



WDL 178-3 Monitoring Report 2014

Vista Gold Australia Pty Ltd

Mount Todd Gold Project

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Amendments

Revision	Date	Changes
<u>0</u>	<u>1/10/2014</u>	<u>Original Document</u>

Abbreviations

80%TV	ANZECC 80% Trigger Value
AAPA	Aboriginal Areas Protection Authority
AFANT	Amateur Fishermen's Association of the Northern Territory
AHD	Australian Height Datum
AMD	Acid Metalliferous Drainage
ANC	Acid Neutralising Capacity
BGL	Below Ground Level
CCNT	Conservation Commission of the Northern Territory
COC	Chain of Custody
CSE	Confluence of Stow Creek and Edith River
DLPE	Department of Lands, Planning and Environment
DME	Department of Mines and Energy
DO	Dissolved Oxygen
DTA	Direct Toxicity Assessment
EC	Electrical Conductivity
ELN	Exploration Lease Number
EPA	Environmental Protection Agency
HDPE	High Density Polyethylene
HLP	Heap Leach Pad
Ha	Hectares
Km	Kilometres
Km/h	Kilometres per hour
L	Litres
L/s	Litres per Second
LGO	Low Grade Ore
PAF	Potentially Acid Forming
PCG	Pine Creek Geosyncline
Mg/L	Microgram per Litre
MLN	Mineral Leases Number
MMP	Mining Management Plan
MSDS	Material Safety Data Sheet
MTPA	Million Tonnes Per Annum
MVs	Monitoring Values

NT	Northern Territory
ROM	Run of Mine
RP	Retention Pond
RWA	Restricted Works Areas
TSF	Tailing Storage Facility
VSD	Variable Speed Drive
WCER	Confluence of West Creek and Edith River
WDL	Waste Discharge Licence
WRD	Waste Rock Dump
WMP	Water Management Plan
WTP	Water Treatment Plant
°C	Degrees Celsius

1 Executive Summary

All monitoring activities pursuant to WDL 178-3 for 2014 have been successfully completed. Surface water monitoring was undertaken during the single controlled release event in February 2014, and biological and sediment monitoring was conducted in early June.

Results of water quality monitoring demonstrate compliance with site specific monitoring values established through ecotoxicological testing processes. Monitoring results are presented and discussed for discharge, monthly cyanide sampling and retention ponds for the duration of the reporting period.

Macroinvertebrate sampling revealed no statistical differences in downstream macroinvertebrate populations, with any small differences attributable to natural spatial ecological variation in both the Edith and Fergusson Rivers.

The annual sediment monitoring program, undertaken at the same time as the macroinvertebrate sampling, identified continued elevated concentrations of some chemical parameters. The particular parameters identified, the delayed survey time and the single short duration of discharge suggests the elevated levels are consistent with passive site drainage issues and increased contributions from groundwater flow into tributaries of the Edith River.

Detailed analysis of macroinvertebrate composition and sediment results are presented in a separate report and so will not be discussed in detail in the present report.

2 Background

2.1 Objectives

The objectives of this annual monitoring report are to:

- Report to the requirements identified in WDL 178-3, including trend analysis where appropriate and interpretation of monitoring data collected from the discharge event. Biological and sediment monitoring results are included in a separate report.
- Provide detail of the site specific trigger values (TVs) developed from Direct Toxicity Assessment and used as a baseline for calculation discharge dilution ratios as well as feedback chemistry concentrations during discharge.

2.2 Scope of Work

The WDL 178-3 authorises the discharge of wastewater into the Edith River from Vista Gold Australia Mt Todd Project Mine leases Northern (MLN) 1071 and 1127 subject to the licence conditions. Specifically, the scope of the licence has been defined as:

“Discharge of wastewater into the Edith River from the Mount Todd mine site, which comprises Mining Lease Numbers MLN1070,1071 and 1127, from the confluence of Stow Creek and Edith River, the confluence of Burrell Creek and Edith River, and the confluence of West Creek and Edith River subject to this Licence.”

Condition 32 of WDL 178-3 states the following:

32. The Licensee must provide to the NT EPA by 30 September for each year of the Licence period a Monitoring report.

The monitoring report must:

32.1. be prepared in accordance with the requirements for a Monitoring Report identified on pages 6-15 of the document: *Guidelines for Consultants reporting on Environmental Issues* available from the NT EPA website: <http://www.ntepa.nt.gov.au/waste-and-pollution>;

32.2. include trend analyses, where appropriate, and interpretation of all monitoring data required as a condition of this Licence including surface water, biological and sediment monitoring;

32.3. be made available on the Licensee's Australian website within 10 Business days of providing the report to the NT EPA.

This report has been prepared by Vista Gold pursuant with condition 32.

3 Summary of results

Discharge Water Quality Monitoring

A single controlled discharge under the conditions of WDL 178-3 occurred within the reporting period. The discharge commenced on the 1st February 2014 at 08:41 hrs and ceased on the 6th of February 2014 at 11:49 hrs. The estimated total of 217.26 ML of RP3 treated water was discharged at an average dilution ratio of 1:162 which is more conservative than the DTA recommended dilution ratio of 1:132, thus affording more protection for the aquatic ecosystem.

Findings were as follows:

- No analytes in receiving waters exceeded the Australian Drinking Water Guidelines published health values.
- The monitoring analytes from the November 2013 Direct Toxicity Assessment (DTA) are listed as Zinc (33 µg/L) and Cadmium (0.4 µg/L). Three exceedances of the monitoring values occurred over the discharge period with both parameters exceeded on the second day of discharge and Zinc a week after discharge had ceased.
- A number of additional key metal parameters measured at SW4 exceeded ANZECC 80% species protection levels on the second day of discharge and a smaller subset one week after discharge ceased.
- Exceedances have been attributed to high catchment wide rainfall and stream flows with passive remobilisation of contaminants from multiple non-point sources around the Mt Todd site.
- High concentrations of copper at the downstream SW10 site are also associated with the historical train derailment and contribute measurable copper, particularly when flow levels are high in the Edith River and water comes in contact with identified spill sites.

RP3 Water Quality Monitoring

Monthly monitoring of RP3 surface water quality for this reporting period revealed very stable pit chemistry (other than some evapo-concentration) up to and including the DTA in November 2013 and discharge period in February 2014. As a result of high retention pond levels across site at the end of the discharge period, water was pumped from RP1 back into RP3 with concurrent dramatic changes in water chemistry. No further discharges were possible for the remainder of the wet season due to the long lead and testing time required for a new DTA determined dilution ratio.

Some reduction in metal concentrations occurred during this dry season as the neutralising capacity of deeper pit waters allowed a reduction in some metals. A late 2014 dry season natural mixing event has recently seen the cleaner surface water layer completely mix with deeper more contaminated layers, resulting in a net increase in metal concentrations at the surface.

A new dilution ratio will have to be determined prior to discharges during the 2014/2015 wet season. Discussions with the EPA have commenced on the possible approaches either using DTA or an alternative chemistry based approach.

Direct Toxicity Assessment

Direct Toxicity Assessment using multi-species ecotoxicological testing was performed on RP3 treated water on 25th November 2013. The results were then passed through additional analyses to determine that a dilution ratio of 1:132 was required to meet the 80% species protection level at SW4.

The calculated dilution factor of 1:132 was then used to interpolate the receiving water concentrations representing 80% species protection at SW4. The concentrations of Zinc and Cadmium of 33 µg/L and 0.4 µg/L respectively, were chosen as the closest values to the ANZECC 80% species protection levels and thus the most likely parameters to identify exceedances of these protection levels.

Macroinvertebrate Monitoring

Multiple-replicate macroinvertebrate monitoring was undertaken in early June 2014 and detailed results and interpretation are included in the 2013-2014 Mt Todd Macroinvertebrate and Sediment Monitoring Report. No statistically significant differences were observed between sites on the Edith River upstream and downstream of the discharge point. Variability in macroinvertebrate community composition both within and between sites was within natural and historic levels and no impact of the short period of discharge can be inferred.

Sediment Monitoring

The annual sediment monitoring was undertaken in conjunction with the macroinvertebrate monitoring in early June 2014. Detailed results and interpretation are presented in the 2013-2014 Mt Todd Macroinvertebrate and Sediment Monitoring Report. There continued to be detectable levels of particular metals and ions downstream of the mine, particularly in edge sediments when compared with benthic sediments. It is likely the concentrations measured are the result of many years of accumulation and not relatable to any specific year of discharge; particularly from the current reporting period given the short duration of the discharge period and long flushing period prior to sample collection.

Any effects from the elevated sediment concentrations are currently unknown and no investigations have yet been undertaken to investigate any correlations between sediment concentrations and macroinvertebrate community composition.

4 Conclusions and Recommendations

The controlled discharge of RP3 water from the Mt Todd mine site that occurred in February 2014 complied with the conditions of WDL 178-3. Results also indicate high concentrations of mine related non-point source metal contributions, particularly due to high intensity rainfall events and subsequent

rapid stream level rises. The combined effects of controlled release and the “flushing” event resulted in some exceedances of the monitoring trigger levels on one of the 6 discharge days and a slight exceedance in one measured parameter one week after cessation of discharge. The adoption of a seven day rolling 80th percentile investigation strategy as developed for WDL 178-2 allows for appropriate monitoring and feedback responses.

The single release period of limited duration early in the wet season has resulted in negligible impact to the aquatic ecosystem. This is supported by water monitoring activities during and after the discharge, as well as sediment and macroinvertebrate monitoring activities during recessional flows at the beginning of the dry season. No direct evidence exists of any detrimental impact from discharge activities undertaken under WDL 178-3.

New dilution ratios for discharges during the 2014/2015 wet season will be required due to changes in RP3 pit chemistry. A public tender is currently open to undertake additional RP3 water treatment prior to this wet season. As such, dilution ratio testing will have to be undertaken after this treatment program to ensure validity of any derived ratios.

5 Site Identification

The Mt Todd Gold mine site is located approximately 40 km North West of Katherine, and 250 km south of Darwin, NT, Australia (Figure 1). The topographical feature named Mt Todd is within the mine lease. The mine site is accessed via the restricted mine access road (Jatbula Road), approximately 10 km along the Edith Falls Road east of the Stuart Highway.

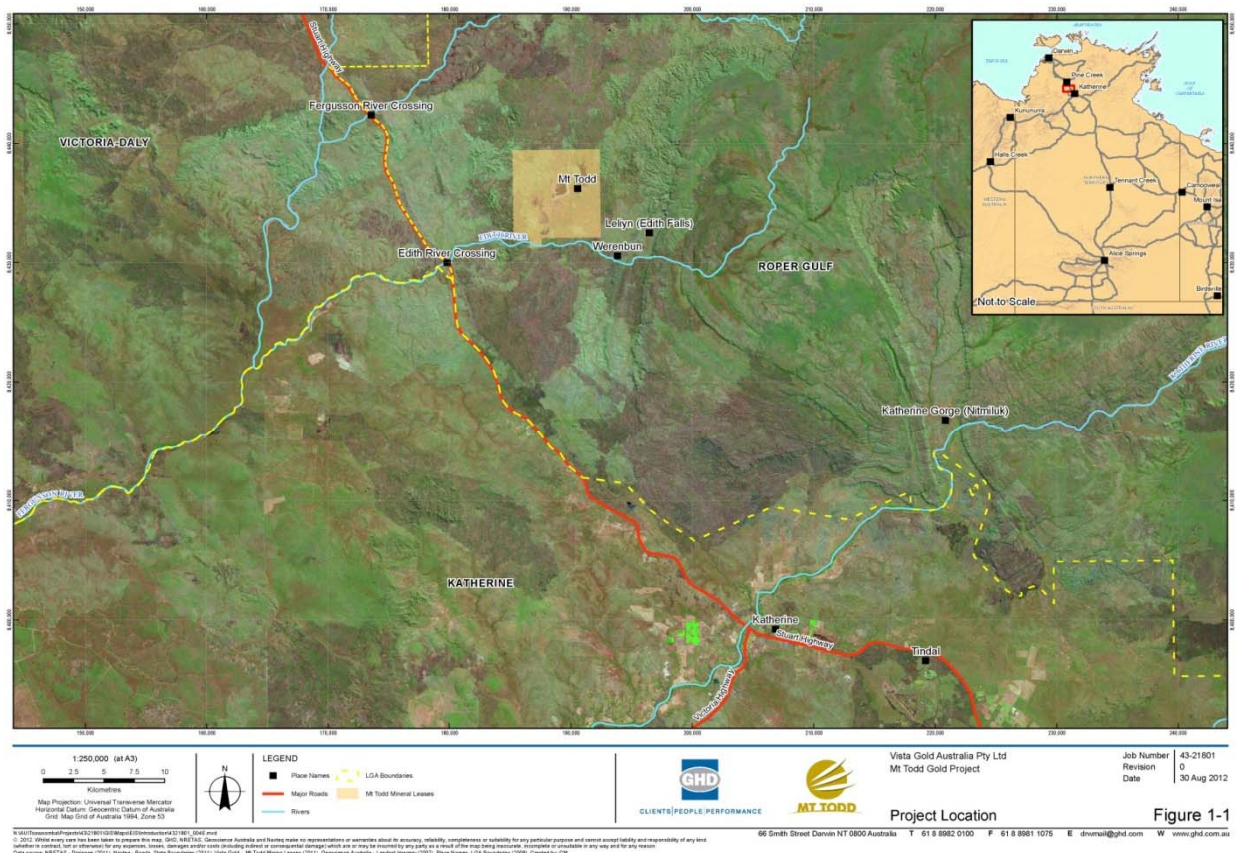


Figure 1 – Site Location

Vista Gold Australia currently hold the titles for Mineral Leases (MLN) 1070,1071 and 1127 which encompass the brownfield workings from previous operations (Figure 2).

Vista Gold currently conducts the care and maintenance activities on the Mount Todd Gold mine site on behalf of the NT Government under agreement D92226. The intention is to re-establish, operate and rehabilitate the site through the Mount Todd Gold Project

The site remains a brownfield/disturbed site that was previously mined for gold in the 1990s until 2000. Mining infrastructure including tailings dams, waste rock dumps and remains of processing facilities remain on site (Figure 2).

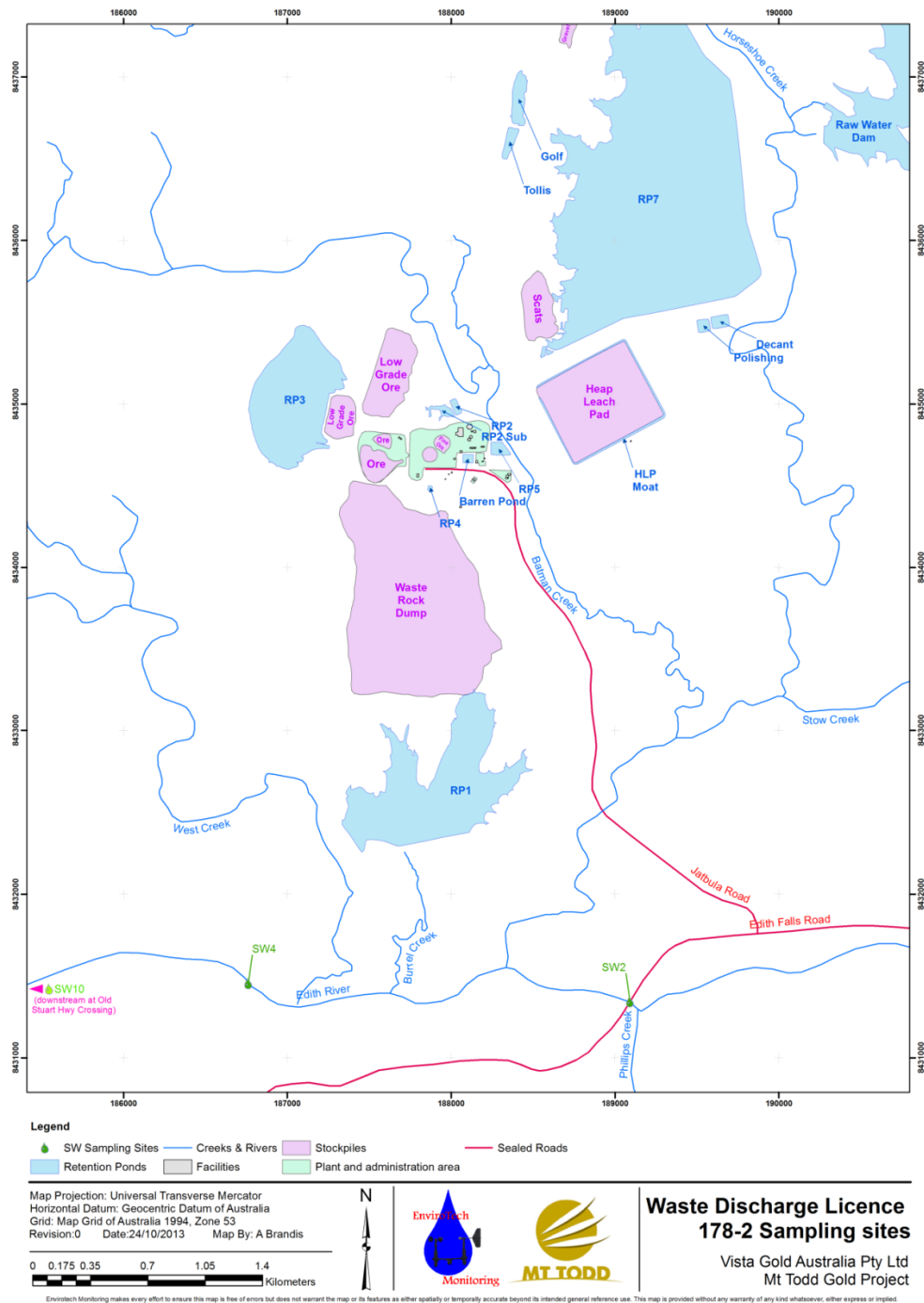


Figure 2 – WDL Site Locations

Internal drainage at the site comprises six primary catchments as listed in Table 1 and shown in Figure 3. A number of smaller ponds without catchments are located onsite but these do not require active management and are therefore not considered in water management operations or planning.

Table 1- Onsite Catchment areas

Catchment	Area (Km²)
RP1	2.174
RP3	0.617
RP5	0.346
RP2	0.323
HLP	0.347
RP7	2.358
TOTAL	6.16

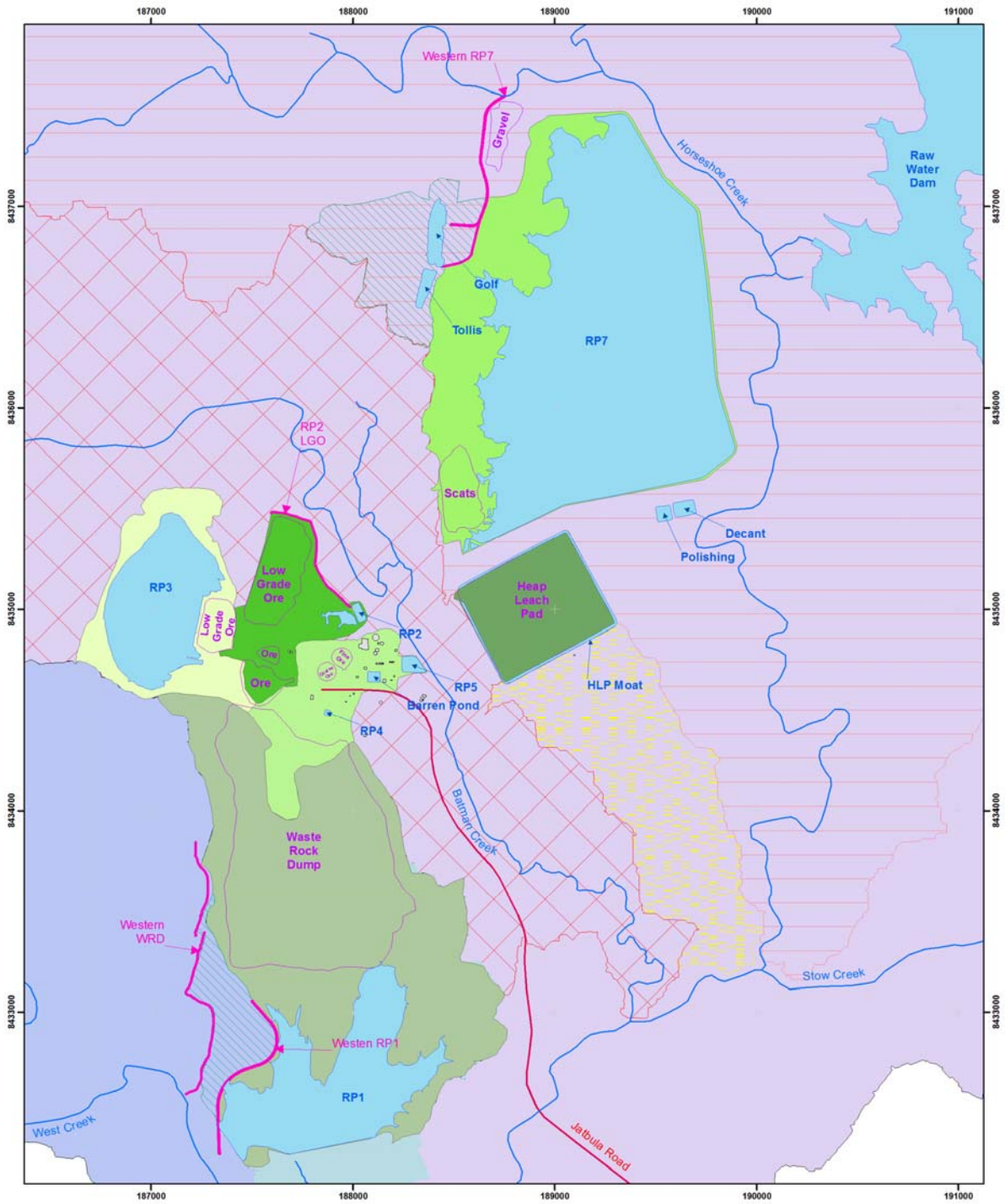
Of the ponds contained in Table 1, only RP1, RP3 and RP7 are of direct relevance to WDL 178-3. These ponds are described below. However during the current reporting period only RP3 will contain additional monitoring data as no discharges occurred from either of the other two ponds.

The catchment areas listed in Table 1 and Figure 3 have been derived from the DME 2008 DEM and corrected where necessary based on local knowledge of surface water flow paths. Catchment areas listed include the respective surface areas of the ponds.

The RP1 catchment stretches to the north and encompasses the WRD. 42% of the RP1 catchment is overlain by the WRD with the remaining 58% contributing to freshwater inflows either via non WRD runoff or direct precipitation onto the pond. The construction of the RP1 diversion drain in 2011 resulted in a 7.71% reduction of the RP1 catchment area from 2.356 km² to 2.174 km². A second diversion drain had been proposed for the eastern side of the RP1 catchment by the DME. However, 2011 works were abandoned due to the significant shelf rock present and the associated additional cost. The northern extent of the RP1 catchment does not contain the surface runoff from the WRD. This runoff generally flows north into the RP5 catchment during heavier falls.

Due to infrastructure between the Run of Mine (ROM) pad and RP3, surface waters from the ROM report to RP2 instead of RP3. The majority of other runoff into RP3 is considered freshwater with little additional AMD being generated by the pit walls, due to their current submersion and lack of exposure to air for oxidation.

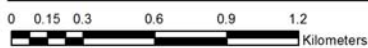
The RP7 catchment is dominated by the existing pond. 72.5% of incident rainfall falls directly within the storages maximum surface area. The 2011 constructed diversion drain resulted in a 13.5% reduction of the old catchment area from 2.727km² to 2.358km². The majority of natural inflows are freshwater with a small amount of AMD generated by the scats stockpile to the west.



Legend

- Retention Ponds
- Creeks & Rivers
- Stockpiles
- Facilities
- Diversion Drains
- Sealed Roads
- Diverted
- RP Catchments
- RP1
- RP3
- RP5
- RP2
- RP7
- HLP Catchments
- HLP Moat
- West Ck
- Horseshoe Ck
- Batman Ck
- Stow Ck
- Burrell
- HLP Drain

Map Projection: Universal Transverse Mercator
 Horizontal Datum: Geocentric Datum of Australia
 Grid: Map Grid of Australia 1994, Zone 53
 Revision: 0 Date: 6/4/203 Map By: A Brandis



Onsite catchments and Diversion

Vista Gold Australia Pty Ltd
 Mt Todd Gold Project

Envirotech Monitoring makes every effort to ensure this map is free of errors but does not warrant the map or its features as either spatially or temporally accurate beyond its intended general reference use. This map is provided without any warranty of any kind whatsoever, either express or implied.

Figure 3 - Onsite catchments, ponds and diversion drains

6 Site History

The three Mineral Leases are located in Northern Territory Parcel Numbers 4366 and 4389 as recorded in the Northern Territory Land Information System records. These parcels are vested in the Barnjarn Aboriginal Corporation as Aboriginal freehold land granted under the Northern Territory *Aboriginal Land Act 1979*. The land is controlled by the Jawoyn Association under Northern Territory enhanced freehold title.

The area has been historically explored and small scale mining conducted at various locations regionally since the early 1900's. Billiton Australia Gold Pty Ltd, in a joint venture with Zapopan NL, discovered the Batman deposit at Mount Todd in May 1988. Zapopan acquired Billiton's interest then Pegasus Gold Australia Pty Ltd subsequently acquired the property when it completed the acquisition of Zapopan in July 1995. Pegasus operated the Batman deposit as an open-pit heap-leach operation from 1993 to 1996, then as a sulphide milling operation until November 1997.

In March 1999, a joint venture between Multiplex Resources Pty Ltd and General Gold Resources Ltd acquired the project from the deed administrators for Pegasus and operated the mine and processing facility from October 1999 until July 2000, when the project was closed and control returned to the deed administrators. Most of the buildings and equipment have since been sold and removed from the site.

From July 2000 to June 2006, the deed administrators for Pegasus, the NT government and the Jawoyn Association Aboriginal Corporation controlled the project. Vista Gold completed the acquisition of the property in June 2006, and has undertaken care and maintenance of the property on behalf of the NT Government since January 2007 in accordance with the conditions of NT Agreement D92226. Further detailed information on the history of mining and exploration activities at Mt Todd is available for viewing on the NT Department of Mines and Energy website:

<http://www.nt.gov.au/d/mttodd/index.cfm?header=History>

Since 2007 Vista Gold has spent over 60 million dollars on care and maintenance activities, exploration and numerous other investigations around the resumption of mining. A Preliminary Feasibility Study report for the Mount Todd Gold Project was issued on 1 October 2010. This was updated for a 10.65Mtpa ore mining rate on 28 January 2011. A further Preliminary Feasibility Study was issued on 29 May 2013. This PFS evaluates two development scenarios including a 50,000 tonne per day project (the "Base Case") which develops more of the Mt. Todd resource and generates a larger Net Present Value, and a smaller and higher-grade 33,000 tonne per day project that focuses on maximizing return and operating margins (the "Alternate Case").

6.1 Hydrology

6.1.1 Introduction

Water management has historically been a challenge for the site since operations ceased in 2000. The site contains several ponds with lower than ambient pH and contains dissolved metals which include the Batman Pit (RP3), the waste rock dump repository (RP1), the tailings dam (RP7), the heap leach facility (HLP), and the low grade ore dump pump sump (RP2).

The current WDL only permits discharges from the three major ponds, RP1, RP3 and RP7. The major component of site AMD is generated each year during the wet season from precipitation on the Waste Rock Dump (exposed sulphide rock) and then drainage into RP1.

The challenge over the years has largely been to prevent uncontrolled release of mine affected water entering the receiving environment using the existing water management infrastructure. Since Vista Gold undertook to manage the site on behalf of the NT Government, since 2007 the water management strategy has been a combined effort of licenced water release, onsite storage and treatment. All activities are subject to DME approvals. This strategy has successfully minimised uncontrolled discharges but has resulted in the net accumulation of AMD waters onsite to a level nearing capacity.

6.1.2 Surface Water

6.1.3 Surface water management infrastructure / features

6.1.3.1 Surface water catchments and drainage channels

The Mount Todd mine site is dissected by several ephemeral streams that are tributaries to the Edith River. Situated within the Daly River Catchment, the site is part of one of the largest river systems in the Northern Territory with a catchment area of 52,577km². The site is situated to the north of the Edith River with drainage across the site flowings primarily to the south via five ephemeral creeks; Batman creek, Horseshoe creek, Stow creek, Burrell Creek and West Creek. Burrell, West and Stow creeks discharge directly into the Edith River, with Horseshoe and Batman creeks reporting to Stow Creek. Locations of the creeks and rivers are shown in Figure 2 and catchment areas in Figure 4.

West Creek

West Creek receives clean water from the diversion channel on the western side of the site, from the spillway of RP1 and from natural runoff west of the site. West creek is dominated by freshwater flows, unless an uncontrolled release is occurring via the RP1 spillway.

Burrell Creek

The Burrell Creek catchment area is essentially covered by the Waste Rock Dump and RP1. The lower reaches of the creek receive small amounts of local freshwater runoff during rain events. However the majority of any flows are typically due to licenced releases of water from RP1 via the siphon system.

Batman and Horseshoe Creek

Batman Creek is fed by a natural catchment area up-stream and to the west of the site, but can also receive overflows from uncontaminated areas through the site and via RP2 and RP5 if they exceed capacity. For this reporting period, Batman Creek received treated water from RP3 via pump. The majority of remaining flows into Batman creek are from freshwater runoff.

Horseshoe Creek is primarily fed by natural catchment flows which originate from the raw water supply reservoir, the diversion channel around the Tailings Storage Facility (RP7) and upstream catchments. Any excess water within RP7 reports to Horseshoe creek via the RP7 spillway. Small amounts of water enter the creek year round from seepage points around the southern and eastern walls of RP7. Water from the Heap Leach Pad (HLP) moat will occasionally enter the catchment if the northern or eastern moats become blocked by erosion of the HLP during rainfall.

Stow Creek

Stow Creek lies to the south of the site and is fed by Batman Creek, Horseshoe Creek and the dominant remainder of its natural catchment to the east of the mineral lease. No on-site infrastructure or activities result in direct discharge to Stow Creek. Such waters can only be received via one of the previous catchments.

Edith River

The Edith River flows from east to west across the south of the site. The river intersects MLN 1127 and receives the runoff from all the previous site related catchments. The volume of runoff from site related catchments typically contributes less than 50% of the total flow within the Edith River at any time. The river has a high ecological and recreational value with the site located approximately 9km downstream of Edith Falls situated within Nitmiluk National Park.

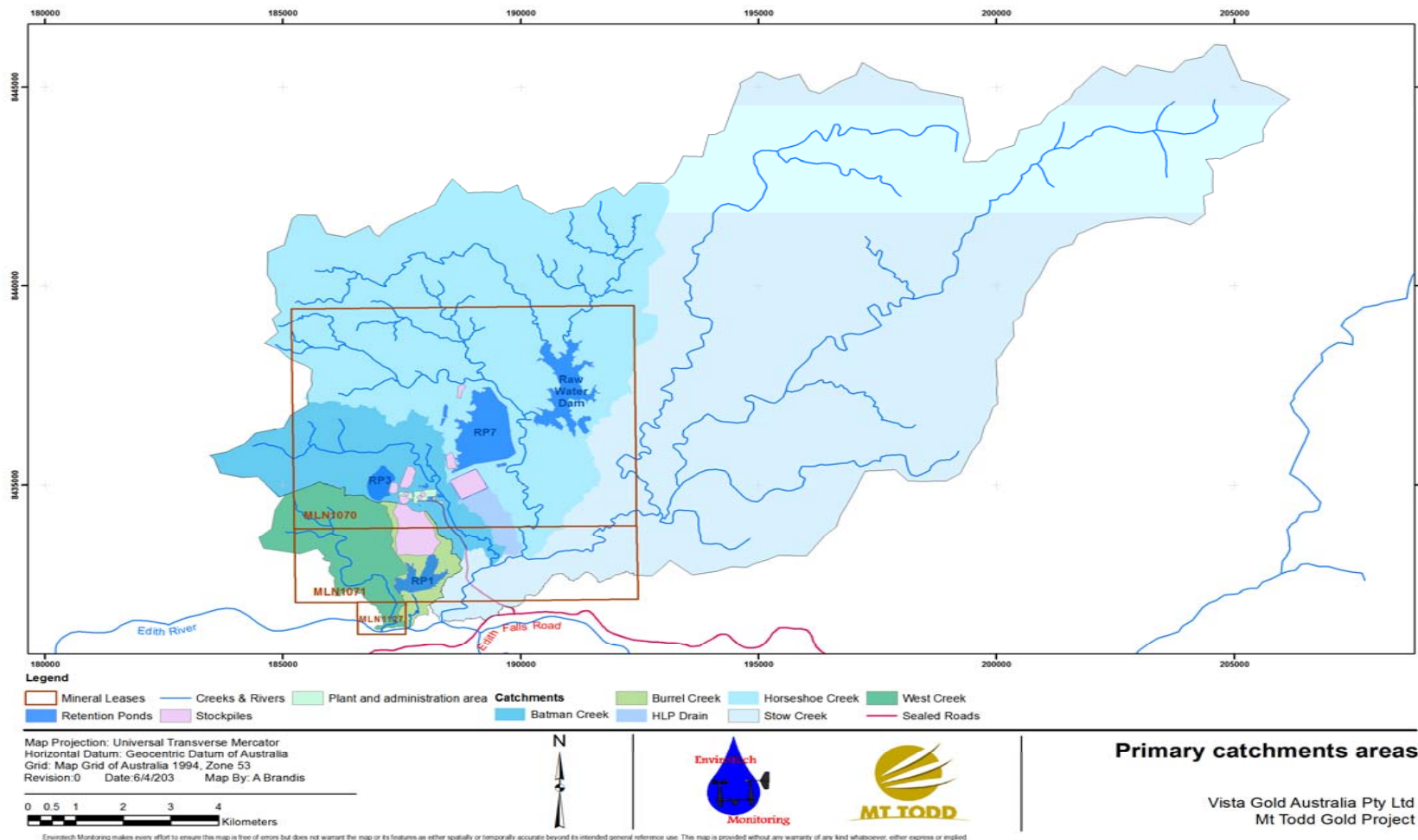


Figure 4 - Onsite catchments, creeks and rivers

6.1.3.2 Diversion drains

Four diversion drains currently exist at the site. Three reduce the volumes of clean water entering onsite catchments and one prevents AMD from directly flowing into natural streams. Details of the diversion drains are as follows:

- Western Waste Rock Dump diversion drain – This drain was constructed during previous operations and is situated to the west of the Waste Rock Dump and RP1. The drain channels flow from the upper reaches of Burrell Creek away from the WRD and RP1 into West Creek
- RP1 Diversion Drain – This drain was commissioned by the NT DME and constructed in late 2011. The drain is situated to the west of the RP1 and collects runoff from the natural surface that lies between the Western Waste Rock Dump diversion drain and RP1. This clean water is diverted away from RP1 and into West Creek.
- Low Grade Ore Stockpile Diversion Drain – This drain was constructed during previous operations and is situated adjacent to the eastern side of the Low Grade Ore (LGO) Stockpile. The drain captures runoff from the stockpile and channels it into RP2.
- Also commissioned by the DME and constructed in 2011 is the Northwest TSF diversion drain which captures runoff from the western catchment as well as overflow from Golf and Tollis pits and diverts this water to Horseshoe Creek away from RP7.

6.1.3.3 Retention ponds

The three onsite primary retention ponds considered in WDL management activities, are listed in Table 2. A number of other ponds exist across the site, however all contain fresh water and as a result do not currently require active management for environmental, safety or engineering purposes. The locations of the primary and secondary ponds across the site are shown in Figure 3.

Table 2 - Primary site retention ponds

Storage Structure	Retention Pond Number	Maximum Storage Capacity (ML)*	Surface area at capacity (m ²)	Spillway Height (AHD)	Spillway Coordinates (WGS84)
Waste Rock Dump Retention Pond	RP1	1,255	357,536	120.26	187440E 8432275S
Batman Pit	RP3	11,810	323,323	143.5*	187299E 8434769S
Tailings Storage Facility	RP7	5,070	1,544,829	137.48 (Plug Crest)	188519E 8435350S

Notes: * This structure does not have an engineered spillway and levels reported are elevations of equivalent breach points

RP1

This storage pond is extensively described in previous reports. As no discharge occurred from this pond during this reporting period, it will not be discussed in any detail in this report.

RP3

The former Batman pit, RP3 is not a retention pond and has historically been the final destination of waters pumped from other retention ponds, in an effort to mitigate uncontrolled discharges from site since operations ceased in 2000. If the pit was to ever completely fill to the point of overflow, water

would begin to discharge around the area of the access ramps, and such water would report to RP1 and then the Edith River. The water quality within RP3 has historically been poor, with low pH and high metal concentrations. However, this significantly changed during 2012-13 and current surface water quality is presented in section 6.6.3.

It is recognised that there is a brecciated zone at the very surface that is predicted to allow connectivity. Due to this feature the operating strategy is to ensure the water levels in RP3 remain below this zone.

RP7

This storage pond is extensively described in previous reports. As no discharge occurred from this pond during this reporting period, it will not be discussed in any detail in this report.

6.1.3.4 Pipeline and valve infrastructure

For detailed descriptions of pipeline and valve infrastructure, please refer to the Vista Gold 2013-2017 Water Management Plan (WMP). The discharge pipeline from RP3 is 500mm in diameter and approximately 1.0km long. The pipe runs from a manifold at RP3 that connects four separate pipe runs from float mounted pumps in RP3 pit as described in section 6.1.3.5

6.1.3.5 Pumps and siphons

For detailed descriptions of pumps and siphons please refer to the Vista Gold 2013-2017 WMP.

The RP3 discharge pumping system comprises four 500kw centrifugal pumps mounted to a floating pontoon structure and reporting via individual pipelines to a manifold which combines flow into the pipeline described above. Flow is measured downstream of the manifold using a magnetic flow meter. The pumps have a combined maximum capacity of 1000 L/s and a minimum triggered rate of 100 L/s.

The actual flow rate permitted, is calculated based on the available water in the Edith River, the permitted dilution rate from chemical composition and direct toxicity assessments (DTA), and as per relevant criteria of WDL 178-3.

While manual operation is possible, this RP3 pump operation and control process is designed to be entirely automated through telemetry, and only requires operator attention for routine servicing or correction of faults. The RP3 system requests the flow rate of the Edith River via telemetry from the SW4 gauge station at regular intervals. It then applies the operator set dilution ratio to calculate the volume of water which can be pumped. As soon as the calculated volume exceeds 100 L/s one of the four pumps starts and water at the correct flow rate is released to Batman Creek. As the Edith flow increases further, the RPM of the pump adjusts to match the volume increase, and additional pumps are spun to provide the additional flow input up the 1,000L/s maximum.

Pump status and flow rate information is logged continuously and presented as a live graphical dashboard on the company intranet. In the event the RP3 pumping system is not able to obtain the flow rates from the Edith River, all pumping immediately ceases as a safety precaution.

Flow rate and pumping data for the February discharge period is presented in section 6.6.1

6.1.3.6 Water treatment plant

For detailed description of the water treatment plant please refer to the Vista Gold 2013-2017 WMP. The plant was not operational during this reporting period so is not discussed in this report.

6.1.3.7 Flow meters

Two of the three discharge sources have magnetic pipe flow meters installed on the discharge lines. One is situated on the primary 500mm siphon at RP1 to measure water volumes released to the Edith River. A second meter is installed downstream of the RP3 discharge manifold to monitor flow output to Batman Creek. Other flow meters are installed on site and are detailed in the Vista Gold 2013-2017 WMP.

6.1.3.8 Gauging stations

A network of gauging stations and other continuous monitoring stations are present across the site and detailed in the Vista Gold 2013-2017 WMP.

The SW4 gauging station installed in 2012 provides continuous stream water level, and water quality parameters of EC, pH and Temperature. Additional sites of importance to WDL reporting include the water level monitoring station at RP1 (late 2012 installation) and the site Weather station (mid 2011 installation).

All continuous monitoring stations are connected to the site telemetry to provide real time information at the site office and over the company intranet. The real time levels at SW4 also automatically determine the discharge rate from RP3.

6.1.3.9 Surface water monitoring locations

Surface water sampling locations relevant to the WDL are detailed in Table 3 and their respective locations illustrated in Figure 5 with other site specific sampling locations. All WDL sites have varying physical and chemical parameters collected at set frequencies during periods of controlled release, as specified in the WDL.

Data will only be presented and discussed from identified WDL sites unless a specific site can provide clarification.

Table 3 – WDL 178-3 Surface Water Monitoring Locations and Associated Sites

Location	Description	Latitude	Longitude
SW2	Edith River upstream of mine	-14.17194471	132.1198981
SW4	Edith River downstream of West Creek	-14.1706686	132.098347
SW10	Edith River downstream of mine	-14.18463718	132.0303688
RP1	Retention Pond 1	-14.16306406	132.1072276
RP1 Spillway	Water from RP1 when discharging via spillway	-14.16334286	132.1046916
RP1 Siphon A	Discharge point 1 from primary siphons	-14.16355	132.1073844
RP1 Siphon B	Discharge point 2 from primary siphons	-14.16355215	132.1074238
RP3	Retention Pond 3 (Batman Pit)	-14.14032773	132.1026623
RP7	Retention Pond 7	-14.12763543	132.1174275

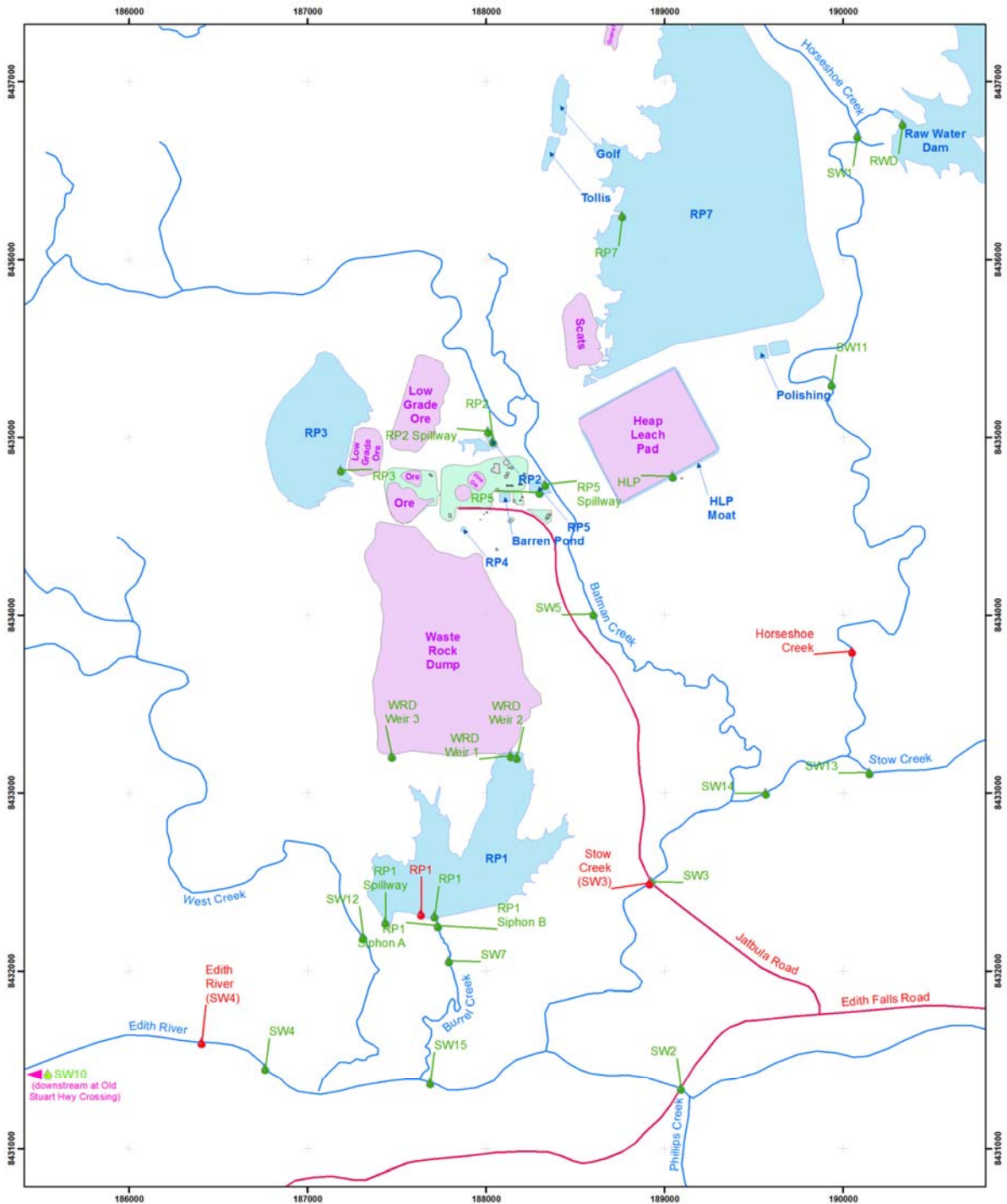


Figure 5 – WDL 178-3 Surface Water Sampling sites (includes non-WDL sites)

6.2 Summary of local Meteorology

The Mt. Todd area has a sub-tropical climate with a distinct wet and dry season. The area receives the majority of rainfall between the months of December and early April.

During the dry season the temperature ranges from 24 to 36°C, occasionally reaching 39°C with night-time temperatures reaching 7°C. During the wet season daily temperatures can range from 27 to 42°C.

Rainfall statistics from the Katherine weather station approximately 40km south southeast of the site are shown in Table 4 and illustrate the general rainfall conditions of the surrounding area. Since 1943 the highest annual rainfall measured at the Aviation Museum was 1,772.5mm in 1998. The lowest annual average rainfall was 678.3mm in 1970. Further climate observations are available in Table 4 through Table 6.

Table 7 and Figure 6 are the Intensity Frequency Duration (IFD) probabilities for rainfall over the Mt Todd Area. These IFD's have been obtained from the Bureau of Meteorology and are largely calculated from the rainfall data collected at the Edith Ridge telemetered rain gauge managed by the Bureau.

An automatic weather station was installed at the Mt Todd site in March 2011. The weather station records the following meteorological parameters –

- Rainfall
- Wind Speed
- Wind Direction
- Solar Radiation
- Net Radiation
- Barometric Pressure
- Relative Humidity
- Air Temperature

Data from the weather station is available at the site in real time via the onsite radio telemetry network, and over time will increasingly be utilised in place of Katherine meteorological data.

Table 4 - Summary of Rainfall Data

	Katherine Monthly Rainfall (mm)												Total Annual Rainfall (mm)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2007	240.9	97.7	475.8	0.0	0.0	8.0	0.0	32.4	0.0	18.4	105.6	330.6	1309.4
2008	219.2	469.8	195.9	1.6	0.0	0.0	0.0	0.0	1.0	4.4	57.9	398.9	1348.7
2009	435.6	308.0	10.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	21.2	291.2	1066.8
2010	342.8	213.6	107.2	56.8	12.2	0.0	0.0	3.8	18.8	76.9	65.2	419.0	1316.3
2011	267.6	359.6	235.8	227.8	0.0	0.0	0.0	0.0	0.0	30.3	201.0	246.8	1568.9
2012	98.2	202.4	357.7	48.2	1.8	0.0	0.0	0.0	14.3	0.0	119.6	173.2	1015.4
2013	137.8	157.8	320.4	105.6	0.0	0.0	0.0	0.0	0.0	14.4	143	165.9	1044.9
2014	281.7	326.6	111.4	26.8	0.0	0.0	0.0	0.0	0.0	-	-	-	-
1943-2013# Average	261.9	243.7	207.3	45.9	5.0	0.4	1.0	1.7	6.8	33.2	88.1	223.9	1141.8
Mt Todd Weather Station Monthly Rainfall (mm)													
2012	-	-	-	-	-	-	0	0	9.6	0.6	128.2	216.4	-
2013	121	284	416.2	73.2	28.4	0	0	0	1.6	27.6	272.4	145	1369.4
2014	368.4	301.2	70.8	12.2	7.4	0	0	0	0	-	-	-	-

Notes: *Average monthly rainfall value.

Table 5 - Summary of Temperature Data

	Katherine Monthly Mean Temperature (°C)																							
	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max
2007	24.5	34.7	24	35.4	23.8	32.9	19.9	33.7	19.6	34	14.2	26.8	10.6	29.3	14.6	31.2	18.3	35.8	23.3	37.8	24.4	37.7	24	35.7
2008	24	34.7	23.9	32.7	22.6	33.6	16.3	33.4	13.1	31.3	14.3	30	11.3	30.1	14	31.4	20.4	36.3	22.7	38.5	25.4	38.4	24.3	34.5
2009	23.8	33.6	23.8	32.6	21.1	35.3	20.6	35.3	17	31.8	13.8	31.2	12.2	30.3	14.8	33.5	21.5	36.8	22.6	37.8	25.4	38.9	24.8	36.4
2010	24.4	34	24.5	34.6	22.9	33.8	22.8	33.5	21.1	32.3	14.1	29.6	17.8	31.2	16.2	32.8	22.9	36.1	23.1	35.7	23	36.1	23.9	34.8
2011	24	33.2	23.7	32.2	23.8	31.8	20.1	31.4	14	29.7	9.2	27.6	13.5	29.8	13.2	31.5	17.4	34.8	23.9	37.3	24.2	35.6	24.6	35.3
2012	24.1	31.5	23.2	36.1	23.3	33.5	20.2	33.8	17	31.2	11.4	29.7	14.2	30.5	11.8	32.8	18.5	37.2	23.7	38.1	25.2	37.9	25.2	37.3
2013	24.8	37	24	36	-	-	-	-	-	-	-	-	-	-	-	-	15.2	39.4	18.9	41.5	23.1	41	22.7	38.8
2014	20	40.6	19.6	35.5	14.9	38.2	18.4	38.1	13.5	37	6.5	34	7.6	34.2	6.4	35.5	11	39.1	-	-	-	-	-	-
1946-2012 average	24.2	34.6	23.9	34.1	23.1	34.2	20.7	34.0	16.8	32.1	13.7	30.0	13.0	30.4	14.5	32.4	20.0	35.9	23.7	37.7	24.7	37.4	24.6	36.0
Mt Todd Weather Station Monthly Mean Temperature (°C)																								
2012	-	-	-	-	-	-	-	-	-	-	-	-	17.6	29.4	17.3	31.9	21.9	36.1	24.1	37.1	25.0	36.7	24.7	36.4
2013	25.1	35.5	24.2	34.4	24.2	33.7	22.2	34.4	22.7	32.6	20.2	31.0	-	-	13.0	36.5	19.7	38.1	23	40.6	22.3	40.1	22.5	38.3
2014	21.7	39.7	20.7	34.3	18.4	37.8	22.4	37.5	16.8	35.3	11.4	32.9	12.7	33.7	13.9	33.5	17.2	38.3	-	-	-	-	-	-

Notes: # Average Monthly value

Table 6 - Summary of Wind Speed Data

	Katherine Wind Speed Averages (km/h)																								
	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		
	9am	3pm	9am	3pm	9am	3pm	9am	3pm	9am	3pm	9am	3pm	9am	3pm	9am	3pm	9am	3pm	9am	3pm	9am	3pm	9am	3pm	
1988-2010	4.2	6.3	3.8	6.2	3.4	7.2	4.8	10.3	6.5	10.8	6.5	10.8	6	11.2	5.5	10.7	5.4	9.4	5.5	8.4	4.6	7	4.2	6.6	
2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	17	11	14	14	14	11	14	10	12	
2013	12	15	9	10	12	12	16	18	16	18	16	18	14	19	10	16	11	14	11	16	12	15	8	12	
2014	11	14	14	16	9	15	11	16	12	17	17	19	12	17	17	18	10	16	-	-	-	-	-	-	
Mt Todd Weather Station Wind Speed Averages (km/h)																									
2012	-	-	-	-	-	-	-	-	-	-	-	-	-	11.9	13.6	7.3	14.9	8.5	13.9	10.5	11.1	7.4	11	5.8	7.6
2013	7.7	10.9	5.4	7.7	6.9	9.4	7.2	13.5	10.9	13.5	11.5	14.1	-	-	7.1	14.5	9.4	12.8	8.6	12.8	6.8	11.3	5.7	8.5	
2014	7.3	10.1	8.2	11	5.7	11.3	6.5	12.7	7.9	13.3	12.6	15.9	6.9	13.4	13.5	16.1	6.6	12.6	-	-	-	-	-	-	

Table 7 - Intensity Frequency Duration probabilities for the Mt Todd area

Duration	Duration in minutes	EY [†]	Annual Exceedance Probability (AEP)					
		1EY	50%	20%	10%	5%	2%	1%
1 min	1	2.7	3	3.7	4.2	4.6	5.1	5.4
2 min	2	5	5.5	6.7	7.4	8	8.6	8.8
3 min	3	7	7.7	9.4	10.5	11.3	12.2	12.7
4 min	4	8.8	9.7	12	13.3	14.5	15.8	16.6
5 min	5	10.5	11.5	14.3	16	17.4	19.1	20.2
10 min	10	17.5	19.2	24	27	29.6	32.9	35.2
15 min	15	22.9	25	31.3	35.2	38.7	42.9	46
30 min	30	33.6	36.7	45.8	51.2	56.1	61.9	65.9
1 hour	60	44.8	49	60.9	67.9	74.1	81.3	86
2 hour	120	54.9	60.1	74.8	83.7	91.6	101	107.2
3 hour	180	59.9	65.6	82.3	92.7	102.1	113.6	121.7
6 hour	360	67.5	74.2	95.1	109	122.5	140.3	154.2
12 hour	720	76	84.1	110.9	130.4	150.5	178.8	202.7
24 hour	1440	89.1	99.3	134.9	162.2	191.8	235.5	273
48 hour	2880	111.3	124.8	172.5	209.7	250.4	311.3	361.7
72 hour	4320	130.2	146.3	202	244.6	290.5	358.1	412.8
96 hour	5760	146.3	164.4	225.3	270.6	318.2	386.4	442.3
120 hour	7200	159.9	179.5	243.6	289.6	336.6	402	458.1
144 hour	8640	171.3	191.9	257.6	303	348.1	408.7	464.9
168 hour	10080	180.6	201.9	267.9	311.8	354.1	408.9	465.6

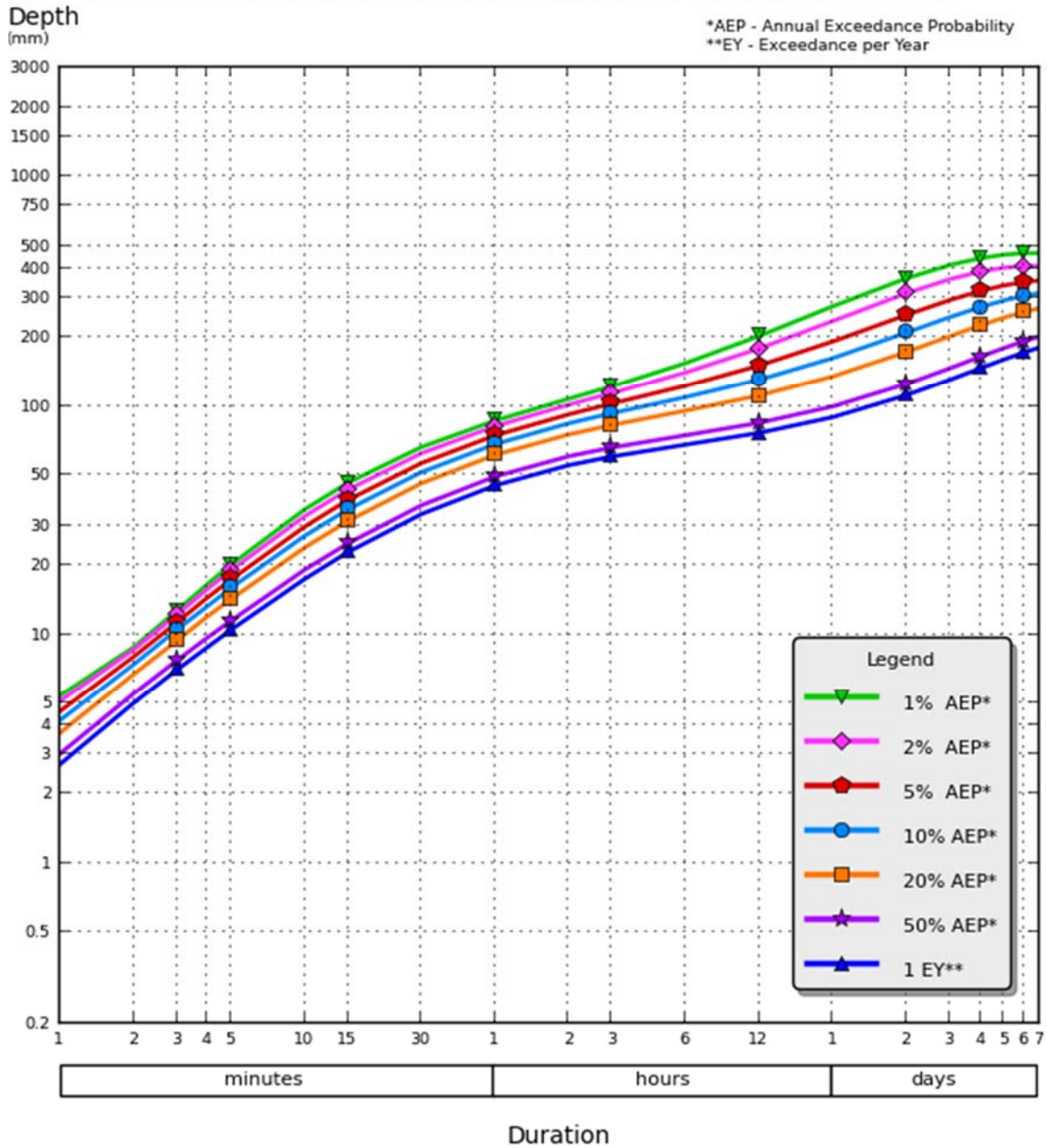
[†]EY = "Exceedance per year"

Requested coordinate Latitude: 14.2910 Longitude: 132.2990
 Nearest grid cell Latitude: 14.2875 (S) Longitude: 132.2875 (E)

IFD Design Rainfall Depth (mm)

Issued: 26 September 2013

Rainfall depth in millimetres for Durations, Exceedance per Year (EY), and Annual Exceedance Probabilities (AEP).



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Figure 6 - Intensity Frequency Duration curves for the Mt Todd area

6.3 Sampling Methodology

Sampling is undertaken in accordance with the requirements specified in WDL 178-3. The monitoring program schedule is initiated by the activity of discharging and sites sampled are dictated by the discharge location and source water. All sampling is undertaken using best practice methodologies detailed in the Vista Gold Surface Water Monitoring Procedure submitted with the WDL Annual Monitoring Report for WDL 178-2.

Sampling is completed by trained on-site personnel when releasing water. Macroinvertebrates and sediment are collected by an independent contractor, Envirotech Monitoring Pty Ltd. All quality control and assurance procedures are detailed in the Surface Water Monitoring Procedure and summarised in section 6.3.1

6.3.1 Sampling quality control and methodology

All sampling programs are conducted to a minimum of Australian standards or procedures relevant to the monitoring program (e.g. AUSRIVAS).

Instruments used for reading water quality physical parameters are calibrated prior to each day of sampling and procedures followed as listed by the relevant instrument manufacturer's manual. Quality control procedures for instruments include:

- Keeping pH and dissolved oxygen sensors moist when stored
- Referencing barometric pressure readings from the site weather station during the calibration of dissolved oxygen meters
- Documenting calibration results to verify instrument performance
- Calibrating EC and pH sensors using standards appropriate for the waters to be sampled

Field QA and QC requirements are managed through the Procedure for the sampling of Surface Waters, Department of Mines Advisory Note #: AA7-025 March 2009 and the respective Australian/New Zealand Standards:

- 5667.1:1998 Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.
- 5667.4:1998 Part 4: Guidance on sampling from lakes, natural and man-made.
- 5667.6:1998 Part 6: Guidance on sampling of rivers and streams.
- 5667.11:1998 Part 11 Guidance on sampling of ground waters.

Vista Gold's contracted laboratory has a large NATA scope of accreditation to AS ISO/IEC 17025, the terms of which can be viewed at <http://www.nata.asn.au>, (Accreditation number 2901). This includes all aspects of the analytical process including sample preservation, sample registration, methodology, instrument calibration and maintenance, data records, calculations and reporting of results. Where not accredited, these tests are subcontracted to a NATA Accredited laboratory where applicable.

All sample containers are supplied pre-dosed with preservative (where required) by the laboratory. Where possible, sample containers and chain of custody forms are pre-labelled to minimise recording and documenting errors in the field. Field filtering (0.45 µm) is performed onsite when required using sterile filters and syringes of brands known to be suitable for water quality chemical sampling. All samples are stored in the site sample refrigerator until they can be dispatched in chilled eskies. Chain of custody forms, samples and blanks are collected by a Katherine to Darwin courier for immediate transport to the laboratory. Electronically received results are compiled and assessed by the Environmental Manager.

6.4 Monitoring and Assessment

In accordance with WDL 178-3, discharge surface water sampling was undertaken for the single discharge event as well as monthly monitoring of all sites for Total Cyanide. Results of these monitoring activities are presented in section 6.6

Annual Macroinvertebrate and Sediment sampling was conducted in early June 2014. The number of sediment sites sampled was reduced from the 2013 survey and results and interpretation for both components are presented in the 2013-2014 Macroinvertebrate and Sediment Monitoring Report.

Ecotoxicology assessment was undertaken on RP3 water in November 2013. The results of the ecotoxicology assessment were used to calculate dilution ratios for discharge from RP3. The calculated dilution ratios are to ensure 80% species protection requirements are met at SW4, and also provides a straightforward mechanism for the management and release of onsite waters. The dilution ratios for RP3 are presented in Table 8. Full results of the Ecotoxicology assessments and dilution calculations are available on the Mt Todd Website.

Table 8 - Calculated dilution rates from Ecotoxicology assessments

Source	Date of applicable water quality	Dilution Rate	Comments
RP3	Jan 2013	1:1,123	Based on near surface sample
	Mar 2013	1:20	Based on sample 10m below the surface
	Nov 2013	1:132	Based on near surface sample

6.4.1 Discharge Management for the Current and Upcoming Reporting Period

In general the operational water management activities undertaken during the current reporting period will remain the same over the foreseeable future. The improvements presented in WDL 178-2 and carried through to 178-3 have allowed discharge waters into the Edith River at such dilution to achieve an 80% level of species protection. The current licence effectively improves the quality of diluted waters in the Edith River while still enabling Vista Gold to release significant volumes of water from site, at a ratio directly related to the quality of such source water. The current capacity to discharge treated waters directly from RP3 helps to achieve the goal of water management to reduce the total volume of onsite waters while ensuring all licence conditions are met. The Discharge Management Strategy was submitted as a requirement of WDL 178-2 and can be accessed via the NT EPA website as follows:

http://www.ntepa.nt.gov.au/data/assets/pdf_file/0004/144913/WDL178_vista_gold_discharge_plan.pdf

6.4.2 Direct Toxicity Assessment

The use of dilution values derived from Direct Toxicity Assessment has been determined as the preferred strategy for deriving safe concentrations of metals for environmental protection of the Edith River downstream of the Mt Todd Mine site. WDL 178-3 specifies this approach and as such Vista Gold commissioned a DTA for RP3 in November 2013 to derive a dilution factor for discharges from this water body during the 2013 -2014 wet season. The full ecotoxicological report is available on the Vista Gold website titled “Mt Todd Discharge Treated Retention Pond 3 Ecotoxicological Report – January 2014”.

Ecotoxicological testing was undertaken using seven key species and a combination of chronic and acute testing methods. RP3 water was diluted with Edith River SW2 water to provide a suitable dilution series for each of the test species. The results of this testing were introduced into a proprietary software program that calculates species sensitivity distributions and a concentration of effluent that will protect 80% of the receiving water population from a 10% decrease in growth and/or reproduction. This concentration was determined to be 0.76% RP3 water, which represents 1 part RP3 water to 132 parts Edith River water, or a 1:132 dilution ratio.

6.4.3 Surface Water Monitoring Values

The DTA ratio should not be used to calculate site specific trigger values. However, it is possible to calculate (from tested RP3 water chemistry) Monitoring Values (MVs) that will allow rapid feedback and more precise control of discharge rates. When the original RP3 chemistry is adjusted by the dilution ratio, the resulting concentrations are indicative of what will be measured at SW4 if the desired dilution is achieved.

Of the suite of parameters measured, the two that are closest to the ANZECC 80% trigger values (80%TV) are Zinc and Cadmium. Zinc is practically equal to the 80%TV and cadmium is half the 80%TV. As such, the measurement of these two key parameters will provide feedback on the actual levels of protection provided in the Edith River. The monitoring values are presented in Table 9 below and discharge monitoring results are discussed in section 6.6 in context of exceedances of these monitoring values.

Table 9 - Feedback Monitoring Values at SW4 based on DTA November 2013

Discharge	Chemical	Concentration (µg/L) 0.45 µm Filtered
RP3	Cd	0.4
	Zn	33

Other measured parameters in the WDL will inform the level of environmental protection afforded by the mixed Edith River water and will also indicate, by ratio analysis, if additional non-point source or passive discharge is occurring from the wider Mt Todd Mine site.

Detailed information on the planned management of discharges, sampling, assessment and investigations against monitoring values is presented in the Discharge Plan submitted as a component of WDL 178-2.

6.5 WDL 178-3 Monitoring Program

The WDL monitoring program for the 2013-2014 wet season is detailed in the WDL 178-3 document and comprises the following monitoring activities. WDL 178-3 is valid for the period 26 November 2013 to 30 September 2014.

6.5.1 Surface water monitoring

To meet the requirements of WDL 178-3 sampling encompasses the following sites-

- RP1 - Waste rock wastewater source
- RP3 – Batman Pit
- RP7 – Tailing Storage area
- SW2 – Edith River at Bridge on Edith Falls road
- SW4 – Edith River downstream of RP1 siphon and spillway discharge
- SW10 – Edith River at old Stuart highway causeway

Samples must be collected on the following schedule -

- Monthly
- Daily when discharging
- 1 week after the cessation of discharge
- Once during the period of first flush

Physical parameters measured include –

1. Discharge flow rate
2. River flow rate
3. River height
4. Temperature
5. Electrical Conductivity
6. pH
7. Dissolved Oxygen

and samples must be analysed for the following parameters:

- Sulphate
- Bicarbonate
- Unfiltered Alkalinity CaCO₃
- Hardness CaCO₃
- Total Dissolved Solids
- Total Suspended Solids
- Total Solids
- Sodium
- Chloride
- Calcium
- Total (WAD) Cyanide*
- Aluminium
- Cadmium
- Cobalt
- Copper
- Chromium III
- Chromium VI
- Iron
- Lead
- Magnesium
- Manganese
- Mercury
- Nickel
- Zinc

*WAD Cyanide is required if the result of monthly Total CN analysis is greater than 0.004 mg/L.

The specific matrix of sampling sites, parameters and frequencies are specified in the WDL. Surface water sampling is conducted by on-site staff following the procedures listed in the Vista Gold Surface Water Monitoring Procedure.

6.5.2 Sediment monitoring

Sediments were monitored as a requirement of WDL 178-3 and monitoring was undertaken in conjunction with Macroinvertebrate sampling in June 2014. Sediment sampling results are presented and discussed in the 2013-2014 Mt Todd Macroinvertebrate and Sediment Monitoring Report.

6.5.3 Biological monitoring

Macroinvertebrates were monitored as a requirement of WDL 178-3 and results and discussion of the June 2014 sampling is presented in the 2013-2014 Mt Todd Macroinvertebrate and Sediment Monitoring Report.

6.6 Water Quality Reporting 2013-2014

6.6.1 Discharge Monitoring

The period of monitoring included only a single discharge period from 1-6 February 2014 and a Monthly Discharge Report was submitted in February 2014 detailing the discharge period in fulfilment of the monthly reporting requirements identified above.

As there was only the single discharge period during the reporting period, the results presented below are primarily the same as those presented in the February report with any additional relevant data.

Discharge commenced 1 February 2014 at 08:41AM and continued without stop until 6 February 2014 at 11:49 AM. A total of 217.26 ML were discharged during this period at an average dilution ratio of 1:162. This rate is below the DTA acceptable value of 1:132 and therefore provides added protection for the downstream environment.

Daily results are displayed in

Table 10 and continuous pumping data over the discharge period is displayed in Figure 7. The theoretical pump rate shown in Figure 7 is a calculated discharge rate based on 1:132 dilution of RP3 water and is determined by the flow rate experience at SW4. As shown in the figure the actual pump rate matches the theoretical flow rate, except when high flows are experienced at SW4 and then the pump rate plateaus at maximum capacity.

The rate of flow from RP3 is measured via an inline magnetic flow meter which is automatically measured every 30 seconds. Flow from the Edith River is determined by measurement of water level at the SW4 Gauging Station and converted via the established rating for the site. River height and flow rate are displayed in Figure 8 for the period 31 January 2014 to 14 February 2014, a period that spans the discharge.

Table 10 - Daily flow readings

Date	Hours	SW4 Flow Rate (m ³ /s)	Edith Volume (m ³)	Theoretical Flow Rate at 1:132 (m ³ /s)	Actual RP3 Discharge Rate (m ³ /s)	Daily Discharge Volume (m ³)	Actual Daily Dilution Ratio
01-February-2014	14.5	149	7,756,506	1.13	0.80	41,685	186
02-February-2014	24.0	118	10,217,592	0.90	0.64	54,876	186
03-February-2014	24.0	77	6,619,446	0.58	0.57	48,841	136
04-February-2014	24.0	63	5,406,300	0.47	0.44	37,843	143
05-February-2014	24.0	45	3,868,794	0.34	0.32	27,512	141
06-February-2014	12.0	30	1,286,928	0.23	0.15	6,271	205
	122.5	80	35,155,566	0.60	0.49	217,029	162

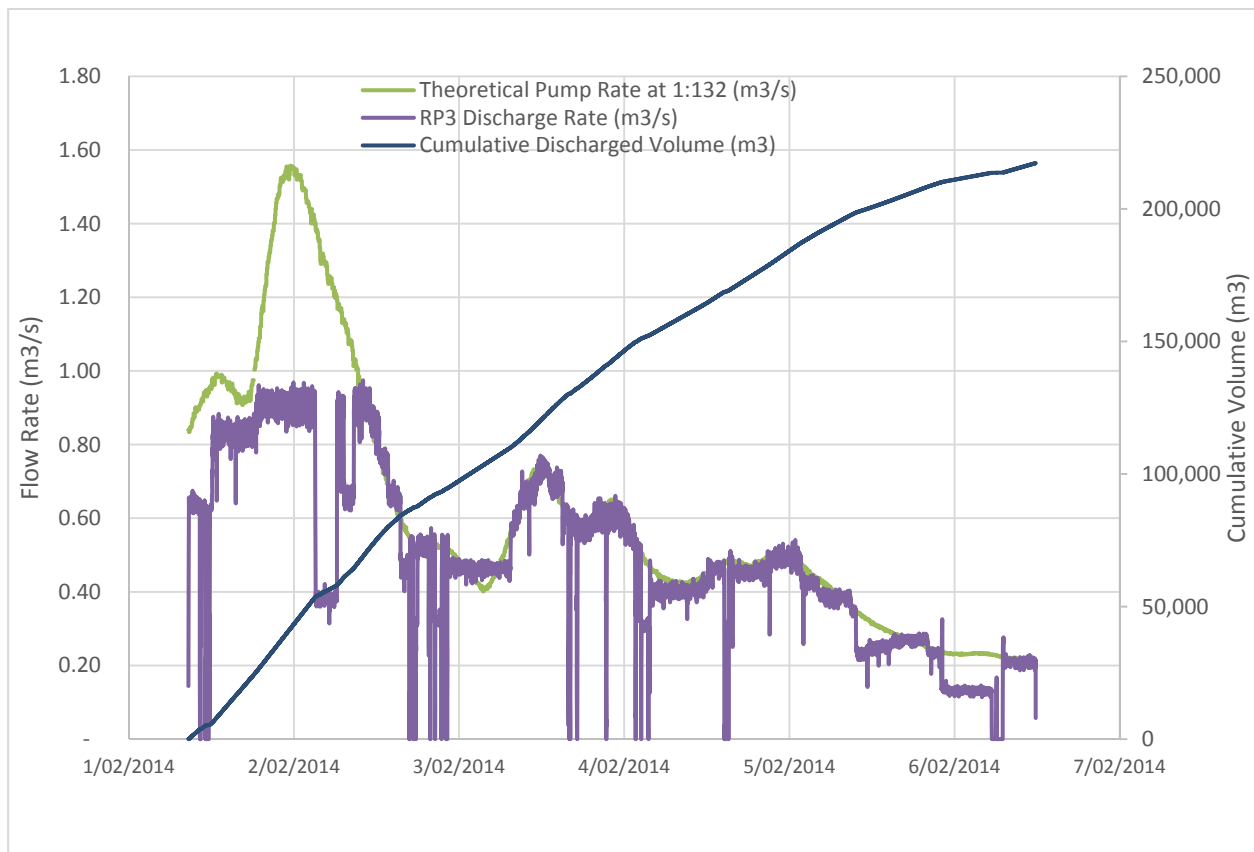


Figure 7 - RP3 treated water discharge rate during February 2014

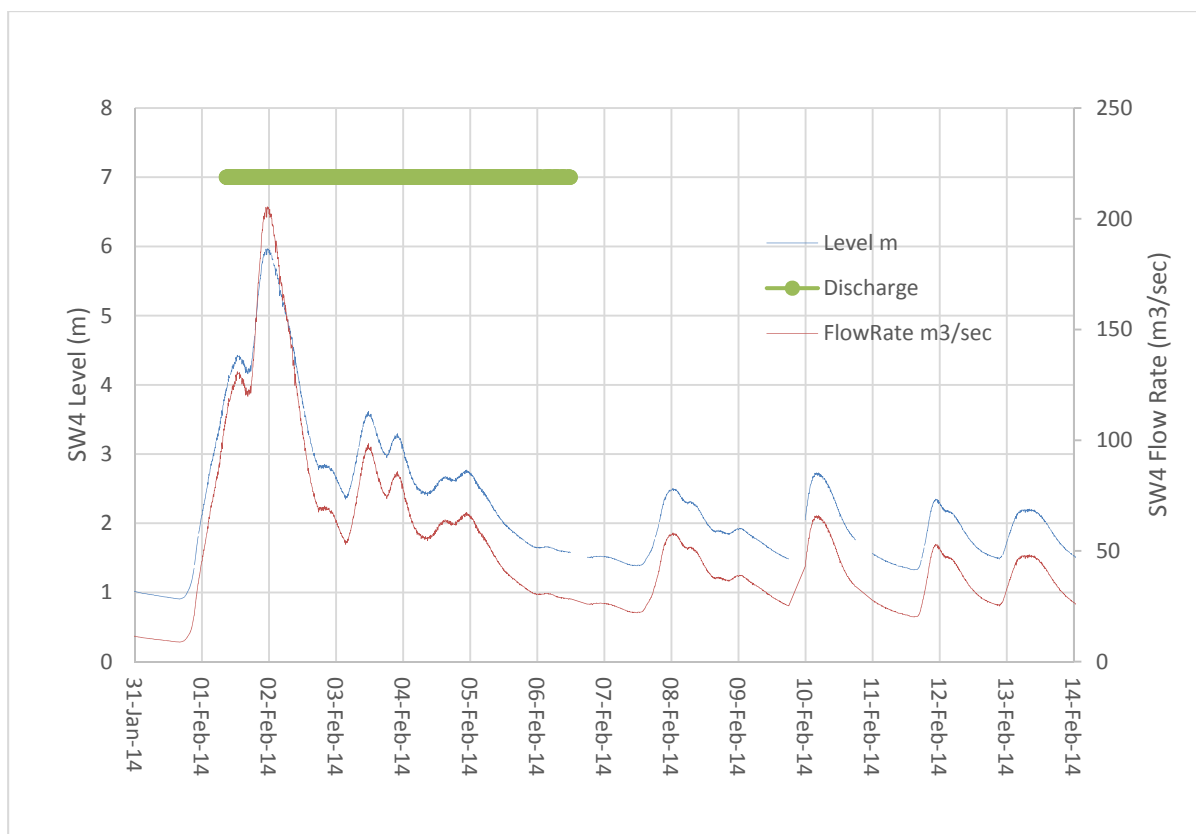


Figure 8 – SW4 river height and flow rate for the February 2014 discharge period

Discharge chemistry and field measurements are presented in full in Appendix 1 for RP3, SW2, SW4 and SW10. The monitoring values determined by DTA and presented in Table 9, were exceeded at SW4 on two of the six discharge days. Cadmium and Zinc exceeded MVs on the second day of discharge and Zinc only just exceeded MVs one week after cessation of flow (37 µg/L).

The second day of discharge exhibited additional contamination contributions as evidenced by high concentrations from chemical parameters not in high levels in RP3 raw water. Copper concentrations at SW4 but not at SW2 indicate a mine site source possibly resulting from high intensity rainfall re-mobilising dry season evaporated mine waters. Copper concentrations at SW10 displayed an extended elevation period of four days, likely a result of high river levels reaching the December 2011 train derailment spillage site.

Water quality results from the early part of the discharge period displayed elevated levels when compared with ANZECC 80% protection levels. Aluminium levels across all three surface water sites were elevated and elevated copper concentrations persisted for the first four days at SW10. The elevated levels exhibited over the beginning of the discharge period are consistent with a flushing event in the localised catchment, including the upper Edith River site (SW2). The contributions from the wider mine area are apparent but short lived. There is no evidence to suggest the discharge water was solely responsible for the exceedances of MVs, rather the cumulative addition of wider mine site contamination associated with the flush event.

Figure 9 to Figure 12 display key water quality parameters from all monitoring sites during the discharge event. Where appropriate the MVs and 80%TV have been included on the graph to identify exceedances.

RP3 ceased discharging on 6 February and displayed considerable elevations in Al, Cu, Pb and Zn in the sample collected one week after discharge. The dramatic increase in concentrations is a result of

a directive from regulators to pump water from RP1 into RP3 to avoid uncontrolled overflow from this pond. The resultant change in water chemistry negated the opportunity for further discharges from RP3 during the remainder of the wet season, as the lead and analysis time required for a full DTA was too long. Monthly pit chemistry results displayed in section 6.6.3 further confirm the persistent change in surface water chemistry.

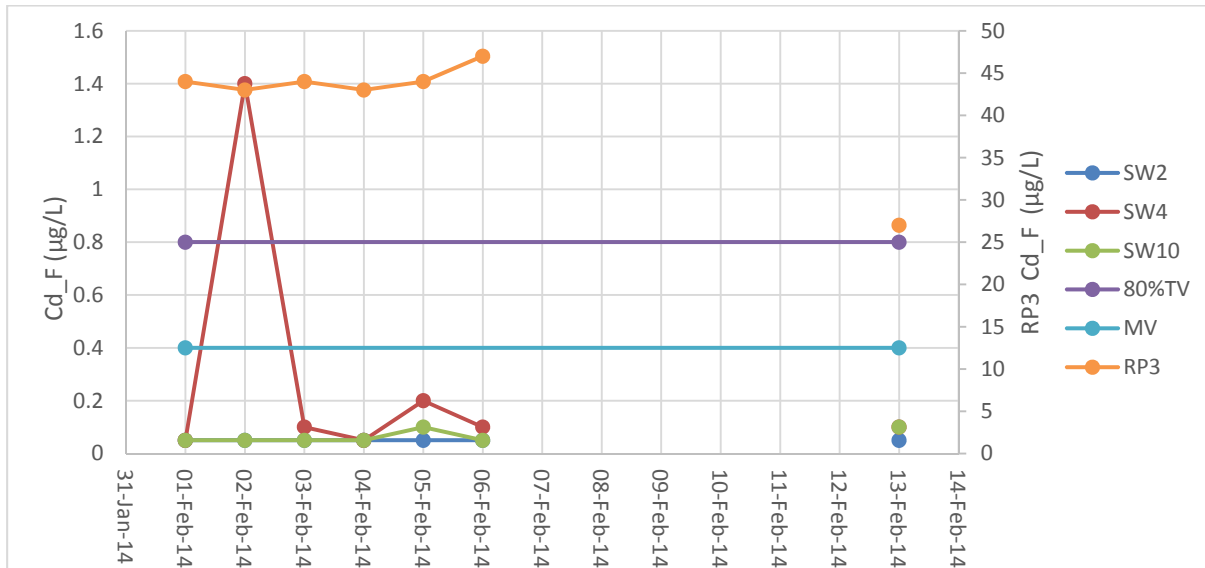


Figure 9 – Cadmium concentrations from SW2, SW4, SW10 and RP3 during discharge

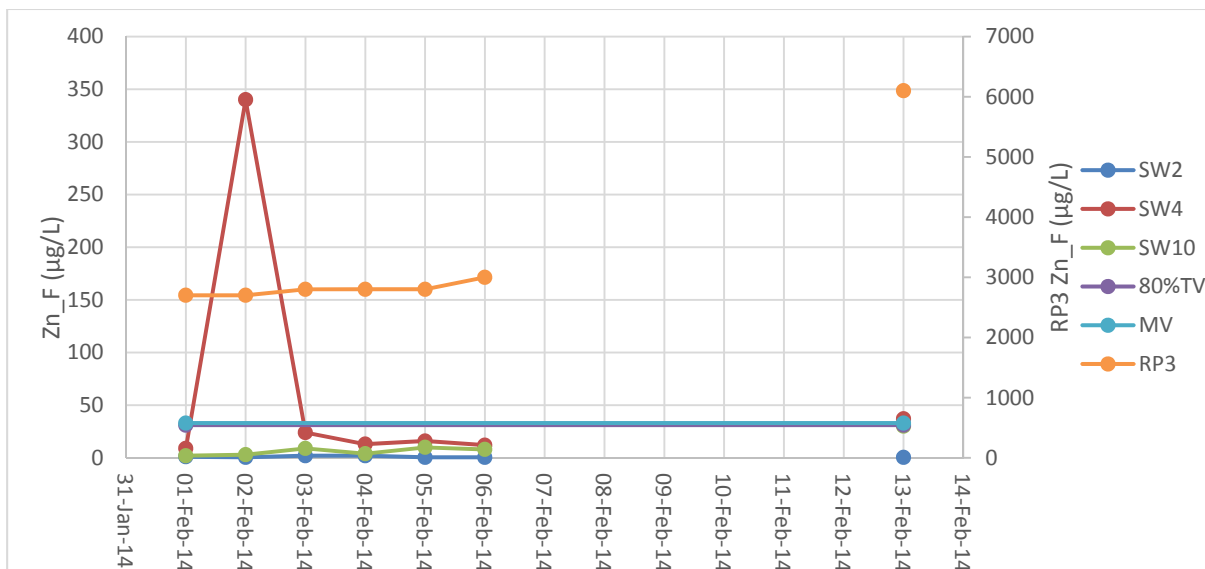


Figure 10 – Zinc concentrations from SW2, SW4, SW10 and RP3 during discharge

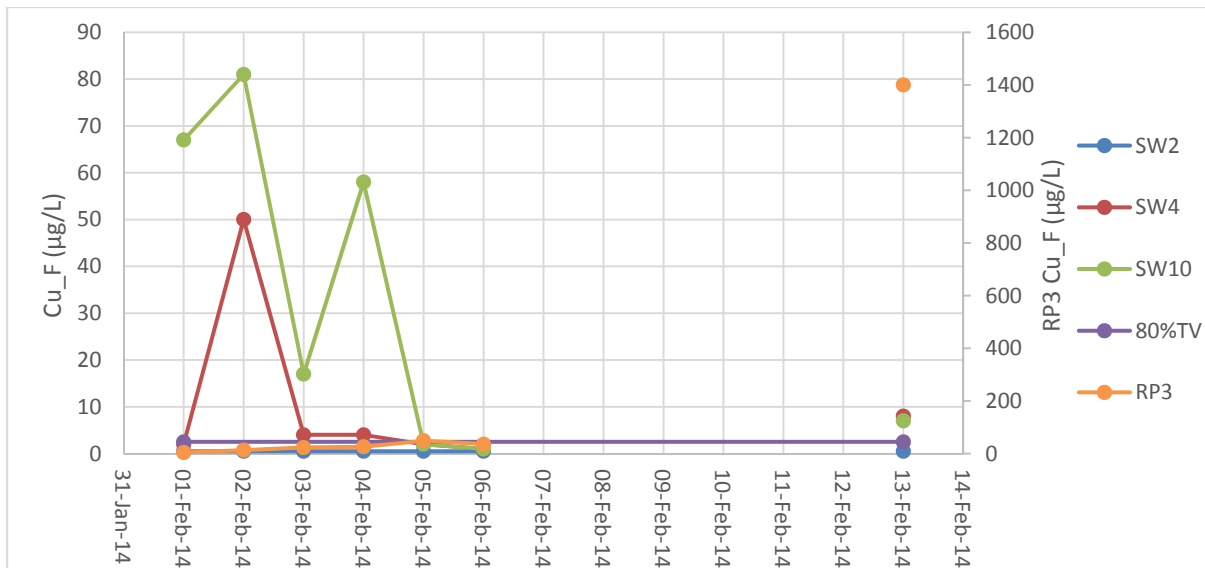


Figure 11 - Copper concentrations from SW2, SW4, SW10 and RP3 during discharge

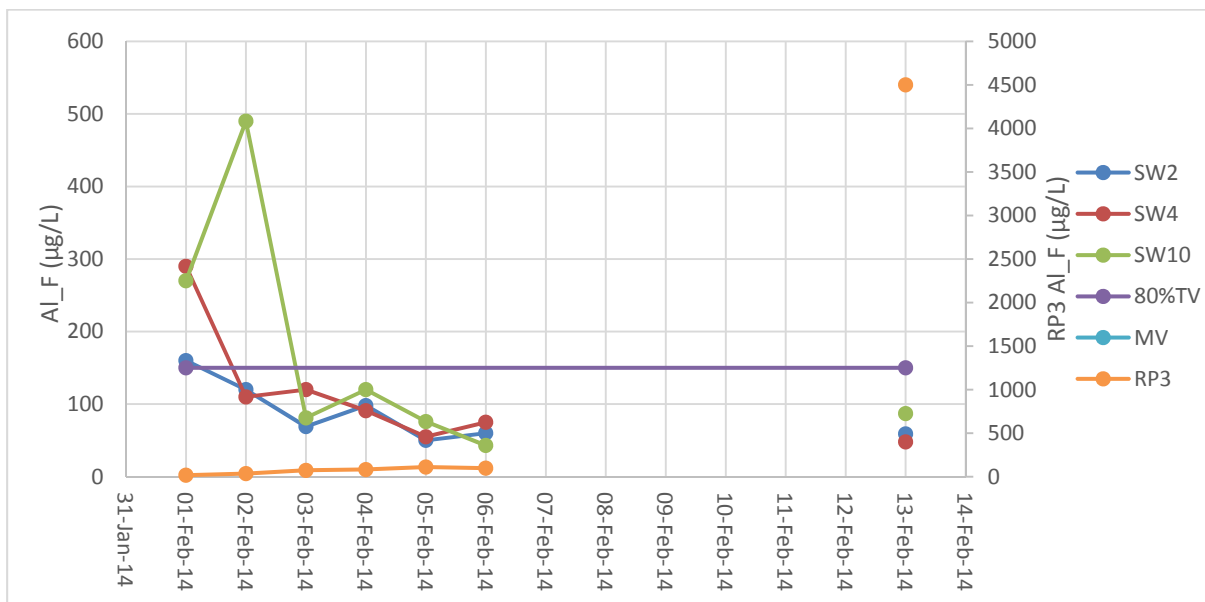


Figure 12 - Aluminium concentrations from SW2, SW4, SW10 and RP3 during discharge

6.6.2 Surface Water

In accordance with WDL178-3 and its Addendum, monthly sampling for Total and WAD Cyanide was undertaken for the reporting period. The results for the entire reporting period are included in Appendix 2. As stipulated in the WDL, when Total Cyanide exceeds 0.004 mg/L an additional Weak Acid Dissociable (WAD) Cyanide analysis must be undertaken. Only those results >0.004 mg/L Tot CN are displayed in Table 11 below. The results for RP3 have been confirmed in a separate monitoring program and are the result of internal pumping activities initiated during the wet season to avoid uncontrolled discharge from RP1. The cyanide transferred to RP3 with pumped water persisted for the wet season until May 2014 when sampling showed concentrations below the 0.004 mg/L detection limit.

The results for both SW4 and SW10 are likely to be false positives as no discharge off-site is occurring this late in the dry season and there are no other likely sources. Sample contamination or switching may be responsible for these results.

Table 11 – Monthly Cyanide Monitoring Results

Site	Date	Total CN ⁻ (mg/L)	WAD CN ⁻ (mg/L)
SW4	3/11/2013	0.006	<0.004
RP3	3/03/2014	0.026	--
RP3	1/04/2014	0.032	0.015
SW10	6/08/2014	0.01	0.009

The full record of Cyanide sampling is included as Appendix 2.

6.6.3 Retention ponds

WDL 178-3 stipulates water quality monitoring from the three retention ponds RP1, RP3 and RP7. Total Cyanide is to be sampled on a monthly frequency and water quality parameters only when discharging, and at the same schedule at other WDL surface water sampling sites. Discharge monitoring results are discussed in section 6.6.1 above and presented in full in Appendix 1.

During the reporting period for this WDL an additional water quality monitoring program was in operation with monthly samples collected over the whole year of reporting. Key results from this sampling program are presented in Figure 13 and included in full in Appendix 3.

6.6.3.1 Chemical quality

Major ions were very stable over the reporting period with some minor seasonal changes from wet season rainfall dilution and dry season evaporative concentration. As discussed in section 6.6.2 the Total Cyanide concentrations increased after RP1 water was pumped into RP3 between cessation of discharge and the final discharge sample collection a week later (6-13 February).

Trace metals show consistent surface concentrations for most of the parameters measured but substantial changes in aluminium, copper and zinc. All of these changes are associated with the input of RP1 water in early February and elevated concentrations persisted for the remainder of the reporting period.

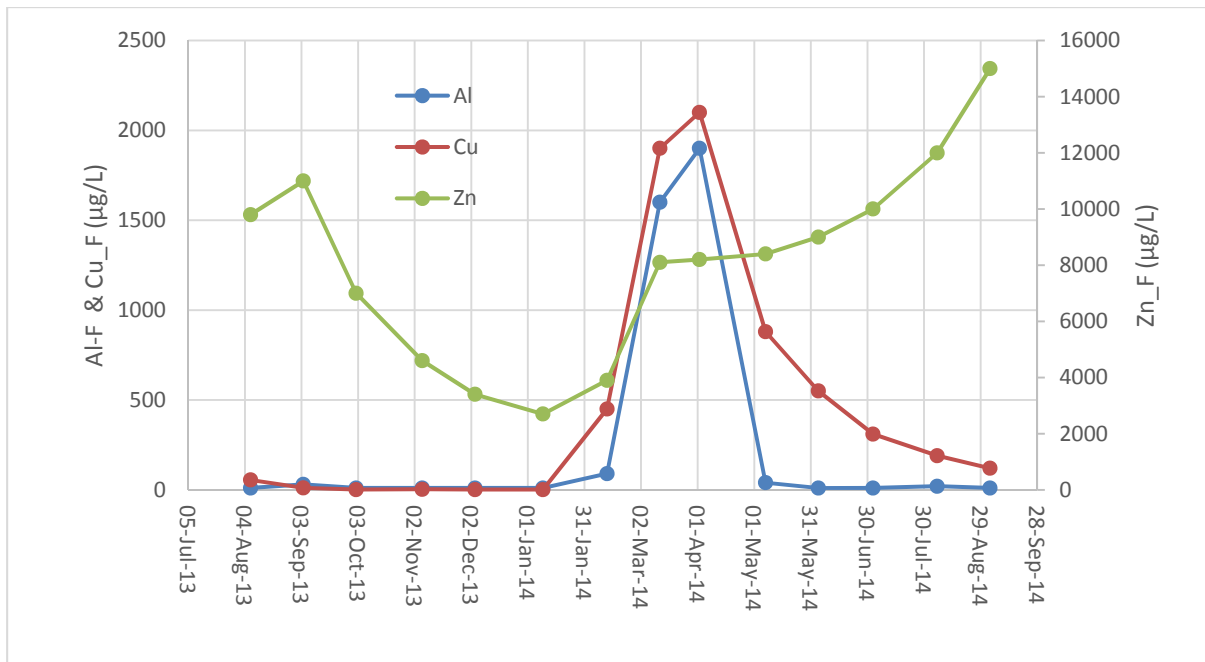


Figure 13 – RP3 concentrations of aluminium, copper and zinc over the 2013-2014 reporting period

6.6.3.2 Pond levels

Levels of both RP1 and RP3 during the reporting period are displayed in Figure 14 and Figure 15 respectively. The peak water level in RP1 for this reporting period occurred on 10 February at a level of 120.293m (Figure 14). Pumping of RP1 to RP3 commenced on this day and continued intermittently during the wet season to keep a safe level of freeboard, thus ensuring no controlled or uncontrolled discharges from this retention pond for the remainder of the reporting period.

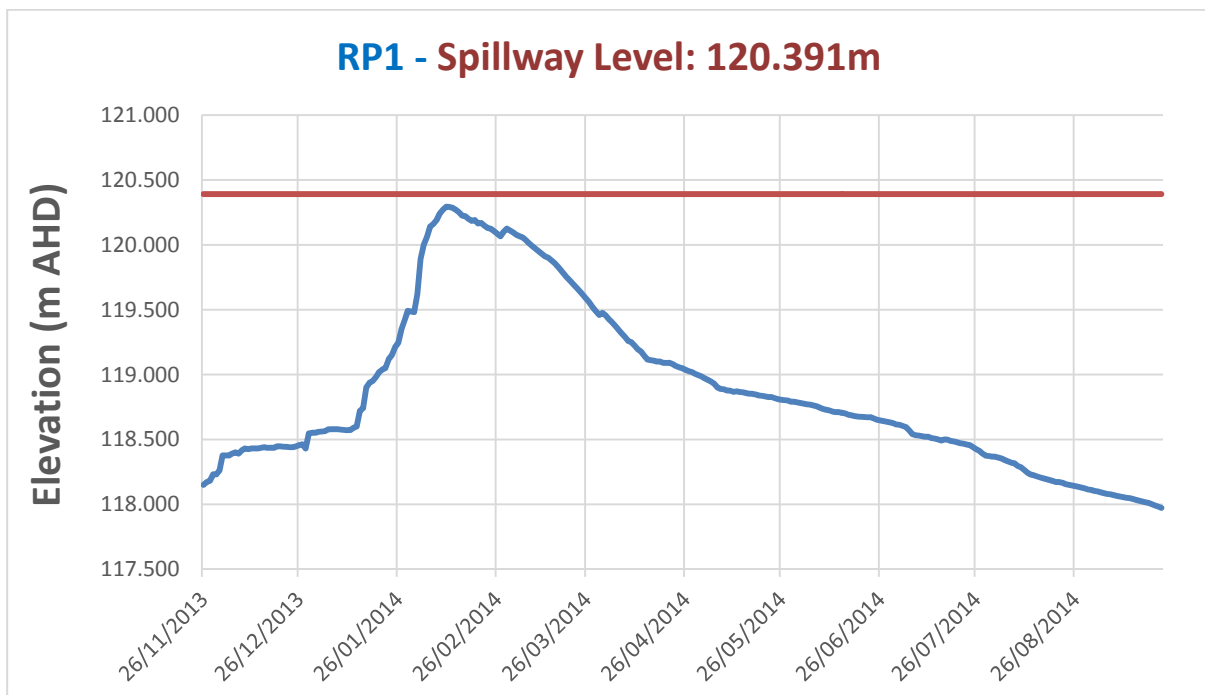


Figure 14 - RP1 Water level during 2013-14

As shown in Figure 15, RP3 level dropped 0.335m during the period of discharge and then displayed a steady increase in level until early April as a result of pumping from RP1 and wet season rainfall. The end of wet season level was 3.14m higher than at the end of the discharge period. RP3 level dropped at a steady rate during the remainder of the reporting period and was approximately 0.9m lower at the end of the WDL period.

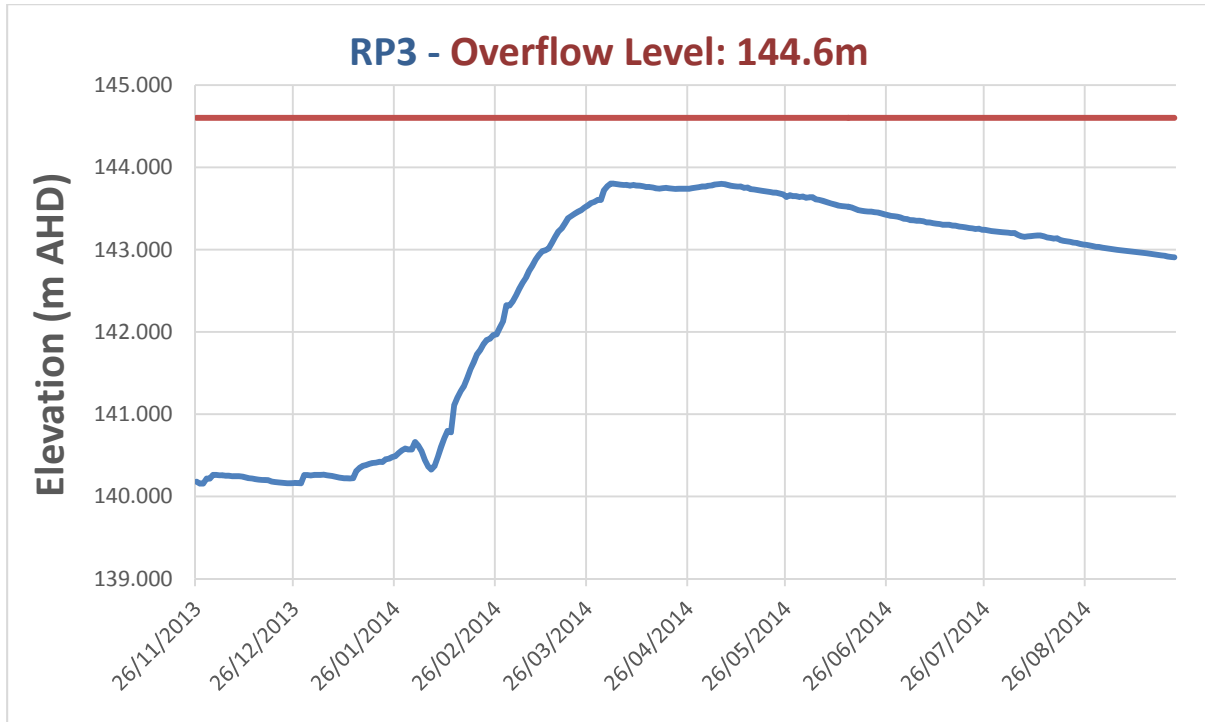


Figure 15 - RP3 Water level during 2013-14

Appendix 1- 2013-2014 Discharge Monitoring Data

RP3	Parameter	01-Feb-14	02-Feb-14	03-Feb-14	04-Feb-14	05-Feb-14	06-Feb-14	13-Feb-14
Physical Parameters & Major Ions	Dissolved Oxygen (% Sat)	96.1	96.5	67.7	97.2	94.2	93.9	73.3
	Electrical Conductivity (uS/cm)	3032	3009	3939	2800	2960	2863	1298
	pH	7.14	6.61	6.39	6.67	6.57	6.78	4.86
	Temperature (degrees celcius)	30.5	30.8	29.7	28.9	29.5	27.9	33
	Total Dissolved Solids (mg/L)	2100	2700	2600	2600	2900	2900	670
	Total Solids (mg/L)	2100	2700	2700	2600	2900	3000	670
	Total Suspended Solids (mg/L)	2.5	5	14	2.5	2.5	2.5	2.5
	Hardness (mgCaCO3/L)	1900	1900	1900	1800	1800	1800	540
	Total Alkalinity (mg/L)	38	36	36	35	38	40	6
	Bicarbonate Alkalinity as (mg/L)	38	36	36	35	38	40	6
	Carbonate Alkalinity as (mg/L)	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	Hydroxide Alkalinity (OH-) (mg/L)	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	Calcium - Dissolved (mg/L)	430	440	440	410	410	420	84
	Calcium - Total (mg/L)	400	390	390	380	430	420	82
	Magnesium - (0.45µm filtered) (mg/L)	190	190	190	180	180	180	81
	Magnesium - Total (mg/L)	200	190	190	190	190	190	76
	Sodium - Total (mg/L)	59	56	57	56	60	58	14
	Chloride, Cl (mg/L)	5	5	31	75	6	5	3
	Sulphate, SO4 (mg/L)	1600	1500	1500	1500	1700	1800	550
	Total Cyanide (mg/L)	0.002	0.002	0.002	0.002	0.002	0.002	0.002

RP3	Parameter	01-Feb-14	02-Feb-14	03-Feb-14	04-Feb-14	05-Feb-14	06-Feb-14	13-Feb-14	DTA MVVs	ANZECC 80% TV	
Trace Metals	Aluminium-(0.45µm filtered) (µg/L)	16	35	72	82	110	97	4500		150	
	Aluminium-Total (µg/L)	100	130	170	170	290	220	4300			
	Cadmium-(0.45µm filtered) (µg/L)	44	43	44	43	44	47	27	0.4	0.8	
	Cadmium-Total (µg/L)	47	44	44	44	44	43	27			
	Chromium-(0.45µm filtered) (µg/L)	0.5	0.5	0.5	0.5	1	1	0.5		40	
	Chromium-Total (µg/L)	0.5	0.5	1	0.5	1	0.5	0.5			
	Cobalt-(0.45µm filtered) (µg/L)	380	370	370	370	400	430	280		90	
	Cobalt-Total (µg/L)	390	380	380	360	390	380	280			
	Copper-(0.45µm filtered) (µg/L)	4	13	23	26	49	36	1400		2.5	
	Copper-Total (µg/L)	11	21	34	38	65	46	1400			
	Iron-(0.45µm filtered) (µg/L)	5	5	5	5	5	5	39		300	
	Iron-Total (µg/L)	130	87	92	82	67	63	62			
	Lead-(0.45µm filtered) (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	26		9.4	
	Lead-Total (µg/L)	0.5	0.5	0.5	0.5	1	0.5	26			
	Manganese-(0.45µm filtered) (µg/L)	4400	4400	4500	4300	4600	4900	3600		3600	
	Manganese-Total (µg/L)	4600	4400	4400	4300	4500	4400	3500			
	Mercury-(0.45µm filtered) (µg/L)	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025		5.4
	Mercury-Total (µg/L)	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025		
	Nickel-(0.45µm filtered) (µg/L)	350	350	350	340	380	400	260		17	
	Nickel-Total (µg/L)	370	350	350	340	370	360	250			
Zinc-(0.45µm filtered) (µg/L)	2700	2700	2800	2800	2800	3000	6100	33	31		
Zinc-Total (µg/L)	3000	2900	2900	2900	3300	3100	5900				

SW2	Parameter	01-Feb-14	02-Feb-14	03-Feb-14	04-Feb-14	05-Feb-14	06-Feb-14	13-Feb-14
Physical Parameters & Major Ions	Dissolved Oxygen (% Sat)	101.5	98.8	75.7	96.2	95.9	92.9	82.2
	Electrical Conductivity (uS/cm)	752.2	11.9	13.9	15	14.8	15.2	14.3
	pH	5.91	5.3	5.79	5.49	5.68	5.82	6.11
	Temperature (degrees celcius)	27.8	28.5	28.9	27.9	28.4	28.3	29.1
	Total Dissolved Solids (mg/L)	48	56	40	100	26	38	30
	Total Solids (mg/L)	65	66	54	120	33	38	36
	Total Suspended Solids (mg/L)	17	10	14	19	7	2.5	6
	Hardness (mgCaCO3/L)	4	1.5	4	4	4	1.5	1.5
	Total Alkalinity (mg/L)	7	7	8	8	8	10	10
	Bicarbonate Alkalinity as (mg/L)	7	7	8	8	8	10	10
	Carbonate Alkalinity as (mg/L)	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	Hydroxide Alkalinity (OH-) (mg/L)	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	Calcium - Dissolved (mg/L)	0.6	0.25	0.5	0.7	0.6	0.25	0.25
	Calcium - Total (mg/L)	0.6	0.25	0.6	0.7	0.5	0.5	0.25
	Magnesium - (0.45µm filtered) (mg/L)	0.5	0.25	0.5	0.6	0.5	0.5	0.25
	Magnesium - Total (mg/L)	0.6	0.25	0.6	0.6	0.6	0.6	0.25
	Sodium - Total (mg/L)	1.1	0.8	1.1	1.1	1.2	1.3	1.3
	Chloride, Cl (mg/L)	0.5	0.5	0.5	0.5	0.5	1	1
	Sulphate, SO4 (mg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Cyanide (mg/L)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	

SW2	Parameter	01-Feb-14	02-Feb-14	03-Feb-14	04-Feb-14	05-Feb-14	06-Feb-14	13-Feb-14	DTA MVVs	ANZECC 80% TV
Trace Metals	Aluminium-(0.45µm filtered) (µg/L)	160	120	69	98	50	60	59		150
	Aluminium-Total (µg/L)	270	40	190	200	470	310	190		
	Cadmium-(0.45µm filtered) (µg/L)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.4	0.8
	Cadmium-Total (µg/L)	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
	Chromium-(0.45µm filtered) (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		40
	Chromium-Total (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
	Cobalt-(0.45µm filtered) (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		90
	Cobalt-Total (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
	Copper-(0.45µm filtered) (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		2.5
	Copper-Total (µg/L)	2	0.5	2	0.5	0.5	0.5	0.5		
	Iron-(0.45µm filtered) (µg/L)	230	150	130	150	130	150	170		300
	Iron-Total (µg/L)	640	99	360	400	460	470	600		
	Lead-(0.45µm filtered) (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		9.4
	Lead-Total (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
	Manganese-(0.45µm filtered) (µg/L)	8	2.5	2.5	5	6	6	2.5		3600
	Manganese-Total (µg/L)	17	2.5	9	9	11	10	9		
	Mercury-(0.45µm filtered) (µg/L)	0.025	0.025	0.025	0.025	0.025	0.025	0.025		5.4
	Mercury-Total (µg/L)	0.025	0.025	0.025	0.025	0.025	0.025	0.025		
	Nickel-(0.45µm filtered) (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		17
	Nickel-Total (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
Zinc-(0.45µm filtered) (µg/L)	1	0.5	2	2	0.5	0.5	0.5	33	31	
Zinc-Total (µg/L)	9	3	5	3	2	2	7			

SW4	Parameter	01-Feb-14	02-Feb-14	03-Feb-14	04-Feb-14	05-Feb-14	06-Feb-14	13-Feb-14
Physical Parameters & Major Ions	Dissolved Oxygen (% Sat)	94.5	89	67.3	89.7	91.9	91.1	83.1
	Electrical Conductivity (uS/cm)	752.6	100.9	39.1	34.1	52.4	45.7	28.2
	pH	6.05	5.28	5.93	5.52	5.69	5.87	6.03
	Temperature (degrees celcius)	29.8	30.3	30	28	29.1	28.2	31.4
	Total Dissolved Solids (mg/L)	82	100	92	90	50	54	20
	Total Solids (mg/L)	92	120	110	99	59	64	29
	Total Suspended Solids (mg/L)	10	12	19	9	9	10	9
	Hardness (mgCaCO3/L)	4	35	11	10	14	12	6
	Total Alkalinity (mg/L)	10	5	8	10	11	9	8
	Bicarbonate Alkalinity as (mg/L)	10	5	8	10	11	9	8
	Carbonate Alkalinity as (mg/L)	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	Hydroxide Alkalinity (OH-) (mg/L)	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	Calcium - Dissolved (mg/L)	0.25	5.3	1.9	1.5	2.5	1.9	0.8
	Calcium - Total (mg/L)	0.5	4	1.9	1.4	2.5	1.9	0.8
	Magnesium - (0.45µm filtered) (mg/L)	0.9	5.2	1.6	1.5	1.9	1.7	1.1
	Magnesium - Total (mg/L)	1	5	1.6	1.4	2	1.7	1.1
	Sodium - Total (mg/L)	1.5	2.1	1.7	1.7	2.3	2.5	1.9
	Chloride, Cl (mg/L)	0.5	1	0.5	67	1	1	1
	Sulphate, SO4 (mg/L)	0.5	26	6	11	8	9	3
	Total Cyanide (mg/L)	0.002	0.002	0.002	0.002	0.002	0.002	0.002

SW4	Parameter	01-Feb-14	02-Feb-14	03-Feb-14	04-Feb-14	05-Feb-14	06-Feb-14	13-Feb-14	DTA MVs	ANZECC 80% TV	
Trace Metals	Aluminium-(0.45µm filtered) (µg/L)	290	110	120	91	55	75	48		150	
	Aluminium-Total (µg/L)	370	310	40	300	810	360	230			
	Cadmium-(0.45µm filtered) (µg/L)	0.05	1.4	0.1	0.05	0.2	0.1	0.1	0.4	0.8	
	Cadmium-Total (µg/L)	0.05	1.5	0.1	0.1	0.2	0.1	0.1			
	Chromium-(0.45µm filtered) (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		40	
	Chromium-Total (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5			
	Cobalt-(0.45µm filtered) (µg/L)	0.5	16	1	0.5	2	1	1		90	
	Cobalt-Total (µg/L)	0.5	16	1	0.5	2	1	2			
	Copper-(0.45µm filtered) (µg/L)	2	50	4	4	2	1	8		2.5	
	Copper-Total (µg/L)	4	65	4	5	3	2	10			
	Iron-(0.45µm filtered) (µg/L)	230	80	140	170	110	120	150		300	
	Iron-Total (µg/L)	500	240	95	550	490	510	550			
	Lead-(0.45µm filtered) (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		9.4	
	Lead-Total (µg/L)	1	0.5	0.5	0.5	0.5	0.5	0.5			
	Manganese-(0.45µm filtered) (µg/L)	12	200	28	23	63	61	29		3600	
	Manganese-Total (µg/L)	17	210	29	26	69	70	32			
	Mercury-(0.45µm filtered) (µg/L)	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025		5.4
	Mercury-Total (µg/L)	0.025	0.025	0.025	0.025	0.025	0.025	0.025			
	Nickel-(0.45µm filtered) (µg/L)	0.5	17	2	1	2	1	2		17	
	Nickel-Total (µg/L)	0.5	17	2	1	2	1	2			
Zinc-(0.45µm filtered) (µg/L)	9	340	24	13	16	12	37	33	31		
Zinc-Total (µg/L)	13	350	27	17	19	16	44				

SW10	Parameter	01-Feb-14	02-Feb-14	03-Feb-14	04-Feb-14	05-Feb-14	06-Feb-14	13-Feb-14
Physical Parameters & Major Ions	Dissolved Oxygen (% Sat)	94.5	91.5	63.5	95.1	92.3	31.9	68.4
	Electrical Conductivity (uS/cm)	753.9	28.1	30.6	29.5	43.2	41.8	26.1
	pH	6.01	5.63	5.65	5.8	5.78	5.92	6.34
	Temperature (degrees celcius)	29.1	30.3	28.5	29.3	28.7	28.4	28.3
	Total Dissolved Solids (mg/L)	70	76	46	80	84	54	60
	Total Solids (mg/L)	110	100	77	89	97	62	88
	Total Suspended Solids (mg/L)	35	25	31	9	13	8	28
	Hardness (mgCaCO3/L)	1.5	5	8	6	11	10	6
	Total Alkalinity (mg/L)	9	11	9	11	11	10	8
	Bicarbonate Alkalinity as (mg/L)	9	11	9	11	11	10	8
	Carbonate Alkalinity as (mg/L)	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	Hydroxide Alkalinity (OH-) (mg/L)	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	Calcium - Dissolved (mg/L)	0.7	0.9	1.3	1.1	1.9	1.7	0.7
	Calcium - Total (mg/L)	0.8	1	1.3	1.1	2.2	1.7	0.8
	Magnesium - (0.45µm filtered) (mg/L)	0.25	0.6	1.2	0.7	1.5	1.5	1
	Magnesium - Total (mg/L)	0.25	0.7	1.2	0.7	1.7	1.6	1.1
	Sodium - Total (mg/L)	1.6	1.9	1.6	2.3	2.1	2.4	1.8
	Chloride, Cl (mg/L)	0.5	0.5	1	2	1	0.5	0.5
Sulphate, SO4 (mg/L)	0.5	1	4	2	8	7	3	
Total Cyanide (mg/L)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	

SW10	Parameter	01-Feb-14	02-Feb-14	03-Feb-14	04-Feb-14	05-Feb-14	06-Feb-14	13-Feb-14	DTA MVVs	ANZECC 80% TV	
Trace Metals	Aluminium-(0.45µm filtered) (µg/L)	270	490	81	120	76	43	87		150	
	Aluminium-Total (µg/L)	750	740	300	370	540	610	190			
	Cadmium-(0.45µm filtered) (µg/L)	0.05	0.05	0.05	0.05	0.1	0.05	0.1	0.4	0.8	
	Cadmium-Total (µg/L)	0.05	0.05	0.05	0.05	0.1	0.05	0.2			
	Chromium-(0.45µm filtered) (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		40	
	Chromium-Total (µg/L)	1	0.5	0.5	0.5	0.5	0.5	0.5			
	Cobalt-(0.45µm filtered) (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	1		90	
	Cobalt-Total (µg/L)	0.5	1	0.5	0.5	1	0.5	2			
	Copper-(0.45µm filtered) (µg/L)	67	81	17	58	2	1	7		2.5	
	Copper-Total (µg/L)	100	130	26	78	2	2	11			
	Iron-(0.45µm filtered) (µg/L)	140	200	120	110	140	120	150		300	
	Iron-Total (µg/L)	900	730	390	490	500	510	560			
	Lead-(0.45µm filtered) (µg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		9.4	
	Lead-Total (µg/L)	1	1	0.5	0.5	0.5	0.5	0.5			
	Manganese-(0.45µm filtered) (µg/L)	14	20	15	18	34	35	25		3600	
	Manganese-Total (µg/L)	20	26	26	21	42	44	36			
	Mercury-(0.45µm filtered) (µg/L)	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025		5.4
	Mercury-Total (µg/L)	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025		
	Nickel-(0.45µm filtered) (µg/L)	0.5	0.5	0.5	0.5	1	1	2		17	
	Nickel-Total (µg/L)	0.5	0.5	0.5	0.5	2	1	2			
Zinc-(0.45µm filtered) (µg/L)	2	3	9	4	10	8	30	33	31		
Zinc-Total (µg/L)	5	5	13	7	14	11	38				

Appendix 2 – Tabulated Monthly Cyanide Monitoring

Retention Ponds

Date	RP1 Total CN (mg/L)	Date	RP3 Total CN (mg/L)	RP3 WAD CN (mg/L)	Date	RP7 Total CN (mg/L)
3/11/2013	<0.004	4/11/2013	<0.004		3/11/2013	<0.004
2/12/2013	<0.004	2/12/2013	<0.004		2/12/2013	<0.004
6/01/2014	<0.004	6/01/2014	<0.004		6/01/2014	<0.004
3/02/2014	<0.004	3/02/2014	<0.004		3/02/2014	<0.004
3/03/2014	<0.004	3/03/2014	0.026	--*	3/03/2014	<0.004
1/04/2014	<0.004	1/04/2014	0.032	0.015	1/04/2014	<0.004
5/05/2014	<0.004	5/05/2014	<0.004		5/05/2014	<0.004
10/06/2014	<0.004	10/06/2014	<0.004		10/06/2014	<0.004
8/07/2014	<0.004	8/07/2014	<0.004		8/07/2014	<0.004
5/08/2014	<0.004	5/08/2014	<0.004		5/08/2014	<0.004
2/09/2014	<0.004	2/09/2014	<0.004		2/09/2014	<0.004

Surface Water Sites

Date	SW2 Total CN (mg/L)	Date	SW4 Total CN (mg/L)	SW4 WAD CN (mg/L)	Date	SW10 Total CN (mg/L)	SW10 WAD CN (mg/L)
3/11/2013	<0.004	3/11/2013	0.006	<0.004			
3/12/2013	<0.004	3/12/2013	<0.004		3/12/2013	<0.004	
7/01/2014	<0.004	7/01/2014	<0.004		7/01/2014	<0.004	
3/02/2014	<0.004	3/02/2014	<0.004		3/02/2014	<0.004	
3/03/2014	<0.004	3/03/2014	<0.004		3/03/2014	<0.004	
2/04/2014	<0.004	2/04/2014	<0.004		2/04/2014	<0.004	
6/05/2014	<0.004	6/05/2014	<0.004		6/05/2014	<0.004	
11/06/2014	<0.004	11/06/2014	<0.004		11/06/2014	<0.004	
9/07/2014	<0.004	9/07/2014	<0.004		9/07/2014	<0.004	
6/08/2014	<0.004	5/08/2014	<0.004		6/08/2014	0.01	0.009
3/09/2014	<0.004	3/09/2014	<0.004		3/09/2014	<0.004	

*WDL 178-3 Addendum stipulates additional WAD CN monitoring when Total CN >0.004 mg/L. There is no explanation for the lack of a result for this date in RP3. However, no further discharges occurred from RP3 which protected downstream sites from any potential environmental harm.

Appendix 3 – RP3 monthly surface water chemistry 2013-2014

Parameter	RP3 Centre										
	6-Nov-13	4-Dec-13	9-Jan-14	12-Feb-14	12-Mar-14	2-Apr-14	7-May-14	4-Jun-14	3-Jul-14	6-Aug-14	3-Sep-14
Hardness mgCaCO ₃ /L	1900	1800	1900	1800	1600	1700	1600	1600	1700	1800	1600
Total Alkalinity as CaCO ₃ mg/L	51	46	47	20	5	5	11	15	34	41	53
Bicarbonate Alkalinity as CaCO ₃ mg/L	51	46	47	20	5	5	11	15	34	41	53
Carbonate Alkalinity as CaCO ₃ mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Hydroxide Alkalinity (OH ⁻) as CaCO ₃ mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Calcium - Dissolved mg/L	440	410	450	410	340	350	350	360	360	370	330
Calcium - Total mg/L	530	350	460	390	300	320	360	410	380	370	450
Magnesium - Dissolved mg/L	200	190	190	200	190	190	170	180	180	200	190
Magnesium - Total mg/L	200	190	210	180	170	170	180	210	200	190	220
Sodium - Dissolved mg/L	63	64	66	59	62	63	60	58	61	64	63
Sodium - Total mg/L	63	59	68	59	65	55	59	66	66	55	60
Chloride, Cl mg/L	8	7	10	6	7	7	7	8	7	6	6
Sulphate, SO ₄ mg/L	1900	1800	1800	1600	1600	1700	1700	2000	1700	1700	2000
Total Cyanide mg/L	<0.004	<0.004	<0.004	<0.004	0.046	0.032	<0.004	<0.004	<0.004	<0.004	<0.004

	Parameter	RP3 Centre										
		6-Nov-13	4-Dec-13	9-Jan-14	12-Feb-14	12-Mar-14	2-Apr-14	7-May-14	4-Jun-14	3-Jul-14	6-Aug-14	3-Sep-14
Trace Metals	Aluminium-Dissolved µg/L	<10	<10	10	90	1600	1900	40	<10	<10	20	10
	Aluminium-Total µg/L	<10	40	50	680	2100	1500	120	140	20	450	30
	Cadmium-Dissolved µg/L	52	51	45	45	54	51	54	64	60	70	80
	Cadmium-Total µg/L	54	52	47	46	52	50	55	65	66	69	80
	Chromium-Dissolved µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Chromium-Total µg/L	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Cobalt-Dissolved µg/L	510	460	440	400	520	570	500	490	400	440	540
	Cobalt-Total µg/L	510	480	460	400	510	500	490	480	420	450	550
	Copper-Dissolved µg/L	3	1	<1	450	1900	2100	880	550	310	190	120
	Copper-Total µg/L	1	7	3	510	2000	1900	950	610	360	220	140
	Iron-Dissolved µg/L	<10	<10	11	<10							
	Lead-Dissolved µg/L	<1	<1	<1	2	7	8	5	2	<1	<1	<1
	Lead-Total µg/L	<1	<1	<1	7	6	7	5	4	2	2	<1
	Manganese-Dissolved µg/L	6500	5700	4900	4600	7000	7100	6200	5800	5100	6000	7100
	Manganese-Total µg/L	6100	5700	5500	4600	6200	6600	6100	6000	5400	6000	7400
	Nickel-Dissolved µg/L	540	440	420	370	500	590	490	500	490	540	660
	Nickel-Total µg/L	580	490	430	370	510	470	480	500	510	570	630
	Zinc-Dissolved µg/L	4600	3400	2700	3900	8100	8200	8400	9000	10000	12000	15000
Zinc-Total µg/L	4900	3800	3000	3900	6800	7900	8600	9200	12000	12000	15000	

Appendix 4- Lab Assay reports

CERTIFICATE OF ANALYSIS

104626

Client:

Vista Gold Australia Pty Ltd
Mt Todd Mine Site
Edith Falls Rd
NT 2067

Attention: Andrew Sawicki, Robbie Friel

Sample log in details:

Your Reference: **Mount Todd - Daily Discharge WDL Monitoring**
No. of samples: 4 Waters
Date samples received / completed instructions received 06/02/14 / 06/02/14

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date: 13/02/14 / 17/02/14
Date of Preliminary Report: Not issued
NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:


Jacinta Hurst
Laboratory Manager

Envirolab Reference: 104626
Revision No: R 00



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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

HM in water - total Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	104626-1 SV2 03/02/2014 Water	104626-2 SW4 03/02/2014 Water	104626-3 SW10 03/02/2014 Water	104626-4 RP3 03/02/2014 Water
Date prepared	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	10/02/2014	10/02/2014	10/02/2014	10/02/2014
Aluminium-Total	µg/L	190	40	300	170
Cadmium-Total	µg/L	<0.1	0.1	<0.1	44
Cobalt-Total	µg/L	<1	1	<1	380
Chromium-Total	µg/L	<1	<1	<1	1
Copper-Total	µg/L	2	4	26	34
Iron-Total	µg/L	360	95	390	92
Lead-Total	µg/L	<1	<1	<1	<1
Manganese-Total	µg/L	9	29	26	4,400
Mercury-Total	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Total	µg/L	<1	2	<1	350
Zinc-Total	µg/L	5	27	13	2,900

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Metals in Waters - Acid extractable	UNITS	104626-1	104626-2	104626-3	104626-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	03/02/2014	03/02/2014	03/02/2014	03/02/2014
Date Sampled		Water	Water	Water	Water
Type of sample					
Date prepared	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Magnesium - Total	mg/L	0.6	1.6	1.2	190
Calcium - Total	mg/L	0.6	1.9	1.3	390
Sodium - Total	mg/L	1.1	1.7	1.6	57

Envirolab Reference: 104626
 Revision No: R 00

Client Reference: Mount Todd - Daily Discharge WDL Monitoring

HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	104626-1 SW2 03/02/2014 Water	104626-2 SW4 03/02/2014 Water	104626-3 SW10 03/02/2014 Water	104626-4 RP3 03/02/2014 Water
Date prepared	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Aluminium-(0.45µm filtered)	µg/L	69	120	81	72
Cadmium-(0.45µm filtered)	µg/L	<0.1	0.1	<0.1	44
Cobalt-(0.45µm filtered)	µg/L	<1	1	<1	370
Chromium-(0.45µm filtered)	µg/L	<1	<1	<1	<1
Copper-(0.45µm filtered)	µg/L	<1	4	17	23
Iron-(0.45µm filtered)	µg/L	130	140	120	<10
Lead-(0.45µm filtered)	µg/L	<1	<1	<1	<1
Manganese-(0.45µm filtered)	µg/L	<5	28	15	4,500
Mercury-(0.45µm filtered)	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-(0.45µm filtered)	µg/L	<1	2	<1	350
Zinc-(0.45µm filtered)	µg/L	2	24	9	2,800

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Metals in Water - Dissolved	UNITS	104626-1	104626-2	104626-3	104626-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	03/02/2014	03/02/2014	03/02/2014	03/02/2014
Date Sampled		Water	Water	Water	Water
Type of sample					
Date digested	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Calcium - Dissolved	mg/L	0.5	1.9	1.3	440
Magnesium - (0.45µm filtered)	mg/L	0.5	1.6	1.2	190
Hardness	mgCaCO3 /L	4.0	11	8.0	1,900

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Miscellaneous Inorganics	UNITS	104626-1	104626-2	104626-3	104626-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	03/02/2014	03/02/2014	03/02/2014	03/02/2014
Date Sampled		Water	Water	Water	Water
Type of sample					
Date prepared	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Chloride, Cl	mg/L	<1	<1	1	31
Total Suspended Solids	mg/L	14	19	31	14
Total Dissolved Solids (grav)	mg/L	40	92	46	2,600
Total Solids	mg/L	54	110	77	2,700
Bicarbonate Alkalinity as CaCO ₃	mg/L	8	8	9	36
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	8	8	9	36
Sulphate, SO ₄	mg/L	<1	6	4	1,500
Dissolved Organic Carbon	mg/L	2	2	[NA]	[NA]
Total Organic Carbon	mg/L	3	2	[NA]	[NA]
Nitrate as N in water	mg/L	<0.005	0.013	[NA]	[NA]
Total Cyanide	mg/L	<0.004	<0.004	<0.004	<0.004
Phosphate as P in water	mg/L	<0.005	<0.005	[NA]	[NA]

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Method ID	Methodology Summary
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 22nd ED, 4110-B.
Inorg-019	Suspended Solids - determined gravimetrically by filtration of the sample, in accordance with APHA 22nd ED, 2540-D. The samples are dried at 104 +/- 5oC.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180 +/- 5oC.
Inorg-041	Gravimetric determination of the total solids content of water using APHA 22nd ED 2540B.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA 22nd ED, 2320-B.
Inorg-079	TOC determined using a TOC analyser using the combustion method. DOC is filtered prior to determination. Analysis using APHA 22nd ED 5310B.
Inorg-055	Nitrate - determined colourimetrically based on EPA353.2 and APHA 22nd ED NO3- F. Soils are analysed following a water extraction.
Inorg-013	Cyanide - total determined colourimetrically after distillation, based on APHA 22nd ED, 4500-CN_C,E. Free cyanide determined colourimetrically after filtration and confirmed by diffusion. Solids are extracted in a caustic media prior to distillation and analysis.
Inorg-060	Phosphate determined colourimetrically based on EPA365. 1 and APHA 22nd ED 4500 P.E. Soils are analysed following a water extraction.

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
HM in water - total						Base Duplicate %RPD		
Date prepared	-			07/02/2014	104626-1	07/02/2014 07/02/2014	LCS-W2	07/02/2014
Date analysed	-			10/02/2014	104626-1	10/02/2014 10/02/2014	LCS-W2	10/02/2014
Aluminium-Total	µg/L	10	Metals-022 ICP-MS	<10	104626-1	190 180 RPD: 5	LCS-W2	105%
Cadmium-Total	µg/L	0.1	Metals-022 ICP-MS	<0.1	104626-1	<0.1 <0.1	LCS-W2	101%
Cobalt-Total	µg/L	1	Metals-022 ICP-MS	<1	104626-1	<1 <1	LCS-W2	101%
Chromium-Total	µg/L	1	Metals-022 ICP-MS	<1	104626-1	<1 <1	LCS-W2	97%
Copper-Total	µg/L	1	Metals-022 ICP-MS	<1	104626-1	2 2 RPD: 0	LCS-W2	99%
Iron-Total	µg/L	10	Metals-022 ICP-MS	<10	104626-1	360 360 RPD: 0	LCS-W2	105%
Lead-Total	µg/L	1	Metals-022 ICP-MS	<1	104626-1	<1 <1	LCS-W2	98%
Manganese-Total	µg/L	5	Metals-022 ICP-MS	<5	104626-1	9 9 RPD: 0	LCS-W2	99%
Mercury-Total	µg/L	0.05	Metals-021 CV-AAS	<0.05	104626-1	<0.05 [N/T]	LCS-W2	96%
Nickel-Total	µg/L	1	Metals-022 ICP-MS	<1	104626-1	<1 <1	LCS-W2	97%
Zinc-Total	µg/L	1	Metals-022 ICP-MS	<1	104626-1	5 5 RPD: 0	LCS-W2	97%

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Waters - Acid extractable						Base II Duplicate II %RPD		
Date prepared	-			11/02/2014	104626-1	11/02/2014 11/02/2014	LCS-W4	11/02/2014
Date analysed	-			11/02/2014	104626-1	11/02/2014 11/02/2014	LCS-W4	11/02/2014
Magnesium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	104626-1	0.6 0.6 RPD: 0	LCS-W4	109%
Calcium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	104626-1	0.6 0.6 RPD: 0	LCS-W4	109%
Sodium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	104626-1	1.1 1.1 RPD: 0	LCS-W4	101%
HM in water - dissolved						Base II Duplicate II %RPD		
Date prepared	-			07/02/2014	104626-3	07/02/2014 07/02/2014	LCS-1	07/02/2014
Date analysed	-			07/02/2014	104626-3	07/02/2014 07/02/2014	LCS-1	07/02/2014
Aluminium-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	104626-3	81 79 RPD: 2	LCS-1	103%
Cadmium-(0.45µm filtered)	µg/L	0.1	Metals-022 ICP-MS	<0.1	104626-3	<0.1 <0.1	LCS-1	100%
Cobalt-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104626-3	<1 <1	LCS-1	106%
Chromium-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104626-3	<1 <1	LCS-1	100%
Copper-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104626-3	17 17 RPD: 0	LCS-1	106%
Iron-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	104626-3	120 120 RPD: 0	LCS-1	107%
Lead-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104626-3	<1 <1	LCS-1	113%
Manganese-(0.45µm filtered)	µg/L	5	Metals-022 ICP-MS	<5	104626-3	15 15 RPD: 0	LCS-1	102%
Mercury-(0.45µm filtered)	µg/L	0.05	Metals-021 CV-AAS	<0.05	104626-3	<0.05 [N/T]	LCS-1	96%
Nickel-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104626-3	<1 <1	LCS-1	101%
Zinc-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104626-3	9 9 RPD: 0	LCS-1	101%

Envirolab Reference: 104626
Revision No: R 00

Client Reference: Mount Todd - Daily Discharge WDL Monitoring

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Water - Dissolved						Base Duplicate %RPD		
Date digested	-			07/02/2014	[NT]	[NT]	LCS-W2	07/02/2014
Date analysed	-			07/02/2014	[NT]	[NT]	LCS-W2	07/02/2014
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W2	120%
Magnesium - (0.45µm filtered)	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W2	119%
Hardness	mgCaCO ₃ /L	3		3.0	[NT]	[NT]	[NR]	[NR]
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Miscellaneous Inorganics						Base Duplicate %RPD		
Date prepared	-			07/02/2014	104626-1	07/02/2014 07/02/2014	LCS-W1	07/02/2014
Date analysed	-			07/02/2014	104626-1	07/02/2014 07/02/2014	LCS-W1	07/02/2014
Chloride, Cl	mg/L	1	Inorg-081	<1	104626-1	<1 <1	LCS-W1	91%
Total Suspended Solids	mg/L	5	Inorg-019	<5	104626-1	14 13 RPD: 7	LCS-W1	94%
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	104626-1	40 [N/T]	LCS-W1	98%
Total Solids	mg/L	5	Inorg-041	<5	104626-1	54 [N/T]	LCS-W1	94%
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104626-1	8 7 RPD: 13	[NR]	[NR]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104626-1	<5 <5	[NR]	[NR]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	104626-1	<5 <5	[NR]	[NR]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104626-1	8 7 RPD: 13	LCS-W1	99%
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	104626-1	<1 <1	LCS-W1	96%
Dissolved Organic Carbon	mg/L	1	Inorg-079	<1	104626-1	2 [N/T]	LCS-W1	99%
Total Organic Carbon	mg/L	1	Inorg-079	<1	104626-1	3 [N/T]	LCS-W1	98%
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	104626-1	<0.005 <0.005	LCS-W1	98%
Total Cyanide	mg/L	0.004	Inorg-013	<0.004	104626-1	<0.004 [N/T]	LCS-W1	111%
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	104626-1	<0.005 <0.005	LCS-W1	110%
QUALITY CONTROL	UNITS		Dup. Sm#		Duplicate	Spike Sm#	Spike % Recovery	
HM in water - total					Base + Duplicate + %RPD			
Date prepared	-		[NT]		[NT]	104626-2	07/02/2014	
Date analysed	-		[NT]		[NT]	104626-2	10/02/2014	
Aluminium-Total	µg/L		[NT]		[NT]	104626-2	110%	
Cadmium-Total	µg/L		[NT]		[NT]	104626-2	98%	
Cobalt-Total	µg/L		[NT]		[NT]	104626-2	96%	
Chromium-Total	µg/L		[NT]		[NT]	104626-2	90%	
Copper-Total	µg/L		[NT]		[NT]	104626-2	95%	
Iron-Total	µg/L		[NT]		[NT]	104626-2	97%	

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
HM in water - total					
Lead-Total	µg/L	[NT]	[NT]	104626-2	94%
Manganese-Total	µg/L	[NT]	[NT]	104626-2	95%
Mercury-Total	µg/L	[NT]	[NT]	[NR]	[NR]
Nickel-Total	µg/L	[NT]	[NT]	104626-2	93%
Zinc-Total	µg/L	[NT]	[NT]	104626-2	96%
QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Metals in Waters - Acid extractable					
Date prepared	-	[NT]	[NT]	104626-2	11/02/2014
Date analysed	-	[NT]	[NT]	104626-2	11/02/2014
Magnesium - Total	mg/L	[NT]	[NT]	104626-2	111%
Calcium - Total	mg/L	[NT]	[NT]	104626-2	107%
Sodium - Total	mg/L	[NT]	[NT]	104626-2	99%
QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
HM in water - dissolved					
Date prepared	-	104626-1	07/02/2014 07/02/2014	104626-2	07/02/2014
Date analysed	-	104626-1	07/02/2014 07/02/2014	104626-2	07/02/2014
Mercury-(0.45µm filtered)	µg/L	104626-1	<0.05 <0.05	104626-2	104%
QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Miscellaneous Inorganics					
Date prepared	-	104626-2	07/02/2014 07/02/2014	104626-2	07/02/2014
Date analysed	-	104626-2	07/02/2014 07/02/2014	104626-2	07/02/2014
Total Dissolved Solids (grav)	mg/L	104626-2	92 88 RPD: 4	[NR]	[NR]
Dissolved Organic Carbon	mg/L	104626-2	2 2 RPD: 0	104626-2	93%
Nitrate as N in water	mg/L	104626-2	0.013 [N/T]	104626-2	96%
Phosphate as P in water	mg/L	104626-2	<0.005 [N/T]	104626-2	116%

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Report Comments:

Trace metals: In theory the total metal content should be higher than the dissolved metal content. However, in some samples this is not the case. The sample has been re-analysed for both Total and Dissolved and results have been confirmed.

Total trace metals: no preserved sample was received for sample 1, 2, therefore analysis was conducted from the unpreserved sample bottle.

Note: there is a possibility some elements may be underestimated.

Dissolved Organic Carbon analysed by NMI. Report No. RN1008982.

Total Organic Carbon analysed by NMI. Report No. RN1008982.

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Environmental Reference: 104626

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CERTIFICATE OF ANALYSIS

104627

Client:

Vista Gold Australia Pty Ltd
Mt Todd Mine Site
Edith Falls Rd
NT 2067

Attention: Andrew Sawicki, Robbie Friel

Sample log in details:

Your Reference: **Mount Todd - Daily Discharge WDL Monitoring**
No. of samples: 4 Waters
Date samples received / completed instructions received 06/02/14 / 06/02/14

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date: 13/02/14 / 17/02/14
Date of Preliminary Report: Not issued
NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:


Jacinta Hurst
Laboratory Manager

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

HM in water - total Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	104627-1 SW2 04/02/2014 Water	104627-2 SW4 04/02/2014 Water	104627-3 SW10 04/02/2014 Water	104627-4 RP3 04/02/2014 Water
Date prepared	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	10/02/2014	10/02/2014	10/02/2014	10/02/2014
Aluminium-Total	µg/L	200	300	370	170
Cadmium-Total	µg/L	<0.1	0.1	<0.1	44
Cobalt-Total	µg/L	<1	<1	<1	360
Chromium-Total	µg/L	<1	<1	<1	<1
Copper-Total	µg/L	<1	5	78	38
Iron-Total	µg/L	400	550	490	82
Lead-Total	µg/L	<1	<1	<1	<1
Manganese-Total	µg/L	9	26	21	4,300
Mercury-Total	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Total	µg/L	<1	1	<1	340
Zinc-Total	µg/L	3	17	7	2,900

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Metals in Waters - Acid extractable		104627-1	104627-2	104627-3	104627-4
Our Reference:	UNITS	104627-1	104627-2	104627-3	104627-4
Your Reference:	-----	SW2	SW4	SW10	RP3
Date Sampled	-----	04/02/2014	04/02/2014	04/02/2014	04/02/2014
Type of sample		Water	Water	Water	Water
Date prepared	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Magnesium - Total	mg/L	0.6	1.4	0.7	190
Calcium - Total	mg/L	0.7	1.4	1.1	380
Sodium - Total	mg/L	1.1	1.7	2.3	56

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	104627-1 SW2 04/02/2014 Water	104627-2 SW4 04/02/2014 Water	104627-3 SW10 04/02/2014 Water	104627-4 RP3 04/02/2014 Water
Date prepared	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Aluminium-(0.45µm filtered)	µg/L	98	91	120	82
Cadmium-(0.45µm filtered)	µg/L	<0.1	<0.1	<0.1	43
Cobalt-(0.45µm filtered)	µg/L	<1	<1	<1	370
Chromium-(0.45µm filtered)	µg/L	<1	<1	<1	<1
Copper-(0.45µm filtered)	µg/L	<1	4	58	26
Iron-(0.45µm filtered)	µg/L	150	170	110	<10
Lead-(0.45µm filtered)	µg/L	<1	<1	<1	<1
Manganese-(0.45µm filtered)	µg/L	5	23	18	4,300
Mercury-(0.45µm filtered)	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-(0.45µm filtered)	µg/L	<1	1	<1	340
Zinc-(0.45µm filtered)	µg/L	2	13	4	2,800

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Metals in Water - Dissolved	UNITS	104627-1	104627-2	104627-3	104627-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	SW2	SW4	SW10	RP3
Date Sampled	-----	04/02/2014	04/02/2014	04/02/2014	04/02/2014
Type of sample		Water	Water	Water	Water
Date digested	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Calcium - Dissolved	mg/L	0.7	1.5	1.1	410
Magnesium - (0.45µm filtered)	mg/L	0.6	1.5	0.7	180
Hardness	mgCaCO3 /L	4.0	10	6.0	1,800

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Miscellaneous Inorganics	UNITS	104627-1	104627-2	104627-3	104627-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	04/02/2014	04/02/2014	04/02/2014	04/02/2014
Date Sampled		Water	Water	Water	Water
Type of sample					
Date prepared	-	10/02/2014	10/02/2014	10/02/2014	10/02/2014
Date analysed	-	10/02/2014	10/02/2014	10/02/2014	10/02/2014
Chloride, Cl	mg/L	<1	67	2	75
Total Suspended Solids	mg/L	19	9	9	<5
Total Dissolved Solids (grav)	mg/L	100	90	80	2,600
Total Solids	mg/L	120	99	89	2,600
Bicarbonate Alkalinity as CaCO ₃	mg/L	8	10	11	35
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	8	10	11	35
Sulphate, SO ₄	mg/L	<1	11	2	1,500
Dissolved Organic Carbon	mg/L	3	3	[NA]	[NA]
Total Organic Carbon	mg/L	3	3	[NA]	[NA]
Nitrate as N in water	mg/L	0.015	0.017	[NA]	[NA]
Total Cyanide	mg/L	<0.004	<0.004	<0.004	<0.004
Phosphate as P in water	mg/L	<0.005	<0.005	[NA]	[NA]

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Method ID	Methodology Summary
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 22nd ED, 4110-B.
Inorg-019	Suspended Solids - determined gravimetrically by filtration of the sample, in accordance with APHA 22nd ED, 2540-D. The samples are dried at 104 +/- 5oC.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180 +/- 5oC.
Inorg-041	Gravimetric determination of the total solids content of water using APHA 22nd ED 2540B.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA 22nd ED, 2320-B.
Inorg-079	TOC determined using a TOC analyser using the combustion method. DOC is filtered prior to determination. Analysis using APHA 22nd ED 5310B.
Inorg-055	Nitrate - determined colourimetrically based on EPA353.2 and APHA 22nd ED NO3- F. Soils are analysed following a water extraction.
Inorg-013	Cyanide - total determined colourimetrically after distillation, based on APHA 22nd ED, 4500-CN_C,E. Free cyanide determined colourimetrically after filtration and confirmed by diffusion. Solids are extracted in a caustic media prior to distillation and analysis.
Inorg-060	Phosphate determined colourimetrically based on EPA365. 1 and APHA 22nd ED 4500 P.E. Soils are analysed following a water extraction.

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
HM in water - total						Base Duplicate %RPD		
Date prepared	-			07/02/2014	104627-3	07/02/2014 07/02/2014	LCS-W2	07/02/2014
Date analysed	-			07/02/2014	104627-3	10/02/2014 10/02/2014	LCS-W2	07/02/2014
Aluminium-Total	µg/L	10	Metals-022 ICP-MS	<10	104627-3	370 [N/T]	LCS-W2	105%
Cadmium-Total	µg/L	0.1	Metals-022 ICP-MS	<0.1	104627-3	<0.1 [N/T]	LCS-W2	101%
Cobalt-Total	µg/L	1	Metals-022 ICP-MS	<1	104627-3	<1 [N/T]	LCS-W2	101%
Chromium-Total	µg/L	1	Metals-022 ICP-MS	<1	104627-3	<1 [N/T]	LCS-W2	97%
Copper-Total	µg/L	1	Metals-022 ICP-MS	<1	104627-3	78 [N/T]	LCS-W2	99%
Iron-Total	µg/L	10	Metals-022 ICP-MS	<10	104627-3	490 [N/T]	LCS-W2	105%
Lead-Total	µg/L	1	Metals-022 ICP-MS	<1	104627-3	<1 [N/T]	LCS-W2	98%
Manganese-Total	µg/L	5	Metals-022 ICP-MS	<5	104627-3	21 [N/T]	LCS-W2	99%
Mercury-Total	µg/L	0.05	Metals-021 CV-AAS	<0.05	104627-3	<0.05 <0.05	LCS-W2	96%
Nickel-Total	µg/L	1	Metals-022 ICP-MS	<1	104627-3	<1 [N/T]	LCS-W2	97%
Zinc-Total	µg/L	1	Metals-022 ICP-MS	<1	104627-3	7 [N/T]	LCS-W2	97%

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QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Waters - Acid extractable						Base II Duplicate II %RPD		
Date prepared	-			07/02/2014	[NT]	[NT]	LCS-W4	11/02/2014
Date analysed	-			07/02/2014	[NT]	[NT]	LCS-W4	11/02/2014
Magnesium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W4	109%
Calcium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W4	109%
Sodium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W4	101%
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
HM in water - dissolved						Base II Duplicate II %RPD		
Date prepared	-			07/02/2014	[NT]	[NT]	LCS-W1	07/02/2014
Date analysed	-			07/02/2014	[NT]	[NT]	LCS-W1	07/02/2014
Aluminium-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	[NT]	[NT]	LCS-W1	103%
Cadmium-(0.45µm filtered)	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	LCS-W1	100%
Cobalt-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	106%
Chromium-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	100%
Copper-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	106%
Iron-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	[NT]	[NT]	LCS-W1	107%
Lead-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	113%
Manganese-(0.45µm filtered)	µg/L	5	Metals-022 ICP-MS	<5	[NT]	[NT]	LCS-W1	102%
Mercury-(0.45µm filtered)	µg/L	0.05	Metals-021 CV-AAS	<0.05	[NT]	[NT]	LCS-W1	96%
Nickel-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	101%
Zinc-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	101%

Envirolab Reference: 104627
Revision No: R 00

Client Reference: Mount Todd - Daily Discharge WDL Monitoring

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Water - Dissolved						Base Duplicate %RPD		
Date digested	-			07/02/2014	[NT]	[NT]	LCS-W2	07/02/2014
Date analysed	-			07/02/2014	[NT]	[NT]	LCS-W2	07/02/2014
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W2	120%
Magnesium - (0.45µm filtered)	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W2	119%
Hardness	mgCaCO ₃ /L	3		3.0	[NT]	[NT]	[NR]	[NR]
QUALITY CONTROL								
Miscellaneous Inorganics						Base Duplicate %RPD		
Date prepared	-			07/02/2014	104627-1	10/02/2014 10/02/2014	LCS-W1	07/02/2014
Date analysed	-			07/02/2014	104627-1	10/02/2014 10/02/2014	LCS-W1	07/02/2014
Chloride, Cl	mg/L	1	Inorg-081	<1	104627-1	<1 [N/T]	LCS-W1	91%
Total Suspended Solids	mg/L	5	Inorg-019	<5	104627-1	19 [N/T]	LCS-W1	94%
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	104627-1	100 [N/T]	LCS-W1	98%
Total Solids	mg/L	5	Inorg-041	<5	104627-1	120 [N/T]	LCS-W1	94%
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104627-1	8 [N/T]	[NR]	[NR]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104627-1	<5 [N/T]	[NR]	[NR]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	104627-1	<5 [N/T]	[NR]	[NR]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104627-1	8 [N/T]	LCS-W1	99%
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	104627-1	<1 [N/T]	LCS-W1	94%
Dissolved Organic Carbon	mg/L	1	Inorg-079	<1	104627-1	3 [N/T]	LCS-W1	103%
Total Organic Carbon	mg/L	1	Inorg-079	<1	104627-1	3 3 RPD: 0	LCS-W1	103%
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	104627-1	0.015 [N/T]	LCS-W1	98%
Total Cyanide	mg/L	0.004	Inorg-013	<0.004	104627-1	<0.004 <0.004	LCS-W1	111%
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	104627-1	<0.005 [N/T]	LCS-W1	110%
QUALITY CONTROL								
HM in water - total	UNITS		Dup. Sm#		Duplicate	Spike Sm#		Spike % Recovery
					Base + Duplicate + %RPD			
Date prepared	-		[NT]		[NT]	104627-4		07/02/2014
Date analysed	-		[NT]		[NT]	104627-4		07/02/2014
Aluminium-Total	µg/L		[NT]		[NT]	[NR]		[NR]
Cadmium-Total	µg/L		[NT]		[NT]	[NR]		[NR]
Cobalt-Total	µg/L		[NT]		[NT]	[NR]		[NR]
Chromium-Total	µg/L		[NT]		[NT]	[NR]		[NR]
Copper-Total	µg/L		[NT]		[NT]	[NR]		[NR]
Iron-Total	µg/L		[NT]		[NT]	[NR]		[NR]

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QUALITY CONTROL HM in water - total	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Lead-Total	µg/L	[NT]	[NT]	[NR]	[NR]
Manganese-Total	µg/L	[NT]	[NT]	[NR]	[NR]
Mercury-Total	µg/L	[NT]	[NT]	104627-4	108%
Nickel-Total	µg/L	[NT]	[NT]	[NR]	[NR]
Zinc-Total	µg/L	[NT]	[NT]	[NR]	[NR]

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Report Comments:

Dissolved Organic Carbon analysed by NMI. Report No.RN1008982.

Total Organic Carbon analysed by NMI. Report No.RN1008982.

Asbestos ID was analysed by Approved Identifier: Not applicable for this job
Asbestos ID was authorised by Approved Signatory: Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Envirolab Reference: 104627
Revision No: R 00

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CERTIFICATE OF ANALYSIS

104628

Client:

Vista Gold Australia Pty Ltd
Mt Todd Mine Site
Edith Falls Rd
NT 2067

Attention: Andrew Sawicki, Robbie Friel

Sample log in details:

Your Reference: **Mount Todd - Daily Discharge WDL Monitoring**
No. of samples: 4 Waters
Date samples received / completed instructions received 06/02/14 / 06/02/14

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date: 13/02/14 / 17/02/14
Date of Preliminary Report: Not issued
NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:


Jacinta Hurst
Laboratory Manager

Envirolab Reference: 104628
Revision No: R 00



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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

HM in water - total Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	104628-1 SW2 02/02/2014 Water	104628-2 SW4 02/02/2014 Water	104628-3 SW10 02/02/2014 Water	104628-4 RP3 02/02/2014 Water
Date prepared	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	10/02/2014	10/02/2014	10/02/2014	10/02/2014
Aluminium-Total	µg/L	40	310	650	130
Cadmium-Total	µg/L	<0.1	1.5	<0.1	44
Cobalt-Total	µg/L	<1	16	1	380
Chromium-Total	µg/L	<1	<1	<1	<1
Copper-Total	µg/L	<1	65	130	21
Iron-Total	µg/L	99	240	710	87
Lead-Total	µg/L	<1	<1	1	<1
Manganese-Total	µg/L	<5	210	26	4,400
Mercury-Total	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Total	µg/L	<1	17	<1	350
Zinc-Total	µg/L	3	350	5	2,900

EnvirolabReference: 104628
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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Metals in Waters - Acid extractable		104628-1	104628-2	104628-3	104628-4
Our Reference:	UNITS	104628-1	104628-2	104628-3	104628-4
Your Reference:	-----	SW2	SW4	SW10	RP3
Date Sampled	-----	02/02/2014	02/02/2014	02/02/2014	02/02/2014
Type of sample		Water	Water	Water	Water
Date prepared	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Magnesium - Total	mg/L	<0.5	5.0	0.7	190
Calcium - Total	mg/L	<0.5	4.0	1	390
Sodium - Total	mg/L	0.8	2.1	1.8	56

Envirolab Reference: 104628
Revision No: R 00

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	104628-1 SW2 02/02/2014 Water	104628-2 SW4 02/02/2014 Water	104628-3 SW10 02/02/2014 Water	104628-4 RP3 02/02/2014 Water
Date prepared	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Aluminium-(0.45µm filtered)	µg/L	120	110	490	35
Cadmium-(0.45µm filtered)	µg/L	<0.1	1.4	<0.1	43
Cobalt-(0.45µm filtered)	µg/L	<1	16	<1	370
Chromium-(0.45µm filtered)	µg/L	<1	<1	<1	<1
Copper-(0.45µm filtered)	µg/L	<1	50	81	13
Iron-(0.45µm filtered)	µg/L	150	80	200	<10
Lead-(0.45µm filtered)	µg/L	<1	<1	<1	<1
Manganese-(0.45µm filtered)	µg/L	<5	200	20	4,400
Mercury-(0.45µm filtered)	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-(0.45µm filtered)	µg/L	<1	17	<1	350
Zinc-(0.45µm filtered)	µg/L	<1	340	3	2,700

Envirolab Reference: 104628
Revision No: R 00

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Metals in Water - Dissolved	UNITS	104628-1	104628-2	104628-3	104628-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	02/02/2014	02/02/2014	02/02/2014	02/02/2014
Date Sampled		Water	Water	Water	Water
Type of sample					
Date digested	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Calcium - Dissolved	mg/L	<0.5	5.3	0.9	440
Magnesium - (0.45µm filtered)	mg/L	<0.5	5.2	0.6	190
Hardness	mgCaCO3 /L	<3.0	35	5.0	1,900

Envirolab Reference: 104628
Revision No: R 00

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Miscellaneous Inorganics	UNITS	104628-1	104628-2	104628-3	104628-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	02/02/2014	02/02/2014	02/02/2014	02/02/2014
Date Sampled		Water	Water	Water	Water
Type of sample					
Date prepared	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Chloride, Cl	mg/L	<1	1	<1	5
Total Suspended Solids	mg/L	10	12	25	5
Total Dissolved Solids (grav)	mg/L	56	100	76	2,700
Total Solids	mg/L	66	120	100	2,700
Bicarbonate Alkalinity as CaCO ₃	mg/L	6	5	11	36
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	6	5	11	36
Sulphate, SO ₄	mg/L	<1	26	1	1,500
Dissolved Organic Carbon	mg/L	2	1	[NA]	[NA]
Total Organic Carbon	mg/L	2	1	[NA]	[NA]
Nitrate as N in water	mg/L	<0.005	0.037	[NA]	[NA]
Total Cyanide	mg/L	<0.004	<0.004	<0.004	<0.004
Phosphate as P in water	mg/L	<0.005	<0.005	[NA]	[NA]

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Method ID	Methodology Summary
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 22nd ED, 4110-B.
Inorg-019	Suspended Solids - determined gravimetrically by filtration of the sample, in accordance with APHA 22nd ED, 2540-D. The samples are dried at 104 +/- 5oC.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180 +/- 5oC.
Inorg-041	Gravimetric determination of the total solids content of water using APHA 22nd ED 2540B.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA 22nd ED, 2320-B.
Inorg-079	TOC determined using a TOC analyser using the combustion method. DOC is filtered prior to determination. Analysis using APHA 22nd ED 5310B.
Inorg-055	Nitrate - determined colourimetrically based on EPA353.2 and APHA 22nd ED NO3- F. Soils are analysed following a water extraction.
Inorg-013	Cyanide - total determined colourimetrically after distillation, based on APHA 22nd ED, 4500-CN_C,E. Free cyanide determined colourimetrically after filtration and confirmed by diffusion. Solids are extracted in a caustic media prior to distillation and analysis.
Inorg-060	Phosphate determined colourimetrically based on EPA365. 1 and APHA 22nd ED 4500 P.E. Soils are analysed following a water extraction.

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Client Reference: **Mount Todd - Daily Discharge WDL Monitoring**

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
HM in water - total						Base II Duplicate II %RPD		
Date prepared	-			07/02/2014	104628-3	07/02/2014 07/02/2014	LCS-W2	07/02/2014
Date analysed	-			10/02/2014	104628-3	10/02/2014 10/02/2014	LCS-W2	10/02/2014
Aluminium-Total	µg/L	10	Metals-022 ICP-MS	<10	104628-3	650 740 RPD: 13	LCS-W2	105%
Cadmium-Total	µg/L	0.1	Metals-022 ICP-MS	<0.1	104628-3	<0.1 <0.1	LCS-W2	101%
Cobalt-Total	µg/L	1	Metals-022 ICP-MS	<1	104628-3	1 1 RPD: 0	LCS-W2	101%
Chromium-Total	µg/L	1	Metals-022 ICP-MS	<1	104628-3	<1 <1	LCS-W2	97%
Copper-Total	µg/L	1	Metals-022 ICP-MS	<1	104628-3	130 130 RPD: 0	LCS-W2	99%
Iron-Total	µg/L	10	Metals-022 ICP-MS	<10	104628-3	710 730 RPD: 3	LCS-W2	105%
Lead-Total	µg/L	1	Metals-022 ICP-MS	<1	104628-3	1 1 RPD: 0	LCS-W2	98%
Manganese-Total	µg/L	5	Metals-022 ICP-MS	<5	104628-3	26 26 RPD: 0	LCS-W2	99%
Mercury-Total	µg/L	0.05	Metals-021 CV-AAS	<0.05	104628-3	<0.05 [N/T]	LCS-W2	96%
Nickel-Total	µg/L	1	Metals-022 ICP-MS	<1	104628-3	<1 <1	LCS-W2	97%
Zinc-Total	µg/L	1	Metals-022 ICP-MS	<1	104628-3	5 5 RPD: 0	LCS-W2	97%

Envirolab Reference: 104628
Revision No: R 00

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Waters - Acid extractable						Base II Duplicate II %RPD		
Date prepared	-			07/02/2014	104628-3	11/02/2014 11/02/2014	LCS-W4	11/02/2014
Date analysed	-			07/02/2014	104628-3	11/02/2014 11/02/2014	LCS-W4	11/02/2014
Magnesium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	104628-3	0.7 0.7 RPD: 0	LCS-W4	109%
Calcium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	104628-3	1 1 RPD: 0	LCS-W4	109%
Sodium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	104628-3	1.8 1.9 RPD: 5	LCS-W4	101%
HM in water - dissolved						Base II Duplicate II %RPD		
Date prepared	-			07/02/2014	104628-3	07/02/2014 07/02/2014	LCS-W1	07/02/2014
Date analysed	-			07/02/2014	104628-3	07/02/2014 07/02/2014	LCS-W1	07/02/2014
Aluminium-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	104628-3	490 [N/T]	LCS-W1	103%
Cadmium-(0.45µm filtered)	µg/L	0.1	Metals-022 ICP-MS	<0.1	104628-3	<0.1 [N/T]	LCS-W1	100%
Cobalt-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104628-3	<1 [N/T]	LCS-W1	106%
Chromium-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104628-3	<1 [N/T]	LCS-W1	100%
Copper-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104628-3	81 [N/T]	LCS-W1	106%
Iron-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	104628-3	200 [N/T]	LCS-W1	107%
Lead-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104628-3	<1 [N/T]	LCS-W1	113%
Manganese-(0.45µm filtered)	µg/L	5	Metals-022 ICP-MS	<5	104628-3	20 [N/T]	LCS-W1	102%
Mercury-(0.45µm filtered)	µg/L	0.05	Metals-021 CV-AAS	<0.05	104628-3	<0.05 <0.05	LCS-W1	96%
Nickel-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104628-3	<1 [N/T]	LCS-W1	101%
Zinc-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104628-3	3 [N/T]	LCS-W1	101%

Envirolab Reference: 104628
Revision No: R 00

Client Reference: Mount Todd - Daily Discharge WDL Monitoring

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Water - Dissolved						Base Duplicate %RPD		
Date digested	-			07/02/2014	104628-4	07/02/2014 07/02/2014	LCS-W2	07/02/2014
Date analysed	-			07/02/2014	104628-4	07/02/2014 07/02/2014	LCS-W2	07/02/2014
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	104628-4	440 420 RPD: 5	LCS-W2	120%
Magnesium - (0.45µm filtered)	mg/L	0.5	Metals-020 ICP-AES	<0.5	104628-4	190 180 RPD: 5	LCS-W2	119%
Hardness	mgCaCO ₃ /L	3		3.0	104628-4	1900 1800 RPD: 5	[NR]	[NR]
QUALITY CONTROL								
Miscellaneous Inorganics						Base Duplicate %RPD		
Date prepared	-			07/02/2014	104628-1	07/02/2014 07/02/2014	LCS-W1	07/02/2014
Date analysed	-			07/02/2014	104628-1	07/02/2014 07/02/2014	LCS-W1	07/02/2014
Chloride, Cl	mg/L	1	Inorg-081	<1	104628-1	<1 <1	LCS-W1	91%
Total Suspended Solids	mg/L	5	Inorg-019	<5	104628-1	10 9 RPD: 11	LCS-W1	94%
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	104628-1	56 [N/T]	LCS-W1	98%
Total Solids	mg/L	5	Inorg-041	<5	104628-1	66 [N/T]	LCS-W1	94%
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104628-1	6 7 RPD: 15	[NR]	[NR]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104628-1	<5 <5	[NR]	[NR]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	104628-1	<5 <5	[NR]	[NR]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104628-1	6 7 RPD: 15	LCS-W1	99%
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	104628-1	<1 <1	LCS-W1	94%
Dissolved Organic Carbon	mg/L	1	Inorg-079	<1	104628-1	2 [N/T]	LCS-W1	103%
Total Organic Carbon	mg/L	1	Inorg-079	<1	104628-1	2 [N/T]	LCS-W1	103%
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	104628-1	<0.005 <0.005	LCS-W1	97%
Total Cyanide	mg/L	0.004	Inorg-013	<0.004	104628-1	<0.004 [N/T]	LCS-W1	111%
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	104628-1	<0.005 <0.005	LCS-W1	104%
QUALITY CONTROL								
HM in water - total						Base + Duplicate + %RPD		
Date prepared	-		104628-1	07/02/2014 07/02/2014				
Date analysed	-		104628-1	10/02/2014 10/02/2014				
Aluminium-Total	µg/L		104628-1	40 [N/T]				
Cadmium-Total	µg/L		104628-1	<0.1 [N/T]				
Cobalt-Total	µg/L		104628-1	<1 [N/T]				
Chromium-Total	µg/L		104628-1	<1 [N/T]				
Copper-Total	µg/L		104628-1	<1 [N/T]				
Iron-Total	µg/L		104628-1	99 [N/T]				

Envirolab Reference: 104628
Revision No: R 00

Client Reference: Mount Todd - Daily Discharge WDL Monitoring

QUALITY CONTROL HM in water - total	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Lead-Total	µg/L	104628-1	< 1 [N/T]
Manganese-Total	µg/L	104628-1	< 5 [N/T]
Mercury-Total	µg/L	104628-1	< 0.05 < 0.05
Nickel-Total	µg/L	104628-1	< 1 [N/T]
Zinc-Total	µg/L	104628-1	3 [N/T]

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Report Comments:

Trace metals: In theory the total metal content should be higher than the dissolved metal content. However, in some samples this is not the case. The sample has been re-analysed for both Total and Dissolved and results have been confirmed.

Total trace metals: no preserved sample was received for sample 1, therefore analysis was conducted from the unpreserved sample bottle.

Note: there is a possibility some elements may be underestimated.

Dissolved Organic Carbon analysed by NMI. Report No. RN1008982.

TOC analysed by NMI. Report No. RN1008982.

Asbestos ID was analysed by Approved Identifier: Not applicable for this job

Asbestos ID was authorised by Approved Signatory: Not applicable for this job

INS: Insufficient sample for this test

PQL: Practical Quantitation Limit

NT: Not tested

NA: Test not required

RPD: Relative Percent Difference

NA: Test not required

<: Less than

>: Greater than

LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Environmental Reference: 104628

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CERTIFICATE OF ANALYSIS

104629

Client:

Vista Gold Australia Pty Ltd
Mt Todd Mine Site
Edith Falls Rd
NT 2067

Attention: Andrew Sawicki, Robbie Friel

Sample log in details:

Your Reference: **Mount Todd - Daily Discharge WDL Monitoring**
No. of samples: 4 Waters
Date samples received / completed instructions received 06/02/14 / 06/02/14

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date: 13/02/14 / 17/02/14
Date of Preliminary Report: Not issued
NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:


Jacinta Hurst
Laboratory Manager

Envirolab Reference: 104629
Revision No: R 00



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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

HM in water - total Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	104629-1 SV2 01/02/2014 Water	104629-2 SW4 01/02/2014 Water	104629-3 SW10 01/02/2014 Water	104629-4 RP3 01/02/2014 Water
Date prepared	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	10/02/2014	10/02/2014	10/02/2014	10/02/2014
Aluminium-Total	µg/L	270	370	750	100
Cadmium-Total	µg/L	<0.1	<0.1	<0.1	47
Cobalt-Total	µg/L	<1	<1	<1	390
Chromium-Total	µg/L	<1	<1	1	<1
Copper-Total	µg/L	2	4	100	11
Iron-Total	µg/L	640	500	900	130
Lead-Total	µg/L	<1	1	1	<1
Manganese-Total	µg/L	17	17	20	4,600
Mercury-Total	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Total	µg/L	<1	<1	<1	370
Zinc-Total	µg/L	9	13	5	3,000

EnvirolabReference: 104629
Revision No: R 00

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Metals in Waters - Acid extractable	UNITS	104629-1	104629-2	104629-3	104629-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference:	-----	01/02/2014	01/02/2014	01/02/2014	01/02/2014
Date Sampled	-----	Water	Water	Water	Water
Type of sample					
Date prepared	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Magnesium - Total	mg/L	0.6	1	<0.5	200
Calcium - Total	mg/L	0.6	0.5	0.8	400
Sodium - Total	mg/L	1.1	1.5	1.6	59

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HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	104629-1 SW2 01/02/2014 Water	104629-2 SW4 01/02/2014 Water	104629-3 SW10 01/02/2014 Water	104629-4 RP3 01/02/2014 Water
Date prepared	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Aluminium-(0.45µm filtered)	µg/L	150	290	270	16
Cadmium-(0.45µm filtered)	µg/L	<0.1	<0.1	<0.1	44
Cobalt-(0.45µm filtered)	µg/L	<1	<1	<1	380
Chromium-(0.45µm filtered)	µg/L	<1	<1	<1	<1
Copper-(0.45µm filtered)	µg/L	<1	2	67	4
Iron-(0.45µm filtered)	µg/L	230	230	140	<10
Lead-(0.45µm filtered)	µg/L	<1	<1	<1	<1
Manganese-(0.45µm filtered)	µg/L	8	12	14	4,400
Mercury-(0.45µm filtered)	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-(0.45µm filtered)	µg/L	<1	<1	<1	350
Zinc-(0.45µm filtered)	µg/L	1	9	2	2,700

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Metals in Water - Dissolved	UNITS	104629-1	104629-2	104629-3	104629-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	01/02/2014	01/02/2014	01/02/2014	01/02/2014
Date Sampled	-----	Water	Water	Water	Water
Type of sample					
Date digested	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Date analysed	-	07/02/2014	07/02/2014	07/02/2014	07/02/2014
Calcium - Dissolved	mg/L	0.6	<0.5	0.7	430
Magnesium - (0.45µm filtered)	mg/L	0.5	0.9	<0.5	190
Hardness	mgCaCO3 /L	4.0	4.0	<3.0	1,900

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Miscellaneous Inorganics	UNITS	104629-1	104629-2	104629-3	104629-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	01/02/2014	01/02/2014	01/02/2014	01/02/2014
Date Sampled		Water	Water	Water	Water
Type of sample					
Date prepared	-	10/02/2014	10/02/2014	10/02/2014	10/02/2014
Date analysed	-	10/02/2014	10/02/2014	10/02/2014	10/02/2014
Chloride, Cl	mg/L	<1	<1	<1	5
Total Suspended Solids	mg/L	17	10	35	<5
Total Dissolved Solids (grav)	mg/L	48	82	70	2,100
Total Solids	mg/L	65	92	110	2,100
Bicarbonate Alkalinity as CaCO ₃	mg/L	7	10	9	38
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	7	10	9	38
Sulphate, SO ₄	mg/L	<1	<1	<1	1,600
Dissolved Organic Carbon	mg/L	2	3	[NA]	[NA]
Total Organic Carbon	mg/L	3	2	[NA]	[NA]
Nitrate as N in water	mg/L	<0.005	0.007	[NA]	[NA]
Total Cyanide	mg/L	<0.004	<0.004	<0.004	<0.004
Phosphate as P in water	mg/L	<0.005	<0.005	[NA]	[NA]

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Method ID	Methodology Summary
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 22nd ED, 4110-B.
Inorg-019	Suspended Solids - determined gravimetrically by filtration of the sample, in accordance with APHA 22nd ED, 2540-D. The samples are dried at 104 +/- 5oC.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180 +/- 5oC.
Inorg-041	Gravimetric determination of the total solids content of water using APHA 22nd ED 2540B.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA 22nd ED, 2320-B.
Inorg-079	TOC determined using a TOC analyser using the combustion method. DOC is filtered prior to determination. Analysis using APHA 22nd ED 5310B.
Inorg-055	Nitrate - determined colourimetrically based on EPA353.2 and APHA 22nd ED NO3- F. Soils are analysed following a water extraction.
Inorg-013	Cyanide - total determined colourimetrically after distillation, based on APHA 22nd ED, 4500-CN_C,E. Free cyanide determined colourimetrically after filtration and confirmed by diffusion. Solids are extracted in a caustic media prior to distillation and analysis.
Inorg-060	Phosphate determined colourimetrically based on EPA365. 1 and APHA 22nd ED 4500 P.E. Soils are analysed following a water extraction.

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QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
HM in water - total						Base II Duplicate II %RPD		
Date prepared	-			07/02/2014	[NT]	[NT]	LCS-W2	07/02/2004
Date analysed	-			10/02/2014	[NT]	[NT]	LCS-W2	07/02/2014
Aluminium-Total	µg/L	10	Metals-022 ICP-MS	<10	[NT]	[NT]	LCS-W2	105%
Cadmium-Total	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	LCS-W2	101%
Cobalt-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	101%
Chromium-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	97%
Copper-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	99%
Iron-Total	µg/L	10	Metals-022 ICP-MS	<10	[NT]	[NT]	LCS-W2	105%
Lead-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	98%
Manganese-Total	µg/L	5	Metals-022 ICP-MS	<5	[NT]	[NT]	LCS-W2	99%
Mercury-Total	µg/L	0.05	Metals-021 CV-AAS	<0.05	[NT]	[NT]	LCS-W2	96%
Nickel-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	97%
Zinc-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	97%

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QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Waters - Acid extractable						Base II Duplicate II %RPD		
Date prepared	-			07/02/2014	[NT]	[NT]	LCS-W4	11/02/2014
Date analysed	-			07/02/2014	[NT]	[NT]	LCS-W4	11/02/2014
Magnesium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W4	109%
Calcium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W4	109%
Sodium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W4	101%
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
HM in water - dissolved						Base II Duplicate II %RPD		
Date prepared	-			07/02/2014	104629-1	07/02/2014 07/02/2014	LCS-W1	07/02/2014
Date analysed	-			07/02/2014	104629-1	07/02/2014 07/02/2014	LCS-W1	07/02/2014
Aluminium-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	104629-1	150 160 RPD: 6	LCS-W1	105%
Cadmium-(0.45µm filtered)	µg/L	0.1	Metals-022 ICP-MS	<0.1	104629-1	<0.1 <0.1	LCS-W1	101%
Cobalt-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104629-1	<1 <1	LCS-W1	101%
Chromium-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104629-1	<1 <1	LCS-W1	97%
Copper-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104629-1	<1 <1	LCS-W1	99%
Iron-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	104629-1	230 230 RPD: 0	LCS-W1	105%
Lead-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104629-1	<1 <1	LCS-W1	98%
Manganese-(0.45µm filtered)	µg/L	5	Metals-022 ICP-MS	<5	104629-1	8 8 RPD: 0	LCS-W1	99%
Mercury-(0.45µm filtered)	µg/L	0.05	Metals-021 CV-AAS	<0.05	104629-1	<0.05 [N/T]	LCS-W1	96%
Nickel-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104629-1	<1 <1	LCS-W1	97%
Zinc-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104629-1	1 <1	LCS-W1	97%

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QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Water - Dissolved						Base II Duplicate II %RPD		
Date digested	-			07/02/2014	[NT]	[NT]	LCS-W2	07/02/2014
Date analysed	-			07/02/2014	[NT]	[NT]	LCS-W2	07/02/2014
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W2	120%
Magnesium - (0.45µm filtered)	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W2	119%
Hardness	mgCaCO ₃ /L	3		3.0	[NT]	[NT]	[NR]	[NR]
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Miscellaneous Inorganics						Base II Duplicate II %RPD		
Date prepared	-			10/02/2014	104629-1	10/02/2014 10/02/2014	LCS-W1	07/02/2014
Date analysed	-			10/02/2014	104629-1	10/02/2014 10/02/2014	LCS-W1	07/02/2014
Chloride, Cl	mg/L	1	Inorg-081	<1	104629-1	<1 [NT]	LCS-W1	91%
Total Suspended Solids	mg/L	5	Inorg-019	<5	104629-1	17 [NT]	LCS-W1	94%
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	104629-1	48 [NT]	LCS-W1	98%
Total Solids	mg/L	5	Inorg-041	<5	104629-1	65 [NT]	LCS-W1	94%
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104629-1	7 [NT]	[NR]	[NR]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104629-1	<5 [NT]	[NR]	[NR]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	104629-1	<5 [NT]	[NR]	[NR]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104629-1	7 [NT]	LCS-W1	99%
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	104629-1	<1 [NT]	LCS-W1	94%
Dissolved Organic Carbon	mg/L	1	Inorg-079	<1	104629-1	2 [NT]	LCS-W1	103%
Total Organic Carbon	mg/L	1	Inorg-079	<1	104629-1	3 [NT]	LCS-W1	103%
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	104629-1	<0.005 [NT]	LCS-W1	97%
Total Cyanide	mg/L	0.004	Inorg-013	<0.004	104629-1	<0.004 <0.004	LCS-W1	111%
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	104629-1	<0.005 [NT]	LCS-W1	104%
QUALITY CONTROL	UNITS		Dup. Sm#		Duplicate	Spike Sm#	Spike % Recovery	
HM in water - dissolved					Base + Duplicate + %RPD			
Date prepared	-		[NT]		[NT]	104629-2	07/02/2014	
Date analysed	-		[NT]		[NT]	104629-2	07/02/2014	
Aluminium-(0.45µm filtered)	µg/L		[NT]		[NT]	104629-2	106%	
Cadmium-(0.45µm filtered)	µg/L		[NT]		[NT]	104629-2	101%	
Cobalt-(0.45µm filtered)	µg/L		[NT]		[NT]	104629-2	107%	
Chromium-(0.45µm filtered)	µg/L		[NT]		[NT]	104629-2	100%	
Copper-(0.45µm filtered)	µg/L		[NT]		[NT]	104629-2	107%	
Iron-(0.45µm filtered)	µg/L		[NT]		[NT]	104629-2	90%	

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QUALITY CONTROL HM in water - dissolved	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Lead-(0.45µm filtered)	µg/L	[NT]	[NT]	104629-2	110%
Manganese-(0.45µm filtered)	µg/L	[NT]	[NT]	104629-2	103%
Mercury-(0.45µm filtered)	µg/L	[NT]	[NT]	[NR]	[NR]
Nickel-(0.45µm filtered)	µg/L	[NT]	[NT]	104629-2	102%
Zinc-(0.45µm filtered)	µg/L	[NT]	[NT]	104629-2	102%

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Report Comments:

Dissolved Organic Carbon analysed by NMI. Report No.RN1008982.

Total Organic Carbon analysed by NMI. Report No.RN1008982.

Asbestos ID was analysed by Approved Identifier: Not applicable for this job
Asbestos ID was authorised by Approved Signatory: Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

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CERTIFICATE OF ANALYSIS

104742

Client:

Vista Gold Australia Pty Ltd
Mt Todd Mine Site
Edith Falls Rd
NT 2067

Attention: Andrew Sawicki, Robbie Friel

Sample log in details:

Your Reference: **Mount Todd - Daily Discharge WDL Monitoring**
No. of samples: 4 Waters
Date samples received / completed instructions received 10/2/2014 / 10/2/2014

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date: 17/02/14 / 19/02/14
Date of Preliminary Report: Not Issued
NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:


Jacinta Hurst
Laboratory Manager

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HM in water - total Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	104742-1 SW2 5/02/2014 Water	104742-2 SW4 5/02/2014 Water	104742-3 SW10 5/02/2014 Water	104742-4 RP3 5/02/2014 Water
Date prepared	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Aluminium-Total	µg/L	400	810	540	290
Cadmium-Total	µg/L	<0.1	0.2	0.1	44
Cobalt-Total	µg/L	<1	2	1	390
Chromium-Total	µg/L	<1	<1	<1	1
Copper-Total	µg/L	<1	3	2	65
Iron-Total	µg/L	450	490	500	67
Lead-Total	µg/L	<1	<1	<1	1
Manganese-Total	µg/L	11	69	42	4,500
Mercury-Total	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Total	µg/L	<1	2	2	370
Zinc-Total	µg/L	2	19	14	3,300

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Metals in Waters - Acid extractable					
Our Reference:	UNITS	104742-1	104742-2	104742-3	104742-4
Your Reference	-----	SW2	SW4	SW10	RP3
Date Sampled	-----	5/02/2014	5/02/2014	5/02/2014	5/02/2014
Type of sample		Water	Water	Water	Water
Date prepared	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	12/02/2014	12/02/2014	12/02/2014	12/02/2014
Magnesium - Total	mg/L	0.6	2.0	1.7	190
Calcium - Total	mg/L	0.5	2.5	2.2	430
Sodium - Total	mg/L	1.2	2.3	2.1	60

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HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	104742-1 SW2 5/02/2014 Water	104742-2 SW4 5/02/2014 Water	104742-3 SW10 5/02/2014 Water	104742-4 RP3 5/02/2014 Water
Date prepared	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Aluminium-(0.45µm filtered)	µg/L	50	55	76	110
Cadmium-(0.45µm filtered)	µg/L	<0.1	0.2	0.1	44
Cobalt-(0.45µm filtered)	µg/L	<1	2	<1	400
Chromium-(0.45µm filtered)	µg/L	<1	<1	<1	1
Copper-(0.45µm filtered)	µg/L	<1	2	2	49
Iron-(0.45µm filtered)	µg/L	130	110	140	<10
Lead-(0.45µm filtered)	µg/L	<1	<1	<1	<1
Manganese-(0.45µm filtered)	µg/L	6	63	34	4,600
Mercury-(0.45µm filtered)	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-(0.45µm filtered)	µg/L	<1	2	1	380
Zinc-(0.45µm filtered)	µg/L	<1	16	10	2,800

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Metals in Water - Dissolved					
Our Reference:	UNITS	104742-1	104742-2	104742-3	104742-4
Your Reference	-----	SW2	SW4	SW10	RP3
Date Sampled	-----	5/02/2014	5/02/2014	5/02/2014	5/02/2014
Type of sample		Water	Water	Water	Water
Date digested	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Calcium - Dissolved	mg/L	0.6	2.5	1.9	410
Magnesium - (0.45µm filtered)	mg/L	0.5	1.9	1.5	180
Hardness	mgCaCO3 /L	4.0	14	11	1,800

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Miscellaneous Inorganics	UNITS	104742-1	104742-2	104742-3	104742-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	5/02/2014	5/02/2014	5/02/2014	5/02/2014
Date Sampled		Water	Water	Water	Water
Type of sample					
Date prepared	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Chloride, Cl	mg/L	<1	1	1	6
Total Suspended Solids	mg/L	7	9	13	<5
Total Dissolved Solids (grav)	mg/L	26	50	84	2,900
Total Solids	mg/L	33	59	97	2,900
Bicarbonate Alkalinity as CaCO ₃	mg/L	8	11	11	38
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	8	11	11	38
Sulphate, SO ₄	mg/L	<1	8	8	1,700
Dissolved Organic Carbon	mg/L	4	4	[NA]	[NA]
Total Organic Carbon	mg/L	4	3	[NA]	[NA]
Nitrate as N in water	mg/L	<0.005	0.022	[NA]	[NA]
Total Cyanide	mg/L	<0.004	<0.004	<0.004	<0.004
Phosphate as P in water	mg/L	<0.005	<0.005	[NA]	[NA]

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

Method ID	Methodology Summary
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 22nd ED, 4110-B.
Inorg-019	Suspended Solids - determined gravimetrically by filtration of the sample, in accordance with APHA 22nd ED, 2540-D. The samples are dried at 104 +/- 5oC.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180 +/- 5oC.
Inorg-041	Gravimetric determination of the total solids content of water using APHA 22nd ED 2540B.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA 22nd ED, 2320-B.
Inorg-079	TOC determined using a TOC analyser using the combustion method. DOC is filtered prior to determination. Analysis using APHA 22nd ED 5310B.
Inorg-055	Nitrate - determined colourimetrically based on EPA353.2 and APHA 22nd ED NO3- F. Soils are analysed following a water extraction.
Inorg-013	Cyanide - total determined colourimetrically after distillation, based on APHA 22nd ED, 4500-CN_C,E. Free cyanide determined colourimetrically after filtration and confirmed by diffusion. Solids are extracted in a caustic media prior to distillation and analysis.
Inorg-060	Phosphate determined colourimetrically based on EPA365. 1 and APHA 22nd ED 4500 P.E. Soils are analysed following a water extraction.

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QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
HM in water - total						Base Duplicate %RPD		
Date prepared	-			11/02/2014	104742-1	11/02/2014 11/02/2014	LCS-W1	11/02/2014
Date analysed	-			11/02/2014	104742-1	11/02/2014 11/02/2014	LCS-W1	11/02/2014
Aluminium-Total	µg/L	10	Metals-022 ICP-MS	<10	104742-1	400 470 RPD: 16	LCS-W1	118%
Cadmium-Total	µg/L	0.1	Metals-022 ICP-MS	<0.1	104742-1	<0.1 <0.1	LCS-W1	101%
Cobalt-Total	µg/L	1	Metals-022 ICP-MS	<1	104742-1	<1 <1	LCS-W1	98%
Chromium-Total	µg/L	1	Metals-022 ICP-MS	<1	104742-1	<1 <1	LCS-W1	97%
Copper-Total	µg/L	1	Metals-022 ICP-MS	<1	104742-1	<1 <1	LCS-W1	95%
Iron-Total	µg/L	10	Metals-022 ICP-MS	<10	104742-1	450 460 RPD: 2	LCS-W1	101%
Lead-Total	µg/L	1	Metals-022 ICP-MS	<1	104742-1	<1 <1	LCS-W1	104%
Manganese-Total	µg/L	5	Metals-022 ICP-MS	<5	104742-1	11 11 RPD: 0	LCS-W1	93%
Mercury-Total	µg/L	0.05	Metals-021 CV-AAS	<0.05	104742-1	<0.05 [N/T]	LCS-W1	96%
Nickel-Total	µg/L	1	Metals-022 ICP-MS	<1	104742-1	<1 <1	LCS-W1	97%
Zinc-Total	µg/L	1	Metals-022 ICP-MS	<1	104742-1	2 2 RPD: 0	LCS-W1	99%

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QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Waters - Acid extractable						Base II Duplicate II %RPD		
Date prepared	-			11/02/2014	104742-1	11/02/2014 11/02/2014	LCS-W1	11/02/2014
Date analysed	-			11/02/2014	104742-1	12/02/2014 12/02/2014	LCS-W1	12/02/2014
Magnesium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	104742-1	0.6 0.6 RPD: 0	LCS-W1	103%
Calcium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	104742-1	0.5 0.5 RPD: 0	LCS-W1	106%
Sodium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	104742-1	1.2 1.2 RPD: 0	LCS-W1	113%
HM in water - dissolved						Base II Duplicate II %RPD		
Date prepared	-			11/02/2014	104742-1	11/02/2014 11/02/2014	LCS-W1	11/02/2014
Date analysed	-			11/02/2014	104742-1	11/02/2014 11/02/2014	LCS-W1	11/02/2014
Aluminium-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	104742-1	50 50 RPD: 0	LCS-W1	102%
Cadmium-(0.45µm filtered)	µg/L	0.1	Metals-022 ICP-MS	<0.1	104742-1	<0.1 <0.1	LCS-W1	100%
Cobalt-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104742-1	<1 <1	LCS-W1	101%
Chromium-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104742-1	<1 <1	LCS-W1	100%
Copper-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104742-1	<1 <1	LCS-W1	98%
Iron-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	104742-1	130 130 RPD: 0	LCS-W1	100%
Lead-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104742-1	<1 <1	LCS-W1	100%
Manganese-(0.45µm filtered)	µg/L	5	Metals-022 ICP-MS	<5	104742-1	6 6 RPD: 0	LCS-W1	94%
Mercury-(0.45µm filtered)	µg/L	0.05	Metals-021 CV-AAS	<0.05	104742-1	<0.05 <0.05	LCS-W1	96%
Nickel-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104742-1	<1 <1	LCS-W1	99%
Zinc-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	104742-1	<1 <1	LCS-W1	100%

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Client Reference: Mount Todd - Daily Discharge WDL Monitoring

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Water - Dissolved						Base Duplicate %RPD		
Date digested	-			11/02/2014	104742-1	11/02/2014 11/02/2014	LCS-W1	11/02/2014
Date analysed	-			11/02/2014	104742-1	11/02/2014 11/02/2014	LCS-W1	11/02/2014
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	104742-1	0.6 <0.5	LCS-W1	107%
Magnesium - (0.45µm filtered)	mg/L	0.5	Metals-020 ICP-AES	<0.5	104742-1	0.5 <0.5	LCS-W1	107%
Hardness	mgCaCO ₃ /L	3		[NT]	104742-1	4.0 <3.0	[NR]	[NR]
QUALITY CONTROL								
Miscellaneous Inorganics						Base Duplicate %RPD		
Date prepared	-			11/2/2014	104742-1	11/02/2014 11/02/2014	LCS-W1	11/02/2014
Date analysed	-			14/02/2014	104742-1	11/02/2014 11/02/2014	LCS-W1	11/02/2014
Chloride, Cl	mg/L	1	Inorg-081	<1	104742-1	<1 <1	LCS-W1	103%
Total Suspended Solids	mg/L	5	Inorg-019	<5	104742-1	7 [N/T]	LCS-W1	95%
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	104742-1	26 [N/T]	LCS-W1	92%
Total Solids	mg/L	5	Inorg-041	<5	104742-1	33 [N/T]	LCS-W1	95%
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104742-1	8 8 RPD: 0	[NR]	[NR]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104742-1	<5 <5	[NR]	[NR]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	104742-1	<5 <5	[NR]	[NR]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	104742-1	8 8 RPD: 0	LCS-W1	104%
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	104742-1	<1 <1	LCS-W1	105%
Dissolved Organic Carbon	mg/L	1	Inorg-079	<1	104742-1	4 [N/T]	[NR]	[NR]
Total Organic Carbon	mg/L	1	Inorg-079	<1	104742-1	4 [N/T]	[NR]	[NR]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	104742-1	<0.005 [N/T]	LCS-W1	106%
Total Cyanide	mg/L	0.004	Inorg-013	<0.004	104742-1	<0.004 <0.004	LCS-W1	106%
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	104742-1	<0.005 [N/T]	LCS-W1	100%
QUALITY CONTROL								
HM in water - total			Dup. Sm#		Duplicate	Spike Sm#		Spike % Recovery
					Base + Duplicate + %RPD			
Date prepared	-		104742-2	11/02/2014 11/02/2014		104742-2		11/02/2014
Date analysed	-		104742-2	11/02/2014 11/02/2014		104742-2		11/02/2014
Aluminium-Total	µg/L		104742-2	810 [N/T]		104742-2		92%
Cadmium-Total	µg/L		104742-2	0.2 [N/T]		104742-2		98%
Cobalt-Total	µg/L		104742-2	2 [N/T]		104742-2		95%
Chromium-Total	µg/L		104742-2	<1 [N/T]		104742-2		95%
Copper-Total	µg/L		104742-2	3 [N/T]		104742-2		95%
Iron-Total	µg/L		104742-2	490 [N/T]		104742-2		101%

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QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate	Spike Sm#	Spike % Recovery
HM in water - total			Base + Duplicate + %RPD		
Lead-Total	µg/L	104742-2	< 1 [N/T]	104742-2	100%
Manganese-Total	µg/L	104742-2	69 [N/T]	104742-2	95%
Mercury-Total	µg/L	104742-2	<0.05 <0.05	[NR]	[NR]
Nickel-Total	µg/L	104742-2	2 [N/T]	104742-2	98%
Zinc-Total	µg/L	104742-2	19 [N/T]	104742-2	98%
QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate	Spike Sm#	Spike % Recovery
Metals in Waters - Acid extractable			Base + Duplicate + %RPD		
Date prepared	-	[NT]	[NT]	104742-2	11/02/2014
Date analysed	-	[NT]	[NT]	104742-2	12/02/2014
Magnesium - Total	mg/L	[NT]	[NT]	104742-2	112%
Calcium - Total	mg/L	[NT]	[NT]	104742-2	107%
Sodium - Total	mg/L	[NT]	[NT]	104742-2	105%
QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate	Spike Sm#	Spike % Recovery
HM in water - dissolved			Base + Duplicate + %RPD		
Date prepared	-	[NT]	[NT]	104742-2	11/02/2014
Date analysed	-	[NT]	[NT]	104742-2	11/02/2014
Aluminium-(0.45µm filtered)	µg/L	[NT]	[NT]	104742-2	99%
Cadmium-(0.45µm filtered)	µg/L	[NT]	[NT]	104742-2	104%
Cobalt-(0.45µm filtered)	µg/L	[NT]	[NT]	104742-2	105%
Chromium-(0.45µm filtered)	µg/L	[NT]	[NT]	104742-2	103%
Copper-(0.45µm filtered)	µg/L	[NT]	[NT]	104742-2	99%
Iron-(0.45µm filtered)	µg/L	[NT]	[NT]	104742-2	92%
Lead-(0.45µm filtered)	µg/L	[NT]	[NT]	104742-2	100%
Manganese-(0.45µm filtered)	µg/L	[NT]	[NT]	104742-2	97%
Mercury-(0.45µm filtered)	µg/L	[NT]	[NT]	104742-2	100%
Nickel-(0.45µm filtered)	µg/L	[NT]	[NT]	104742-2	101%
Zinc-(0.45µm filtered)	µg/L	[NT]	[NT]	104742-2	104%

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QUALITY CONTROL Metals in Water - Dissolved	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	104742-2	11/02/2014
Date analysed	-	[NT]	[NT]	104742-2	11/02/2014
Calcium - Dissolved	mg/L	[NT]	[NT]	104742-2	103%
Magnesium - (0.45µm filtered)	mg/L	[NT]	[NT]	104742-2	105%
Hardness	mgCaCO 3/L	[NT]	[NT]	[NR]	[NR]

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Report Comments:

TOC was analysed by SAL report no SAL24970C.

Asbestos ID was analysed by Approved Identifier: Not applicable for this job
Asbestos ID was authorised by Approved Signatory: Not applicable for this job

INS: Insufficient sample for this test PQL: Practical Quantitation Limit NT: Not tested
NA: Test not required RPD: Relative Percent Difference NA: Test not required
<: Less than >: Greater than LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

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CERTIFICATE OF ANALYSIS

104743

Client:

Vista Gold Australia Pty Ltd
Mt Todd Mine Site
Edith Falls Rd
NT 2067

Attention: Andrew Sawicki, Robbie Friel

Sample log in details:

Your Reference:	<u>Mount Todd - Daily Discharge WDL Monitoring</u>
No. of samples:	4 Waters
Date samples received / completed instructions received	10/2/2014 / 10/2/2014

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	17/02/14 / 19/02/14
Date of Preliminary Report:	Not Issued

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:


Jacinta Hurst
Laboratory Manager

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HM in water - total Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	104743-1 SV2 6/02/2014 Water	104743-2 SW4 6/02/2014 Water	104743-3 SW10 6/02/2014 Water	104743-4 RP3 6/02/2014 Water
Date prepared	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Aluminium-Total	µg/L	310	360	610	220
Cadmium-Total	µg/L	<0.1	0.1	<0.1	43
Cobalt-Total	µg/L	<1	1	<1	380
Chromium-Total	µg/L	<1	<1	<1	<1
Copper-Total	µg/L	<1	2	2	46
Iron-Total	µg/L	470	510	510	63
Lead-Total	µg/L	<1	<1	<1	<1
Manganese-Total	µg/L	10	70	44	4,400
Mercury-Total	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Total	µg/L	<1	1	1	360
Zinc-Total	µg/L	2	16	11	3,100

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Metals in Waters - Acid extractable	UNITS	104743-1	104743-2	104743-3	104743-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	6/02/2014	6/02/2014	6/02/2014	6/02/2014
Date Sampled		Water	Water	Water	Water
Type of sample					
Date prepared	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	12/02/2014	12/02/2014	12/02/2014	12/02/2014
Magnesium - Total	mg/L	0.6	1.7	1.6	190
Calcium - Total	mg/L	0.5	1.9	1.7	420
Sodium - Total	mg/L	1.3	2.5	2.4	58

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HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	104743-1 SW2 6/02/2014 Water	104743-2 SW4 6/02/2014 Water	104743-3 SW10 6/02/2014 Water	104743-4 RP3 6/02/2014 Water
Date prepared	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Aluminium-(0.45µm filtered)	µg/L	60	75	43	97
Cadmium-(0.45µm filtered)	µg/L	<0.1	0.1	<0.1	47
Cobalt-(0.45µm filtered)	µg/L	<1	1	<1	430
Chromium-(0.45µm filtered)	µg/L	<1	<1	<1	1
Copper-(0.45µm filtered)	µg/L	<1	1	1	36
Iron-(0.45µm filtered)	µg/L	150	120	120	<10
Lead-(0.45µm filtered)	µg/L	<1	<1	<1	<1
Manganese-(0.45µm filtered)	µg/L	6	61	35	4,900
Mercury-(0.45µm filtered)	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-(0.45µm filtered)	µg/L	<1	1	1	400
Zinc-(0.45µm filtered)	µg/L	<1	12	8	3,000

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Metals in Water - Dissolved	UNITS	104743-1	104743-2	104743-3	104743-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	6/02/2014	6/02/2014	6/02/2014	6/02/2014
Date Sampled		Water	Water	Water	Water
Type of sample					
Date digested	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Calcium - Dissolved	mg/L	<0.5	1.9	1.7	420
Magnesium - (0.45µm filtered)	mg/L	0.5	1.7	1.5	180
Hardness	mgCaCO3 /L	<3.0	12	10	1,800

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Miscellaneous Inorganics	UNITS	104743-1	104743-2	104743-3	104743-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	6/02/2014	6/02/2014	6/02/2014	6/02/2014
Date Sampled		Water	Water	Water	Water
Type of sample					
Date prepared	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Date analysed	-	11/02/2014	11/02/2014	11/02/2014	11/02/2014
Chloride, Cl	mg/L	1	1	<1	5
Total Suspended Solids	mg/L	<5	10	8	<5
Total Dissolved Solids (grav)	mg/L	38	54	54	2,900
Total Solids	mg/L	38	64	62	3,000
Bicarbonate Alkalinity as CaCO ₃	mg/L	10	9	10	40
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	10	9	10	40
Sulphate, SO ₄	mg/L	<1	9	7	1,800
Dissolved Organic Carbon	mg/L	3	3	[NA]	[NA]
Total Organic Carbon	mg/L	3	3	[NA]	[NA]
Nitrate as N in water	mg/L	0.007	0.022	[NA]	[NA]
Phosphate as P in water	mg/L	<0.005	<0.005	[NA]	[NA]
Total Cyanide	mg/L	<0.004	<0.004	<0.004	<0.004

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Method ID	Methodology Summary
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 22nd ED, 4110-B.
Inorg-019	Suspended Solids - determined gravimetrically by filtration of the sample, in accordance with APHA 22nd ED, 2540-D. The samples are dried at 104+/-5oC.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-5oC.
Inorg-041	Gravimetric determination of the total solids content of water using APHA 22nd ED 2540B.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA 22nd ED, 2320-B.
Inorg-079	TOC determined using a TOC analyser using the combustion method. DOC is filtered prior to determination. Analysis using APHA 22nd ED 5310B.
Inorg-055	Nitrate - determined colourimetrically based on EPA353.2 and APHA 22nd ED NO3- F. Soils are analysed following a water extraction.
Inorg-060	Phosphate determined colourimetrically based on EPA365. 1 and APHA 22nd ED 4500 P.E. Soils are analysed following a water extraction.
Inorg-013	Cyanide - total determined colourimetrically after distillation, based on APHA 22nd ED, 4500-CN_C.E. Free cyanide determined colourimetrically after filtration and confirmed by diffusion. Solids are extracted in a caustic media prior to distillation and analysis.

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QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
HM in water - total						Base II Duplicate II %RPD		
Date prepared	-			11/02/2014	[NT]	[NT]	LCS-W1	11/02/2014
Date analysed	-			11/02/2014	[NT]	[NT]	LCS-W1	11/02/2014
Aluminium-Total	µg/L	10	Metals-022 ICP-MS	<10	[NT]	[NT]	LCS-W1	118%
Cadmium-Total	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	LCS-W1	101%
Cobalt-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	98%
Chromium-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	97%
Copper-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	95%
Iron-Total	µg/L	10	Metals-022 ICP-MS	<10	[NT]	[NT]	LCS-W1	101%
Lead-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	104%
Manganese-Total	µg/L	5	Metals-022 ICP-MS	<5	[NT]	[NT]	LCS-W1	93%
Mercury-Total	µg/L	0.05	Metals-021 CV-AAS	<0.05	[NT]	[NT]	LCS-W1	96%
Nickel-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	97%
Zinc-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	99%

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QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Waters - Acid extractable						Base II Duplicate II %RPD		
Date prepared	-			12/02/2014	[NT]	[NT]	LCS-W1	11/02/2014
Date analysed	-			12/02/2014	[NT]	[NT]	LCS-W1	12/02/2014
Magnesium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W1	103%
Calcium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W1	106%
Sodium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W1	113%
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
HM in water - dissolved						Base II Duplicate II %RPD		
Date prepared	-			11/2/2014	[NT]	[NT]	LCS-W1	11/02/2014
Date analysed	-			11/2/2014	[NT]	[NT]	LCS-W1	11/02/2014
Aluminium-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	[NT]	[NT]	LCS-W1	102%
Cadmium-(0.45µm filtered)	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	LCS-W1	100%
Cobalt-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	101%
Chromium-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	100%
Copper-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	98%
Iron-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	[NT]	[NT]	LCS-W1	100%
Lead-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	1000%
Manganese-(0.45µm filtered)	µg/L	5	Metals-022 ICP-MS	<5	[NT]	[NT]	LCS-W1	100%
Mercury-(0.45µm filtered)	µg/L	0.05	Metals-021 CV-AAS	<0.05	[NT]	[NT]	LCS-W1	94%
Nickel-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	99%
Zinc-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	100%

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QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Water - Dissolved						Base II Duplicate II %RPD		
Date digested	-			11/02/2014	[NT]	[NT]	LCS-W1	11/02/2014
Date analysed	-			11/02/2014	[NT]	[NT]	LCS-W1	11/02/2014
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W1	107%
Magnesium - (0.45µm filtered)	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W1	107%
Hardness	mgCaCO ₃ /L	3		[NT]	[NT]	[NT]	[NR]	[NR]
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Miscellaneous Inorganics						Base II Duplicate II %RPD		
Date prepared	-			11/2/2014	[NT]	[NT]	[NR]	[NR]
Date analysed	-			14/2/2014	[NT]	[NT]	[NR]	[NR]
Chloride, Cl	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NR]	[NR]
Total Suspended Solids	mg/L	5	Inorg-019	<5	[NT]	[NT]	[NR]	[NR]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	[NT]	[NT]	[NR]	[NR]
Total Solids	mg/L	5	Inorg-041	<5	[NT]	[NT]	[NR]	[NR]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NR]	[NR]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NR]	[NR]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NR]	[NR]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NR]	[NR]
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NR]	[NR]
Dissolved Organic Carbon	mg/L	1	Inorg-079	<1	[NT]	[NT]	[NR]	[NR]
Total Organic Carbon	mg/L	1	Inorg-079	<1	[NT]	[NT]	[NR]	[NR]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	[NT]	[NT]	LCS-W1	106%
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	[NT]	[NT]	LCS-W1	106%
Total Cyanide	mg/L	0.004	Inorg-013	<0.004	[NT]	[NT]	LCS-W1	100%

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Report Comments:

Asbestos ID was analysed by Approved Identifier: Not applicable for this job
Asbestos ID was authorised by Approved Signatory: Not applicable for this job

INS: Insufficient sample for this test PQL: Practical Quantitation Limit NT: Not tested
NA: Test not required RPD: Relative Percent Difference NA: Test not required
<: Less than >: Greater than LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

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CERTIFICATE OF ANALYSIS

105279

Client:

Vista Gold Australia Pty Ltd
Mt Todd Mine Site
Edith Falls Rd
NT 2067

Attention: Andrew Sawicki, Robbie Friel

Sample log in details:

Your Reference: **Mount Todd - Daily Discharge WDL Monitoring**
No. of samples: 4 Waters
Date samples received / completed instructions received 19/02/14 / 19/02/14

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date: 26/02/14 / 26/02/14
Date of Preliminary Report: None Issued
NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:


Jacinta Hurst
Laboratory Manager

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HM in water - total Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	105279-1 SV2 13/02/2014 Water	105279-2 SW4 13/02/2014 Water	105279-3 SW10 13/02/2014 Water	105279-4 RP3 13/02/2014 Water
Date prepared	-	20/02/2014	20/02/2014	20/02/2014	20/02/2014
Date analysed	-	20/02/2014	20/02/2014	20/02/2014	20/02/2014
Aluminium-Total	µg/L	190	230	190	4,300
Cadmium-Total	µg/L	<0.1	0.1	0.2	27
Cobalt-Total	µg/L	<1	2	2	280
Chromium-Total	µg/L	<1	<1	<1	<1
Copper-Total	µg/L	<1	10	11	1,400
Iron-Total	µg/L	600	550	560	62
Lead-Total	µg/L	<1	<1	<1	26
Manganese-Total	µg/L	9	32	36	3,500
Mercury-Total	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Total	µg/L	<1	2	2	250
Zinc-Total	µg/L	7	44	38	5,900

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Metals in Waters - Acid extractable		105279-1	105279-2	105279-3	105279-4
Our Reference:	UNITS	105279-1	105279-2	105279-3	105279-4
Your Reference:	-----	SW2	SW4	SW10	RP3
Date Sampled	-----	13/02/2014	13/02/2014	13/02/2014	13/02/2014
Type of sample		Water	Water	Water	Water
Date prepared	-	19/02/2014	19/02/2014	19/02/2014	19/02/2014
Date analysed	-	19/02/2014	19/02/2014	19/02/2014	19/02/2014
Magnesium - Total	mg/L	<0.5	1.1	1.1	76
Calcium - Total	mg/L	<0.5	0.8	0.8	82
Sodium - Total	mg/L	1.2	1.9	1.8	14

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HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	105279-1 SW2 13/02/2014 Water	105279-2 SW4 13/02/2014 Water	105279-3 SW10 13/02/2014 Water	105279-4 RP3 13/02/2014 Water
Date prepared	-	20/02/2014	20/02/2014	20/02/2014	20/02/2014
Date analysed	-	20/02/2014	20/02/2014	20/02/2014	20/02/2014
Aluminium-(0.45µm filtered)	µg/L	55	48	87	4,500
Cadmium-(0.45µm filtered)	µg/L	<0.1	0.1	0.1	27
Cobalt-(0.45µm filtered)	µg/L	<1	1	1	280
Chromium-(0.45µm filtered)	µg/L	<1	<1	<1	<1
Copper-(0.45µm filtered)	µg/L	<1	8	7	1,400
Iron-(0.45µm filtered)	µg/L	170	150	150	39
Lead-(0.45µm filtered)	µg/L	<1	<1	<1	26
Manganese-(0.45µm filtered)	µg/L	<5	29	25	3,600
Mercury-(0.45µm filtered)	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-(0.45µm filtered)	µg/L	<1	2	2	260
Zinc-(0.45µm filtered)	µg/L	<1	37	30	6,100

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Metals in Water - Dissolved	UNITS	105279-1	105279-2	105279-3	105279-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----				
Date Sampled		13/02/2014	13/02/2014	13/02/2014	13/02/2014
Type of sample		Water	Water	Water	Water
Date digested	-	20/02/2014	20/02/2014	20/02/2014	20/02/2014
Date analysed	-	20/02/2014	20/02/2014	20/02/2014	20/02/2014
Calcium - Dissolved	mg/L	<0.5	0.8	0.7	84
Magnesium - (0.45µm filtered)	mg/L	<0.5	1.1	1.0	81
Hardness	mgCaCO3 /L	<3.0	6.0	6.0	540

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Miscellaneous Inorganics	UNITS	105279-1	105279-2	105279-3	105279-4
Our Reference:	-----	SW2	SW4	SW10	RP3
Your Reference	-----	13/02/2014	13/02/2014	13/02/2014	13/02/2014
Date Sampled		Water	Water	Water	Water
Type of sample					
Date prepared	-	19/02/2014	19/02/2014	19/02/2014	19/02/2014
Date analysed	-	19/02/2014	19/02/2014	19/02/2014	19/02/2014
Chloride, Cl	mg/L	1	1	<1	3
Total Suspended Solids	mg/L	6	9	28	<5
Total Dissolved Solids (grav)	mg/L	30	20	60	670
Total Solids	mg/L	36	29	88	670
Bicarbonate Alkalinity as CaCO ₃	mg/L	10	8	8	6
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	10	8	8	6
Sulphate, SO ₄	mg/L	<1	3	3	550
Total Cyanide	mg/L	<0.004	<0.004	<0.004	<0.004
Dissolved Organic Carbon	mg/L	2	2	[NA]	[NA]
Total Organic Carbon	mg/L	3	2	[NA]	[NA]
Nitrate as N in water	mg/L	<0.005	0.020	[NA]	[NA]
Phosphate as P in water	mg/L	<0.005	<0.005	[NA]	[NA]

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Method ID	Methodology Summary
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 22nd ED, 4110-B.
Inorg-019	Suspended Solids - determined gravimetrically by filtration of the sample, in accordance with APHA 22nd ED, 2540-D. The samples are dried at 104 +/- 5oC.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180 +/- 5oC.
Inorg-041	Gravimetric determination of the total solids content of water using APHA 22nd ED 2540B.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA 22nd ED, 2320-B.
Inorg-013	Cyanide - total determined colourimetrically after distillation, based on APHA 22nd ED, 4500-CN_C,E. Free cyanide determined colourimetrically after filtration and confirmed by diffusion. Solids are extracted in a caustic media prior to distillation and analysis.
Inorg-079	TOC determined using a TOC analyser using the combustion method. DOC is filtered prior to determination. Analysis using APHA 22nd ED 5310B.
Inorg-055	Nitrate - determined colourimetrically based on EPA353.2 and APHA 22nd ED NO3- F. Soils are analysed following a water extraction.
Inorg-060	Phosphate determined colourimetrically based on EPA365. 1 and APHA 22nd ED 4500 P.E. Soils are analysed following a water extraction.

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QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
HM in water - total						Base Duplicate %RPD		
Date prepared	-			21/02/2014	105279-1	20/02/2014 20/02/2014	LCS-W1	21/02/2014
Date analysed	-			21/02/2014	105279-1	20/02/2014 20/02/2014	LCS-W1	21/02/2014
Aluminium-Total	µg/L	10	Metals-022 ICP-MS	<10	105279-1	190 190 RPD: 0	LCS-W1	108%
Cadmium-Total	µg/L	0.1	Metals-022 ICP-MS	<0.1	105279-1	<0.1 <0.1	LCS-W1	113%
Cobalt-Total	µg/L	1	Metals-022 ICP-MS	<1	105279-1	<1 <1	LCS-W1	108%
Chromium-Total	µg/L	1	Metals-022 ICP-MS	<1	105279-1	<1 <1	LCS-W1	103%
Copper-Total	µg/L	1	Metals-022 ICP-MS	<1	105279-1	<1 <1	LCS-W1	105%
Iron-Total	µg/L	10	Metals-022 ICP-MS	<10	105279-1	600 600 RPD: 0	LCS-W1	113%
Lead-Total	µg/L	1	Metals-022 ICP-MS	<1	105279-1	<1 <1	LCS-W1	106%
Manganese-Total	µg/L	5	Metals-022 ICP-MS	<5	105279-1	9 9 RPD: 0	LCS-W1	101%
Mercury-Total	µg/L	0.05	Metals-021 CV-AAS	<0.05	105279-1	<0.05 [N/T]	LCS-W1	108%
Nickel-Total	µg/L	1	Metals-022 ICP-MS	<1	105279-1	<1 <1	LCS-W1	102%
Zinc-Total	µg/L	1	Metals-022 ICP-MS	<1	105279-1	7 6 RPD: 15	LCS-W1	110%

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QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Waters - Acid extractable						Base II Duplicate II %RPD		
Date prepared	-			20/02/2014	105279-1	19/02/2014 19/02/2014	LCS-W1	19/02/2014
Date analysed	-			20/02/2014	105279-1	19/02/2014 19/02/2014	LCS-W1	19/02/2014
Magnesium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	105279-1	<0.5 <0.5	LCS-W1	98%
Calcium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	105279-1	<0.5 <0.5	LCS-W1	97%
Sodium - Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	105279-1	1.2 1.3 RPD: 8	LCS-W1	114%
QUALITY CONTROL						Base II Duplicate II %RPD		
HM in water - dissolved								
Date prepared	-			21/02/2014	105279-1	20/02/2014 20/02/2014	LCS-W2	21/02/2014
Date analysed	-			21/02/2014	105279-1	20/02/2014 20/02/2014	LCS-W2	21/02/2014
Aluminium-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	105279-1	55 59 RPD: 7	LCS-W2	99%
Cadmium-(0.45µm filtered)	µg/L	0.1	Metals-022 ICP-MS	<0.1	105279-1	<0.1 <0.1	LCS-W2	101%
Cobalt-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	105279-1	<1 <1	LCS-W2	101%
Chromium-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	105279-1	<1 <1	LCS-W2	101%
Copper-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	105279-1	<1 <1	LCS-W2	102%
Iron-(0.45µm filtered)	µg/L	10	Metals-022 ICP-MS	<10	105279-1	170 170 RPD: 0	LCS-W2	102%
Lead-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	105279-1	<1 <1	LCS-W2	101%
Manganese-(0.45µm filtered)	µg/L	5	Metals-022 ICP-MS	<5	105279-1	<5 <5	LCS-W2	92%
Mercury-(0.45µm filtered)	µg/L	0.05	Metals-021 CV-AAS	<0.05	105279-1	<0.05 [N/T]	LCS-W2	108%
Nickel-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	105279-1	<1 <1	LCS-W2	94%
Zinc-(0.45µm filtered)	µg/L	1	Metals-022 ICP-MS	<1	105279-1	<1 <1	LCS-W2	99%

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QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in Water - Dissolved						Base Duplicate %RPD		
Date digested	-			20/02/2014	[NT]	[NT]	LCS-W2	20/02/2014
Date analysed	-			20/02/2014	[NT]	[NT]	LCS-W2	20/02/2014
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W2	101%
Magnesium - (0.45µm filtered)	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W2	106%
Hardness	mgCaCO ₃ /L	3		3.0	[NT]	[NT]	[NR]	[NR]
QUALITY CONTROL								
Miscellaneous Inorganics						Base Duplicate %RPD		
Date prepared	-			19/02/2014	105279-1	19/02/2014 19/02/2014	LCS-W1	19/02/2014
Date analysed	-			19/02/2014	105279-1	19/02/2014 19/02/2014	LCS-W1	19/02/2014
Chloride, Cl	mg/L	1	Inorg-081	<1	105279-1	1 [N/T]	LCS-W1	96%
Total Suspended Solids	mg/L	5	Inorg-019	<5	105279-1	6 [N/T]	LCS-W1	95%
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	105279-1	30 [N/T]	LCS-W1	97%
Total Solids	mg/L	5	Inorg-041	<5	105279-1	36 [N/T]	LCS-W1	95%
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	105279-1	10 [N/T]	[NR]	[NR]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	105279-1	<5 [N/T]	[NR]	[NR]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	105279-1	<5 [N/T]	[NR]	[NR]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	105279-1	10 [N/T]	LCS-W1	104%
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	105279-1	<1 [N/T]	LCS-W1	101%
Total Cyanide	mg/L	0.004	Inorg-013	<0.004	105279-1	<0.004 <0.004	LCS-W1	107%
Dissolved Organic Carbon	mg/L	1	Inorg-079	<1	105279-1	2 [N/T]	LCS-W1	96%
Total Organic Carbon	mg/L	1	Inorg-079	<1	105279-1	3 [N/T]	LCS-W1	96%
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	105279-1	<0.005 [N/T]	LCS-W1	103%
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	105279-1	<0.005 [N/T]	LCS-W1	112%
QUALITY CONTROL								
HM in water - total	UNITS		Dup. Sm#	Duplicate		Spike Sm#	Spike % Recovery	
				Base + Duplicate + %RPD				
Date prepared	-		105279-3	20/02/2014 20/02/2014		105279-2	20/02/2014	
Date analysed	-		105279-3	20/02/2014 20/02/2014		105279-2	20/02/2014	
Aluminium-Total	µg/L		105279-3	190 [N/T]		105279-2	94%	
Cadmium-Total	µg/L		105279-3	0.2 [N/T]		105279-2	105%	
Cobalt-Total	µg/L		105279-3	2 [N/T]		105279-2	104%	
Chromium-Total	µg/L		105279-3	<1 [N/T]		105279-2	101%	
Copper-Total	µg/L		105279-3	11 [N/T]		105279-2	104%	
Iron-Total	µg/L		105279-3	560 [N/T]		105279-2	97%	

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QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
HM in water - total					
Lead-Total	µg/L	105279-3	< 1 [N/T]	105279-2	107%
Manganese-Total	µg/L	105279-3	36 [N/T]	105279-2	92%
Mercury-Total	µg/L	105279-3	<0.05 <0.05	[NR]	[NR]
Nickel-Total	µg/L	105279-3	2 [N/T]	105279-2	97%
Zinc-Total	µg/L	105279-3	38 [N/T]	105279-2	103%
QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Metals in Waters - Acid extractable					
Date prepared	-	[NT]	[NT]	105279-2	19/02/2014
Date analysed	-	[NT]	[NT]	105279-2	19/02/2014
Magnesium - Total	mg/L	[NT]	[NT]	105279-2	99%
Calcium - Total	mg/L	[NT]	[NT]	105279-2	96%
Sodium - Total	mg/L	[NT]	[NT]	105279-2	102%
QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
HM in water - dissolved					
Date prepared	-	105279-3	20/02/2014 20/02/2014	105279-4	21/02/2014
Date analysed	-	105279-3	20/02/2014 20/02/2014	105279-4	21/02/2014
Aluminium-(0.45µm filtered)	µg/L	105279-3	87 [N/T]	105279-4	99%
Cadmium-(0.45µm filtered)	µg/L	105279-3	0.1 [N/T]	105279-4	102%
Cobalt-(0.45µm filtered)	µg/L	105279-3	1 [N/T]	105279-4	101%
Chromium-(0.45µm filtered)	µg/L	105279-3	<1 [N/T]	105279-4	102%
Copper-(0.45µm filtered)	µg/L	105279-3	7 [N/T]	105279-4	100%
Iron-(0.45µm filtered)	µg/L	105279-3	150 [N/T]	105279-4	98%
Lead-(0.45µm filtered)	µg/L	105279-3	<1 [N/T]	105279-4	104%
Manganese-(0.45µm filtered)	µg/L	105279-3	25 [N/T]	105279-4	92%
Mercury-(0.45µm filtered)	µg/L	105279-3	<0.05 <0.05	[NR]	[NR]
Nickel-(0.45µm filtered)	µg/L	105279-3	2 [N/T]	105279-4	94%
Zinc-(0.45µm filtered)	µg/L	105279-3	30 [N/T]	105279-4	100%

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QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate	Spike Sm#	Spike % Recovery
Miscellaneous Inorganics			Base + Duplicate + %RPD		
Date prepared	-	[NT]	[NT]	105279-2	19/02/2014
Date analysed	-	[NT]	[NT]	105279-2	19/02/2014
Chloride, Cl	mg/L	[NT]	[NT]	[NR]	[NR]
Total Suspended Solids	mg/L	[NT]	[NT]	[NR]	[NR]
Total Dissolved Solids (grav)	mg/L	[NT]	[NT]	[NR]	[NR]
Total Solids	mg/L	[NT]	[NT]	[NR]	[NR]
Bicarbonate Alkalinity as CaCO ₃	mg/L	[NT]	[NT]	[NR]	[NR]
Carbonate Alkalinity as CaCO ₃	mg/L	[NT]	[NT]	[NR]	[NR]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	[NT]	[NT]	[NR]	[NR]
Total Alkalinity as CaCO ₃	mg/L	[NT]	[NT]	[NR]	[NR]
Sulphate, SO ₄	mg/L	[NT]	[NT]	[NR]	[NR]
Total Cyanide	mg/L	[NT]	[NT]	105279-2	102%
Dissolved Organic Carbon	mg/L	[NT]	[NT]	[NR]	[NR]
Total Organic Carbon	mg/L	[NT]	[NT]	[NR]	[NR]
Nitrate as N in water	mg/L	[NT]	[NT]	[NR]	[NR]
Phosphate as P in water	mg/L	[NT]	[NT]	[NR]	[NR]
QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate	Spike Sm#	Spike % Recovery
HM in water - dissolved			Base + Duplicate + %RPD		
Date prepared	-	[NT]	[NT]	105279-4	20/02/2014
Date analysed	-	[NT]	[NT]	105279-4	20/02/2014
Aluminium-(0.45µm filtered)	µg/L	[NT]	[NT]	[NR]	[NR]
Cadmium-(0.45µm filtered)	µg/L	[NT]	[NT]	[NR]	[NR]
Cobalt-(0.45µm filtered)	µg/L	[NT]	[NT]	[NR]	[NR]
Chromium-(0.45µm filtered)	µg/L	[NT]	[NT]	[NR]	[NR]
Copper-(0.45µm filtered)	µg/L	[NT]	[NT]	[NR]	[NR]
Iron-(0.45µm filtered)	µg/L	[NT]	[NT]	[NR]	[NR]
Lead-(0.45µm filtered)	µg/L	[NT]	[NT]	[NR]	[NR]
Manganese-(0.45µm filtered)	µg/L	[NT]	[NT]	[NR]	[NR]
Mercury-(0.45µm filtered)	µg/L	[NT]	[NT]	105279-4	112%
Nickel-(0.45µm filtered)	µg/L	[NT]	[NT]	[NR]	[NR]
Zinc-(0.45µm filtered)	µg/L	[NT]	[NT]	[NR]	[NR]

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Report Comments:

Asbestos ID was analysed by Approved Identifier: Not applicable for this job
Asbestos ID was authorised by Approved Signatory: Not applicable for this job

INS: Insufficient sample for this test PQL: Practical Quantitation Limit NT: Not tested
NA: Test not required RPD: Relative Percent Difference NA: Test not required
<: Less than >: Greater than LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

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