
**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 JANUARY 2014
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I. PERFORMANCE LIMITING FACTORS DEFINED IN THE COMPREHENSIVE PERFORMANCE EVALUATION

A. ADMINISTRATION – POLICIES ADMINISTRATION (A)

1. Adopt Plant Performance Goals

During the month of January, 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. In January, Roberts Filter Services, Inc. conducted a detailed inspection of the gravity filters. The inspection included multiple excavations of each filter to identify any issues with the quantity and stratification of media. In addition, samples of sand and anthracite were collected from each filter for physical and chemical analysis. Preliminary findings from the inspection indicate that the filters are in good shape with the exception of an issue related to the underdrain in Filter No. 8. This may require some structural rehabilitation of the filter before it can be returned to service. A final report on the inspections is due in mid-February.

Work continued in January on replacing aging filter effluent control valves. A proposal has been received from Allied Construction and a second proposal is forthcoming from Roberts Services to complete the valve replacements and replace the loss-of-head gages in each filter on an expedited basis. In addition, these proposals will also include work needed to remove old 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.

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 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. As discussed above, these instruments will be installed/relocated while the gravity filters are out of service.

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 but the installation has been delayed by poor weather.

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)

These organizational changes put in place through early December 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 installed to fully populate Cell No. 1 and integrity testing was also be done on the reserved membranes. These wer

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 has increased from 10.68 MGD, up 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 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. Work on this phase of the CTA should begin in March when several of the gravity filters will be ready to be returned to service.

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.

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)

The City purchased and installed replacement membranes as needed to address membranes that could not meet appropriate pressure criteria. This work is complete.

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

The gravity filters were completely renovated in 2005. While the media should deliver ten or more years of service, detailed inspections had not been done since the renovation project. Full inspections of the gravity filters were completed in January and the final report will be issued once the chemical and physical testing of media samples is complete. The final report is expected in mid-February. A rolling schedule for media replacement will be developed based on the results of the report 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.

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. AS noted earlier, this work has been delayed by poor weather conditions. 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 by the utility Director.

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. 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. Visual inspections of the media done during the detailed filter inspections appear to indicate that manganese build-up has not impacted the media but this will be addressed by detailed chemical and physical testing of the media in the laboratory. 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.