Table 5.1 Analytical Schedule

Analyte	Number of Soil Samples For Analysis	QA/QC samples [1]
Metals (arsenic, cadmium, chromium, lead, copper, nickel, zinc)	4	1
Total Petroleum Hydrocarbons (TPH)	4	1
Benzene, Toluene, Ethyl Benzene and Xylene (BTEX)	21	5 [2]
Polycyclic Aromatic Hydrocarbons (PAH)	4	1
Asbestos	2	-
TCLP Metals	3	-
TCLP PAH (BaP)	3	-
TCLP BTEX	7	-

(1) Field duplicates.

(2) Including one trip blank and one trip spike.

5.6 Waste Classification

Waste classification undertaken as part of the current investigation was focused on correctly classifying the ashy fill material that was considered to be contaminated and which would require off site disposal as part of the remediation program at the site. As such, samples selected for toxicity characteristic leaching procedures (TCLP) analysis were biased to the upper ash horizons.

Other material at the site such as backfill clay material and topsoil / rail ballast containing fill material has not been considered as part of this waste classification.

To classify the fill / ashy material at the site, selected samples were subject to toxicity characteristic leaching procedures (TCLP). The leachate produced by the TCLP tests were analysed for BTEX, PAH and metals.

The procedures for classifying waste are detailed in the NSW EPA Environmental Guidelines: *Assessment, Classification & Management of Liquid & Non-Liquid Wastes* (1999). Non-virgin excavated material and material that has been excavated from a contaminated area must be classified using the procedures in Technical Appendix 1 of the guidelines.

Site material is classified by comparing analytical results from the material to threshold criteria provided in the guidelines. The guidelines provide threshold concentrations for three different waste categories, namely; inert waste; solid waste; and industrial waste. The wastes which fail to meet the criteria for industrial waste classify as hazardous waste. Hazardous waste cannot be landfilled without prior remediation or stabilisation.

The guidelines provide threshold values for total concentrations and leachable concentrations (based on TCLP tests) for a list of about 50 contaminants and groups of contaminants. For a waste to be classified under a given category, both total and

leachable concentrations of the waste should meet the respective threshold concentrations. The waste may be classified solely based on total concentrations (i.e. without undertaking leachability testing), but the applicable threshold concentrations when leachability testing is not undertaken are significantly lower (i.e. more stringent) than would apply when leachability testing is undertaken.

Guidelines from the NSW EPA (1999) do not provide any specific density of sampling and analysis for waste classification. A suitable sampling frequency for waste classification should be based on the quantity of material involved and the variability of the concentrations and different contamination sources involved. Depending on the origin of the material undergoing classification, a sampling frequency of approximately one sample per $50m^3$ is often considered adequate for waste classification.

In this instance, sampling was biased to select samples from the suspected contaminated horizon (ashy fill unit) that previous investigations have shown to contain BTEX contamination at concentrations that would require remediation.

6. Quality Assurance & Quality Control

6.1 Field Program

6.1.1 Field Quality Assurance

Fieldwork was conducted in general accordance with GHD's Standard Field Operating Procedures, which ensured environmental samples were collected by a set of uniform and systematic methods, as required by GHD's Quality Assurance (QA) system. Key requirements of these procedures are listed below:

- Decontamination procedures – including the use of new disposable gloves for the collection of each sample, decontamination of the sampling equipment between each sampling location if required (using DECON 90 – a phosphate free detergent) and the use of dedicated sampling containers provided by the laboratory;
- Sample identification procedures - collected soil samples were transferred to appropriately preserved and pre-treated sample containers. All sample containers were clearly labelled with a sample number, sample location, sample depth, sample date and sampler's initials;
- Chain of custody information requirements - a chain-of-custody form was completed and forwarded to the testing laboratory; and
- Sample duplicate frequency – (10%).

6.1.2 Field Quality Control

The soil sampling program comprised the collection and analysis of the following field QC soil samples:

- Intra-laboratory (blind) duplicates;
- Trip spike; and
- Trip blank;

Blind Duplicates

Comprise a single sample that is 'split' into 2 separate sample containers. Both samples are sent anonymously to the project laboratory. Blind duplicates provide an indication of the analytical precision of the laboratory, but are inherently influenced by other factors such as sampling techniques and sample media heterogeneity.

The following blind duplicates were submitted to the primary laboratory for analysis:

- DUP1 of TP1 – 0.1-0.3;
- DUP2 of TP7 – 0.4-0.6; and
- DUP3 of TP8 – 0.4-0.6.

Duplicates were assessed by calculating the Relative Percentage Difference (RPD) between the primary and duplicate samples.

$$RPD(\%) = \frac{|C_o - C_d|}{C_o + C_d} \times 200$$

Where Co = Analyte concentration of the original sample
Cd = Analyte concentration of the duplicate sample

GHD adopts a nominal acceptance criteria of:

- 30% RPD for field duplicates and splits for inorganics; and
- 50% RPD for field duplicates and splits for organics.

However it is noted that this will not always be achieved, particularly in heterogenous soil materials, or at low analyte concentrations (where the concentration detected is within 10 times the PQL).

Trip Spike

Samples prepared by the laboratory containing known quantities of volatile contaminants. The trip spike accompanies the samples between the site and laboratory. The trip spike is analysed for BTEX compounds, and results are used to assess the loss of volatile contaminants during transportation of samples.

One trip spike (labelled TS 17/8/05) was analysed for this project.

Trip Blank

A sample with contaminant concentrations below detection limits accompanied the other samples over the course of the fieldworks and submitted to the laboratory for analyses. Trip blanks provide an indication of contamination introduced during sample transport and handling.

One trip blank (labelled TB 17/8/05) was analysed for this project.

6.2 Laboratory Program

6.2.1 Laboratory Quality Assurance

The project laboratory (Envirolab) used their internal procedures and NATA accredited methods in accordance with their quality assurance system.

6.2.2 Laboratory Quality Control

Laboratory quality control procedures used during the project included the following:

Laboratory Duplicate Samples

The analytical laboratory collected duplicate sub samples from one sample submitted for analytical testing at a rate equivalent to one in twenty samples per analytical batch, or one sample per batch if less than twenty samples are analysed in a batch. A laboratory duplicate provides data on the analytical precision and reproducibility of the test result.