

24 May 2018

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Auckland Council

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Attention: Nigel Donovan

Re: Soil Sampling for Auckland Council at the Three Kings Managed Fill site.

Job Reference: FES0092.035

Dear Nigel,

Attached are the results of the soil sampling and analysis carried out on 30th of April 2018 following the random soil material sampling of the fill deposited at the Winstone Aggregates Three Kings solid waste disposal site.

The biannual sampling was undertaken to satisfy Condition 25 of the Consent Number 36221/36222/37770/R/LUC/2009/743.

Work Programme

Winstone Aggregates Limited personnel directed Focus Environmental Services Limited personnel to the stockpiled shallow fill materials. Two composite samples were taken from the stockpile (COMP01 & COMP02). The location of the stockpiled materials is presented in Figure 1 attached.

Sampling and Analysis Plan and Sampling Method

Environmental Sampling was carried out in accordance with the Contaminated Land Management Guidelines No.5 (MfE, 2011).

Two composite samples (COMP01 & COMP02) were collected by Focus Environmental Services Limited personnel.

The two soil samples were sent under full chain of custody documentation to an IANZ accredited laboratory and analysed for:

- Total Recoverable Arsenic, Boron, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc;
- Total Recoverable Cyanide;
- Organo-Chlorine Pesticides;
- Poly-Aromatic Hydrocarbons;
- Total Petroleum Hydrocarbons; and
- BTEX.

Field Sampling Quality Assurance

All sampling implements were triple washed between samples using clean tap water, followed by a solution of laboratory grade phosphate free detergent (Decon 90), and a final rinse with de-ionised water.

Clean, latex gloves were worn when handling each sample. Samples were stored in laboratory cleaned glass jars and immediately placed in an iced cooler. The samples were transported under chain of custody documentation to an IANZ accredited laboratory for analysis.

Laboratory Quality Assurance

Routine laboratory quality assurance procedures include analysis of laboratory blanks and spiked samples. Soil sample analyses were carried out using industry standard methods as follows:

- Total Recoverable Metals - nitric acid digestion- ICP-MS analysis (USEPA 200.2).
- Total Cyanide Distillation - Distillation of sample as received APHA 4500-CN- C & E 21st ed 2005.
- Organo-chlorine pesticides - Sonication extraction, SPE cleanup dual column GC-ECD analysis (modified US EPA 8082).
- TPH Oil Industry Profile + Poly-Aromatic Hydrocarbons - Sonication DCM extraction, SPE cleanup (if required), GC-FID & GS-MS analysis. US EPA 8015B/MfE Petroleum Industry Guidelines.
- BTEX - Solvent extraction, Headspace GC-MS analysis US EPA 8260B.

Fill Acceptance Criteria

In accordance with Consent Number 36221/36222/37770/R/LUC/2009/743 the results of the sample analysis will be compared to those values presented in Table 1 below. Furthermore, as the materials sampled are to be used as shallow fill, the concentrations of all parameters have been compared to the shallow fill acceptance criteria as detailed in Table 1 below.

The fill acceptance criteria for the Winstone Aggregates Three Kings solid waste disposal site is attached to this letter report.

Table 1: Shallow Fill Acceptance Criteria for Waste Disposal (mg/kg).

Parameter	Fill <2m
Arsenic	20
Boron	260
Cadmium	1
Chromium	400
Copper	325
Lead	210
Mercury	0.75
Nickel	320
Zinc	1160
Cyanide	0
BaP eq. ¹	0.27
DDT(total)	0.7
Aldrin	0.7
Dieldrin	0.7
Benzene	0.2
TEX(total) ²	20
TPH (C ₇ - C ₉)	120
TPH (C ₁₀ - C ₁₄)	300
TPH (C ₁₅ - C ₃₆)	1000

Note: 1. = Includes group of 7 compounds with equivalence factors that contribute to BaP (eq). 2. = Sum of Toluene, Ethyl Benzene and Xylenes.

Results

Tabulated soil sampling results are presented in Table 2 below and the laboratory transcripts have been attached to this letter report.

Table 2: Laboratory Analysis Results (mg/kg).

Parameter	COMP01	COMP02
Arsenic	3	3
Boron	< 20	< 20
Cadmium	< 0.10	< 0.10
Chromium	16	16
Copper	18	16
Lead	6.2	5.5
Mercury	< 0.10	< 0.10
Nickel	18	15
Zinc	53	53
Cyanide	< 0.10	< 0.10
BaP eq.	< 0.03	< 0.03
DDT(total)	< 0.08	< 0.08
Aldrin	< 0.013	< 0.013
Dieldrin	< 0.013	< 0.013
Benzene	< 0.05	< 0.05
TEX(total)	<0.30	<0.30
TPH (C ₇ - C ₉)	< 8	< 8
TPH (C ₁₀ - C ₁₄)	< 20	< 20
TPH (C ₁₅ - C ₃₆)	< 40	< 40

Note: Results in **red** exceed the Shallow Fill acceptance criteria for the Three Kings Managed Fill Disposal site.

Discussion & Conclusion

The concentrations of all parameters tested, as listed in the sites acceptance criteria, from the two composite samples taken on the 30th of April 2018 were all below the site acceptance criteria for shallow fills being deposited on site. The next biannual sampling event will be scheduled for November 2018.

Thank you for the opportunity to work with you and we look forward to being of further assistance. Please contact Andrew Barr on (09) 579 4155 or Cell (027) 563 3407.

Yours sincerely,

Andrew Barr
Environmental Scientist
Focus Environmental Services Limited

Attachments:

Figure 1: Sample Location Plan
Laboratory Transcripts
Fill Acceptance Criteria
Photograph