

DATE: 8 JULY 2016

OUR REF: 16_115

CAROL MULLER
DEPARTMENT OF ENVIRONMENT AND HERITAGE PROTECTION
LEVEL 10, VERDE TOWER
445 FLINDERS ST
TOWNSVILLE CITY QLD 4810

RE: HIGHWAY REWARD SEDIMENT EARTHWORKS, SITE SS7 - EPML00550413

Dear Carol,

In response to ongoing exceedances at the sediment site SS7 as nominated in the Environmental Authority (EA) (EPML00550413), earthworks were recently undertaken with the intent to remove any potentially contaminated sediments from the SS7 drainage line.

Northern Resource Consultants (NRC), on behalf of the Joint Venture have prepared this correspondence in accordance with Condition C2-3 and C2-2 of the EA to provide an overview of the works undertaken and the results of sampling conducted on completion of the earthworks. NRC also highlights items for EHP to consider and a list of actions planned to be undertaken by the site.

Description of earthworks

In accordance with the TEP currently in place SS7 was identified as a potential source of contamination and the resulting surface water exceedances at SW5 and SW6. A plan was put in place to undertake earthworks involving the removal of potentially contaminated sediments from the drainage line at SS7.

On Friday 20 May 2016, earthworks were undertaken within the drainage line at SS7, sediment was removed to a depth of approximately 0.5m, as this is acknowledged to be the depth at which contaminants generally accumulate in sediment. The depth of 0.5m was confirmed to be sufficient as all fine sediments were removed and bedrock was reached at this depth. In 2009, EGC completed a similar action with the intent to remove contaminants. The extent of the earthworks is estimated to stretch approximately 20m along the drainage line and the location of the earthworks is shown as SS7 A-D on Figure 3. On completion of the earthworks, contractors ensured the profile of the drainage line was re-instated as much as possible.

Figure 1 shows the base of sediment removal at SS7 and sample bags placed along the drainage line. Figure 2 shows the completion of the earthworks at SS7 on completion of profiling the slope of the drain.



Figure 1: Depth of sediment removal at SS7.



Figure 2: Completion of earthworks at SS7

Sediment Sampling

On completion of earthworks, a total of 6 samples were collected as a transect along the drainage line of SS7 including downstream of the culvert where the earthworks were completed, and upstream of the culvert. Approximate locations of the sediment samples are provided in Figure 3.



Figure 3: SS7 sediment sampling locations May 2016

Results of Sediment Sampling

The 6 samples collected on 20 May 2016 have been reviewed against the trigger levels and contaminant limits for SS7 as contained within Schedule C – Table 4 and Schedule C – Table 5 of the EA. Results have been collated with triggers and exceedances highlighted in Table 1.

On review of the sediment results collected in the drainage line of SS7 (Table 1) it is noted all parameters, except for lead, have recorded compliance with the EA trigger levels. Of the 6 samples taken within the vicinity of SS7, all exceeded the contaminant limit for lead. The lead levels recorded, in most samples are significantly higher than the results from the April compliance monitoring for sediments. However, they are within the range of results also recorded at other sediment monitoring sites. This indicates the fine sediments removed were not contributing to the exceedances and the fact that elevated concentrations are present in the bedrock may be related to the natural geology. Comprehensive laboratory results are attached to this letter which also include 7 samples named “SS7 Dam 1- 7” which are results for on site stockpiles not in the vicinity of the SS7 sample site.

Table 1: Results of SS7 sediment sampling May 2016.

PARAMETER	UNITS	EA TRIGGER LEVELS	EA CONTAMINANT LIMIT	SS7 A	SS7 B	SS7 C	SS7 D	SS7 U/S A	SS7 U/S B
Cadmium	Mg/Kg	1.6	2	<1	<1	1	<1	<1	<1
Copper	Mg/Kg	824	1030	318	355	600	449	206	321
Lead	Mg/Kg	60.8	76	83	88	95	106	99	97
Zinc	Mg/Kg	203.2	254	127	122	147	128	116	105

Red indicated exceedance with EA contaminant limits, yellow indicates exceedance with trigger levels.

Items for consideration

Surrounding concentrations

The EA has specific trigger levels and contaminant limits in place for each of the designated stream sediment points (Schedule C – Table 4 and Schedule C – Table 5). It is noted sites SS1 and SS2 have the highest trigger and contaminant limits for lead. The location of SS1 is upstream of the mine in a channel, which drains towards the site (Figure 4) indicating lead levels may be naturally high in the surrounding environment.

This suggests that the EA limits currently in place for sediment sampling sites are unsuitable. There is a need to discuss with EHP regarding the suitability of the EA limits in place at SS7 if the limits at upstream sites are significantly higher. CMT request further clarification regarding the basis for the stream sediment limits currently in place for each EA site.

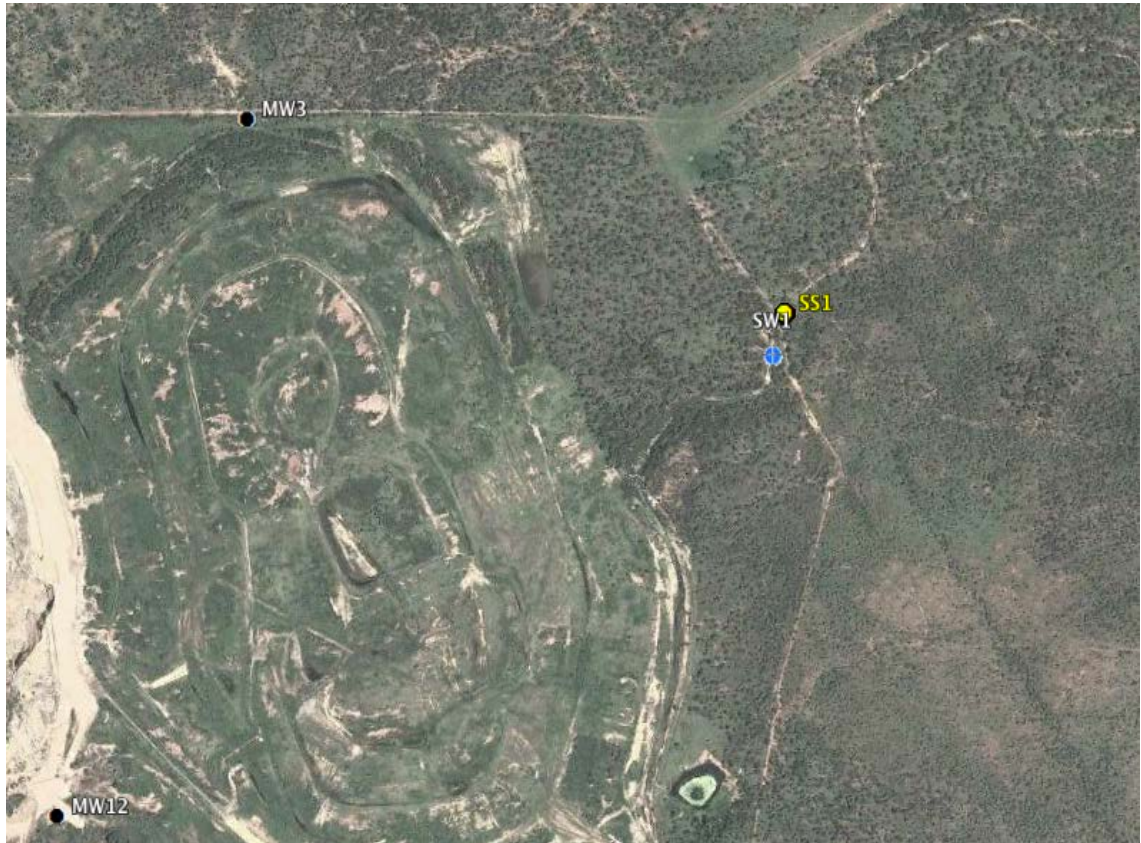


Figure 4: Location of SS1 in respect to the mine

Location of SS7 compliance point

The exact location of SS7 has been reviewed in accordance with the EA to ensure all future sampling is taken at the coordinates designated in the EA. On review of recent imagery the location of SS7 has been confirmed to be upstream of the culvert as depicted in Figure 5. No earthworks were undertaken at this site; however, it is noted that the sediment results (Table 1) for the upstream locations were similar to the concentrations recorded at SS7 C and SS7 D for lead, with SS7 D recording the highest lead concentration of all 6 samples. All other parameters were also compliant with the EA limits. This also indicates the results, which are being recorded, may be attributed to natural geology.



Figure 5: Confirmed location of SS7 and SW5.

Actions

NRC has advised the joint venture of the correct location for stream sediment sampling of SS7 and will ensure all future samples are conducted at this site.

Based on the review of concentrations recorded at surrounding EA points, particularly SS1 and the limits in place for this site, NRC and the joint venture are investigating the potential to meet with EHP regarding the trigger levels and contaminant limits contained within the EA.

NRC and the joint venture would appreciate initial feedback regarding the items raised in this letter and EHPs thoughts on the proposed actions.

Should you have any concerns please feel free to contact Shalika Walker of Northern Resource Consultants on (07) 4772 6500.

Sincerely,

Marty Costello
Principal Environmental Scientist

Attachments:

ALS Laboratory results for SS7 sampling 20 May 2016 (including soil stockpiles "SS7 Dam" samples.

CERTIFICATE OF ANALYSIS

Work Order : **EB1613566**
Client : **THALANGA COPPER MINES PTY LTD**
Contact : MR GEOFF CORDERY
Address : P O BOX 873
 CHARTERS TOWERS QLD, AUSTRALIA 4820
Telephone : +61 07 47529701
Project : Special soil Wall Project
Order number : ----
C-O-C number : ----
Sampler : DON GRINSTEAD
Site : Highway Reward Site
Quote number : ----
No. of samples received : 14
No. of samples analysed : 14

Page : 1 of 5
Laboratory : Environmental Division Brisbane
Contact : Joy Morgan
Address : 2 Byth Street Stafford QLD Australia 4053

Telephone : + 61 7 4796 0605
Date Samples Received : 24-May-2016 09:20
Date Analysis Commenced : 25-May-2016
Issue Date : 30-May-2016 14:37

NATA Accredited Laboratory 825
 Accredited for compliance with
 ISO/IEC 17025.



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EG005T (Total Metals by ICP-AES): Sample EB1613566 – 012 (South Fence 9) shows poor duplicate results due to sample heterogeneity. Confirmed by visual inspection.



Analytical Results

Sub-Matrix: **SOIL**
 (Matrix: **SOIL**)

Client sample ID

				SS7 A	SS7 B	SS7 C	SS7 D	SS7 Dam 1
Client sampling date / time				20-May-2016 09:30	20-May-2016 09:40	20-May-2016 09:45	20-May-2016 09:55	20-May-2016 10:20
Compound	CAS Number	LOR	Unit	EB1613566-001	EB1613566-002	EB1613566-003	EB1613566-004	EB1613566-005
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.0	6.2	5.5	5.4	7.0
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	3.3	3.2	4.1	5.0	3.9
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	13	13	15	18	23
Cadmium	7440-43-9	1	mg/kg	<1	<1	1	<1	<1
Copper	7440-50-8	5	mg/kg	318	355	600	449	25
Lead	7439-92-1	5	mg/kg	83	88	95	106	85
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	<2
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Zinc	7440-66-6	5	mg/kg	127	122	147	128	52



Analytical Results

Sub-Matrix: **SOIL**
 (Matrix: **SOIL**)

Client sample ID

				SS7 Dam 2	SS7 Dam 3	SS7 Dam 5	SS7 Dam 6	SS Dam 7
Client sampling date / time				20-May-2016 10:35	20-May-2016 10:40	20-May-2016 10:50	20-May-2016 11:10	20-May-2016 11:30
Compound	CAS Number	LOR	Unit	EB1613566-006	EB1613566-007	EB1613566-008	EB1613566-009	EB1613566-010
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.1	8.8	7.9	8.9	9.1
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	2.3	1.2	6.2	4.5	5.2
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	30	20	16	15	13
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Copper	7440-50-8	5	mg/kg	15	47	12	26	19
Lead	7439-92-1	5	mg/kg	78	77	60	72	62
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	<2
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Zinc	7440-66-6	5	mg/kg	33	59	41	49	38



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	South Fence 8	South Fence 9	SS7 UPstream A	SS7 UPstream B	----
Client sampling date / time					[20-May-2016]	[20-May-2016]	[20-May-2016]	[20-May-2016]	----
Compound	CAS Number	LOR	Unit		EB1613566-011	EB1613566-012	EB1613566-013	EB1613566-014	-----
					Result	Result	Result	Result	----
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		6.0	6.0	5.5	5.7	----
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		6.7	6.7	1.1	<1.0	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		9	8	17	14	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	----
Copper	7440-50-8	5	mg/kg		18	17	206	321	----
Lead	7439-92-1	5	mg/kg		284	128	99	97	----
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	<2	----
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	----
Zinc	7440-66-6	5	mg/kg		23	24	116	105	----