
**CITY OF NEW BRUNSWICK
COMPREHENSIVE TECHNICAL ASSISTANCE (CTA)
MONTHLY PROGRESS REPORT**

TO: FRANK J. MARASCIA
FROM: HOWARD J. WOODS, JR., P.E.
SUBJECT: MONTHLY REPORT FOR DECEMBER 2013
DATE: JANUARY 14, 2014

I. PERFORMANCE LIMITING FACTORS DEFINED IN THE COMPREHENSIVE PERFORMANCE EVALUATION

A. ADMINISTRATION – POLICIES ADMINISTRATION (A)

1. Adopt Plant Performance Goals

During the month of December, the gravity filters were not used to produce water. All filtration operations were shifted to the membrane filters and the City continued to purchase water from the East Brunswick Water Department. This is water produced by Middlesex Water Company at the Carl J. Olsen Water Filtration Plant and delivered to East Brunswick.

Gravity filtration operations were suspended to all the filters to be removed from service for additional repairs and upgrades. This includes replacing aging filter effluent control valves, replacing loss-of-head gages that were determined in the CTA to be unreliable, to remove odd surface wash equipment that was abandoned in place in 2005, to verify and calibrate the backwash rate of flow controller and verify and calibrate the individual filter rate of flow controllers. In addition, a proposal has been obtained from Roberts Filter to conduct full inspections of all eight filters.

Through November 2013, the operation of the filters was stabilized and performance at IFE turbidity levels consistently below 0.3 NTU was achieved. However, better performance is possible. The objective is to improve filter performance to the point where IFE turbidity is consistently below the target of 0.1 NTU. After the work discussed in the previous paragraph is complete (possibly by the end of February or early in March), the filters will be returned to service and additional work to develop refined performance goals will be undertaken. Once the filtration process is optimized, work will turn toward optimizing the coagulation/sedimentation process.

2. Outdated or Inadequate Continuous Monitoring Equipment

New loss of head gages have been purchased for use on the gravity filters. The existing combined filter effluent turbidimeter will be relocated to a more representative location to provide an accurate measure of the combined filter effluent turbidity for only the gravity filters. These instruments will be installed/relocated while the gravity filters are out of service.

Previously, a streaming current monitor was installed to continuously monitor the effect of coagulant addition. Spare parts for this device are now on hand to allow this monitoring system to be returned to service quickly in the event of a failure. Jar testing will be done periodically as a supplemental check of the performance of the coagulation and settling processes and in the event of a failure of the streaming current monitor.

A new continuous chlorine residual analyzer was purchased and installed to measure chlorine residual at the location of the high service pumps. The pressure control issues reported last month have been corrected. This location more accurately measures the chlorine residual of water leaving the plant after the water has passed through the gravity filter clearwell. This point will be used for compliance monitoring purposes. The chlorine residual analyzer in the clearwell (referred to as the “house chlorine monitoring point”) will be retained as a back-up for the primary monitoring point at the high service pumps. A new chlorine residual analyzer was purchased and will be installed at the influent of the chlorine contact basin for additional operational control. This monitoring point will also sense a change in dose rate and will signal the operators through and alarm if the primary chlorine feed is interrupted. A contractor has been engaged to perform this work.

A more detailed evaluation of the plant SCADA system has been completed and it has been determined that the SCADA system is inadequate and should be replaced. The existing system does not have adequate redundancy to assure that the historical operating data will be properly stored for later recovery. A new System Integrator (Enterprise Automation, Inc.) has been selected and has provided the City with a proposal to phase-out the existing SCADA system and replace it with a new, state-of-the-art system. The estimated cost of the new SCADA system is \$200,000 and it is expected to be placed in service in the second quarter of 2014.

3. *Delayed Maintenance*

The City has restructured the water treatment plant staff and designated an employee to be responsible for all maintenance planning. Work is currently in progress to identify a suitable maintenance planning software program. While a final selection has not yet been made, “Maintenance Connection” appears to have the best set of features to assist in the management of the Comstock Street plant.

The City has hired a new licensed operator with extensive maintenance experience and placed this individual in a front line supervisory position over all plant maintenance personnel. This new organizational structure will ensure that the maintenance personnel receive proper training and supervision.

4. *Lack of Safety Equipment*

The City requested a survey of the plant by P-OSHA. An inspection was completed and a report is pending.

B. SUPERVISION – ADMINISTRATION (A)

The City has completed the restructuring of the water treatment function. A new T-4/W-4 licensed operator (Mr. Keith Smith) has been hired to function as the plant superintendent and began work on December 9, 2013. Mr. Smith reports directly to the Utility Director, who is also a T-4/W-4 licensed operator. The plant superintendent is responsible for all plant operations and maintenance functions. The plant superintendent has three direct reports: a supervisor of maintenance, a supervisor of operations and a maintenance planner. The supervisor of maintenance and supervisor of operations are both T-1 licensed operators. Mr. Smith will serve as the primary T-4 operator for

the facility and Mr. Marascia, the Utility Director, will serve as the back-up T-4 operator. Mr. Marascia will serve as the primary W-4 operator for the system and Mr. Smith will be the back-up W-4.

These organizational changes resolve the organizational issues identified in the CPE report.

C. WATER TREATMENT UNDERSTANDING – OPERATIONS (A)

In-service training of the plant operations and maintenance staff is now being performed by the newly installed operations staff management team. This training is also being supplemented by periodic visits by the CTA consultants.

During December, work shifted from a focus on the gravity filters, which were temporarily removed from service, to the membrane filters. Membranes were purchased and will be installed to fully populate Cell No. 1 and integrity testing will also be done on the reserved membranes. These will be used to fully populate Cells 2 through 4. Fully populating the cells will increase the output capacity of the membrane plant from 8 MGD (with one cell out of service) to 8.2 MGD. With four cells operational, the capacity will increase from 10.68 MGD to 10.95 MGD. The increased output values are based on a 30-day run between clean-in-place cycles. If the clean-in-place cycle is shortened to two weeks, an output of 4.61 MGD per cell could be maintained, giving the membrane plant a total output capacity of 18.45 MGD.

At a loading rate of 4 gpm/sf, the eight gravity filters have a total output capacity of 16.13 MGD. When the gravity filters are returned to service and optimized, a series of special studies will be conducted to determine and document the optimum balance of flow through the two filtration systems. Operational criteria will be established for the operators to govern shifts in the balance of flow to maintain target water quality objectives. During challenging raw water quality conditions, a higher percentage of water could be produced in the membrane filters while in normal and favorable conditions, more water could be produced through the gravity filters. The gravity filters have significantly better life-cycle cost profiles than the membrane filters.

After filtration operations are optimized and balanced, the CTA will focus on pre-treatment, coagulation and sedimentation operations.

D. DATA INTEGRITY – OPERATIONS (B)

A new System Integrator (Enterprise Automation, Inc.) has been selected and has provided the City with a proposal to phase-out the existing SCADA system and replace it with a new, state-of-the-art system. The existing SCADA system will remain in service for several more months and manual data recording will continue to provide a permanent record of operations until the SCADA system is replaced.

An evaluation of the time of travel through the gravity filter effluent turbidity sample lines was completed. The maximum travel time from Filter Nos. 7 and 8 to the turbidimeters was determined to be 31 seconds. As a result of the short duration, no changes in the turbidimeter locations are warranted. The present location provides easy access for the operators for maintenance and calibration of the units.

E. OPERATING GUIDELINES – OPERATIONS (B)

Work on the gravity filtration system operating guidelines will restart when the filters are placed back in service. Up-to-date operating procedures will be developed by the plant operations and maintenance staffs, with assistance from the CTA consultants, and these updated procedures will be

consolidated in a living operations manual. As new procedures are developed, the manual will be expanded.

F. MAINTENANCE – MAINTENANCE (B)

Work has already been authorized by the City to purchase replacement membranes. The membranes are roughly 5 years old and some units will need to be replaced.

As noted above, work is progressing on the replacement of gravity filter control valves and instrumentation and calibration of flow meters.

A proposal has been received for a complete and detailed inspection of the gravity filters and this proposal is currently under review. The gravity filters were completely renovated in 2005. While the media should deliver ten or more years of service, detailed inspections have not been done since the renovation project. A rolling schedule for media replacement will be developed so that the replacement of media can be done on a frequency where one or two filters are replaced each year.

G. REPRESENTATIVE SAMPLING – OPERATIONS (B)

A new CFE turbidity monitoring location will be created to provide a more representative CFE result for the gravity filters prior to introduction of water from the membrane filters. Once this is done, independent CFE reports for the membrane filters and for the gravity filters will be prepared. This will provide better operational control for the plant as a whole. The existing combined CFE monitoring point will be maintained for operational control as this point does provide a representative monitoring point for all water produced and delivered from the plant. These modifications will be coordinated with the SCADA improvements and the gravity filter improvements.

The plant chlorine residual monitoring location has been changed. The new continuous residual analyzer is supplied water through the high service pump priming supply line. The priming supply is in continuous operation so the data generated at this location will be representative of the chlorine residual at the completion of treatment operations regardless of the status of the high service pumps.

A contractor has been engaged to install a redundant chlorine feed line to the head of the chlorine contact chamber. While this work is being done, a new chlorine residual sampling pump and chlorine residual analyzer will also be installed at the head of the contact basin. This instrument will be tied to an audible alarm to give the operators instant knowledge of a change in the status of the primary chlorine feed at the inlet to the chlorine contact chamber.

ATI probe-type turbidimeters will be installed at the outlets to the two sedimentation basins. The devices have been received on site. The purpose of these two monitoring points is to give the operators real-time knowledge of the quality of the effluent leaving each individual sedimentation basin prior to the addition of lime. This will provide better operational control of the sedimentation process. The current monitoring point will continue to provide data that reflects the turbidity of the combined settled water after lime addition and prior to filtration.

A sample pump and pH probe will be installed to link pH to the operation of the streaming current monitor to provide better control of the coagulation process.

The grab sampling routine for the plant will be reviewed after the replacement of the SCADA system. The current grab sampling schedule is redundant and nearly all of this work should be eliminated. However, this cannot be completely done until a reliable data historian is available in the

SCADA system. At this point in time, the grab sampling routine provides a useful backup to the preferred automated monitoring system.

H. COMPENSATION – ADMINISTRATION (B)

This item has not yet been evaluated in the CTA. Changes in the compensation system must reflect the unionized nature of the workforce and the fact that these are public employees. A pilot proposal for training and licensing incentives is currently being developed.

II. ADDITIONAL ISSUES DEFINED DURING THE CTA

A. LIME ADDITION RELIABILITY

During the CTA, reliability issues associated with the lime feeders have been identified. Alternatives to lime addition will be reviewed during the CTA to determine the best way to adjust pH. Caustic soda, which is available at the plant, may provide a more reliable pH adjustment process and may be desirable even though the chemical is generally more costly. An evaluation of the pH adjustment process and its impact on distribution system corrosion control will be done during the CTA.

B. PRIMARY CHLORINE APPLICATION POINT RELIABILITY

A contractor has been engaged to install a second chlorine feed line to the head of the chlorine contact basin. This is a redundant line and feed system that can be used in the event of a failure of the primary feed system. As noted above, additional residual monitoring equipment and alarms will also be installed to assure continuous disinfection.

C. POTASSIUM PERMANGANATE FEED

Inspections of various elements of the plant show some evidence of manganese staining. The planned gravity filter inspections will specifically test the media to determine if manganese accumulation has effected the media in any way. Consideration is being given to the possible need to reactivate the use of potassium permanganate at the intakes. This was a practice used at the plant many years ago to control manganese, but it was suspended.

D. DISINFECTION BYPRODUCT REPORT CALCULATIONS

This issue was identified in the USEPA Sanitary Survey. The erroneous cell in the calculation form has been corrected. The calculations used to produce the reports have been verified.