Pillar Point Valley Restored Landfill

Investigation of Alleged Mal-operation

Findings of the Investigation Team

May 2017

Introduction

1. The Pillar Point Valley Restored Landfill (PPVRL) received municipal solid waste between 1983 and 1996. PPVRL is now in the aftercare period undertaken by EPD's Restoration Contractor – SITA Waste Services Limited (SITA). Typical aftercare work includes operation and maintenance of the treatment facilities for landfill gas and leachate.

2. On 11 January 2016, EPD started receiving complaints against alleged mal-operation of the PPVRL. Issues under complaint were:

(a) The landfill gas treatment system had been operated at a temperature below the contract requirement, leading to air pollution problem;

(b) Substandard leachate had been discharged to the foul sewer, leading to water pollution problems;

(c) Untreated leachate had been discharged through an overflow pipe to the nearby stream.

The complainants also complained against the handling of their complaints by EPD. The complaints were -

(a) Their complaint case had been pushed around between Special Waste and Landfill Restoration Group (SLG) and Regional Office (West) (RWG); and

(b) EPD staff might have disclosed the identities of the complainants to SITA, which had led to their subsequent dismissal by SITA, and

(c) SITA had been informed of the inspection by RWG one day before the EPD's inspection on 28 January 2016.

3. In response to the complaints, the Director of Environmental Protection has assigned an Investigation Team comprising a Deputy Director of Environmental Protection, three Principal Environmental Protection Officers and a Senior Environmental Protection Officer to conduct an investigation into the matters under complained. The findings of the investigation are provided in the following paragraphs.

Temperature of the Vent Gas Unit

4. The landfill gas treatment facility of PPVRL comprised mainly a Vent Gas Unit (VGU). The VGU was designed to operate with landfill gas having a methane content of 20% to 65% at the temperature of 1000°C – 1200°C and a minimum retention time of 0.6 seconds. The contract between EPD and SITA required the landfill gas flaring temperature to be maintained at over 1000°C. If the methane content of landfill gas was not sufficient to support the burning process and maintain the temperature, external fuel (diesel) would be supplemented.

5. Since diesel was needed to support the combustion temperature to above 1000°C in case the methane content of landfill gas was not sufficient, the Investigation Team had also looked at the diesel consumption data. From the records provided by SITA, since January 2016, a large amount of diesel has been consumed by the VGU to maintain the temperature to above 1000°C, coincidentally after the complaints had been lodged. The diesel consumption in November and December 2015 was much lower.

6. Various operation parameters of the PPVRL including the VGU temperature were recorded in daily log sheets filled in by the technicians. The daily log sheets showed that the VGU temperature had been below the contractual requirement of 1000°C for many occasions in December 2015, February and March 2016. The Investigation Team also noted discrepancies between the VGU temperature recorded in the daily log sheets and those in the Aftercare Monthly Reports submitted by SITA to EPD. The low-temperature incidents had not been reported in the Aftercare Monthly Reports.

7. The Investigation Team had also considered whether the incidents with VGU temperature below 1000°C could emit excessive hazardous air pollutants (HAPs) such as dioxin and furan. On emission of dioxins and furans from landfill gas flaring, the USEPA (United States Environmental Protection Agency) had conducted a review[1] which concluded that "*EPA believes that the potential for dioxin emissions from the combustion of landfill gas is small.*" Given the USEPA review conclusion, the potential of large amount of dioxin emissions due to combustion of landfill gas should be small. The background dioxin levels measured by EPD in Hong Kong in the last 3 years also did not show any anomalies.

[1] https://www3.epa.gov/lmop/faq/public.html

Discharge of Substandard Effluent

8. The key component of the leachate treatment system was the Ammonia Stripping Plant (ASP), which recovered the heat generated from the VGU to produce hot steam to strip the aqueous ammonia out of the leachate generated by PPVRL. The treated leachate would be discharged to the foul sewer leading to the Pillar Point Sewage Treatment Works for treatment and then disposal via a submarine outfall to the waters south of Pillar Point. As rainfall would dilute the leachate generated, the discharge licence had two sets of effluent standards, i.e. the Total Nitrogen level of 200 mg/L at a maximum flow rate of 894 m^3/day during the November – May (dry season), and the Total Nitrogen level of 100 mg/L at a maximum flow rate of 2600 m^3/day during June – October (wet season).

9. The ASP was designed to operate at the temperature of 72°C – 74°C in order to strip off ammonia from the leachate before discharge. A test conducted by the Investigation Team in May 2016 found that the ASP had malfunctioned for an unknown period of time. The ASP temperature recorded in the daily log sheets during 1 Sept 2015 – 30 Apr 2016 indicated that the ASP was operated with the majority of the time with the top part of the ammonia stripping column operating between 60°C – 65°C, and the middle and bottom part of the ammonia stripping column operating below 60°C. The entire ammonia stripping column was operating below 60°C during December 2015. Since the ASP was operating below the designed temperature range, the ammonia removal capability could have reduced.

10. Regarding the leachate to be treated, the typical Total Nitrogen content of the strong leachate was about 350 mg/L and that of the weak leachate was about 150 mg/L – 170 mg/L. The latter was below the dry season discharge standard of 200 mg/L even without treatment. This allowed some freedom to manage the leachate treatment operation by mixing strong leachate with weak leachate such that even though the ASP was not functioning, the discharge might still meet the standard during the dry season.

11. The wet season discharge standard was 100 mg/L. The daily log sheets showed that the ASP had been operating below the design temperature range as a norm. Since the typical nitrogen content of weak leachate was about 150 mg/L – 170 mg/L and that of the strong leachate was about 350 mg/L, mixing of leachate could not meet this wet season discharge standard. Hence the Investigation Team could not exclude the possibility that substandard discharge had happened given the operation temperature condition as recorded. However, due to limitation of available data, the frequency and quantity of the substandard discharge could not be established.

12. The treated leachate was discharged via the public sewerage system and a submarine outfall into the sea south of Pillar Point and the key concerned parameter is ammonia. To check whether the marine waters nearby had been unduely affected, the Investigation Team checked the monthly water quality data at the EPD's Routine Marine Monitoring Station (NM2) which was located close to the outfall. The water quality objective is 0.021 mg/L of unionized ammonia nitrogen as annual average. As shown in the table below the unionized ammonia nitrogen concentration between 2014 – 2016 was well below the water quality objective. The marine environment had been normal.

Unionized Ammonia Concentration at the EPD's Routine Marine Monitoring Station (NM2)

Year	2014	2015	2016
Unionized Ammonia Nitrogen (mg/L)			
Jan	0.005	0.004	0.011
Feb	0.004	0.002	0.002
Mar	0.004	0.003	0.005
Apr	0.008	0.003	0.005
May	0.006	0.008	0.002
Jun	0.002	0.002	0.003
Jul	0.003	0.001	0.002
Aug	0.000	0.001	0.003
Sept	0.001	0.005	0.003
Oct	0.001	0.000	0.003
Nov	0.002	0.003	0.003
Dec	0.002	0.002	0.003
Annual Average	0.003	0.003	0.004

Discharge of Untreated Leachate to the Stream

13. The Investigation Team noticed that the contaminated ground water collection chamber had an overflow pipe leading to the stream next to PPVRL. Inspections found that the overflow pipe was actually blocked. No significant quantity of effluent could go out through the pipe. Close examination showed that the cover was not new, i.e. the overflow pipe had been blocked for a long time. Therefore untreated leachate could not be discharged to the stream via the overflow pipe.

14. Further dye tests revealed that only a very small flow was observed seeping out of the pipe when the pump was switch off and the water level in the chamber was allowed to rise up to 30 cm above the overflow pipe. In view of this, it is unlikely that a large amount of leachate could have been deliberately discharged to the stream through this overflow pipe. Between 28 Jan 2016 and 15 April 2016, EPD collected 5 water samples from the stream next to PPVRL. The Total Nitrogen level of the stream was below 2 mg/L, indicating that the stream was not polluted. Hence the Investigation Team considered that this allegation was not substantiated.

Complaint Pushed Around within EPD

15. The Investigation Team found that upon receipt of the complaints, both SLG and RWG had taken immediate actions to carry out the site inspection and arranged for water and effluent sampling, collection of site diary and log sheets for follow up actions. The complaints were handled by 2 groups from different aspects. Complaints against violation of environmental laws would be handled by the law enforcement team (i.e. RWG) while contract management issues would be handled by the contract management team (i.e. SLG).

Complainant's Identity Disclosed

16. On the allegation that EPD staff might have disclosed their identities to SITA, the Investigation Team found that one of the Complainants, had alerted the SITA staff of PPVRL on 11 Jan 2016 that he would make a report to EPD on the illegal discharge of wastewater to the sea. Hence SITA might already be aware of the identity of the technicians before they made a report to EPD. No other evidence could be found that EPD staff had disclosed the identities of the Complainants to SITA.

SITA Informed Before Inspection

17. Regarding the allegation that SITA had been informed of the inspection by EPD staff one day before the inspection on 28 Jan 2016, the Investigation Team found that there had been a telephone communication between the enforcement staff of RWG and the contract management staff of SLG at the site office of PPVRL before the inspection, in order to let the SLG site office get ready some relevant drawings to facilitate the inspection. The communication was part of the normal operation which complied with the operation guidelines. No other evidence could be found that SITA had been informed of the inspection beforehand. Nonetheless, all enforcement staff have been reminded of the importance of keeping enforcement plans and actions on a strictly confidential basis, in order not to jeopardise the effectiveness of the planned enforcement actions.

Follow Up Actions

18. The Complainants were PPVRL technicians employed by SITA. They claimed that they had been instructed to operate the VGU below 1000^{o}C, discharge substandard leachate to the foul sewer, as well as to enter false data in the daily log sheets. It was confirmed that the VGU had been operated below the required temperature for substantial amount of time in December 2015 as well as February and March 2016. There were many discrepancies in the VGU temperature reported in the Aftercare Monthly Report and recorded in the daily log sheets, and the low-temperature incidents had not been reported in the Aftercare Monthly Reports submitted to EPD. Further investigation of these matters might be beyond the scope of the pollution control laws and normal management of the PPVRL contract between EPD and SITA. The case had been referred to the Police for further investigation.

19. The wet season discharge standards came into effect on 1 June 2016. The effluent samples collected by RWG revealed that the Total Nitrogen of the discharges exceeded the wet season licence limit of 100 mg/L on 8 occasions (i.e. 1 June 2016, 22 and 24 August 2016, and 12, 14 and 25 September 2016, and 5 and 18 October 2016). Based on the reports from SITA, during the heavy rain period the quantities of effluent discharges from the plant also exceeded the daily flow limit of 894 m^3/day permitted under the licence on 10 occasions (i.e. from 22 to 31 May 2016). SITA also failed to notify EPD within 24 hours upon the occurrence of discharge with daily flow rate exceeding the licence limit on 2 occasions (i.e. 26 and 28 May 2016). RWG had initiated prosecutions against SITA on the above incidents under the Water Pollution Control (General) Regulation, Cap. 358D.

20. The Environmental Infrastructure Division of EPD had taken immediate actions to enhance site monitoring, and had closely monitored SITA's follow-up actions. As at the end of April 2017, SITA has been deducted altogether a total sum of about $5.5 million from the contract payment for the non-compliance of the VGU temperature, leachate treatment plant operation and discharge. SITA had taken actions to rectify the operation problem and the major leachate treatment plant refurbishment works have been substantially completed in January 2017.

- END -

Abbreviations

ASP	Ammonia Stripping Plant
EPD	Environmental Protection Department
PPVRL	Pillar Point Valley Restored Landfill
RWG	Regional West Office, EPD
SLG	Special Waste and Landfill Restoration Group, EPD
SITA	SITA Waste Services Limited, the contractor of the Landfill Site
VGU	Vent Gas Unit

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