

**Minutes of a Meeting of the Environmental Authority  
Held on Wednesday, 30 October 2019**

**At the Department of Environment and Natural Resources, Botanical Gardens, Paget**

**PRESENT:** Mrs. Sarah Haycock Tafur, Chair  
Mr. Eugene Saunders, Member  
Mr. Jonathan Starling, Member

**ADVISORS:** Dr. Geoff Smith, Environmental Engineer, DENR  
Mr. Tom Crossan, Chief Environmental Health Officer  
Mr. Kirk Outerbridge, Chief Engineer, Public Works  
Mr. Tarik Christopher, Principal Engineer (Water & Sewage), Public Works  
Dr. Shaun Lavis, Hydrogeologist, DENR  
Ms. Patricia Hollis, Environmental Officer, DENR, Recording Secretary

**IN ATTENDANCE:**

**BELCO:** Mrs. Jessica McClure, Director, OHSE, Business Continuity & Fire  
Mr. Andrew Rothwell, Coordinator, OHSE  
**Corp. of Hamilton:** Mr. Patrick Cooper, City Engineer

**ABSENT:** Mrs. Winnifred Fostine-DeSilva, Chair  
Mrs. Susan Armstrong, Member  
Dr. Nick Bates, Member, via internet video call  
Ms. Lynesha Lightbourne, Member  
Mr. Armell Thomas, Senior Environmental Health Officer

**1. Confirmation of Minutes**

The minutes of the meetings held on 28 August, 10 September, 7 October, 15 October and 21 October 2019 were approved and signed by the Chair. The Authority noted that the meetings of 10 September, 7 October, 15 October and 21 October were held electronically and for the avoidance of doubt ratified all decisions made.

**2. Presentation on the Bermuda Electric Light Co. Ltd. Annual Report 2018 (OL-114)**

Mr. Andrew Rothwell made a presentation on the operation and performance of the BELCO engines during 2018.

**Power Generation**

It was reported that in 2018 BELCO operated 12 diesel engines, 5 gas turbines and one oily water treatment facility. It is anticipated that 4 new dual fuel engines (North Power Station) will come online in Spring 2020; one gas turbine (GT4) was retired 31 December 2018.

In 2018, BELCO's power generation capacity was 173.3 MW, compared with 158.3 MW in 2019. The peak load in 2018 was 104 MW. During 2018, 723,200 barrels of heavy fuel oil (max sulphur 1.90%); and 141,212 barrels of light fuel oil (max. sulphur 0.00086%) were used.

**Environmental Management Programmes**

BELCO continued to manage programmes for opacity monitoring using:

- (i) 3 continuous in-stack monitors and visual assessments by trained personnel to US EPA Method 9;
- (ii) Ambient air monitoring, with 2 chemical measurement stations and one weather station;
- (iii) Oily waste handling for both oily wastes from the plant and that recovered from the subsurface;
- (iv) Handling of environmental complaints;
- (v) Ambient vibration monitoring using 2 continuous sensors; and
- (vi) Spill prevention and response.

BELCO continues to conform to the requirements of the environmental management system ISO 14001.

**Compliance with Operating Licence Conditions**

In 2018 there were four non-compliances with Operating Licence conditions:

- a) Condition 5.3.2: Two opacity exceedances from engine E4 were recorded on 17 April and 3 July. Both were due to operator error and the engine was able to be returned to service immediately without the engine being taken out of service as a non-compliant engine. It was noted that opacity exceedances have been reduced significantly over the past few years due to the implementation of standard operating procedures which resulted in improved operation and maintenance of the engines.
- b) Condition 5.3.5: The opacity monitoring quality assurance plan was not maintained. This has been rectified.
- c) Condition 5.4.5: The ambient air quality monitoring quality assurance plan was not updated as required after acquisition of new equipment. This has been rectified.
- d) Condition 5.9.1: The oily water treatment facility oil-in-water monitor failed a verification check in Q4 2017. This has been repaired. Also, the disposal boreholes from the oily water treatment facility were found to be non-compliant with current conditions. These boreholes have been replaced with fully-compliant boreholes.

### **Ambient Air Quality, Noise, Vibration and Opacity Monitoring**

It was noted that no non-compliant engines had been run in 2018.

There was one exceedance of the ambient air quality - that being the 24 hour PM<sub>10</sub> reading at BDA #1 (Cemetery lane).

Generally, there has been upward trend in NO<sub>2</sub>, SO<sub>x</sub>, particulates, and PM<sub>10</sub> at BDA #1. This is most likely due to the increased frequency of engine startups and shut downs of the engines in the Old Power Station. These engines are due to be decommissioned in Fall 2020.

It was also agreed to remove condition 5.4.8. in OL-114 that refers to the considered relocation of the ambient air monitoring station at Cemetery lane (BDA #1) to a location to the south of BELCO. It is noted that a location at Bermuda High School had been identified that met the US EPA Siting Requirements (40 CFR Parts 53 and 58) but this site was not available for long term use and an adjacent site presented some challenges to determine whether it met the same siting requirements. In light of the BDA #1 primarily detecting the emissions from the shorter stack engines that are due to be retired in 2020 it was considered that there is value in maintaining a monitoring capability at Cemetery Lane for the next few years to observe the potential positive effect on air quality local to BELCO. It is also noted that Bermuda Government is recently in receipt of a portable ambient air monitoring sensor system that uses technology for particulate matter that is considered an equivalent method to use.

A discussion followed on the practicalities of studying health impacts in neighbourhoods. It was concluded that it is challenging to isolate effects of BELCO emissions from those of vehicles as similar fuel is used in both. However, the North Power Station engines will burn heavy fuel oil rather than light fuel oil (diesel), so in the future, studies could be undertaken. The Chief Environmental Health Officer added that Bermuda does not keep a comprehensive register of cancer occurrences or cluster signatures.

It was stated that pre-construction ambient noise monitoring has been completed; the post construction noise survey will be completed in 2020. Ambient vibration monitoring will be undertaken once the North Power Station engines are on line.

It was noted that leaks in the flue of engine E4 of exhaust gases in the vicinity of the opacity sensor present health and safety challenges to maintain this sensor. Costly repair of the flue is not recommended as Engine E4 is due to be retired in 2020. It was agreed to remove reference to the E4 opacity sensor in condition 5.3.1. and to require this stack to have visual emission testing monthly or when required by BELCO or the regulator.

### **Spill Prevention and Reporting**

Mr. Rothwell confirmed that tanks, piping and cathodic protection are routinely inspected. There were 7 spills each exceeding 5 gallons in 2018, involving releases of about 171 US gallons in total.

### **Major Environmental Pollution Plan**

It was stated that BELCO's newly formatted Major Environmental Pollution Plan (MEPP) is updated regularly and was exercised on 30 May 2018. The MEPP replaces the Major Environmental Emergency Contingency Plan (MEECP).

### **Oily Water Treatment Facility**

The total volume of oil on the groundwater that was recovered since 2001 is 339.3 m<sup>3</sup>. In 2018, 2.1 m<sup>3</sup> was recovered. The removal rate in recent years is demonstrating diminished returns as the volume of recoverable oil approaches zero. It is currently estimated that the amount of recoverable oil in the ground is 20.8 m<sup>3</sup> suggesting that 94% of the recoverable oil has already been removed. Most of this oil is believed to be around the foundations of the Old Power Station (OPS). It is anticipated that most of this remaining oil will be recovered after the demolition of the OPS.

### **Reporting**

It was noted that all reporting was submitted when due.

The BELCO representatives were thanked for their presentation.

### **3. Corp of Hamilton Presentation on the Operation of Sewage Screening Plant 2018 (OL-142)**

Mr. Patrick Cooper gave an outline of the operation of the Front Street screening and pump station and the system as a whole during 2018. This description included the new 3 millimetre screens and changes to the control philosophy. It was noted that the effluent quality in terms of Total Suspended Solids (TSS) and Biochemical oxygen demand (BOD) typically reflects raw sewage albeit screened of large particles. TSS in the effluent ranged typically from ~100 to 400 mg/l (Average ~250mg/l) and BOD ranged typically from ~150 mg/l to ~500 mg/l (Average ~300mg/l). According to operators at the plant, who manually skim the Fats Oils and Greases (FOG) with nets from the wet well, the amount of FOG has visibly decreased significantly since the restaurants and victualing establishments were regulated to install and maintain grease interceptors. The concentration of FOG in the screened effluent over 2018 to April 2019 ranged from 10 to 190 mg/l (Average ~47 mg/l), which for an average daily flow of 600,000 GPD, equates to 107 kg of FOG and 567 kg of TSS discharged to the outfall each day. It is noted that heavy rain or cruise ships that connect to the sewerage can cause sudden increases in the discharge volume.

Maintenance performed in 2018 included: monthly inspection of the outfall; sewer jetting on Sundays to remove FOG; testing of the pipe thicknesses in the effluent header; inspection of the overhead cranes in the pump house; replacement of chains at the Seabright Outfall, replacement of the rolling bar screen chain mechanism, and servicing of all sewage pumps within the system by a Flygt representative (manufacturer's rep)

The Corporation employs an inspector, Mr. Roger Mello, to monitor the grease traps installed in restaurants and victualing establishments in Hamilton. Grease is skimmed off the wet well on a weekly basis. In addition the Corporation collects about 5.5 Tonnes of packaged waste cooking oil from restaurants and victualing establishment each week for delivery to Tynes Bay Waste to Energy Facility.

The Corporation has received some complaints of mal-odours from the sewer. Smoke tests revealed that there were unsealed pipes in the Muse building which caused the odours on Front Street near the Ferry Terminal. Also, empty P traps and cracked vent pipes caused complaints of malodours near Stevedoring House, Front Street. Complaints were lodged about odours in Global House, Church Street. There were found to emanate from unsealed pipes and floor drains without water in the P traps.

Mr. Cooper then described the three proposed improvements in the Corp. of Hamilton sewer system:

1. **Mechanical Primary Treatment.** Installation of a micro-screen (SALSNES screen) to filter influent and remove particles less than either 250µm or 350 µm, depending on screen selection option. This would require extending the existing building to the west into a small portion of the commercial docks. Bench scale testing by Associated Engineering International Limited predicted the SALSNES primary screen would remove about 38% of the Total Suspended Solids, 59% of the Fats Oils and Grease, and about 8% of the Biological Oxygen Demand using a 350µm screen. Using a finer 250µm screen would improve the removal efficiencies to 44% TSS, 58% FOG and 18% BOD.



2. **Disinfection** using peracetic acid at a 12 mg/l dose rate would reduce bacterial numbers by a log 1.5 to 2 removal (i.e. 95 to 99% reduction). However, the bench scale testing indicated that higher doses would be required than originally expected, probably due to the presence of organic matter reducing its effectiveness. Further testing on dosage is needed and seasonal application (i.e. April to November) of disinfectant could also be considered.
3. Installation of a mechanical odour control unit on the sewerage line south of South Road is also due to replace an existing passive activated carbon filter in order to extend effective odour control between servicing.

Mr. Cooper said that the Corporation has budgeted for these projects and has sent the reports to the Permanent Secretary, Ministry of Home Affairs, for approval. The Corporation has not yet received approval to proceed.

There was much discussion between the representatives from the Ministry of Public Works and the Advisors and Members.

Mr. Kirk Outerbridge, Chief Engineer, said that Public Works' feedback on the proposed primary mechanical treatment with disinfection had been provided to Cabinet. Their view is that the SALSNES screen is not the best solution. Whilst it reduces the FOG, it does not do so completely. The estimated cost of \$3 million would improve the sewage quality but it may not fix the issues entirely. The addition of peracetic acid could be a significant through life cost (i.e. ~\$100,000 PA). If greaseballs on south shore beaches do occur, even if sterilized, there may still be a problem. The Ministry of Public Works would have more comfort with the proposal if some performance specifications were included in the contract. Mr. Outerbridge confirmed that the decision to approve the sewage system is with Cabinet.

Mr. Patrick Cooper was thanked for his presentation.

Due to a shortage of time, only some of the items on the agenda were considered; the remainder being deferred to the next meeting.

#### 4. **Applications for Construction Permits and Operating Licences (New)**

##### 4.1 **CP-643, OL-1034 Eversley Lewis, 4 Lemon Grove Road, Hamilton Parish**

The Authority **APPROVED** the construction permit for a 20 kW propane generator at 4 Lemon Grove Lane, Hamilton Parish subject to standard conditions.

##### 4.2 **CP-660, OL-1053 Stanhope Trust, 6 Hexham Drive, Hamilton Parish**

The Authority **APPROVED**:

the application for a construction permit and operating licence for a 20 kW propane genset at 6 Hexham Drive, Hamilton Parish, subject to standard conditions and providing the genset is sunk at least 30 cm into the ground and a 1.5 m high stone wall is constructed and maintained around the genset.

##### 4.3 **CP-658, OL-151 Graham Jack/Susan Armstrong, 181 South Road, Paget**

The Authority **APPROVED**:

the retroactive application for a construction permit and operating licence for a 20 kW propane genset at 181 South Road, Paget subject to standard conditions.

#### 5. **Applications for Operating Licences (Reissue)**

##### 5.1 The Authority **APPROVED**:

the reissue of Operating Licences on the two-page printout, subject to standard conditions, with the exception of OL-798, Zippy lube spray painting facility and three waste water treatment facilities (OL-145 Grotto Bay; OL-146 Southampton Princess; OL-478 Newstead Hotel) which were deferred.

**6. Applications for Water Rights (New)**

**6.1 WR 5647, WR 5650 Hotelco, St. Regis Hotel, St. George's**

The Authority **APPROVED**:

the application for two commercial water rights submitted by Hotelco, St. Regis Golf Course, Bourne Drive, St. George's. WR 5647 is for the supply of 100,000 gpd to a reverse osmosis treatment plant. WR 5650 is for the disposal of 50,000 gpd reject from the RO Plant. Both were approved subject to standard conditions; WR-5650 shall be sealed 60 feet below sea level.

**6.2 WR 5649, Island Properties, 10 Marsh Lane, Devonshire**

The Authority **APPROVED** the application for a domestic water right disposal of rain water at 10 Marsh Lane, Devonshire, subject to standard conditions

**6.3 WR 5651 The Lima Trust, 3 Mills Creek Lane, Pembroke**

The Authority **APPROVED** the application for a domestic water right for the disposal of sewage effluent at 3 Mill Creek Lane subject to standard conditions and providing the effluent is treated in a septic tank prior to disposal into the borehole that is sealed at least 40 feet below sea level.

**7. Applications for Water Rights (Reissue)**

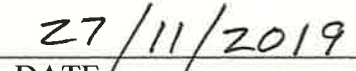
The Authority **APPROVED**:

the issue of water rights as listed on the two-page printout with the exception of one indicated as withdrawn.

**8. Date of the Next Meeting**

The date of the next meeting was set for 8:30 am, Wednesday, 27 November 2019.

  
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CHAIRMAN

  
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DATE