industrial spills in the watershed?

# Old Bridge MUA Groundwater WTPs

## Source Water Evaluation Checklist Page 2 of 2

D. Do you have source water turbidity or particle count data? N/A  Yes  No

If NO, proceed to item E. If YES, were the turbidity values or particle counts higher than normal?  Yes  No

If NO, proceed to item E. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes    No

Did lake or reservoir turnover occur?

Did heavy rainfall or snowmelt occur in the watershed?

Did logging, fires, or landslides occur in the watershed?

Were river/reservoir flow rates higher than normal?

E. Do you have source water pH or alkalinity data?  Yes  No

If NO, proceed to item F. If YES, was the pH or alkalinity different from normal values?  Yes  No

If NO, proceed to item F. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes    No

Was there an algal bloom in the source water?

If algal blooms were present, were algae control measures employed?

Did heavy rainfall or snowmelt occur in the watershed?

Has the PWS experienced diurnal pH changes in source water?

F. Conclusion

Did source water quality factors contribute to your OEL exceedance?  Yes  No

Possibly

If YES or POSSIBLY, explain below.

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All source water at these WTPs are from Groundwater Aquifers.

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13

# Middlesex Water Company (MWC)

## Surface Water WTP

Treatment Process Evaluation Checklist	Page 1 of 4																																	
<input type="checkbox"/> NO DATA AVAILABLE																																		
Facility Name: <u>Middlesex Water Company WTP</u> Checklist Completed by: <u>Mike Ray Assisted by MWC Personnel</u> Date: <u>2/14/13</u>																																		
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<b>B. Does the treatment process include predisinfection?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																																		
If NO, proceed to item C. If YES, answer the following questions for the period in which an OEL exceedance occurred:																																		
<table style="width: 100%; border: none;"> <tr> <td style="width: 10%; text-align: center;">Yes</td> <td style="width: 10%; text-align: center;">No</td> <td></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Was disinfected raw water stored for an unusually long time?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Were treatment plant flows lower than normal?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Were treatment plant flows equally distributed among different trains?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Were water temperatures high or warmer than usual?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Were chlorine feed rates outside the normal range?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Was a disinfectant residual present in the treatment train following predisinfection?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Were online instruments utilized for process control?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Did you switch to free chlorine as the oxidant?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Was there a recent change (or addition) of pre-oxidant?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Did you change the location of the predisinfection application?</td> </tr> </table>	Yes	No		<input type="checkbox"/>	<input type="checkbox"/>	Was disinfected raw water stored for an unusually long time?	<input type="checkbox"/>	<input type="checkbox"/>	Were treatment plant flows lower than normal?	<input type="checkbox"/>	<input type="checkbox"/>	Were treatment plant flows equally distributed among different trains?	<input type="checkbox"/>	<input type="checkbox"/>	Were water temperatures high or warmer than usual?	<input type="checkbox"/>	<input type="checkbox"/>	Were chlorine feed rates outside the normal range?	<input type="checkbox"/>	<input type="checkbox"/>	Was a disinfectant residual present in the treatment train following predisinfection?	<input type="checkbox"/>	<input type="checkbox"/>	Were online instruments utilized for process control?	<input type="checkbox"/>	<input type="checkbox"/>	Did you switch to free chlorine as the oxidant?	<input type="checkbox"/>	<input type="checkbox"/>	Was there a recent change (or addition) of pre-oxidant?	<input type="checkbox"/>	<input type="checkbox"/>	Did you change the location of the predisinfection application?	
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<input type="checkbox"/>	<input type="checkbox"/>	Was disinfected raw water stored for an unusually long time?																																
<input type="checkbox"/>	<input type="checkbox"/>	Were treatment plant flows lower than normal?																																
<input type="checkbox"/>	<input type="checkbox"/>	Were treatment plant flows equally distributed among different trains?																																
<input type="checkbox"/>	<input type="checkbox"/>	Were water temperatures high or warmer than usual?																																
<input type="checkbox"/>	<input type="checkbox"/>	Were chlorine feed rates outside the normal range?																																
<input type="checkbox"/>	<input type="checkbox"/>	Was a disinfectant residual present in the treatment train following predisinfection?																																
<input type="checkbox"/>	<input type="checkbox"/>	Were online instruments utilized for process control?																																
<input type="checkbox"/>	<input type="checkbox"/>	Did you switch to free chlorine as the oxidant?																																
<input type="checkbox"/>	<input type="checkbox"/>	Was there a recent change (or addition) of pre-oxidant?																																
<input type="checkbox"/>	<input type="checkbox"/>	Did you change the location of the predisinfection application?																																
<b>C. Does your treatment process include presedimentation?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																																		
If NO, proceed to item D. If YES, answer the following questions for the period in which an OEL exceedance occurred:																																		
<table style="width: 100%; border: none;"> <tr> <td style="width: 10%; text-align: center;">Yes</td> <td style="width: 10%; text-align: center;">No</td> <td></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Were flows low?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Were flows high?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Were online instruments utilized for process control?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Was sludge removed from the presedimentation basin?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Was sludge allowed to accumulate for an excessively long time?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Do you add a coagulant to your presedimentation basin?</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Was there a problem with the coagulant feed?</td> </tr> </table>	Yes	No		<input type="checkbox"/>	<input type="checkbox"/>	Were flows low?	<input type="checkbox"/>	<input type="checkbox"/>	Were flows high?	<input type="checkbox"/>	<input type="checkbox"/>	Were online instruments utilized for process control?	<input type="checkbox"/>	<input type="checkbox"/>	Was sludge removed from the presedimentation basin?	<input type="checkbox"/>	<input type="checkbox"/>	Was sludge allowed to accumulate for an excessively long time?	<input type="checkbox"/>	<input type="checkbox"/>	Do you add a coagulant to your presedimentation basin?	<input type="checkbox"/>	<input type="checkbox"/>	Was there a problem with the coagulant feed?										
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Middlesex Water Company (MWC)  
Surface Water WTP

Treatment Process Evaluation Checklist		Page 2 of 4
D. Does your treatment process include coagulation and/or flocculation?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If NO, proceed to item E. If YES, answer the following questions for the period in which an OEL exceedance occurred:		
Yes	No	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Were there any feed pump failures or were feed pumps operating at improper feed rates?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Were chemical feed systems controlled by flow pacing?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Were there changes in coagulation practices or the feed point?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Did you change the type or manufacturer of the coagulant?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Do you suspect that the coagulant in use at the time of the OEL exceedance did not meet industry standards?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Did the pH or alkalinity change at the point of coagulant addition?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Were there broken or plugged mixers?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Were flow rates above the design rate or was there short-circuiting?
E. Does your treatment process include sedimentation or clarification?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If NO, proceed to item F. If YES, answer the following questions for the period in which an OEL exceedance occurred:		
Yes	No	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Were there changes in plant flow rate that may have resulted in a decrease in settling time or carry-over of process solids?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Were settled water turbidities higher than normal?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Was there any disruption in the sludge blanket that may have resulted in carryover to the point of disinfection?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Was there any maintenance in the basin that may have stirred sludge from the bottom of the basin and caused it to carry over to the point of disinfectant addition?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Was sludge allowed to accumulate for an excessively long time or was there a malfunction in the sludge removal equipment?

**Treatment Process Evaluation Checklist**

F. Does your treatment process include filtration?  Yes  No

If NO, proceed to item G. If YES, answer the following questions for the period in which an OEL exceedance occurred:

Yes	No	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Was there an increase in individual or combined filter effluent turbidity or particle counts?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Was there an increase in turbidity or particle loading onto the filters?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Was there an increase in flow onto the filters or malfunction of the rate of flow controllers?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Were any filters taken off-line for an extended period of time that caused the other filters to operate near maximum design capacity and created the conditions for possible breakthrough?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Were any filters operated beyond their normal filter run time?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Were there any unusual spikes in individual filter effluent turbidity (which may indicate particulate or colloidal TOC breakthrough) in the days leading to the excursion?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Were all filters run in a filter-to-waste mode during initial filter ripening?
<input type="checkbox"/>	<input type="checkbox"/>	If GAC filters are used, is it possible the adsorptive capacity of the GAC bed was reached before reactivation occurred (leave blank if not applicable)?
<input type="checkbox"/>	<input type="checkbox"/>	If biological filtration is used, were there any process upsets that may have resulted in the breakthrough of TOC (leave blank if not applicable)?

G. Does your treatment process include primary disinfection by injecting chlorine prior to a clearwell?  Yes  No

If NO, proceed to item H. If YES, answer the following questions for the period in which an OEL exceedance occurred:

Yes	No	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Was there a sudden increase in the amount of chlorine fed or an increase in the chlorine residual?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Was there an increase in clearwell holding time?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Was the plant shut down or were plant flows low?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Was there an increase in clearwell water temperature?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Did you switch to free chlorine recently as the primary disinfectant?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Was the inactivation of <i>Giardia</i> and/or viruses exceptionally high?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Was there a change in the mixing strategy (i.e., mixers not used, adjustment of tank level)?

H. Does your plant recycle spent filter backwash or other streams?  Yes  No

If NO, proceed to item I. If YES, answer the following questions for the period in which an OEL exceedance occurred:

Yes	No	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Did a change in the recycle stream quality contribute to increased DBP precursor loading that was not addressed by treatment plant processes?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Did a recycle event result in flows in excess of typical or design flows?



# MWC Surface water WTP

Treatment Process Evaluation Checklist		Page 4 of 4
I.	Do you inject a disinfectant after your clearwell to maintain a distribution system residual? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If NO, proceed to item J. If YES, answer the following questions for the period in which an OEL exceedance occurred: Yes No <input type="checkbox"/> <input checked="" type="checkbox"/> Was there a sudden increase in the amount of chlorine fed? <input type="checkbox"/> <input checked="" type="checkbox"/> Was there a switch from chloramines to free chlorine for a burnout period? <input type="checkbox"/> <input type="checkbox"/> If using chloramines, was the chlorine to ammonia ratio in the proper range? <input type="checkbox"/> <input type="checkbox"/> Was there a problem with either chlorine or ammonia mixing?	
J.	Did concern about complying with a rule other than Stage 2 DBPR, such as the Lead and Copper rule, the LT2ESWTR, or any other rule constrain your options to reduce the DBP levels at this site? For example, are you limited by other treatment targets/requirements in your ability to control precursors in coagulation/flocculation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If NO, proceed to item K. If YES, explain below and consult EPA's <i>Simultaneous Compliance Guidance Manual</i> for alternative compliance approaches.  _____ _____	
K.	<b>Conclusion</b> Did treatment factors and/or variations in the plant performance contribute to the OEL exceedance(s)? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Possibly If YES or POSSIBLY, explain below.  _____ _____  SEE ATTACHED _____ _____ _____	

Middlesex Water Company (MWC)  
Surface Water WTP

Source Water Evaluation Checklist	Page 1 of 2																																							
<input type="checkbox"/> NO DATA AVAILABLE System Name: <u>Middlesex Water Company WTP</u> Checklist Completed by: <u>Mike Roy Assisted by MWC personnel</u> Date: <u>2/14/13</u>																																								
<p>A. Do you have source water temperature data? <span style="float: right;"><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</span></p> <p style="padding-left: 20px;">If NO, proceed to item B. If YES, was the source water temperature high? <span style="float: right;"><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</span></p> <p style="padding-left: 20px;">If NO, proceed to item B. 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Do you have data that characterizes organic matter in your source water (e.g., TOC, DOC, SUVA, color, THM formation potential)? <span style="float: right;"><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</span></p> <p style="padding-left: 20px;">If NO, proceed to item C. If YES, were these values higher than normal? <span style="float: right;"><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</span></p> <p style="padding-left: 20px;">If NO, proceed to item C. 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<p>C. Do you have source water bromide data? <span style="float: right;"><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</span></p> <p style="padding-left: 20px;">If NO, proceed to item D. If YES, were the bromide levels higher or lower than normal? <span style="float: right;"><input type="checkbox"/> Yes <input type="checkbox"/> No</span></p> <p style="padding-left: 20px;">If NO, proceed to item D. If YES, answer the following questions for the time period prior to the OEL exceedance.</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;">Yes</th> <th style="text-align: left; padding: 2px;">No</th> <th style="padding: 2px;"></th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="padding: 2px;">Has saltwater intrusion occurred?</td> </tr> <tr> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="padding: 2px;">Are you experiencing a long-term drought?</td> </tr> <tr> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="padding: 2px;">Did heavy rainfall or snowmelt occur in the watershed?</td> </tr> <tr> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="padding: 2px;">Did you place another water source on-line?</td> </tr> <tr> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="padding: 2px;">Are you aware of any industrial spills in the watershed?</td> </tr> </tbody> </table>	Yes	No		<input type="checkbox"/>	<input type="checkbox"/>	Has saltwater intrusion occurred?	<input type="checkbox"/>	<input type="checkbox"/>	Are you experiencing a long-term drought?	<input type="checkbox"/>	<input type="checkbox"/>	Did heavy rainfall or snowmelt occur in the watershed?	<input type="checkbox"/>	<input type="checkbox"/>	Did you place another water source on-line?	<input type="checkbox"/>	<input type="checkbox"/>	Are you aware of any industrial spills in the watershed?																						
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MWC Surface Water WTP

Source Water Evaluation Checklist	Page 2 of 2
<p>D. Do you have source water turbidity or particle count data? <span style="float: right;"><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</span></p> <p style="padding-left: 20px;">If NO, proceed to item E. If YES, were the turbidity values or particle counts higher than normal? <span style="float: right;"><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</span></p> <p style="padding-left: 20px;">If NO, proceed to item E. If YES, answer the following questions for the time period prior to the OEL exceedance.</p> <p style="padding-left: 20px;">Yes    No</p> <p><input type="checkbox"/>    <input type="checkbox"/> Did lake or reservoir turnover occur?</p> <p><input type="checkbox"/>    <input type="checkbox"/> Did heavy rainfall or snowmelt occur in the watershed?</p> <p><input type="checkbox"/>    <input type="checkbox"/> Did logging, fires, or landslides occur in the watershed?</p> <p><input type="checkbox"/>    <input type="checkbox"/> Were river/reservoir flow rates higher than normal?</p>	
<p>E. Do you have source water pH or alkalinity data? <span style="float: right;"><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</span></p> <p style="padding-left: 20px;">If NO, proceed to item F. If YES, was the pH or alkalinity different from normal values? <span style="float: right;"><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</span></p> <p style="padding-left: 20px;">If NO, proceed to item F. If YES, answer the following questions for the time period prior to the OEL exceedance.</p> <p style="padding-left: 20px;">Yes    No</p> <p><input type="checkbox"/>    <input type="checkbox"/> Was there an algal bloom in the source water?</p> <p><input type="checkbox"/>    <input type="checkbox"/> If algal blooms were present, were algae control measures employed?</p> <p><input type="checkbox"/>    <input type="checkbox"/> Did heavy rainfall or snowmelt occur in the watershed?</p> <p><input type="checkbox"/>    <input type="checkbox"/> Has the PWS experienced diurnal pH changes in source water?</p>	
<p>F. Conclusion</p> <p style="text-align: right;"><input type="checkbox"/> Yes    <input type="checkbox"/> No</p> <p>Did source water quality factors contribute to your OEL exceedance? <span style="float: right;"><input checked="" type="checkbox"/> Possibly</span></p> <p style="padding-left: 20px;">If YES or POSSIBLY, explain below.</p> <hr/> <p style="text-align: center; font-size: 1.2em;">SEE ATTACHED</p> <hr/> <hr/> <hr/>	

# MWE Surface Water WTP

## Treatment Process Evaluation

### K. Conclusion

Finished water DBP precursors were slightly elevated, the TOC increased 9% from 1.5 to 1.6 mg/l and the UV-254 went from 0.028 to 0.032 abs/cm, before and after the storm respectively. But the percent TOC removal through the plant increased from 52% to 61%. The plant maintained effluent turbidity below the 0.3 NTU regulation the entire time with only two (2) spikes to 0.12 NTU on 11/3 and 11/5. Settled turbidity did rise several times after the storm due to power outages and flow changes which may have increased the loading on the filters but they were for only very short time periods. The power outages also may have briefly increased holding times in the chlorine contact basins.

The plant complied with all state and federal regulations regarding surface water plant operation and water quality. Plant performance varied slightly but within normal operation parameters, although there is a possibility that the variation could have contributed slightly to the OEL exceedance.

## Source Water Evaluation

### F. Conclusion

Rain from Hurricane Sandy caused an increase in organics in the source water. The TOC had a modest increase from 3 mg/l prior to the storm to slightly over 4 mg/l after the storm. The UV-254 went from 0.12 abs/cm to 0.18 abs/cm. To put it in perspective the range of source water TOC for 2012 was 1.4 mg/l to 10 mg/l and UV-254 was 0.04 to 0.4 abs/cm. The alkalinity decreased slight from 50 mg/l to 40 mg/l but is not out of the normal range. The pH was steady at approximately 7.1. Because the rainfall was not as high as it could have been the source water turbidity never went over 5 NTU.

TOC and UV-254 are surrogate parameters for indicating potential DBP formation. When they increase DBPs tend to increase and vice versa. Although there is no direct correlation on how much they will be affected it could contribute to an OEL exceedance.

# Distribution System Evaluation Checklist

System Name: Old Bridge MUA  
 Checklist Completed by: Mike Ray and Guy Donatelli Date: 2/15/13

A. Do you have disinfectant residual or temperature data for the monitoring location where you experienced the OEL exceedance?  Yes  No

If NO, proceed to item B. If YES, answer the following questions for the period in which an OEL exceedance occurred:

Yes No

Was the water temperature higher than normal for that time of the year at that location?

Was the disinfectant residual lower than normal for that time of the year at that location?

Was the disinfectant residual higher than normal for that time of the year at that location?

B. Do you have maintenance records available for the time period just prior to the OEL exceedance?  Yes  No

If NO, proceed to item C. If YES, answer the following questions:

Yes No

Did any line breaks or replacements occur in the vicinity of the exceedance?

Were any storage tanks or reservoirs taken off-line and cleaned?

Did flushing or other hydraulic disturbances (e.g., fires) occur in the vicinity of the exceedance?

Were any valves operated in the vicinity of the OEL exceedances?

C. If your system is metered, do you have access to historical records showing water use at individual service connections?  Yes  No

If NO, proceed to item D. If YES, was overall water use in your system unusually low, indicating higher than normal water age?  Yes  No

D. Do you have high-volume customers in your system (e.g., an industrial processing plant)?  Yes  No

If NO, proceed to item E. If YES, was there a change in water use by a high-volume customer?  Yes  No

E. Is there a finished water storage facility hydraulically upstream from the monitoring location where you experienced the OEL exceedance?  Yes  No

If NO, proceed to item F. If YES, review storage facility operations and water quality data to answer the following questions for the period in which the OEL exceedance occurred:

Yes No

Was a disinfectant residual detected in the stored water or at the tank outlet?

Do you know of any mixing problems with the tank or reservoir?

Does the facility operate in "last in-first out" mode?

Was the tank or reservoir drawn down more than usual prior to OEL exceedance, indicating a possible discharge of stagnant water?

Was there a change in water level fluctuations that would have resulted in increased water age within the tank or reservoir?

**Distribution System Evaluation Checklist**

F. Does your system practice booster chlorination?  Yes  No  
If NO, proceed to item G. If YES, was there an increase in booster chlorination feed rates?  Yes  No

G. Did you have customer complaints in the vicinity of the OEL exceedance?  Yes  No  
If NO, proceed to item H. If YES, explain.

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H. Did concern about complying with a rule other than Stage 2 DBPR, such as the Lead and Copper rule, the TCR, or any other rule constrain your options to reduce the DBP levels at this site? For example, are you limited by the need to maintain a detectable disinfectant residual in your ability to control DBP levels in the distribution system?  Yes  No  
If NO, proceed to item I. If YES, explain below and consult EPA's *Simultaneous Compliance Guidance Manual* for alternative compliance approaches.

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**I. Conclusion**

Did the distribution system cause or contribute to the OEL exceedance(s)?  Yes  No  
 Possibly  
If NO, proceed to evaluations of treatment systems and source water. If YES or POSSIBLY, explain below.

See Attachment I

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## DISTRIBUTION SYSTEM EVALUATION CHECKLIST

### I. Conclusion

Both Middlesex Water Company (MWC) and the Old Bridge MUA experienced a week long power outage due to Super-Storm Sandy. A generator malfunctioned at the MWC intake that resulted in a drawdown of their water storage tanks to very low levels. That water that was emptied from the MWC tanks was delivered to the Old Bridge MUA Water Storage Tank on Perrine Road. The interconnection with MWC was then shut due to an impending boil water advisory by MWC. The Old Bridge MUA Storage Tank on Perrine Road did not receive water from MWC during the time the interconnection with MWC was shut. The water in the Perrine Road Tank had a longer contact time than normal due to the low water demand in the aftermath of Super-Storm Sandy, and the increased reliance by the Old Bridge MUA on our groundwater treatment plants to meet the water demands in the low pressure zone. The water in the Perrine Road Water Storage Tank was utilized only for the high pressure zone during this power outage, and the water resided in the tank without an additional supply of water entering and mixing in the tank.