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Our ref: 2127877
Your ref:

Dear Melanie and Mauricio

FRNSW Alexandria UST Sampling

1 Background

A 225,000 Litre Underground Storage Tank (UST) is located adjacent to entrance on the southern side of the Fire and Rescue New South Wales (FRNSW) Alexandria Site. This UST was historically used for the capture and storage of water used for fire-fighting training. The use of the UST for this purpose ceased in the early 2000's however stormwater collected from the training area drainage system still flows into the UST. The dimensions of the tank are approximately 11 m x 8 m x 4.5 m. The tank is designed so that the water will fill to a maximum level of approximately 2.875 m from the bottom of the tank and then will overflow into the stormwater discharge drain, which runs from the site to Sheas Creek.

FRNSW was concerned the UST held water and sediments containing high concentrations and Per- and poly- fluoroalkyl substances (PFAS) which may have been acting as a potential secondary source of PFAS contamination. FRNSW engaged GHD Pty Ltd (GHD) to collect samples of the water to identify the concentration of PFAS and other contaminants in this water to help inform disposal options (if required).

2 Objective

GHD's objectives were as follows:

- To collect representative samples of water from the UST and to assess the concentration of PFAS within this water.
- To assess the volume of water current remaining within the UST.
- To assess the condition of the UST including the number and condition of inlets/outlets (this scope item was put on hold pending sampling results).

3 Scope

To complete the objectives listed above, GHD undertook the following scope of work:

- Update of Job Safety and Environmental Assessment (JSEA).
- Gauging of the UST using an interface probe to assess the depth and volume of water.

- Collection of two primary samples and one duplicate sample of water within the tank (one sample collected from the centre of the tank, approximately 2.5 m below ground level (bgl)) and one collected from as close as practicable to the base of the tank, 4.3 m bgl). This allowed water that had settled and stratified over time to be sampled. Samples were collected as “grab” samples collected from the specified depth using a peristaltic pump at low flow rate with no purging being undertaken. A duplicate sample was also collected for QAQC purposes. Samples were collected using a low flow peristaltic pump with the inlet depth determined by attaching the HDPE tubing to the interface probe using HDPE zip ties.
- Samples were analysed for the following analytical suite (as requested by FRNSW):
  - PFAS suite (standard LOR)
  - Major anions
  - Minor anions
  - Total Alkalinity
  - PH
  - Electrical Conductivity
  - Total Organic Carbon
  - Total Recoverable Hydrocarbons (TRH)
  - Oils and grease
  - Volatile Organic Compounds
  - Total Suspended Solids
  - Specific Gravity
  - Free Chlorine
  - Heavy Metals

4 Field Observations

Access to the UST was via a grated manhole cover. Upon arrival at the site, it was noted that leaves and debris had accumulated over the grated cover. These were cleared and the cover opened so that the water in the UST could be observed. The water was still and had leaves and debris on the surface. During sampling from the centre of the UST, the water collected was noted to be generally clear and had a stagnant/decay odour. During sampling from close to the base of the UST, the water was also noted to be clear but contained black sediment particles which were observed flowing into the sampling bottles. The deeper sample also had a strong stagnant/decay odour. The outflows of the UST could not observed via the manhole however it is understood that when the UST spills over, the water flows into Sheas Creek (underground stormwater culvert) via a 450 mm pipe (observed during previous confined space works at the site).

5 Results

GHD submitted the two primary samples and one duplicate samples to a NATA accredited laboratory for analysis. The results of this analysis are provided in **Tables 1** and **2**.

Table 1 provides a summary of the PFAS results compared against the NEMP 2018 Heath Based Guidance Values for Drinking Water and Recreational Use of water as well as Aquatic Ecosystems Freshwater Guideline Values (95% species protection). It is acknowledged that the water within the UST is unlikely to be consumed or used recreationally however during wet weather events, it is diluted and has the potential to be released to the environment. These guideline values are applied for comparison purposes against the samples previously collected at the outflows of the site and to provide wider context around the levels of PFAS reported in the samples. GHD notes that the assessment of potential risks associated with the water within the UST was beyond the scope of this targeted sampling from the UST.

It is noted that measured concentrations of PFAS and heavy metals were detected above the laboratory LOR. There were no detections of TRH or VOC's with the exception of Toluene in samples collected from close to the base of the UST.

The measured concentration of PFOS exceeded the NEMP 2018 Aquatic Ecosystems Freshwater (95% Species protection) criterion in the three samples analysed (two primary and one duplicate).

The summed concentrations of PFOS and PFHxS exceeded the NEMP 2018 Health Based Guideline Value for Drinking Water in the three samples analysed (two primary and one duplicate)

Table 2 provides the results of all other analytes. Screening criteria have not been applied as this data was gathered to inform management options for the tank contents.

6 Quality Assurance/ Quality Control

6.1 Field QAQC

Given the scope of this sampling event was to collect two grab samples from a single UST, there was no opportunity for cross contamination to occur between the samples. However, several quality control measures were utilised to ensure the representativeness and integrity of samples and accuracy and reliability of analytical results. These measures included:

- Dedicated disposable tubing was used to collect the samples, and the samples were collected in laboratory supplied containers.
- Sampling was undertaken by an experienced GHD Senior Environmental Scientist.
- Sample identification procedures - samples were immediately transferred to sample containers of appropriate composition and preservation for the required laboratory analysis. All sample containers were clearly labelled with a sample number, job number, and sample date. The sample containers were then transferred to a chilled insulated container for sample preservation prior to and during shipment to the analytical laboratory.
- Chain of custody information requirements - a chain of custody form was completed and forwarded to the testing laboratory with the samples.

- Blind duplicate: Blind replicates are used to identify the variation in the analyte concentration between samples from the same sampling point and the repeatability of the laboratory's analysis. The results of the blind duplicate (QA01) are provided in Table 3 with calculated relative percentage differences (RPD) between the blind duplicate and the primary sample.

6.2 Laboratory QAQC

Laboratory methods used by the primary laboratory were suitable for environmental contaminant analysis and are based on established internationally recognised procedures such as those published by the United States Environmental Protection Agency (US EPA), American Public Health Association (APHA), AS and National Environment Protection (Assessment of Site Contamination) Measure (NEPM).

The individual testing laboratory conducted an assessment of the laboratory QC program however the results were also independently reviewed and assessed internally by GHD. Recovery targets are defined in the Eurofins QA/QC section of the certificates of analysis reports. All laboratory QA/QC results are documented with the laboratory certificates of analysis appended to this letter.

6.3 Duplicate Results

Duplicate RPD's are presented in **Table 3**. It is noted that variation in heavy metal concentrations have caused elevated RPD's that exceed the nominated acceptance criteria. When the concentration of an analyte in one sample is low and the concentration in the other sample is non detect, this can give rise to large RPD value but does not cast doubt on the overall integrity of the data. The elevated RPD's for heavy metals in these samples are not considered to affect the integrity of the data.

7 Conclusions

Based on the field observations and analytical data, and subject to the limitations presented in Section 7 of this letter, the following conclusions are made:

- The total depth of the tank was measured to be 4.375 m bgl, with a standing water level of 1.50 m bgl. This equates to a water depth of 2.875 m in the UST.
- The water collected was clear but contained sediment particles (noted in deeper sample UST_4.3) and had a stagnant odour.
- The analytical results confirm the presence of PFAS within the water in the UST. The summed concentration of PFHxS and PFOS exceeded the NEMP (2018) Human Health drinking water criteria and the concentration of PFOS exceeded the NEMP (2018) Aquatic Ecosystems Freshwater guidelines (95% species protection). The drinking water screening criteria is conservative in this case, as the likelihood of consumption of this water is very low as it is discharging into a subsurface concrete lined culvert and ultimately into Alexandria Canal (not publically accessible and containing tidal brackish water). The ecological guidelines are also considered conservative as the receiving water bodies are highly disturbed ecosystems however detailed evaluation of potential risk to receptors was beyond the scope of this limited sampling program.

- There were detections of other analytes in the samples collected, specifically heavy metals and toluene however these results were provided to inform management options for disposal and therefore were not screened against environmental or human health based criteria.

8 Limitations

This report has been prepared by GHD for FRNSW and may only be used and relied on by FRNSW for the purpose agreed between GHD and FRNSW as set out in this report. The conclusions and recommendations in this report are based on conditions encountered, and information reviewed, at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as site accessibility, location of buildings, services and operational constraints. As a result, not all relevant site features and conditions may have been identified in this report.

Sincerely
GHD

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Appendix A

Table 1

Table 2

Table 3

Laboratory Results