ROOT CAUSE REPORT

DECEMBER 2019 WWTF FAILURE AND DISCHARGE

26 February 2020

PREPARED BY: Thomas S Panetta, Board Member Lewes BPW

Reviewed and Accepted by Lewes BPW

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Executive Summary

Event

Early on 19 December 2019, White Marsh Environmental Services, Inc (WMES) received a High-Level Alarm for the Membrane tank and Digester basin. At the Lewes Waste Water Treatment Facility (WWTF) The WMES operator arrived on-site and found that all four trains had backwashed over 10 times using contaminated permeate water for at least a 90-minute period (a review of the alarm logs indicates this could have been occurring over a 6-8 hour period).

- The use of contaminated backwash water compromised the ability of the membranes to process the flow.
- Investigation of the incident revealed that there had been inadequate monitoring and trending of the data from the plant to determine the condition of the membranes. Inspection of the membranes revealed excessive buildup of sludge.
- The sludge build-up created excessive loads on the membrane assembly leading to the catastrophic failure of a locking tab on one module, eventually allowing the module to work loose from its connecting spigot.
- The isolation set-points for the instrumentation installed to detect contaminated back flush water had been increased 10 NTU at some point thereby eliminating all protection. It is unclear what set-point was being used for the alarm function, but from the data records there were numerous turbidity alarms in the days leading up to the 19 December 2019 failure. The actual turbidity of the process was still being recorded.
- The data review determined that a nearly identical incident had occurred in April 2019. The seriousness of this earlier incident was not highlighted to the Lewes Board of Public Works (BPW) nor did WMES take actions to determine the failure mode or corrective actions to prevent it from happening again.
- Had either the proper cleaning been performed as indicated by the membrane performance **OR** had the instrumentation set-points not been changed, the failure would have been limited and there would have been no discharge of partially treated effluent.
- The investigation revealed several cases of inadequate communication by WMES to BPW of events or details of events. For example; not notifying BPW that train #4 was off-line for 8 months in 2019 with no mention of it in the monthly reports or other communications, the OHSA reportable accident in December 2019, among several others.
- WMES also did not request assistance from Suez, the membrane supplier, about the cause of the prior failure or corrective actions prior to the December 2019 event.

The investigation was able to rule out several issues as being the cause for the failure, among them are:

- The Membranes were **NOT** at end-of life as confirmed by Suez. Even after being contaminated; it was still possible to return a set of old filter back to satisfactory operation.
- The failure was **NOT** caused by age, fatigue or by a chemical induced condition. Suez had stated that the cassette hardware has a useful life of approximately 13-14 years; the membrane assemblies themselves have a life greater than this. The lower header locking device is part of the membrane assembly and had only been in service for 11-12 years. The failure of the locking devices was not related to age, rather it was due to excessive stress.
- The contamination of the permeate tank was **NOT** due to a clogging of the needle valve. The data clearly shows that the turbidity was well above the alarm/isolate set-point prior to the needle valve fouling. Thus, the system should have isolated.

Several of the findings in the WMES report are inaccurate and unsupported by the facts and evidence. In addition, the WMES report notably lacks a detailed Corrective Action and Improvement program. Appendix C highlights the BPW's specific concerns with the WMES report.

Corrective Actions

- Replace all four trains of plant membranes
- WMES to put in place management systems to trend plant operating data and use it to determine proactive maintenance.
- Improve communication by WMES to BPW of the condition of the plant and recommendations for maintenance and capital improvements
- Review of plant design by WMES, Suez and BPW engineer to determine ways to increase reliability and add redundancy
- Review off-normal plant operation, for example loss of power, storms, security threats, etc, and determine if it is adequate or needs to be improved
- Use Suez cloud-based data collection and analysis capabilities to aid BPW in monitoring the filter performance
- Improve BPW staff oversight though routine walk-through and audits of WMES management system and plant condition
- Improve BPW Board oversight through detailed reviews of BPW staff, WMES and Suez reports.

Review other areas of the BPW operation, that is water, electric and storm water, to determine where there is a possibility to apply the Lessons Learned from the WWTF Root Cause Report to improve reliability and oversight.

This report covers the first two actions in the DNREC Notice of Violation W-20-SWD-01, dated 5 February 2020. The third action, that is to assess the impacts to the wetlands as a result of the bypass event, will be covered in a separate submission.

Introduction

The Lewes Board of Public Works (BPW) Waste Water Treatment Facility (WWTF) also known as the Howard H Seymour Water Reclamation Facility is located at 106 American Legion Rd on the beach side of Lewes.

It is operated under National Pollution Elimination Discharge System (NPEDS) Permit number DE 0021512.

White Marsh Environmental Services (WMES) has operated the plant for the BPW since 1 March 2017. WMES is a wholly owned subsidiary of Tidewater Utilities. WMES has the contractual responsibility to operate the plant within the requirements of the NPDES permit and to provide the certified operators for the plant.

The BPW does not directly employ certified waste water treatment facility operators, but relies on those from the contracted operator of the plant per the terms of the contract.

Suez, formally part of GE Water & Process Technologies is the designer and supplier of the filter membranes used in the WWTF process.

Severn Trent was the operator of the WWTF for two (2) consecutive 5-year contract periods for the BPW up until early 2017 when WMES took over operation.

This report will cover the operating history of the WWTF, the events leading up to the failure in December 2019, proposed Corrective Action, and the impact of the by-pass of partially treated flow to the marsh.

Additional information on the failure is contained in the Appendices.

A. Suez WTS report, dated 9 January 2020
B. WMES Report of findings – Lewes Wastewater Treatment Plant bypass of partially treated wastewater in December 2019, Report dated 13 February 2020
C. BPW Comments on WMES Report of 13 February 2020
D. BPW preliminary Presentation - 29 January 2020
E. DNREC Notice of Violation W-20-SWD-01, dated 5 February 2020
F. List of people interviewed/participating in the Root Cause Report

In conducting its investigation BPW considered, the Suez (previously known as GE Water & Process Technologies) and WMES reports together with interviews, data records, contracts and other relevant information to conduct a comprehensive review of the complete set of events that are presented in this report

While this report is intentionally broad, including areas for improvement, it is worth highlighting three areas that may otherwise be overlooked in the aftermath of an event such as the December 2019 failure:

- Once the failure occurred, WMES mobilized quickly and lined up all the necessary resources to recover from the failure. WMES had senior management on-site throughout the recovery and they were available to answer questions. Its communication about the incident once BPW was notified was transparent and timely.
- Suez WTS was readily available throughout the event to provide guidance to WMES. Suez was rapid to find and expedite the procurement and delivery of new membrane trains. The Suez team that was onsite for three days was able to provide valuable insight into the failure and guidance for areas that could be improved on.
- Once the extent of the event was understood by the BPW, the BPW Staff responded quickly and provided continuous oversight to the recovery effort. BPW's strong financial position made the procurement of the four new membrane trains possible in an expedited and timely manner.

The conclusion of the analysis is that there were two primary failures that contributed equally to the need to discharge partially treated effluent to the marsh.

1. Excess fouling of the membrane with sludge leading to a failure of one lower header due to excessive stress in the membrane assemblies
2. Change of turbidity meter set-point to isolate the failed train eliminated the design back-up protection for membrane failures leading to the total loss of all four filter trains

If either of these two events had not occurred, the total loss of all treatment capabilities would not have happened and no discharge would have occurred. The recovery would have been limited to repairing a single filter cassette, similar to the 2 April 2019 event.

These two failures are described in more detail in the "Primary Cause of Failure Leading to Discharge" section of this report

Aside from the primary two events leading to the failure in December 2019, the investigation found shortcomings in several other areas. These can be grouped into several broad categories: Inadequate management systems by WMES for monitoring of the plant, configuration control and reporting to BPW; poor communication by WMES of the status of the plant and recommendations for plant maintenance/improvements; and oversight of WMES by BPW. More detail can be found in the "Secondary Cause of Failure" and "Other Areas for Improvement" sections of this report.

History

The Lewes BPW Waste Water Treatment Facility (WWTF) also known as the Howard Seymour Water Reclamation Facility is located at 106 American Legion Rd on the beach side of Lewes.

The original WWTF was built prior to 1950. The WWTF underwent a major refurbishment in 2007-2008. During this refurbishment the GE/Suez filter membranes were installed.

The WWTF was designed to process 1.5 Million Gallons per Day (MGD) of influent. The maximum peak daily flow that the plant experienced in recent years was ~1.1 MGD (which typically occurs after heavy rainfall) which allows a margin for maintenance and for expected load growth

A design assumption to the plant was that it would process influent with 9,200 Mixed liquor suspended solids (MLSS); the plant has been operating in the 12,000 -18,000 MLSS range. Operating the plant at this level does not invalidate the plant design or increase the probability of failure, but rather impacts the intervals between cleaning cycles.

The WWTF has operated extremely well for the last 12 years with no significant equipment failures or violation of the DNREC permit limits (there was one verbal administrative finding for missing a monthly reporting requirement; the testing had been performed but not reported). The prior excellent operation may have contributed to a false sense of security in the operation of the plant by WMES and the BPW.

Background of Failure – December 2019

Severn Trent operated the WWTF for the BPW from 2007 until 2017. During this time period the filter membranes where routinely cleaned using both chemical (hypochlorite and citric acid) and mechanical cleaning. Mechanical cleaning was performed once per year and verified by routine physical inspection of the membrane.

Suez would do routine consultation on the performance of the filters. The last review by Suez was March 2017. During that inspection Suez recommended to WMES that the filters had accumulated significant amounts of solids which were interfering with the effectiveness of the automatic backwashes and operation of the filters and that the filters be mechanically cleaned. (Picture 1)

Picture 1 Debris Loading Suez Report 2017

According to the WMES operating reports, limited mechanical cleaning was performed between March 2017 and the failure in December 2019. It appears that Train #4 was mechanically cleaned between

early 2018 and mid-2019. There also appears to have been some mechanical cleaning performed in early 2017 on Train #2

Trains 1, 3, and 4 received chemical cleaning between May and August 2019 with little or no discernable improvement of permeability as shown in the data logs. WMES did not appear to investigate the reason for ineffectiveness of the chemical cleaning nor did they report this to the BPW. The excess fouling of the membranes prevented the chemicals from reaching the membranes.

On 18 December 2019

- 4:58 PM- Train #1 high back pulse pressure alarm occurred. Train #2 permeate turbidity was above 2 NTU's. (which is the level at which a high turbidity alarm message should have occurred)
- 5:52 PM-Train #2 NTU reading peaked at 5.62 NTU's. NTU's remained above 5 NTU's for over 3 minutes. The 5 NTU automatic shut of safeguard had been disarmed. Excessively contaminated permeate water was being back pulsed into all 4 trains

On 19 December 2019

- 3:00 AM- WMES operator received Membrane Tank **High Level Alarm**
- 3:30 AM- On call operator was on site and needed help from the Plant Operator. **The permeate tank was dirty**. The back pulse had operated for 90 minutes- over 10 times, which forced contaminants into the membranes
- 5:30 AM- Operators notified WMES Supervisor Production Director, Central District Manager and Assistant Production Director
- 6:00 AM Sussex County was contacted by WMES to stop the flow from the county to the WWTF
- 8:30 AM- WMES Contacted DNREC NPDES, and BPW to alert them of the failure
- Early morning - WMES called BPW - The communication was that the plant had issues, and they were confident to get it back online quickly. No additional detail was provided during this notification which when combined with "…confident to get it back online quickly" lead the BPW to believe it was under control. WMES said they would keep BPW informed
- 3:15 PM- The plant Equalization tank (400,000 gallons) was full, the additional EQ tank (150,000 gallons) was nearing full. Jeff Deats, WMES Asst. Production Director, contacted Nicole Smith, DNREC NPDES Compliance to inform DNREC that WMES was going to need to begin bypassing **partially treated** wastewater to the marsh. The first steps of the cleaning process were under way. The effluent was being screened, grit removed, and hydrogen peroxide added as a disinfecting agent
- 6:35 PM- Bypass pumping began with flow going to the marsh

20 December 2019

- Mechanical cleaning of filters starts (Picture 2)

- **Picture 2 – Condition of filters as cleaning starts in December 2019**

21 December 2019

- 7:45 PM- OSHA reportable injury occurred. WMES employee fell. All work in vicinity of filter tanks was suspended
- BPW was not officially notified by WMES of the injury, BPW discovered event through reports on police scanner

- BPW contacted WMES to understand what had occurred with respect to the accident at the WWTF
- During this phone call BPW was notified that failure was more extensive then reported on 19 December 2019
- WMES suspended work in the filter building until additional safety equipment and procedures could be put in place to protect the employees

22 December 2019

- BPW ordered one new train of filters from Suez that were available in Canada. No additional membranes were readily available in N. America at that time

23 December 2019

- BPW President and Board was given first full brief on events
- BPW requested AM and PM updates from WMES until plant was restored
- BPW provided AM and PM updates to the City
- From this date until plant was fully restored BPW Board and Staff where on-site for daily updates

24 December 2019

- WMES hired a safety consultant to provided safety equipment and procedures to allow work in the filter area to resume

27 December 2019

- First train of new membrane is received and installed (Picture 3)

Picture 3 – New Membrane Loaded into Cassettes – December 2019

28 December 2019

- First train of new filter is started up
- Bypass flow is stopped

1 January 2020

- New filter train experienced high pressure
- Filter taken off line for a 30 min chlorine soak
- Bypass operation restarted and lasted 2 hours
- Filter returned to services with no subsequent issues

3 January 2020

- One train of old filters was returned to services, allowing for redundancy and increased capacity
- Second train of new membrane was located and procured by BPW

7 January 2020

- Second train of membranes delivered

9 January 2020

- Second new train in operation
- Total of two new trains and one cleaned trains in services. Total plant capacity ~1.0 MGD

31 January 2020

Full flow restored from the County. Total influent to the WWTF was ~0.7 MGD

Prior Event – April 2019

Separate from the event leading to the December 2019 failure, the investigation revealed a prior event had occurred on 03 April 2019 that suggests the filter trains were not being adequately maintained.

2 April 2019

- In the evening, the plant received a **High Turbidity Alarm** for all three trains that were in operation (It should be noted that the high turbidity alarm coming from ALL three trains can only been explained by contamination of the permeate tank similar to the December 2019 event)
- Failure was determined to be in Train 2 and the failure was isolated
- The plant continued to process influent within Permit limits

3 April 2019

- BPW was notified of failure and repair.
- WMES Suspect module was pulled. Pictures indicate high level of sludge accumulation in the cassettes
- Failure was a break in the lower header, blank installed and cassette returned to services (Picture 4)

Picture 4 – Lower Lock Tab Break and dislocated header, April 2019

- BPW asked what else needed to be done. WMES responded they would keep BPW informed on the status of the membranes. There was no further correspondence from WMES.
- Suez was not contacted by WMES to assist in the evaluation of the failure
- DNREC was notified by WMES of the event

Primary Cause of Failure Leading to Discharge

There were two key contributing factors that combined to cause the extent of the 2019 failure.

Excessive Fouling of the Membrane

Insufficient monitoring of the membrane condition and proactive maintenance/cleaning by WMES led to physical over-stressing resulting in the mechanical failure of the lower header locking tab.

The excessive physical loading of the membrane was caused by:

1. The considerable weight that was added to the membranes and hardware by the sludge build-up
2. Increased tensile stresses due to the lateral spreading of the membranes due to sludge build-up
3. The dynamic loading of the membranes from the disrupted air flow due to the excessive fouling which added additional lateral stress on the membranes

Note: Suez has stated that the End of Life for the membrane is determined on a plant by plant basis. They have not experienced examples of catastrophic failure of the membrane or hardware due solely to age. The End of Life is a cost-benefit calculation based on the cost of cleaning, length of time between back-flushes and how much capacity is recovered after cleaning/back-flushing.

It should be noted that even after the contamination of the filters; they had additional life and were able to be returned to service after mechanical cleaning.

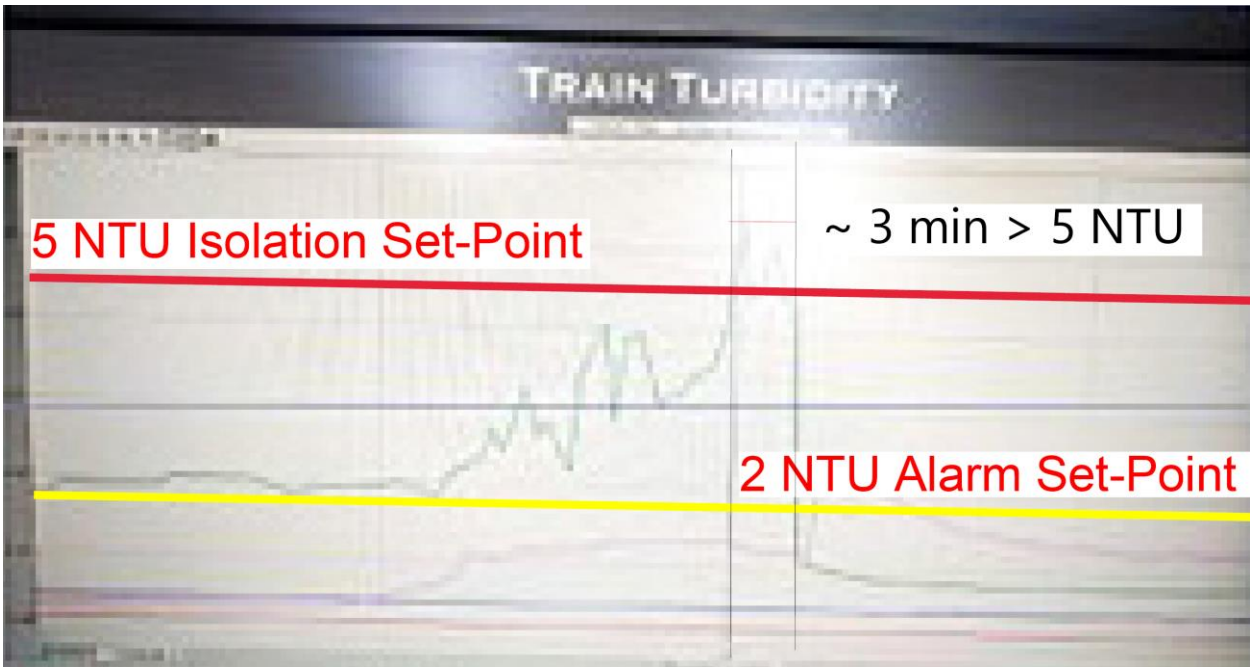
Setpoints Changed Outside of Suez Operation and Maintenance Manual

The filters are designed to detect and isolate themselves in the case of a break in the membranes or any contamination of the permeate tank water. The Turbidity Meter set-points were supposed to be set at 2 NTU to alarm and 5 NTU to isolate. During Suez's site visit in January 2020, the isolation set-point was initially found to be set to 10 NTU (top of scale) thus removing any protective function. Upon returning to site the next day, Suez found the set-point had been returned to its correct settings. This indicates that WMES knew the correct set-points.

The correct set-points would have prevented the contamination of the permeate tank and resulting in the contamination of the other trains. The extent of the failure would have been limited to one cassette in one train and thus prevented the loss of the entire filter system.

Note: The needle valve plugging did not contribute to the failure of December 2019. In reviewing the log data, it is clear that the turbidity meter was operating through the event and only plugged after there was gross contamination of the permeate. The Turbidity in Train # 3 was above the Isolation set-point of 5 NTU for over 3 minutes. The system should have isolated within 10-15 seconds (Picture 6)

Picture 6 – Turbidity During 19 December 2019 Event



Cause of Personnel Injury

- On 2 December 2019, a floor grate shifted at the WWTF and an employee slid into the wastewater on train #3. This did not result in an OSHA reportable accident. An investigation by WMES of the December 2nd incident was completed. Recommendations in the WMES report were not implemented prior to the accident on 21 December 2019.
- A reportable OSHA accident occurred on 21 December 2019, when the unsecured grating above Train #2 shifted and an employee fell into the empty tank. An investigation was performed and temporary safeguards have been put in place.

The BPW was not informed of either of the above accidents. Even once BPW was aware of the OHSA Reportable accident on 21 December 2019, the extent of the injury was not shared.

Secondary Cause of Failure

There were several secondary failures that either contributed to the failure or were discovered in the process of this investigation.

1. Insufficient trending of the plant operating data, thus no advance notice of the pending failure. The contract required that WMES "…provide an effective management system for process control…" WMES did collect data for influent and effluent chemistry/nutrient but did not trend this data or other key indicators such as backwash frequency, backwash effectiveness, filter chemical and mechanical cleaning frequency, equipment failures, etc.
2. WMES failure to respond appropriately to system alarms. In reviewing the data logs for the several days leading up to the failure on 19 December 2019, there were numerous turbidity and permeability alarms that should have provided WMES with an indication that the performance of the filters was severely degraded
3. WMES did not keep BPW Informed of the condition of the plant or interpretation of the plant data, as is required by the contract in the monthly and annual reports. The contract requires that WMES provide recommendation for equipment refurbishment, replacement equipment and improvements. In addition, the annual report should include recommendations for capital improvements to the plant.

   The monthly WMES reports contained some information related to equipment failures, but mostly around pump refurbishment and other routine maintenance items. Based on the forensic review of the data it was determined to be incomplete and did not address the fouling of the membranes or decreased effectiveness of backwashes/chemical cleaning nor did they adequately reflect the actual condition of the WWTF.

4. There were numerous indications of sludge buildup in the filters. Several examples are:
   a. Suez report of 2017 indicating that mechanical cleaning was needed
   b. Ineffectiveness of chemical cleaning to recover membrane permeability
   c. Failure of Train #2 in April 2019
   d. December 2018 BPW specifically reinforced the need to de-sludge of all of the filters
5. Inadequate communication to the BPW by WMES of off-normal operations. There are several specific cases that highlight this issue:
   a. Train 4 was off-line from 1 January 2019 until 23 August 2019. BPW was only made aware of this as part of this Root Cause report investigation
   b. Failure of WMES to follow-up with BPW on the 3 April 2019 event with recommendations
   c. On 19 December 2019 WMES, received first plant alarms at 3:00 AM, but BPW was not informed until approximately 8:30 AM that the plant had issues, even then the extent of the issue was not communicated to BPW. WMES said they were confident that it would be back online quickly.

d. On 21 December 2019 at 7:45 PM an OHSA reportable accident occurred. BPW was not notified. BPW learned of the accident from a BPW employee who was listening to a police scanner calling for ambulance support at the WWTF. BPW questioned WMES and was told that it was a minor injury to a WMES employee to the wrist. Later it was discovered that this was not a minor injury.

BPW Enhanced Oversight

1. BPW Staff needs to be more proactive in ensuring that the WWTF operator is performing its functions and obligations. For example;
    a. Even though BPW had authorized the cleaning of the filters and such cleaning was part of the required maintenance of the plant per the Operation and Maintenance manual, WMES's efforts to perform this required work were slow, at best.
    b. BPW authorized resolution of a caustic leak, but WMES failed in performing this work in a timely fashion.
    c. BPW should also have required more detail in the monthly reports from the WWTF operator. By being proactive, the BPW may be able to gain critical data that could provide advance notice of a lack of adequate preventive maintenance or management systems
2. BPW Board of Directors and Staff should be more proactive in ensuring adequate management control systems are in place to monitor the performance of its contractors.

Other Areas of Concern

During the accident recovery it was observed that the CDC guidelines to protect workers handling human waste or sewerage were not being followed or posted by WMES. Employees were routinely seen eating and smoking in the process building.

Corrective Actions

1. Replace all four trains of filter membranes

    Status: Two trains have been installed and the remaining two have been ordered and will be installed by no later than the beginning of May 2020 in advance of the Memorial Day weekend

2. Reset Turbidity set-point to Manufacture recommended setting

    Status: Complete as of 13 February 2020

3. Replace all four Turbidity monitors with new models that have additional functionality, including the ability to alarm on loss of flow.

   Status: Complete as of 13 February 2020

4. Have the BPW consulting engineers and BPW staff perform Quarterly WWTF walk through to evaluate the field condition, maintenance records, compliance records and the operation and maintenance of the WWTF.

   Status: Contract was awarded in February 2020 and the first walk through was performed on 14 February 2020

5. Review and update the plant Operation and Maintenance Manual to ensure that the current plant configuration is captured, including other updates such as Suez's recommendation on chemical and mechanical cleaning

   Status: In-process, estimated to be complete 1 May 2020

6. Issue Contract with Suez to remotely collect data (Insight-Pro) and provide cloud-based access to the data for BPW and plant operator. Suez will monitor and trend data, provide bi-weekly reporting and cleaning recommendations. Suez will provide an annual summary report.

   Status: In-process, to be completed by 1 May 2020

7. Perform an engineering analysis of the entire plant to identify ways to improve redundancy and reliability of the plant, including:
   a. Review current screen design to determine if there is a way to remove more of the "soft and spongy" material to reduce filter fouling
   b. Potential for splitting the four filter trains to have them operate in a redundant parallel configuration
   c. Configuration of turbidity meters to provide better protection against use of dirty water during back flush cycle

   Status: To be completed by 31 June 2020

8. WMES to establish an improvement program for monitoring of plant performance to be evaluated and accepted by BPW. The Corrective Actions contained in the WMES report are not detailed enough to provide assurance to BPW that the plant is being operated to industry Best Practices

   Status: WMES to provide a schedule in their April 2020 report

9. Improve reporting requirements from WMES to BPW for:
   a. Off-normal conditions at the plant
   b. Discharges outside of Permit limits
   c. OHSA accidents

d. Details included in monthly reports (to include trending of performance data, trending of equipment failures, preventative maintenance required, suggested capital improvements and other concerns
e. WMES to present their report at the monthly BPW meeting
f. Require, as per the contract, a detailed yearly reporting on the operation of the plant to include the items listed in a. through d. above

Status: To start with April 2020 report

10. BPW staff to strengthen its oversight of Operators performance
    a. Through the review of trending data in monthly and annual reports
    b. Schedule routine plant walk through with plant WMES management
    c. Annual review of WMES Policies and Procedures
    d. Reporting to the BPW Board of condition of the plant
    e. Developing of an open Item tracking system

    Status: Starting with April 2020 report

11. BPW Board of Directors to review its oversight function of the operation of the BPW.
    a. Continue to use outside subject matter experts such as Sargent and Lundy, Suez, GMB, etc. to provide the Board with guidance on the condition of the BPW systems
    b. Perform audit by a sub-group of the Board of the BPW operation and management systems

    Status: To be completed annually, Schedule to be determined and added to tracking list that will be developed in Corrective Action 10. e.

12. WMES to develop plans for operating plant in off-normal conditions. BPW provided WMES with a Best Practices template and copy of the prior operating company plan. This should include, but not be limited to:
    a. Loss of filter membrane
    b. Digesters
    c. Other critical equipment
    d. Loss of Power
    e. Storm response
    f. Security Breach
    g. Terrorist/cyber terrorist attack

    Status: WMES to provide BPW with a schedule in March Report

13. BPW to look at other areas of its operation to determine if there are generic implications from the failure at the WWTF
    a. Evaluate the operation of the Water Department, electrical department and other areas of BPW operation to determine where improvements in Management practices are needed.

Status: In process – Sargent & Lundy is currently performing a review of the BPW electrical system and will provide input to BPW for future capital projects and areas of improvement. Review quarterly at monthly BPW meeting

14. Require all WMES operational staff to have appropriate training by Suez on the proper operation and maintenance of the filters and plant

    Status: WMES to provide schedule in their April 2020 report

15. WMES to review its safety manual to verify they are complying with the appropriate CDC guidelines and industry best practices for sanitary conditions. Post the appropriate areas of the plant as no-smoking/no-eating

    Status: In-process, need commitment date from WMES in their March 2020 report

16. WMES to review its safety practices and plant conditions to determine what changes may be required. Note: The Temporary cabling that was installed to protect employees appears to create other safety concerns.

    Status: Need commitment date from WMES in their March 2020 report

17. BPW to audit WMES safety procedures and practices to included:
    a. Lock-out/Tag-out of equipment
    b. Confined entry permit
    c. Personal Protective Equipment
    d. General Housekeeping
    e. Chemical control and handling

    Status: To be completed prior to work starting in April 2020 when new filters are installed

18. WMES to provide a monthly update on its Corrective Actions to BPW

    Status: to start with March monthly report

19. BPW Staff to provide an update on the status of the above Corrective Actions at routine monthly BPW meetings. This will be part of the standing agenda for the meetings

    Status: Starting at the March 2020 meeting

Appendices

A. Suez WTS report, dated 9 January 2020 (Total # pages 26)
B. WMES Report of findings – Lewes Wastewater Treatment Plant bypass of partially treated wastewater in December 2019, Report dated 13 February 2020 (Total # pages 26)
C. BPW Comments on WMES Report of 13 February 2020 (Total # pages 7)
D. BPW preliminary Presentation - 29 January 2020 (Total # pages 66)
E. DNREC Notice of Violation W-20-SWD-01, dated 5 February 2020 (Total # pages 6)
F. List of people interviewed/participating in the Root Cause Report (Total # pages 1)