Transitional Environmental Program
Mount Veteran Mill
October 2014

Report No:	MGT14.02.02_08
Prepared for:	MGT Mining Ltd
Prepared by:	Biotropica Australia Pty Ltd

BIOTROPICA AUSTRALIA PTY LTD

This page has intentionally been left blank

DOCUMENT CONTROL SUMMARY

REPORT AND CLIENT DETAILS

Title:	Transitional Environmental Program – Mt Veteran Mill
Client:	MGT Mining Ltd
Client Contact:	Gary Kuo
Status:	Draft for Comment
Project Manager:	Sarah Holt
Author/s:	Sarah Holt

REVISION/QUALITY ASSURANCE								
REVISION NUMBER	*DATE*	*CHECKED BY*		*ISSUED BY*		*DISTRIBUTION – NO. OF COPIES*		
						Client	*Other*	*Biotropica Library*
1	*19/08/2014*	*NT*	✓	*SH*	✓	*1*	*0*	*1*
2	*8/10/2014*	*NT*	✓	*SH*	✓	*1*	*0*	*1*
3	*21/10/2014*	*NT*	✓	*SH*	✓	*1*	*0*	*1*

BIOTROPICA AUSTRALIA PTY LTD

BIOTROPICA Australia Pty Ltd
PO Box 866
MALANDA QLD 4885
Telephone: (07) 4095 1116
Facsimile: (07) 4095 1296
Email: info@biotropica.com.au
Web: www.biotropica.com.au

Table of Contents

List of Tables

List of Figures

This page has intentionally been left blank

SUMMARY

Principal holder:	MGT Mining Ltd 2.05B/68 York Street Sydney NSW 2000
ABN:	38 131 715 645
Title:	Transitional Environmental Program – Mount Veteran Mill
Date:	October 2014
Reason for TEP:	Section 330(c): Comply with a condition of an environmental authority
Site details:	ML4349 & ML20547
End date for TEP:	1st December 2014

1.0 BACKGROUND

The Mount Veteran Mill site is owned and operated by MGT Mining Ltd (a wholly owned subsidiary of MGT Resources Pty Ltd) and encompasses Mining Leases ML20547 and ML4349. The site is located approximately 12km north-east of Mount Garnet and in the upper reaches of the Herbert River catchment on the undulating metamorphic hills of the Hodgkinson Formation. The vegetation generally consists of open sclerophyll woodlands.

The history of mining in the study area extends over approximately 120 years with 56 historic mining leases recorded by the Queensland Mines Department. Tin has been the primary target although copper and lead ores have also been mined. Almost the entire project area has been subject to historic disturbance including dredging in major valleys and the use of mobile plants to extract tin from hill slopes and gullies. There are also a few small underground workings. There appear to have been three major periods of mining activity; extending from 1898 to around 1910, from around 1930 to 1940, and from the mid- 1960's through until around 1980. There has been little or no active rehabilitation of the mined areas, and disturbance from the more recent period of activity remains visible (Landline Consulting 2013).

The Mount Veteran Mill site was constructed in the early 1980's and was used to treat approximately 28,000mt of hard rock ore from the Viking prospect which falls within ML20547 (Summer Hills). The operation lasted no more than 2 years and finished in 1985. MGT Mining Ltd (formerly Xtreme Ltd) purchased the Mount Veteran Mill site in April 2009. There has been no processing undertaken at the Mount Veteran Mill site since it was purchased in 2009, with the exception of some tailings material use to commission the mill during its refurbishment process in late 2011. Since 2012 the mill has been in care and maintenance mode until the current date.

An Environmental Authority (EA) reference EPVL00864413 as amended on 21 February 2014 is currently in effect at the site.

2.0 INTRODUCTION

Representatives from the Department of Environment and Heritage Protection (EHP) attended the Mount Veteran site on 30th October 2013 and reported seepage from the downstream wall of the Tailings Storage Facility (TSF). The post inspection letter stated that: "During the inspection of the downstream wall of the TSF on ML4349 and ML20547, seepage waters were observed across a widespread area along the length of the toe of the downstream TSF wall. This seepage was observed to congregate at a ponded area at the southern end of the downstream wall, and flow from this point into the tributary of Return Creek, referred to as 'Males Creek'. The occurrence of reed beds at the ponded area would indicate that this seepage has occurred for some time" (refer Appendix A).

Since the time of the inspection by EHP, an amended surface water sample collection regime has been implemented on site with daily or weekly (dependent on flow level) samples collected since November 2013 (with the exception of the Christmas 2013 period); at seven representative sampling locations as agreed with EHP (refer Appendix B).

Tropical Cyclone Ita passed across the far north Queensland coast on 11th April 2014 as a Category 4 cyclone. The cyclone moved through the inland North Tropical Coast district before passing back across the coast further south (BOM, 2014). This cyclone brought significant rainfall with 155mm recorded on the Mount Veteran site over 4 days between 13th and 16th April. This volume of rain caused the tailings dam to overflow at the release point SW1, and a corresponding uncontrolled release into the receiving environment.

MGT Mining representatives informed EHP in writing of an 'uncontrolled release' from the mine on 14th April 2014. An uncontrolled release is discharge from the Tailings Storage Facility (TSF) via a spillway (SW1), in an unregulated manner. This means that flow cannot be stopped manually and flow only ceases when the freeboard within the TSF is greater than 0 metres. It was considered that this incident may result in the release of contaminants not in accordance with the conditions of the EA. EHP inspected site during the uncontrolled release and issued a post-inspection letter on 1st August stating that the site was found to be non-compliant with the terms of the EA (refer Appendix C).

Uncontrolled releases from the TSF as a result of Cyclone Ita continued from 13th April to 5th May 2014 (inclusive). The uncontrolled release from the TSF as a result of seepage from the dam wall is ongoing.

3.0 OBJECTIVES

This objective of this voluntary Transitional Environmental Program (TEP) is to return the Mount Veteran Mill site to compliance with the water quality conditions as set out in Schedule B of the EA. Table 1 summarises the conditions of the EA that are currently not complied with at the Mount Veteran site. The works will be completed, and the mine will be compliant with the site EA on 1st December 2014.

Table 1: Non-compliance of Mount Veteran site with site EA

EA condition	Nature of non-compliance	Description of transition	Completion date
B1 – Contaminants that will, or have the potential to cause environmental harm, must not be released directly or indirectly to any waters except as permitted under the conditions of this EA.	Contaminants that have the potential to cause environmental harm have been released into the receiving environment waters during the uncontrolled release (14/4/2014-5/5/2014) and as a result of the ongoing seepage from the TSF on site.	The TSF will be sealed to stop the uncontrolled release at the seepage location. If the sealer fails then a catch drain and water return system will be constructed to contain the seepage. The freshwater dam (FWD) will be sealed to stop the inflow into the Mill Pond. The water in the Mill Pond will be pumped into FWD. The dam wall between the Mill Pond and the TSF will be sealed. Water from the TSF will be pumped into the Mill Pond causing a decrease of the water level in the TSF to an acceptable level. Although the water in the TSF is likely to still contain water with contaminants over the release limits in the EA, this water will no longer be at risk of release.	1st December or forecast of first rains (whichever is sooner)
B2 – Unless otherwise permitted under the conditions of this EA, the release of contaminants to waters must only occur from the release point specified in Schedule B – Table 1 (Release Point) and Schedule E – Figure 1 (Water Sampling Locations).	Contaminants have been released from the TSF to receiving waters at the seepage location.	The TSF will be sealed to stop the uncontrolled release at the seepage location. If the sealer fails then a catch drain and water return system will be constructed to contain the seepage. Water will be temporarily released from the Mill Pond for approximately 2 weeks during the TEP timeframe.	1st December or forecast of first rains (whichever is sooner)
B4 – The release of contaminants to waters in accordance with condition B2	Contaminants have been and continue to be released to waters at the seepage	The TSF will be sealed to stop the uncontrolled release at the seepage location.	1st December or forecast of first

must only take place during periods of natural flow events at the release point specified in Schedule B – Table 1 (Release Point).	location during periods of no flow in the receiving environment.	If the sealer fails then a catch drain and water return system will be constructed to contain the seepage. The release of water from the Mill Pond to the upstream dam will not cause a release of waters into the receiving environment. There is currently no flow in the receiving environment on site.	rains (whichever is sooner)
B5 – The release of contaminants to waters must not exceed the contaminant limits stated in Schedule B - Table 2 – Release limits.	Contaminants that exceed the contaminant limits in Table 2 of the EA have been released to the receiving environment during the uncontrolled release (14/4/2014 – 5/5/2014) and as a result of the ongoing seepage from the TSF on site	The TSF will be sealed to stop the uncontrolled release at the seepage location. If the sealer fails then a catch drain and water return system will be constructed to contain the seepage. The water released from the Mill Pond to the upstream dam will slightly exceed the release limit for pH (see below). No other contaminants in the released water will exceed contaminant limits in Schedule B – Table 2. Although the water in the TSF is likely to still contain water with contaminants over the release limits in the EA, this water will no longer be at risk of release.	1st December or forecast of first rains (whichever is sooner)
B7 – The release of contaminants directly or indirectly to waters must not: - Produce any visible discolouration of receiving waters; or - Produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.	The release of contaminants at the seepage location has produced visible discolouration of receiving waters and a scum on the water at the release point.	The TSF will be sealed to stop the uncontrolled release at the seepage location. If the sealer fails then a catch drain and water return system will be constructed to contain the seepage. The release of water from the Mill Pond into the upstream dam will not create any of the listed issues.	1st December or forecast of first rains (whichever is sooner)

4.0 ACTIONS REQUIRED

4.1 Sealing the TSF

At the time of writing, water is currently seeping into the TSF from an upstream freshwater dam (FWD) via the Mill Pond (refer Figure 1) through one or more small leaks in the dividing dam walls. Water is also currently seeping out of the TSF and into the receiving environment along the toe of the downhill TSF dam wall. The exact location of the seepage(s) is not known as they are beneath the water level. Twenty-one tonnes of Bentonite was cast into the TSF on 18th December 2013 in an attempt to arrest the seepage. This was partially successful and the seepage rate from the TSF showed a reduction in volume. However after the high volume rain event related to TC Ita in April 2014, the volume of the seepage appears to have increased to approximately the original flow rate.

A v-notch weir was installed at the culvert on the main access road into the site in September 2014. All water that is leaking from the TSF dam wall collects in a small (approximately 0.7ha) low lying area downstream from the TSF (refer Appendix D). The topography of this area channels all water through the culvert under the site access road and into the receiving environment of the diverted Males Gully. As there has been no rainfall on the MGT Mining site since 16th August 2014 (BOM, 2014a), it is likely that all flow through the culvert (and v-notch weir) as at September 2014 is a result of seepage from the TSF. Figure 1 shows that the flow through the weir at the culvert as at 15th September 2014 is 3.2mm which equates to 0.25L/s or 15L/min.

Figure 1: V-notch weir

MGT Mining Ltd are currently applying a second sealer known as “Water$ave Plug & Seepage” from Polymer Innovations to permanently seal both the upper and lower dam walls of the TSF. A long reach excavator has been used to clean and scrape the vegetation from the inside of both dam walls to enable the polymer to efficiently reach and seal the dam walls. The product is broadcast onto the surface of the water whereby the flow and pressure of the water will move the product onto the dam wall where it expands to fill any gaps.

It is anticipated that the seepage from the toe of the TSF dam wall should stop within 7 days of application of the product. Due to the history of discharge into the area between the TSF and the site access road, it has developed a wet microhabitat with areas of swamp, marsh and accompanying wetland vegetation (refer Appendix D). Once the seepage from the TSF is reduced to zero, the swamp area will continue to drain through the culvert under the access road for some time, therefore flow is likely to continue through the V-notch weir after the seepage has been stopped. The exact time taken for the flow to the receiving environment (and at the v-notch weir) to be zero is dependent on many unknown factors including the volume of water in the seepage area, the porosity of the ground, rainfall, evaporation and pressure gradient. Due to these unknown quantities, it is not feasible to produce a flow curve showing a required decrease in flow over time. However, it is considered likely that if the application of the sealant is successful, the flow at the v-notch weir will decrease by at least 50% within 2 weeks of the application of the polymer, and continue to reduce at a decreasing rate over the following weeks. A second targeted round of application is to be undertaken on the FWD on 9th October 2014 to address any remaining areas of seepage and a similar second round may be completed on the TSF dependent on the rate of cessation of the seepage.

MGT Mining Ltd commissioned a review of the toxicity tests of the proposed polymer product (Appendix E) to evaluate the risk of any environmental harm caused by releasing the polymer into the dam system. The review concluded that based on the chemical and geochemical review of the polymer properties, toxicological information, quantities of polymer to be used, and the volume of tailings water within the dams, the polymer is highly insoluble in water and as such is unlikely to be carried as a dissolved phase. Hazardous decomposition products from degradation of the polymer are unlikely to occur in the dam to which it will be applied. If decomposition products do result from unusual conditions, it is unlikely to be present at significant concentrations to cause environmental concern (CDM Smith, 2014).

The FWD is excised from the MGT Mining Lease and is owned by a private individual. Permission has been granted by the owner of the FWD to allow the polymer to be cast into the water of the FWD in an attempt to stop the seepage into the Mill Pond and TSF (refer Appendix F).

Should the sealer fail to stop the seepage from the TSF (as shown by monitoring methods discussed in Section 6), a second and concurrent approach will be undertaken. This will consist of earthworks to construct an earthen catch drain downstream of the seepage point. To ensure that all seepage is captured, whilst minimising the rainwater catchment, the location of this earthen dam wall is as close to the TSF downstream dam wall as is practicable, an indicative location only is shown in Appendix D. The exact location of the catch drain cannot be finalised at this time as the ground is too wet for vehicular access due to the seepage.

The catch drain will direct the water seepage from the TSF to a collection point where it will be contained and then pumped back to the TSF. The required pump and pipes for this are readily available on site and have the capacity and power required to pump the seepage back upstream into the TSF.

Should the TSF reach 95% capacity, the water in the Mill Pond will be tested and if compliant, will be pumped into the FWD, which once complete will allow water from the TSF to be pumped into the Mill Pond. It will be essential that the flow of water into the Mill Pond / TSF from the FWD is stabilised otherwise the system will fail to contain the increasing water flowing into it from the upstream environment.

4.2 Reduction of water level in TSF

4.2.1 Volume calculations

The TSF is currently storing approximately 105-110% of its design capacity and there is no freeboard. The water level in the TSF means that the water currently lies approximately half way down the spill way. In the event of a significant rain event, the additional water into to the TSF would cause an uncontrolled release. This would lead to the release of non-compliant water to the receiving environment in contravention of the site EA. To prevent such an uncontrolled release from the TSF, it is necessary to reduce the standing water level before the 2014/2015 wet season.

The current surface area of the TSF is 1.72ha and the Mill Pond is 0.59ha as estimated from aerial mapping. Historical plans and a site survey shows that the average depth of water in the TSF is approximately 3.4m with a range between 1.2m depth (on edges) to 6.5m (refer Table 2 and Figure 2). Using this data the average depth of the TSF is 3.4m and the approximate volume of the TSF is 58ML. The maximum recoverable volume of the Mill Pond is approximately 15ML, whilst the estimated volume of the FWD is approximately 173ML.

Table 2: Sample location and depth for TSF

Sample Number	MGA North	MGA East	Depth of water (m)
TD01	8055425	304159	3
TD02	8055427	304179	5
TD03	8055426	304201	4
TD04	8055427	304221	2
TD05	8055394	304108	2
TD06	8055391	304133	6.5
TD07	8055395	304157	6
TD08	8055394	304176	2
TD09	8055392	304194	4
TD10	8055391	304217	4
TD11	8055392	304237	Not recorded
TD12	8055356	304101	1.2
TD13	8055356	304119	5
TD14	8055345	304141	3
TD15	8055357	304165	3
TD16	8055357	304196	5
TD17	8055355	304225	2
TD18	8055318	304099	2
TD19	8055318	304119	4
TD20	8055320	304139	3
TD21	8055321	304155	3
TD22	8055320	304186	2

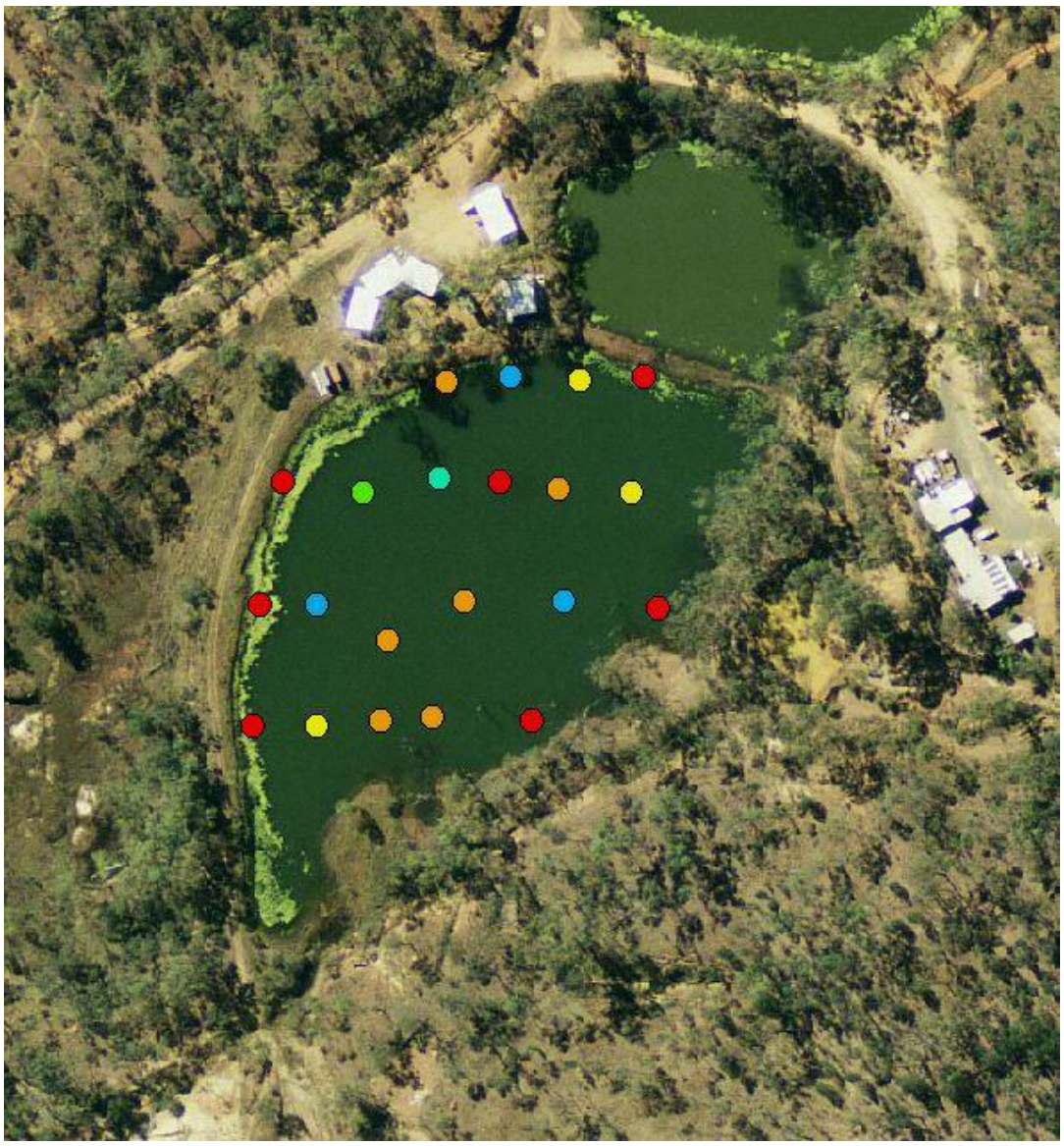


Figure 2: TSF depth record locations

Key: Red: 1-2m, Orange: 2.1 – 3m, Yellow: 3.1-4m, Blue: 4.1-5m, Aqua: 5.1-6m, Green: 6m+

A hazard category assessment of the TSF was undertaken by Fraser Osborn in 2013. It concluded TSF structure is not considered a regulated structure. The dam is therefore not subject to the water level requirements associated with regulated structures. However based on the catchment area (estimated to be 4.2ha), the design storage allowance for the dam requires the dam water level to be lowered 1.29m. For the extreme storage allowance the dam water level needs to be lowered by an additional 0.46m and the freeboard (height from water surface to spillway level) should be a minimum of 0.25m. Altogether there is a requirement to reduce the level of the water in the TSF by approximately 2m (34,400m^3 or 34.4ML).

If the entire volume of the Mill Pond (15ML) is pumped into the FWD (assuming negligible flow from the TSF upstream into the Mill Pond), this would raise the water level in the FWD by approximately 0.26m. Given the current water level in the FWD and assuming that there is no rain received on site until at 1st November at the earliest, this would not cause the FWD to overflow.

The earthen wall dividing the Mill Pond from the TSF currently allows water to flow between these dams through a large pipe. The wall is also leaking in a number of locations. To ensure that the TSF and Mill Pond water does not mix, the pipe linking the two dams has been capped (completed 7th October 2014), and repairs

undertaken to ensure the wall is impermeable to water. A bund will be placed in the Mill Pond to minimise the impact on the turbidity of the water in this dam and works will preferentially be undertaken on the TSF side of the dam wall. However, it is possible that the repairs will temporarily increase the turbidity of the water within the Mill Pond. Section B Table 2 of the EA shows that waters released into the receiving environment (in this case being pumped from the Mill Pond to the FWD) must not exceed a turbidity of 15NTU (Nephelometric Turbidity Unit). Hence on-site water quality testing will be undertaken to ensure that the turbidity of the water in the Mill Pond is below 15NTU before the start of the pumping process.

4.2.2 Chemical Receiving Environment

Samples and chemical analysis has been undertaken on the water in the Mill Pond. Testing has shown that the water is compliant with the discharge requirements in the site EA (refer Table 3)

Table 3: Mill Pond water quality results

Parameter	Contaminant Limit	Mill Pond Result			
pH (pH units)	6.0-7.5	8.0	8.0	8.0	8.0
EC(µs/cm)	435	250	240	240	240
Turbidity (NTU)	15	2.5	2.5	2.2	2.8
Sulfate (mg/L)	770	0.5	0.5	0.5	0.5
Aluminium (mg/L)	0.055	0.005	0.005	0.005	0.005
Arsenic (mg/L)	0.013	0.005	0.005	0.005	0.005
Cadmium (mg/L)	0.0002	0.0001	0.0001	0.0001	0.0001
Chromium (mg/L)	0.001	0.001	0.001	0.001	0.001
Cobalt (mg/L)	0.0028	0.001	0.001	0.001	0.001
Copper (mg/L)	0.0014	0.001	0.001	0.001	0.001
Fluoride (mg/L)	2	0.84	0.84	0.84	0.84
Lead (mg/L)	0.0034	0.001	0.001	0.001	0.001
Manganese (mg/L)	1.9	0.005	0.005	0.005	0.012
Mercury (inorganic) (mg/L)	0.0006	0.00005	0.00005	0.00005	0.00005
Nickel (mg/L)	0.011	0.001	0.001	0.001	0.001
Selenium (mg/L)	0.011	0.003	0.003	0.003	0.003
Silver (mg/L)	0.00005	0.00005	0.00005	0.00005	0.00005
Zinc (mg/L)	0.008	0.005	0.005	0.005	0.005

Table 3 shows that the water in the Mill Pond is compliant with the release limits set out in the site EA with the exception of pH. The Mill Pond pH is 8 and the upper limit in the EA is 7.5.

Most natural freshwaters have a pH in the range of 6.5-8.0 (ANZECC 2000). It is recognised that changes to pH may affect the physiological functioning (e.g. enzymes, membrane processes) of biota. However reviews of the effects of pH changes on freshwater biota indicate no acutely lethal effects to fish in the pH range 5 to 9 (Alabaster & Lloyd 1982, CCREM 1991).

The pH range given within the ANZECC guidelines for tropical Queensland's upland rivers is 6.4 – 7.3. However this is based on samples taken from perennial pristine rainforest streams in the Wet Tropics (ANZECC 2000). This data is not appropriate in determining values for a highly ephemeral drainage system in a monsoon savannah ecosystem. Almost all water quality guidelines around the world (e.g. (ANZECC 1992, CCREM 1991, Alabaster & Lloyd 1982, USEPA 1986) recommend that pH should be maintained in the range 6.5 to 9.0 to protect freshwater aquatic organisms.

Based on these guidelines, the upper limit of the pH range given within the EA is a conservative figure and a literature review (i.e., ANZECC 1992, CCREM 1991, Alabaster & Lloyd 1982, USEPA 1986) suggests that records of pH lower than 9.0 should have no impact on the freshwater aquatic organisms.

The proposal is to pump approximately 15ML of water with pH 8.0 into the FWD that has a volume of approximately 173.3ML. The dilution effect (approximately 11.5:1) of the much larger mass of water is likely to ensure that there is no fluctuation of pH in the FWD water.

It is concluded that there is negligible risk of environmental harm that may be caused by the release of pH 8.0 water from the Mill Pond into the FWD and receiving environment for this limited period of time.

To further minimise the potential for environmental harm as a result of the water moving from the Mill Pond to the FWD, water quality samples will be taken from the FWD every second day whilst the pumping is occurring. Should any of the samples show a significant increase in water pH, the pumping regime will be halted whilst an investigation is completed.

5.0 TIMEFRAME

The proposed schedule of works to occur on the site is set out below.

MGT - TSF Works program dates

	October																													November															
	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Scraping of FWD & TSF wall																																															
Application of sealer on FWD																																															
Complete scraping TSF dam wall																																															
Earthworks on Mill Pond - TSF dividing wall																																															
TEP approval received																																															
Mill Pond water sample x 2 TEP**																																															
Pumping Mill Pond - FWD**																																															
Application of sealer on TSF dam wall *																																															
Flow at V-notch wier to be 50% reduced																																															
Earthworks on receiving environment																																															
Pump TSF - Mill Pond																																															

* Subject to weather and staff availability

** Subject to DEHP approval and time of day. Latest approval time is 10:00am to allow sufficient time to get samples to lab. Otherwise samples will be collected on the Monday with 24hr turnaround required.

The schedule shows that it is not possible to complete all of the required works by the official commencement of the 2014/2015 wet season (1st November), however all works will be completed by 11th November 2014. By 1st November the seepage into the TSF and into the receiving environment will have reduced by at least 50% due to the application of the sealant to both dam walls. Should this have failed then the water seeping from the dam wall will be caught within the new catch drain and pumped back into the TSF by 11th November 2014.

Should the seepage have reduced by at least 50% by 2 weeks after the application of the sealer to the TSF dam wall, monitoring of the flow rate at the v-notch weir will continue. Should the rate of flow at the weir fail to continue falling, and/or the flow does not cease before 1st December or the first rain of the wet season is forecast, the new catch drain and water return system will be constructed.

6.0 MONITORING

Monitoring will be undertaken during the proposed works to ensure that the water quality in the chain of dams is not negatively affected. Water will be contained within the Mill Pond and the TSF unless it can be shown that it meets the water quality standards set out in Schedule B Table 1 of the EA.

Prior to pumping the water from the Mill Pond to the FWD, two water samples will be taken from the Mill Pond and analysed in a NATA accredited laboratory. If these samples show that the water quality is within the parameters defined in Schedule 8 Table 1 (with the exception of pH) then pumping of the water into the FWD may commence. As discussed in Section 4.2.2 water of pH no greater than 8 will also be discharged.

During the time that water is being pumped from the Mill Pond into the FWD, water samples will be taken once a week from SW6 (refer Appendix D). These samples will be sent to a NATA accredited laboratory for analysis of all contaminants listed in Schedule B Table 1 of the EA. Additionally, on-site water testing will be undertaken daily within the Mill Pond. This testing will use a portable water quality testing machine to measure pH, EC and Turbidity. Should any of these tests return a result for any contaminant that is outside of the parameters shown in Schedule B Table 1 of the EA, the pumping of water between the Mill Pond and the FWD will be stopped immediately and EHP will be informed within 24 hours. Pumping will not resume until the issue is resolved.

A short compliance report including the results of all tests undertaken immediately prior to and during the pumping will be sent to EHP within 2 weeks of the completion of works.

Monitoring will also be undertaken to measure the reduction and cessation of flow from the TSF into the receiving environment. To monitor this flow, the level of water at the v-notch weir located at the culvert under the site access road (Appendix D) will be measured and a photographic record updated on a daily basis for the 2 weeks after the sealer has been applied to the TSF dam wall. These results will be compiled and sent to a representative of EHP.

If the flow at the v-notch weir shows a >50% reduction in flow 2 weeks after the sealant is applied, the catch drain and water return system will not be constructed and monitoring will continue at the v-notch weir. If monitoring shows that the flow at the v-notch weir ceases before 1st December or the first wet season rain is forecast (whichever is sooner) then the catch drain and water return system will not be constructed. In this scenario, standard monitoring will continue across the site including at surface water monitoring point SW8 adjacent to the v-notch weir.

Should the flow at the v-notch weir not reach zero before 1st December or the first wet season rain is forecast, the catch drain and water return system will be constructed. Once the catch drain is constructed, any remaining seepage from the TSF will be returned to the TSF. Therefore from this time the monitoring of any

seepage from the TSF will be completed by recording the flow rate of the water pumped back to the TSF. Once the wet season commences, no further monitoring of the seepage will be possible as the rainfall events will disrupt any potential monitoring. In this scenario, monitoring of the seepage would recommence during the 2015 dry season.

7.0 PERFORMANCE INDICATORS

The performance indicators for the TEP are shown in Table 4.

Table 4: Performance Indicators

Performance Indicator	Measure	Timeframe
>50% reduction of flow from TSF at v-notch	Flow across v-notch weir	2 weeks post sealing of TSF downstream dam wall
Zero flow at v-notch weir	Flow across v-notch weir	Before first wet season rains are forecast
No uncontrolled flow from the TSF into the receiving environment	Cessation of flow due to sealing dam; or creation of catch drain and water return system downstream of TSF.	11th November 2014
No release of water with contaminant levels outside of parameters into the receiving environment	Water quality testing	Duration of TEP

8.0 SUMMARY

Table 5 shows a summary list of actions to be completed under this TEP.

Objective	Action	Action Description	Performance Indicator	Target Date of Completion
Seal the FWD with polymer to stop inflow from FWD to TSF	1.Obtain permission from landowner	Request written permission from landowner of FWD to allow MGT Mining to pump water from the Mill Pond into the FWD	Written permission obtained (refer Appendix F)	Completed.
	2. Complete toxicity testing	An investigation and report on the potential toxicity of the sealant polymer was undertaken by CDM Smith. The report concluded that the polymer is highly insoluble in water and as such is unlikely to be carried as a dissolved phase. Hazardous decomposition products from degradation of the polymer are unlikely to occur in the dam to which it will be applied. If decomposition products do result from unusual conditions, it is unlikely to be present at significant concentrations to cause environmental concern.	Written report from expert (refer Appendix E)	Completed
	3.Obtain permission from EHP to spread polymer	Dannielle Tela, a representative of EHP, confirmed in writing that EHP had no objection to the commencement of spread of the polymer in the FWD and TSF.	Written permission obtained	Completed
	4. Spread polymer in FWD	The polymer was spread onto the surface of the water of the FWD by hand from a boat in October 2014. The movement of the water drew the polymer into the dam wall and expanded, effectively sealing any cracks through which water had been seeping.	Polymer spread into FWD	Completed
	5. Evaluation and further targeted application of polymer	The water level in the Mill Pond (the receiving dam for the leak from the FWD) decreased after the application of the polymer. Areas of the dam wall that had green vegetation are drying out and dying off. A second targeted round of sealant was applied using the same method and concentrating on the areas of the dam wall that still had green vegetation.	Reduction in water level in FWD	Completed
Undertake earthworks to make the dam wall between the Mill Pond and the TSF impermeable.	1. Seal pipe between Mill Pond and TSF.	Pipe was manually capped.	Visual	Completed
	2. Earthworks to	Earthworks undertaken to ensure no flow between the Mill Pond and the TSF.	Visual	Completed

	improve impermeability of dam wall			
Seal the TSF dam wall to stop the seepage into the receiving environment.	1. Install v-notch weir downstream to measure rate of seepage.	V-notch weir installed downstream of the TSF and the immediate wet receiving environment (refer Appendix D). All seepage from the broad toe of the TSF collects from the wet area and passes through the culvert under the main entrance road to the Mt Veteran Mill site. The flow at this point is considered representative of the seepage flow rate	V-notch weir installed and flow rates recorded daily.	Installation completed, flow rate records ongoing.
	2. Broadcast sealant into TSF	The polymer is being spread onto the surface of the water of the TSF by hand from a boat in October 2014. The movement of the water will draw the polymer into the dam wall and expand, effectively sealing any cracks through which water had been seeping.	Rate of flow at v-notch weir	16-26 October (weather dependent)
	3. Evaluation and further targeted application of polymer if required.	The rate of flow at the v-notch weir will be representative of the flow from the toe of the TSF dam wall together with the indirect effects of the pooling of water in the wet area between the dam wall and the v-notch weir. After the polymer is applied, the rate of flow at the v-notch weir is expected to decrease. Visual analysis of vegetation growth patterns on the downstream dam wall will assist in establishing areas that may require a second round of polymer application.	Rate of flow at v-notch weir and visual records of vegetation growth patterns	31st October
Empty water from Mill Pond	1. Water quality testing on Mill Pond water	Two water samples will be taken from the Mill Pond and tested in a NATA accredited laboratory immediately before pumping of the water will begin. The results will be compared against the contaminant limits for released water in the EA Schedule B.	All water samples will return contaminant levels within release limits (with the exception of pH which must be pH8 or less).	Immediately on approval of TEP – estimated 24th October
	2. Pump water from Mill Pond to FWD	Water will be pumped from the Mill Pond to the FWD over the dam wall using a series of pipes with pumps. Pumping will continue until the water fails to comply with contaminant release limits or the Mill Pond is empty (whichever is sooner). This is expected to take approximately 2 weeks.	Visual	Immediately water results returned – estimated 27th October
Transfer water from TSF to Mill Pond	1. Release water from TSF into Mill Pond	The pipe between the TSF and the Mill Pond will be uncapped, allowing the water to flow from the TSF to the Mill Pond and the levels in both dams to stabilise. A siphon hose or a pump will be used to complete the transfer of water to the Mill Pond from the TSF. This process is expected to take approximately 1 day.	Water levels stabilise between TSF and Mill Pond	Estimated 10th November

Catch Drain and water return system	1. Design and location	The exact location of the catch drain will be dependent on the ground conditions encountered during construction, however it will be located as close as possible to the downstream toe of the TSF dam wall to minimise the runoff during the wet season. The catch drain will direct the water to a ponding area where the water will be collected and then pumped back upstream into the TSF.	Any changes to the location of the catch drain will be reported to EHP before construction is finalised.	Estimated 11th November
	2. Construction	Fitzgerald's Earthworks Contractors have been engaged to undertake the construction of the catch drain. They are able to mobilise to site to undertake works with 2-3 days' notice.	Construction of catch drain to design specifications	Estimated 11th November
Water Quality Monitoring	1. Water quality before pumping from Mill Pond to FWD	Two water samples from the Mill Pond will be tested before the water is pumped into the FWD.	Water will not be transferred to the FWD unless it is compliant with the EA specified release limits (with the exception of pH that may be pH 8 or less).	Sampled 24th October, results received 27th October
	2. Water quality whilst pumping between Mill Pond and FWD.	Water samples undertaken at SW6 on a weekly basis during pumping and analysed at a NATA accredited laboratory for all contaminants recognised in the site EA Water testing of pH, EC and turbidity to be undertaken on a daily basis using a portable water meter. Should any water samples return contaminants outside of the release limits in Schedule B of the site EA, pumping will cease immediately and the result would be reported to EHP within 24 hours.	Pumping will stop if any results show contaminant limits that breach the release limits in the site EA (with the exception of pH that may be pH 8 or less).	Completion of pumping – estimated 11th November
	3. Report of water quality results	The results of the water quality testing at the Mill Pond and the FWD will be presented in a short report within 2 weeks of the completion of the exercise	Water quality report to be presented within 2 weeks or completion	Within 2 weeks of completion
Seepage Monitoring	Flow monitoring	The rate of seepage from the TSF will be monitored using the v-notch weir at the culvert under the main access road. Photographs of the v-notch weir will be	>50% reduction in flow at v-notch weir	2 weeks after sealant is

		taken for 2 weeks after the polymer has been applied. A photographic log and report will be provided to EHP after 2 weeks.	within 2 weeks of application of sealer to TSF dam wall.	applied to downstream TSF wall – estimated 10th November
Monthly reporting	1. A monitoring report will be submitted to EHP on a monthly basis from the time of approval of the TEP	The monthly monitoring report will provide reports on the carrying out of the actions, whether or not the objectives are being achieved, the required timeframes are being met, and progress of the implementation of the TEP	Monthly progress report submitted to EHP	Monthly from approval of the TEP
Close out report	1. A close out report will be submitted to EHP at the end of the TEP period.	The close out report will provide the outcome of the actions undertaken and assess if the objectives of the TEP have been achieved.	Report provided to EHP	1 month post completion of works – estimated mid-December
	Ongoing monitoring	Any seepage will be recorded at the v-notch weir on a weekly basis. Water levels in the TSF and in the Mill Pond will be monitored on an ongoing basis using a permanent depth stick.	An increase in water depth for any reason except for rainfall will be reported to EHP	Ongoing

9.0 REFERENCES

ANZECC (1992). *Australian water quality guidelines for fresh and marine waters*. Australian and New Zealand Environment and Conservation Council, Canberra

ANZECC (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Volume 2. Aquatic Ecosystems – Rationale and Background Information (Chapter 8).* Australian and New Zealand Environment and Conservation Council, Canberra.

Alabaster, J.S. & Lloyd, R. (1982). *Water quality criteria for freshwater fish*. Butterworth Scientific, London.

Bureau of Meteorology (2014). *Queensland in April 2014*. http://www.bom.gov.au/climate/current/month/qld/summary.shtml. Accessed 23/05/2014.

Bureau of Meterology (2014a) *Daily Rainfall Mount Garnet Post Office, summary statistics for all years*. http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=136&p_display_type=dailyDataFile&p_startYear=2014&p_c=-192857427&p_stn_num=031046. Accessed 07/08/2014

CCREM (1991). *Canadian water quality guidelines*. Canadian Council of Resource and Environment Ministers, Ontario.

USEPA (1986) *Quality criteria for water*. US Department of Commerce, National Technical Information Service, US Environmental Protection Agency, Springfield, Viginia. PB87-226759, EPA 440/5 86-001.

This page has intentionally been left blank

APPENDIX A: POST INSPECTION LETTER (2013)

Reference: NOR/043355

29 November 2013

Queensland Government

Department of **Environment and Heritage Protection**

Dohn Taylor
Managing Director
MGT Mining Limited
C/- Duncan Dovico
Level 12, 90 Arthur Street
North Sydney NSW 2060

Dear Mr Taylor,

Compliance Inspection- Mount Veteran Mine, Environmental Authority EPVL00864413 (ML4349, ML20547)

I refer to the compliance inspection of the Mount Veteran Mine conducted by the Department of Environment and Heritage Protection (EHP) on 30 October 2013.

The site inspection was conducted in the presence of Stephen Frost who was representing MGT Mining Limited (MGT Mining). The purpose of the inspection was to evaluate compliance with Environmental Authority EPVL00864413.

While undertaking the inspection, EHP identified a number of non-compliances with Environmental Authority EPVL00864413, and areas of concern which are outlined as follows:

Table 1: Details of Non-Compliance with EPML00497413

Condition number	Detail of non-compliance
A9	Condition: *The holder of this environmental authority must notify the administering authority by written notification within twenty-four (24) hours, after becoming aware of any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of this environmental authority.* Justification/Recommended action During the inspection of the downstream wall of the tailings storage facility (TSF) on ML4349 and ML20547, seepage waters were observed across a widespread area along the length of the toe of the downstream TSF wall. This seepage was observed to congregate at a ponded area at the southern end of the downstream wall, and flow from this point into the tributary of Return Creek, referred to as 'Males Creek'. The occurrence of reed beds at the ponded area would indicate that this seepage has occurred for some time. This incident has not previously been reported to EHP by written notification and therefore constitutes a non-compliance with Condition A9 of Environmental

5b Sheridan Street
CAIRNS QLD 4870
PO Box 937 CAIRNS
QLD 4870 Australia
Telephone (07) 4222 5334
Facsimile (07) 4222 5070
Website www.ehp.qld.gov.au
ABN 46 640 294 485

	Authority EPVL00864413.
B10	Condition: *The holder of this environmental authority must ensure a stream flow gauging station(s) is installed, operated and maintained to determine and record stream flows at the gauging station monitoring points and at the monitoring frequency specified in Schedule B – Table 5 (Gauging Station).* Justification/Recommended action It was advised to EHP on the date of the inspection that stream flow gauging stations have not been installed to date. This is a non-compliance with Condition B10 of Environmental Authority EPVL00864413. By **6 December 2013**, MGT Mining are required to provide a written response to EHP, stating the timeframes by which the stream flow gauging stations will be installed and provide the GPS co-ordinates (including the datum used) of their proposed locations.
B11/B12	Condition: *B11 – A receiving environment monitoring program (REMP) must be developed and implemented by 1 September 2013.* *B12 – The REMP will monitor and record the effects of the release of contaminants on the receiving environment periodically and whilst contaminants are being released from the licensed place. The aim of the REMP is to identify and describe the extent of any adverse impacts on local environmental values and to monitor any changes in the receiving water (including groundwater). A copy of the REMP and any update or variation of the REMP must be provided to the administering authority prior to its implementation.* Justification/Recommended action As advised to EHP on the date of the inspection, the development and implementation of a receiving environment monitoring program (REMP) did not occur by 1 September 2013. This is a non-compliance with Condition B11 of Environmental Authority EPVL00864413. By **6 December 2013**, MGT Mining are required to provide a written response to EHP, stating the timeframes by which the REMP will be developed, implemented and a copy provided to EHP. These actions must be undertaken by no later than three months from the date of this letter.

It is an offence under section 430 of the *Environmental Protection Act 1994* to contravene a condition of an environmental authority and significant penalties apply.

The maximum penalty for contravention of a condition of an environmental authority is $220,000 or two year's imprisonment.

On this occasion, and consistent with the department's Enforcement Guidelines, EHP has decided to issue you a **formal warning** for failing to comply with conditions A9, B10 and B11 of Environmental Authority EPVL00864413.

Table 2: Areas of concern

Area of Concern 1 – Release of potentially contaminated water to the receiving environment

During the inspection, seepage waters from the downstream wall of the TSF were observed to be releasing potentially contaminated water to Males Creek in an uncontrolled manner. This seepage was observed to be discharging into the tributary of Return Creek, referred to as 'Males Creek' at a rate of approximately 1L/s. If contaminants are present in this water, the release will be in non-compliance with Condition B1 of Environmental Authority EPVL00864413.

Recommended Action

As this seepage is potentially resulting in the release of contaminants to the receiving environment, MGT are required to sample the seepage water as near as practical to its source point and analyse for those water quality parameters defined in Schedule B – Table 4 (Surface Water Trigger Levels) of Environmental Authority EPVL00864413. The monitoring of receiving waters in accordance with Conditions B8 and B9 of Environmental Authority EPVL00864413 must also be undertaken by MGT Mining, commencing immediately.

By **20 December 2013**, MGT Mining are required to provide a written report to EHP detailing the monitoring results obtained to (that) date, and those actions taken or proposed to be taken, including timeframes, to prevent seepage from the TSF and the potential release of contaminants to the receiving environment.

Area of Concern 2 – Storage and handling of flammable and combustible liquids

During the inspection of the 10,000 diesel tank storage, it was observed that perforations had been made in the besser block bunding in order to accommodate a metal pipe connecting the tank to the down-slope refuelling pump.

Recommended Action

MGT Mining are required to review their activities in this area to ensure that the storage capacity of the diesel tank bunding is compliant with the requirements of Condition 27 of the *Code of Environmental Compliance for Mining Lease Projects*.

Area of Concern 3 - Open drill holes and spillage of drill cores on ML20547

During inspection of the area proposed for the Dalcouth open cut mine, numerous uncapped drill holes and the spillage of drill cores from disintegrated sample bags were observed.

Recommended Action

The uncapped holes are considered to pose a danger to native fauna and stock, and it is required that they be capped as a minimum and immediate course of action. In accordance with Condition 29 of the *Code of Environmental Compliance for Exploration and Mineral Development Projects*, drill holes must be decommissioned as soon as practical, but by no later than 6 months after the hole was drilled. Should any drill holes need to be retained for more than three years, in accordance with Condition 33 of the *Code of Environmental Compliance for Exploration and Mineral Development Projects*, they must be capped with steel casing and appropriately identified.

The neglect of drill wastes has the potential to release contaminants to the receiving environment and therefore, MGT Mining must ensure that all drill bags and their contents are either stored or disposed of in an appropriate manner.

By **20 December 2013**, MGT Mining must provide in writing to EHP, a description of those measures to be taken to cap or decommission the open drill holes and appropriately store or dispose of drill wastes on the site.

Annual inspection of regulated structures by a suitably qualified and experienced person

During the inspection on 30 October 2013, it was advised by MGT Mining that the annual inspection of the TSF was due to be undertaken by a suitably qualified consultant on 1 November 2013. Please provide a copy of this annual dam inspection report to EHP by **20 December 2013**.

Wet Season

As the wet season is approaching, EHP would also like to remind MGT Mining that all reasonable and practicable measures to improve or maintain site water management and prevent the release of contaminated material from leaving site should be implemented.

During the wet season, EHP would strongly encourage MGT Mining to regularly review Bureau of Meteorology updates to receive the latest information on predicted rainfall in the local area. This information is available on the Bureau of Metrology website at www.bom.gov.au.

Should any event occur that threatens or causes material or serious environmental harm, be advised that under the conditions of your EA, as well as pursuant to section 320 of the *Environmental Protection Act 1994*, MGT Mining has a duty to notify EHP of such events. Further information on your duty to notify requirements is available on the EHP website (www.ehp.qld.gov.au), and should an event occur, please contact your project officer during business hours, or if the event occurs outside of business hours, please contact EHP's pollution hotline on 1300 130 372.

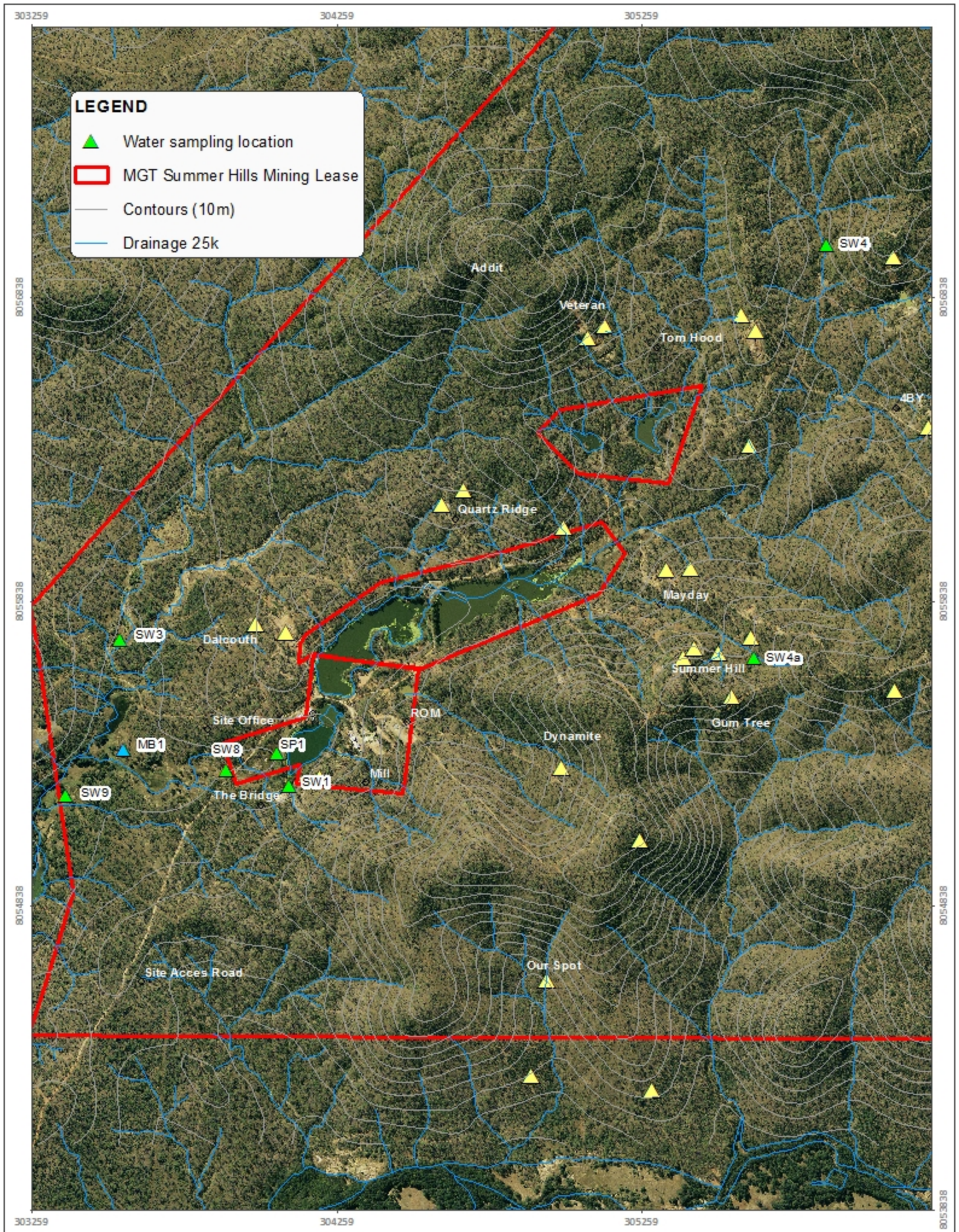
It is required that MGT Mining undertake all the required actions and report on these to EHP by the dates specified above.

Should you wish to discuss any of the matters raised in this letter, please liaise with Geraldine Davis, who can be contacted on (07) 42225384 or at geraldine.davis@ehp.qld.gov.au.

Yours sincerely

Dean Sharpe
Team Leader
Mining & Heavy Industry, Northern Region
Environmental Services and Regulation
Department of Environment and Heritage Protection

APPENDIX B: WATER SAMPLING LOCATIONS



Summer Hills ML20547 - Proposed water sample locations

METRES

0 200 400 600 800 1,000 1,200

N

BIOTROPICA AUSTRALIA PTY LTD

APPENDIX C: POST INSPECTION LETTER (2014)

Ref 101/0008747

1 August 2014

Queensland Government

Department of
Environment and Heritage Protection

MGT Mining Ltd
PO Box 226
MOUNT GARNET QLD 4872

Attention: Gary Kuo

Dear Sir,

Compliance Inspection - Environmental Authority (variation) EPVL00864413 (ML4349 and ML20547)

I refer to the compliance inspection on 15 April 2014 conducted by officers of the Department of Environment and Heritage Protection (EHP).

The purpose of the inspection was to evaluate compliance of the activities occurring on site with the conditions prescribed in Environmental Authority (variation) EPVL00864413 (ML4349 and ML20547), the *Code of Environmental Compliance for Mining Lease Projects* (EM588), the *Code of Environmental Compliance for Exploration and Mineral Development Projects* (EM586) and the provisions of the *Environmental Protection Act 1994* (EP Act).

Non-Compliance
While undertaking the inspection the following non-compliance with the conditions prescribed in Environmental Authority EPVL00864413:

Table 1: Details of Non-Compliance

Condition Number	Details of Non-Compliance
B5	Condition The release of contaminants to waters must not exceed the contaminant limits stated in Schedule B – Table 2 (Release Limits). Justification EHP undertook sampling during the inspection at release location SW1and SW9 in response to a non-compliant release event from the SW1 during the April 2014 to May 2014. The results of the water quality indicate that copper levels at SW1 were above the limits specified in Table 2 of the EA. The results were as follows: • Samples at SW1 returned a result of 0.004mg/L for copper; an exceedence of the 0.0014mg/L release contaminant limit for copper as specified in Schedule B - Table 2 (Contaminant Limits) of the EA; • The downstream compliance point at the boundary of the tenure (SW9) returned a result of 0.006mg/L for copper, an exceedence of the 0.0014mg/L receiving waters trigger level for copper as specified in Schedule B - Table 4 (Surface Water Trigger Levels) of the EA; Furthermore, monitoring reports submitted by MGT Mining on 7 July 2014 identified ongoing exceedences of contaminant limits stated in Schedule B – Table 2 (Release Limits) and Schedule B – Table 4 (Surface Water Trigger Levels) of the EA. In particular the report states that there is ongoing seepage from the TSF into the receiving

5b Sheridan Street Cairns
PO Box 7230 Cairns
Queensland 4870 Australia
Telephone +61 7 4222 5334
Facsimile +61 7 4222 5070
Website www.ehp.qld.gov.au
ABN 46 640 294 485

	environment which is not an authorised release location specified in Table 1 - Release Point of the EA. The water quality data provided indicates that the ongoing release exceeds the contaminant limits stated in Schedule B – Table 2 (Release Limits). EHP would like to make you aware that it is an offence under section 430 of the *Environmental Protection Act 1994* to contravene a condition of an Environmental Authority and significant penalties apply. EHP is currently considering enforcement actions for failing to comply with the above condition. EHP look forward to meeting with MGT Mining Ltd on the 8 August 2014 to discuss this matter further.
A3	Condition A3 The holder of this environmental authority must comply with each of the standard environmental conditions contained in the latest version of the *Code of Environmental Compliance of Mining Lease Projects*. Condition 7 of the *Code of Environmental Compliance of Mining Lease Projects* states: "The holder of the environmental authority must design, install and maintain adequate erosion and sediment control structures wherever necessary to prevent or minimise erosion of disturbed areas and the sedimentation of any Watercourse, Waterway, Wetland or Lake." Justification Erosion was observed occurring at various locations across the site including but not limited to roads and tracks, exploration pads and stockpiles. Current erosion and sediment control structures in disturbed areas are considered inadequate to minimise the release of sediment to waters.
A5	Condition A5 All exploration activities carried out on the mining leases must comply with each of the standard environmental conditions contained in the latest version of the *Code of Environmental Compliance for Exploration and Mineral Development Projects.* Condition 29 of the *Code of Environmental Compliance for Exploration and Mineral Development Projects* states: "The holder of the environmental authority must decommission all non-artesian drill holes, apart from those still required for monitoring purposes as soon as practical, but no later than 6 months after the hole was drilled by undertaking the following actions: • where practical dispose of all unused drill chips to the hole or to a sump pit and; • cap the hole at a depth that is appropriate for the previous land use of the area (unless the land owner stipulates a future use which requires the cap to be placed deeper); and • backfill the hole above the cap with soil or material similar to the surrounding soil or material." Justification Active and/or disused drill holes were observed at various locations across the site along with stored and/or waste drill samples and sample bags. The holder of the environmental authority is reminded to decommission all non-artesian drill holes, apart from those still required for monitoring purposes as soon as practical in accordance with Condition 29 of the *Code of Environmental Compliance for Exploration and Mineral Development Projects.*

Table 2: Area of concern

Waste Storage *Observation* A significant quantity of mixed general and regulated waste (tyres) was observed at the laydown/storage area. *Condition 20 – Waste Management* In accordance with Condition 20 of the *Code of Environmental Compliance of Mining Lease Projects*, MGT Mining Pty Ltd is reminded that all general and regulated waste (tyres) must be managed appropriately and taken to a suitably licensed facility if practicable.

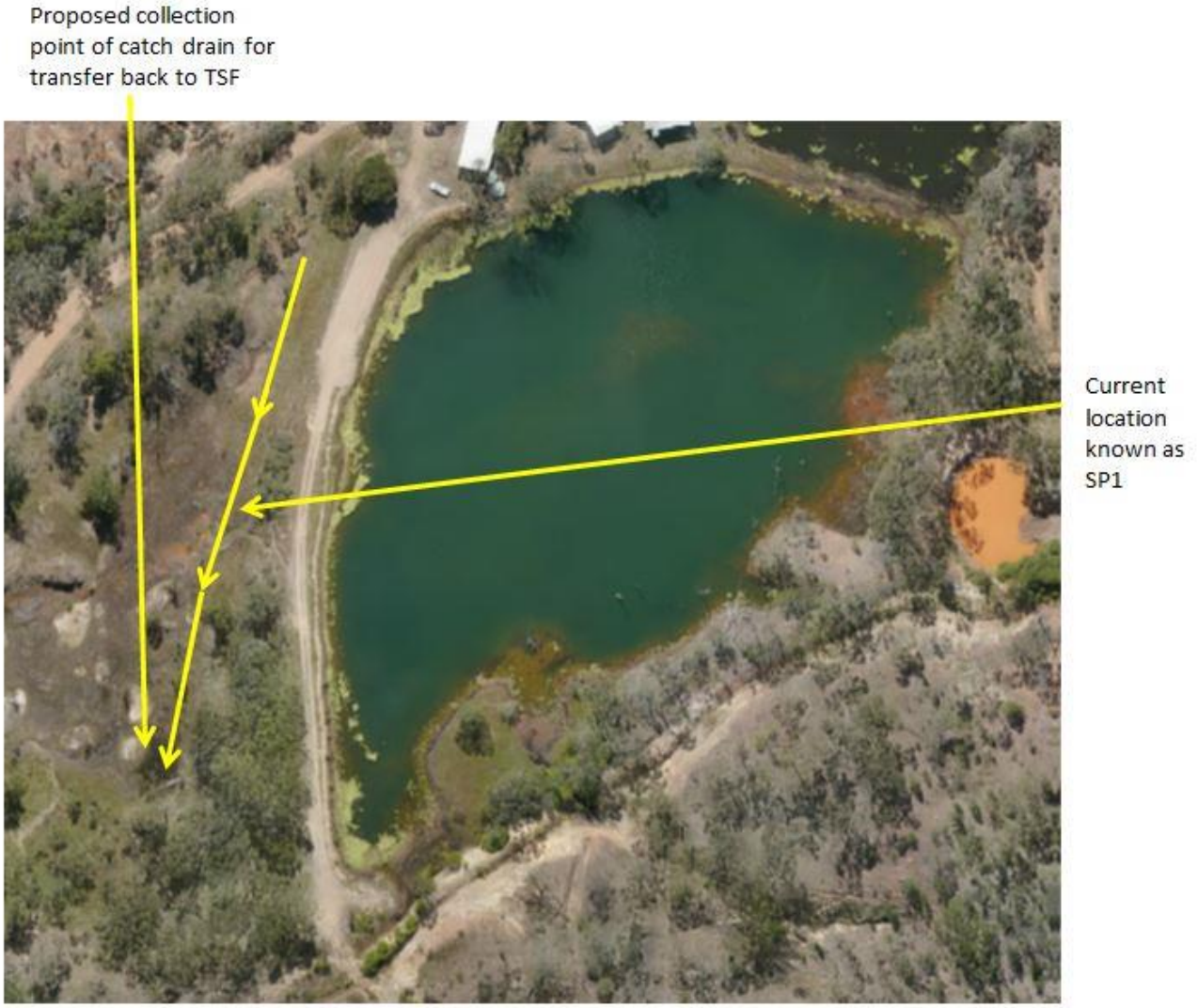
MGT Mining Ltd is required to rectify the identified non-compliances. EHP requests MGT Mining Ltd provide a written response to EHP by **31 August 2014** detailing the actions proposed and timeframes to rectify the identified non-compliances with all issues in this letter apart from the non-compliance with condition B5 which will be discussed during the meeting on 8 August 2014.

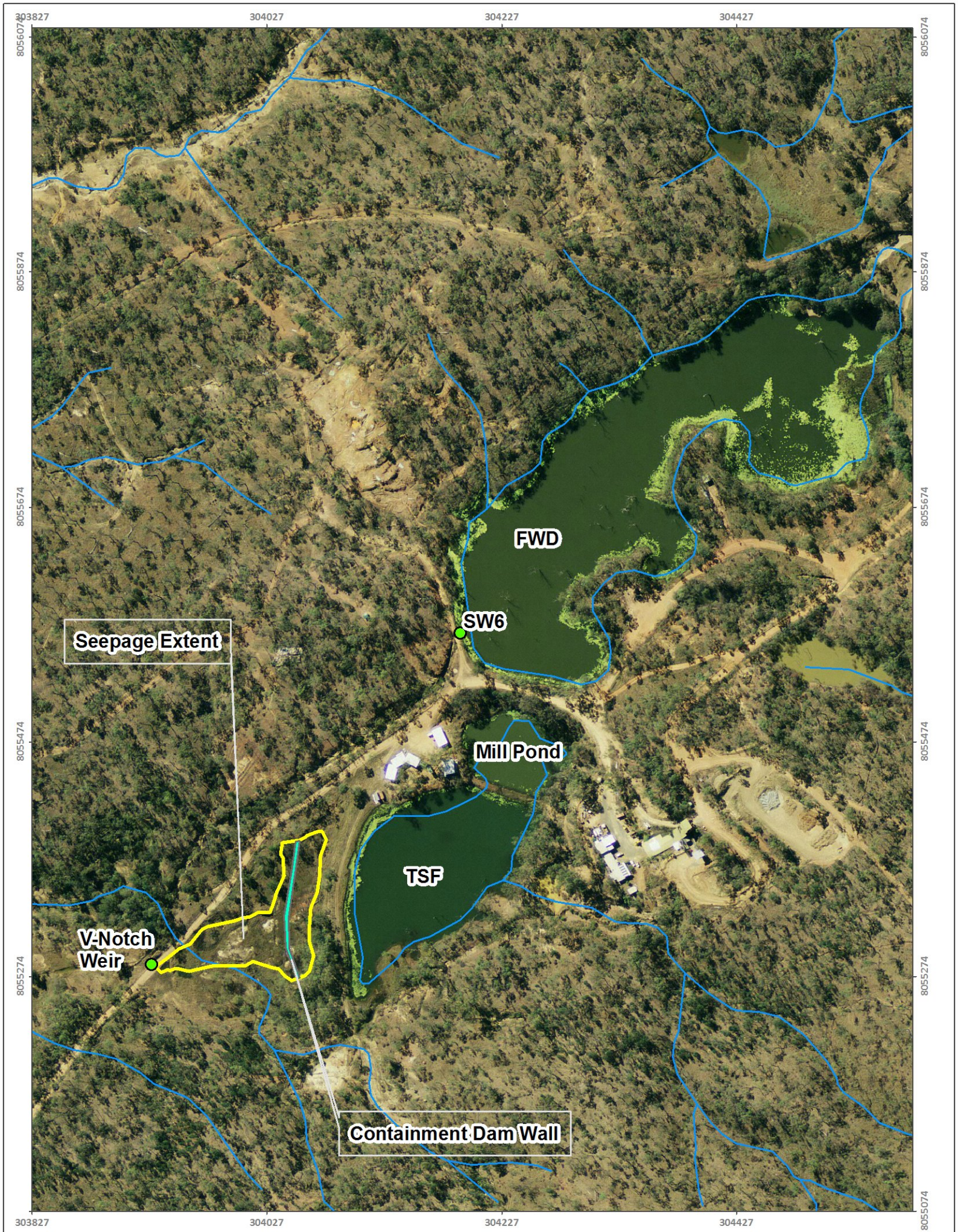
Should you wish to discuss any of the matters raised in this letter, please contact Dannielle Tela by telephone on (07) 4222 5353 or email at dannielle.tela@ehp.qld.gov.au.

Yours sincerely,

Dean Sharpe
Team Leader - Mining and Heavy Industry
Environmental Services and Regulation – Northern Region
Department of Environment and Heritage Protection

APPENDIX D: ANNOTATED SITE MAPS





Summer Hills ML20547 - TEP Locations

METRES

0 200 400

N

BIOTROPICA AUSTRALIA PTY LTD

APPENDIX E: POLYMER TOXICITY REPORT

21 McLachlan St
Fortitude Valley
QLD 4006
Telephone: +61 7 3828 6900
Fax: +61 7 3828 6999

11 August 2014
Project Number: BCL140148.01

Ms Sarah Holt
Assistant Manager
Biotropica
PO Box 866
Malanda QLD 4885

Dear Sarah

RE: Technical Advice - Use of Polymer for Tailings Dam Management

Introduction

In response to an email request made by Sarah Holt of Biotropica on July 28 regarding the use of polymer as a sealant for the management of leaking Tailings Storage Dam, CDM Smith has conducted a review of the sealant polymer characteristics and potential environmental impacts associated with its use.

Project Appreciation and Objectives

CDM Smith understands Biotropica on behalf of MGT Mining (MGT) has been evaluating remedy options for a leaking tailings storage dam. One of the options identified includes the use of propriety polymer, which upon application into the affected area of the earthen dam (cracks and voids) will expand in contact with water thereby forming a seal. While the polymer may prove to be a viable solution for the management of the dam, concerns have been raised by MGT geologists on the polymers impact on water quality within the dam and the potential effects of the polymer on the receiving environment. CDM Smith understands that the quality of the water currently stored in the dam is poor, being dominated by high concentrations of dissolved heavy metals.

Given the above, the objectives of this review is to undertake a desktop review and establish the potential impacts, if any, on the use of the polymer on the receiving environment and existing water quality within the dam. This review is based on the existing information provided by Biotropica and a geochemical assessment on the properties of the polymer and its potential for degradation in the conditions it is proposed to be used.

Scope

In order to achieve the assessment objectives outlined above, the following scope of work was undertaken:

- Data review of the information supplied to CDM Smith;
- Chemical and/or geochemical assessment of the polymer's physical and chemical properties; and
- The preparation of this report.

Assessment of the Polymer

Information Provided

A total of four PDF documents and one schematic sketch were made available to CDM Smith for review (Appendix A). These include:

- Application letter prepared by the supplier of the propriety polymer (Polymer Innovations Pty Ltd), detailing the relevant quantities and general instructions on its application. This letter indicated an application rate of 100 grams per square meter, and based on proposed quantity use of 1 tonne equates to an application area of 10,000 square metres;
- Polymer Material Safety Data Sheet (MSDS) detailing the products identification (Water$ave Plug-Seepage; Chemical Name: Super Adsorbent Polymer – cross linked), its chemical & physical properties, stability and reactivity, hazard classification and general handling measures for its use and accidental release;
- Frequently Asked Questions (FAQs) brochure, which presents a list of common queries raised by users of the product;
- Polymer toxicity assessment report, prepared by Ecotox Services Australia Pty Ltd (Ecotox) for Kempsey Bypass Alliance for proposed use in non-natural water bodies as a water treatment solution; and
- Schematic illustration of the application area of the polymer within the dam and images of dam design drawings, one of which indicated that the dam comprises a capacity of 40,000 cubic meters and is linked to a smaller mill pond with a reported capacity of 6,000 cubic meters.

Technical Assessment

Information presented in MSDS indicates that the polymer chemical structure is made up of linear- and cross-linked flocculating agents. Although not implicitly stated in the MSDS, the polymer is assessed to contain compounds of carbon (C), nitrogen (N) and thiocyanite (SCN) chemical groups, based on the reported thermal decomposition products. These compounds are common for use as polymer building blocks and more importantly, once combined in specific

geometry (mixture of linear and cross link groups) form highly water insoluble products. The physical and chemical properties reported in the MSDS indicate that the polymer is "insoluble" in water and swells on contact.

Given the insoluble nature of the polymer, CDM Smith considers that this material is unlikely to produce toxic degradation products in aqueous (water environments). Reported incompatible materials, which will cause degradation to occur and thereby produce toxic chemical by-products, include oxidising agents and heating in excess of 200°C. Oxidising agents are chemicals rich in electrons that cause the material to undergo reduction-oxidation (redox) reactions to produce chemical by-products. Common oxidising agents include:

- Ozone (O_3);
- Concentration hydrogen peroxide (H_2O_2);
- Concentrated sulphuric acid (H_2SO_4);
- Halogens such as fluorine and chlorine (F_2, Cl_2)

In the context of the tailings storage dam, none of these oxidising agents are expected to be present in the tailings dam in an appreciable concentration to cause oxidising reactions, based on the contents of the dam (tailings water and mineral gangue phases) as it is understood the water is dominated by dissolved metal concentrations. Given the abundance of the dissolved metals, oxidising reagents are realistically likely to be consumed, if not fully depleted in the tailings dam. In the unlikely case that oxidising reactions do occur, the reported chemical by-products, as stated in the MSDS from such reactions include hydrogen cyanide, carbon oxides and nitrogen oxides.

Oxides of carbon and nitrogen are highly insoluble and would form solid mass and drop out of solution. Hydrogen cyanide, on the other hand, is a toxic compound and can cause deleterious impacts to the environment. However, given the reported quantities of the polymer to be used, it is unlikely that hydrogen cyanide will persist in the tailings dam for two main reasons:

- the hydrogen cyanide produced, which is based on the reported quantities to be applied, will be diluted in the large volume of water within the tailings dam; and
- cyanide ion, which is the toxic constituent of hydrogen cyanide, will combine with dissolved metals present in the water to form metal-cyano complexes, which in-turn may either form a gelatinous solid precipitate or be adsorbed on the sediments, clays and or soils present in the environment.

Based on the above chemical and geochemical interpretation of the polymer properties, CDM Smith considers that the polymer is unlikely to have a deleterious impact to the receiving environment or contribute to a poorer water quality within the dam.

Toxicological studies undertaken by Ecotox that involved a series of tests with test organisms indicated that polymer was classed as "slightly toxic" to a species of algae and "practically non-toxic" to the tested species of fish and recommended management of the polymer to prevent it entering protected waters. The main effects observed were inhibitory effects. Based on the highly insoluble nature of this polymer, CDM Smith considers that the classifications derived by Ecotox are due to physical contact of the polymer with the test species in the presence of water. As indicated previously, upon contact of the polymer with water, swelling of the material occurs. Based on this property, CDM Smith considers that the toxic effects noted, albeit be non-toxic to slightly toxic, is based on tiny micro-particles being either ingested or become in direct contact with the test species, leading to the swelling of the compound and causing an inhibitory effect, rather that the polymer being assimilated by test species. Based on the insoluble nature of the specified polymer, there is considered to be a low risk of discharge of this material dissolved in tailings water, if a tailing dam leakage event were to occur in the future.

Conclusions

Based on the chemical and geochemical review of the polymer properties, toxicological information, quantities of polymer to be used and the volume of tailings water within the dam, the following is concluded:

- Polymer is highly insoluble in water and as such is unlikely to be carried as a dissolved phase; and
- Hazardous decomposition products from degradation of the polymer are unlikely to occur in the tailings dam to be applied. If decomposition products do occur from some unusual conditions, it unlikely to be present at significant concentrations to cause an environmental concern.

Regards,

Ritnesh Syna
Project Geochemist
Enclosures: Appendix A – Documents Supplied by Biotropica

cc: Craig Streatfield

Appendix A - Documents Supplied by Biotropica

WATER$AVE PLUG-SEEPAGE - MATERIAL SAFETY DATA SHEET

1. IDENTIFICATION and COMPANY DETAILS

Product Name: **Water$ave Plug — Seepage**

Recommended Use: Lineal & cross linked flocculating polymers to seal earthen dams, ponds or canals for most soil types & conditions.

Supplier:

Polymer Innovations Pty Ltd
2/129 Maison Dieu Road
P.O. Box 431
SINGLETON NSW 2330
Phone: +61 2 6571 5177
Fax: +61 2 6571 2505

Email: info@polymerinnovations.com.au
Web: www.polymerinnovations.com.au

Emergency Telephone (24 Hours): +61 4 8829 6794

2. HAZARDS IDENTIFICATION

Product Code:	PISEEP1WE2AQ2EV6AN	**Dangerous Goods Class:**	Not applicable
U.N. Number:	Not assigned	**Poisons Schedule:**	Not applicable
Hazchem Code:	Not assigned	**Hazard Class:**	Not assigned
Risk Phrase (s):	Not assigned		

Safety Phrases:

S26: In case of contact with eyes, rinse immediately with plenty of water. Seek medical advice.
S36: Wear suitable protective clothing.

All the constituents of this material are listed on the Australian Inventory of Chemical Substances (AICS).

This product when wet renders surfaces extremely slippery.
The product swells in water.
This product contains fine powders and can create dusty conditions.

NOT CLASSIFIED AS HAZARDOUS ACCORDING TO CRITERIA OF WORKSAFE AUSTRALIA [NOHSC:2011(2003)].

- Not classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for transport by Road and Rail.
- Poisons Schedule (Australia): Not Applicable

No adverse health effects expected if product is handled in accordance with this Safety Data Sheet and the product label.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name: Super Absorbent Polymer—cross linked.

CAS Number: Available on request.

Proportion: Not assigned.

4. FIRST AID MEASURES

Ingestion: Product is considered non toxic, but if ingestion occurs consult a doctor.

Eye: Rinse immediately with plenty of water, continuing for 15 minutes, including under the eyelids. If irritation persists, seek medical assistance.

Skin: Wash with water and soap as a precaution. If irritation persists, seek medical assistance.

Inhaled: No hazards which require special first aid measures. Ensure adequate ventilation.

First Aid: As indicated by clients site plan.

Advice to Doctor: Treat symptomatically.

If poisoning occurs contact a doctor or Poisons Information Centre Australia 131 126 New Zealand 0800 474 7000

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: Water spray or fog, foam, dry powder or CO2.

Fire Hazards: Carbon monoxide and carbon dioxide may be released.

Special Fire-fighting Precautions: The product when wet renders surfaces extremely slippery. The product swells in water.

Special Protective Equipment for Fire-fighters: Wear self-contained breathing apparatus and protective suit.

Hazchem Code: Not applicable.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: Wear protective equipment to prevent skin and eye contamination. Avoid inhalation of dust. Sweep or vacuum up, but avoid generating dust.

Environmental Precautions: Do not contaminate water. Do not flush into surface water drains or sanitary sewer systems. Dispose of in accordance with local and national regulations.

Methods for Cleaning up: Clean up by sweeping or vacuum. Do not flush with water. Keep in suitable closed Containers for disposal. After cleaning, traces of polymer may be washed away with water. Avoid dust formation. Contact with water will make surface extremely slippery.

WATER$AVE PLUG-SEEPAGE - MATERIAL SAFETY DATA SHEET

7. HANDLING AND STORAGE

Handling:
Follow normal personal hygiene and housekeeping practices.
Avoid contact with skin, eyes or clothing. Ensure sufficient ventilation. Avoid dust formation. Do not breathe dust. Wash hands before breaks and at the end of workday.
CAUTION: Wet areas may be slippery.

Storage:
Store in cool dry place, all containers to be sealed. Do not store with oxidising agents, acids and alkalis. Temperature Conditions 5-35°C.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Standards:
No value assigned for this specific material by the Australian Safety and Compensation Council (ASCC), however exposure limit for 'Dusts not otherwise specified' is 10 mg/m³ TWA.

Engineering Controls:
Ensure ventilation is adequate to maintain air concentrations below exposure standards. Avoid generating and inhaling dusts. Use with local exhaust ventilation or while wearing dust mask. Keep containers closed when not in use.

Personal Protection Equipment

- **Respiratory protection**: In case of dust or aerosol formation use respirator with an approved filter.
- **Hand protection:** For prolonged and repeated contact use protective gloves.
- **Eye Protection:** Safety glasses with side-shields. Do not wear contact lenses.
- **Skin and Body Protection:** Chemical resistant apron or protective suit if splashing or repeated contact with solution is likely. Avoid contact with skin.

Hygiene Measures:
Wash hands before breaks and at the end of the workday.
Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form:	Granular Solid	**Colour:**	White
Odour:	Ester-like	**Melting Point (degrees C):**	Not determined
Flash point (degrees C):	Not applicable	**Auto Ignition Temperature:**	Not determined
Vapour Pressure (mmHg):	<20 hPa (20°C)	**Solubility (water):**	Insoluble
Density:	0.7 g/cm^3	**Specific Gravity:**	Not applicable
Flammability Limits:	Not applicable	**Particle Size:**	≥ .3mm - ≤ 3mm
Evaporation Rate:	Not applicable	**pH**	range 4.9 to 7
Boiling point/range:	Net determined	**Bulk Density:**	ca. 650 kg/m³
Explosiveness:	Dusts can form explosive mixtures with air		
Lower explosion limit:	Not determined	**Upper explosion limit:**	Not determined

10. STABILITY AND REACTIVITY

Chemical Stability:
Product is stable under recommended storage conditions. Hazardous polymerisation will not occur.

Conditions to avoid:
None

Incompatible Materials:
Oxidizing agents
The product swells in water

Thermal decomposition: >200°C

Hazardous decomposition products:
Thermal decomposition may produce hydrogen cyanide, carbon oxides and or nitrogen oxides.

WATER$AVE PLUG-SEEPAGE - MATERIAL SAFETY DATA SHEET

11. TOXICOLOGICAL INFORMATION

Acute toxicity: No adverse health effects expected if the product is handled in accordance with this safety data sheet

- **Oral:** LD50/oral/rat > 5000 mg/kg. May cause irritation to the mucous membranes of the Mouth, throat and digestive tract.
- **Dermal:** LD50/dermal/rabbit > 2000 mg/kg. Non—toxic. May cause skin irritation.
- **Inhalation:** Dust may cause irritation. Possible discomfort includes coughing and sneezing

Irritation

- **Skin:** LD50/dermal/rabbit > 2000 mg/kg. Non—toxic. May cause skin irritation.
- **Eyes:** By analogy with similar products tested according to the Draize technique this material should produce no corneal of iridial effects and only slight transitory conjunctival effects similar to those which all granular materials have on conjunctiva.
  Dust may cause irritation.

Sensitization: Not sensitizing.

Chronic toxicity: No adverse health effects are known.

12. ECOLOGICAL INFORMATION

Acute aquatic toxicity

- **Fish:** LC50/96 hours > 100 mg/l (OECD 203).
- **Daphnids:** EC50/48 hours > 100 mg/l (OECD 202).
- **Algae:** IC50/Scenedesmus subspicatus/72 hours > 100 mg/l (OECD 201).
- **Hydrolysis:** Does not hydrolyse.
- **Biodegradation:** Not readily biodegradable.
- **LogP_{ow}:** 0
- **Bioaccumulation:** The product is not expected to bioaccumulate.

13. DISPOSAL CONSIDERATIONS

Waste from residues/unused product: In accordance with local, state and national regulations.

Incineration/Landfill: Can be land filled or incinerated when in compliance with local, state and national regulations.

WATER$AVE PLUG-SEEPAGE - MATERIAL SAFETY DATA SHEET

14. TRANSPORT INFORMATION

ADGC:	Not classified as dangerous in the meaning of ADGC regulations.
IMDG/IMO:	Not classified as dangerous in the meaning of IMO/IMDG regulations.
ICAO/IATA:	Not classified as dangerous in the meaning of ICAO/IATA regulations.
Transport:	In containers provided.
Proper Shipping Name:	None allocated.
LPG Number:	None allocated.
ULRG Number:	None allocated.
Hazchem Code:	Not applicable

15. REGULATORY INFORMATION

Risk Phrase (s):	None.
Safety Phrase (s):	None.
ACCHS:	Not classified according to Approved Criteria for Classifying Hazardous Substances [NOHSC:2011 (2003)].

International Inventories

European Union (EINECS/ELINCS):	All components of this product are either listed on the inventory or are exempt from listing.
USA (TSCA):	All components of this product are either listed on the inventory or are exempt from listing.
Australia (AICS):	All components of this product are either listed on the inventory or are exempt from listing.
China (IECSC):	All components of this product are either listed on the inventory or are exempt from listing.
Japan (ENCS):	All components of this product are either listed on the inventory or are exempt from listing.
Korea (ECL):	All components of this product are either listed on the inventory or are exempt from listing.
Philippines (PICCS):	All components of this product are either listed on the inventory or are exempt from listing.

16. OTHER INFORMATION

Further Information

This MSDS was prepared in accordance with the following:
National Code of Practice for the preparation of Material Safety Data Sheets 2nd edition [NOHSC:2011 (2003)].

Contact Point: 24 Hour Emergency contact +61 4 8829 6794

Water$ave Plug & Seepage FAQ

Q: What is Water$ave Plug?

Water$ave Plug/Seepage is a blend of super absorbents polymers used to seal earthen **dams** and/or **ponds**. The polymers have the appearance of a dry, white crystal.

Q: How does it work?

Water$ave Plug/Seepage works by applying the dry polymer blend to the water surface in the **dam/pond**. The different sized polymers get drawn into the voids, cracks and areas where the water is leaking and start to expand. These polymers create a plug and continue to expand filling holes, cracks and porous soils.

Q: Can it be applied to dry dams/ponds?

Yes. Please contact our sales team on 0061 2 65 715177 for further assistance in this case. If your **dam/pond** is currently leaking water then now would be the best time to apply the Water$ave Plug/Seepage. The pressure of the water and the leakage creates the suction needed to draw the polymers into the problem areas. If you do not have any water in your **dam/pond** then you can apply Water$ave Plug/Seepage as your **dam/pond** is filling up as this ensures even coverage.

Q: I know where the leak is, so can I apply the Water$ave Plug/Seepage to that area or do I have to treat the whole dam/pond?

If you know where the leak is you can concentrate your application in that area but it can be difficult to identify exactly where the leak is, therefore after application in a specific area, you may need to assess the situation as to whether the rest of the **dam/pond** will need to be treated as well and this can be done when **dam/pond** is full or where the water level is above the problem area.

Q: How do you apply it?

Application rate is at 100g/m^{2*} over the problem area and should not be broadcast further than 1.5* metres by hand or fertilizer spreader. For **dams/ponds** where you need to broadcast the Water$ave Plug/Seepage further across the **dam/pond** (more than 1.5* metres across,) a boat is recommended to make sure that the application is spread evenly over the **dam/pond** surface.

Q: Is it safe for fish and animals?

Yes. It is non-toxic and environmentally friendly.

Q: How much area does the 20kg pail cover?

The pail will cover an area of approximately 200m^{2*} when applied at 100g/m^{2*} over the surface area.

Q: How much Water$ave Plug/Seepage will I need?

A minimum of 100g/m^{2*} is needed, calculated on the surface area of your dam/pond, depending on whether your **dam/pond** is full or partially full. You can work out how much product is needed by using our online Water$ave Plug Calculator at www.polymerinnovations.com.au.

Q: I have tried bentonite and my dam/pond still leaks, will Water$ave Plug/Seepage work better than bentonite?

Many clients that have tried sealing their leaking **dams/ponds** with bentonite, without success, have had great results using Water$ave Plug/Seepage.

Q: Will my dam/pond be sealed on first application? How many applications will I need?

In most cases clients have successfully sealed their leaking **dams/ponds** on the first application but in some cases further application may be required.

2/129 Maison Dieu Rd Singleton
PO Box 431 Singleton NSW 2330
☏ +61 2 6571 5177 🖷 +61 2 6571 2505
Email: info@polymerinnovations.com.au
Web: www.polymerinnovations.com.au Online Shopping: www.polyinn.com.au

Q: How long will it take to work?

Some clients have had their **dams/ponds** sealed within a few days. You should expect to have your **dam/pond** sealed or notice the slowing down of water loss within 7-10 days. If your **dam/pond** is still leaking after this time further applications could be necessary.

Q: What if it does not stop my dam/pond from leaking after 3 weeks?

There may be a few factors to consider that may have an influence on why your dam/pond is not sealed:
Has the leak slowed down or is there any noticeable change in the leak?
Are there any obstructions for example reeds, leaves, grass, weeds etc?
Was the recommended amount used and was enough product applied to the dam/pond?
Were the dam/pond measurements correct?
Have there been any other changes to the dam/pond or area since the first application?
Is the water too shallow?
There may be a more severe problem than first thought and further applications may be required.

Q: Will it work if my dam/pond has weeds? Do I need to remove the weeds first?

Weeds will inhibit the flow of the polymer into the soil. The polymer needs a clear path to the soil, if you have any weeds, reeds, leaves, grass, litter or deep silt, you will need to remove these before application.

Q: When is best time of day to apply it?

Best applied at times when it is not raining and there is little to no wind so the product is not blown away during application.

Q: How long will it last in the dam/pond? Is it permanent?

Under normal conditions we anticipate that this is a permanent solution to sealing leaks.

Q: Who has used it?

We have been working closely with The Department of Land/Soil Conservation who has trialled our products in the field for 3-4years with great success. Water$ave Plug and Seepage has been used by farmers, fisheries, government departments/councils, as well as mining and construction companies.

Q: What is the success rate?

In most cases **dams/ponds** are generally successfully sealed on first application.

Q: Does it work on all soil types?

Generally, yes, but depending on alkalinity/salinity or acidity, the product's performance may be reduced. In these cases more product will need to be applied.

Q: Can I apply it to a new dam/pond that I am building?

Water$ave Plug/Seepage can be used in the construction of a new **dam/pond** as well as already constructed dams/ponds by incorporating the product into the base and/or walls of the **dam/pond.**

Q: Will you guarantee it will seal my dam/pond?

We have had great success in sealing all types of dams/ponds, but due to unforeseen circumstances and the nature of the problems we are unable to guarantee that this will work. Further applications may be necessary and we do encourage you to communicate with us if you are experiencing problems with sealing your leaking dam/pond so that we can work with you on getting the best possible results.

*1.5 m = approximately 5ft
*200 m^2 = approximately 2153 ft^2
*100 g/m^2 = approximately 4 oz/1076 ft^2

2/129 Maison Dieu Rd Singleton
PO Box 431 Singleton NSW 2330
☏ +61 2 6571 5177 🖷 +61 2 6571 2505
Email: info@polymerinnovations.com.au
Web: www.polymerinnovations.com.au Online Shopping: www.polyinn.com.au

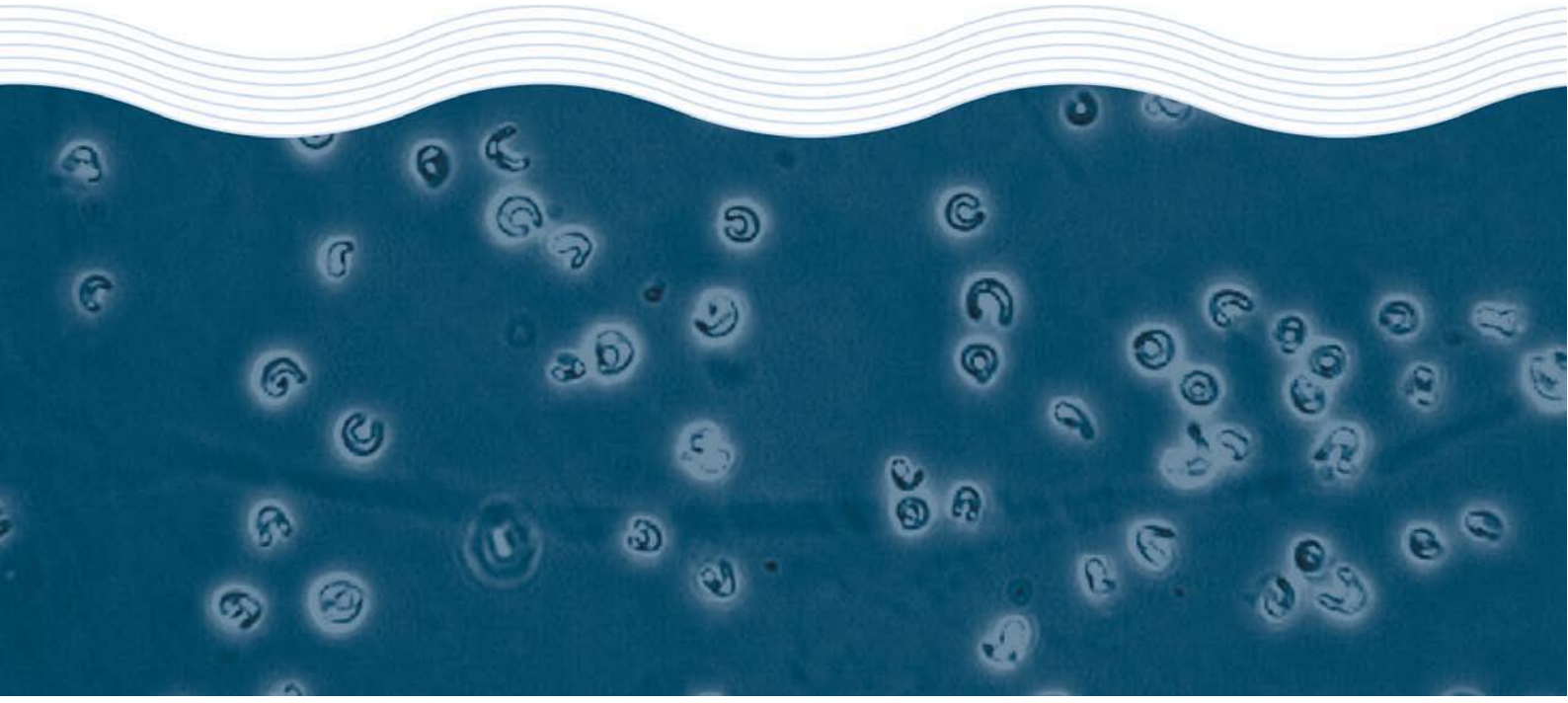
ecotox
SERVICES AUSTRALASIA

Toxicity Assessment of a Polymer Product

Kempsey Bypass Alliance and Polymer Innovations Pty Ltd

Test Report

November 2011



Toxicity Assessment of a Polymer Product

Kempsey Bypass Alliance and Polymer Innovations Pty Ltd

Test Report

November 2011

ECOTOX Services Australasia Pty Ltd ABN>45 094 714 904
unit 27/2 chaplin drive lane cove nsw 2066 T>61 2 9420 9481 F>61 2 9420 9484 W>www.ecotox.com.au

14 December 2011
Ref: PL0812_q01

Ms Abigail Meddings
Environmental Coordinator
Kempsey Bypass Alliance
PO Box 596
Kempsey NSW 2440
P: 02 6560 2551
M: 0439 021 960
Abigail.Meddings@leicon.com.au

Re: Ecotoxicity Testing of SAP HD Polymer for Water Treatment

Dear Ms Meddings

Please find following our test reports TR0812/1, TR0812/2, and TR0812/3, for the testing of the water treatment polymer SAP HD (Super Absorbent Polymer Heavy Duty) using the following tests:

- 48hr acute (immobilisation) test using the freshwater daphnid *Ceriodaphnia cf dubia* or (based on USEPA 2002)
- 72-hr algal growth inhibition (cell yield) test using the freshwater alga *Selenastrum capricornutum* (*Pseudokirchneriella subcapitata*) (based on USEPA Method 1003.0)
- 96-h fish imbalance test using the Rainbowfish *Melanotaenia splendida* (based on OECD Method 203)

The test item was supplied in a dry-granulated form. Upon addition to water, the granules dissipate to form a gel. At concentrations of 4000mg/L and above, the entire solution transformed to a gel that was not considered to be filterable for the purposes of obtaining an aqueous solution for ecotoxicity testing. At concentrations of 2000mg/L, the gel components may be filtered off using a 120µm sieve, leaving a solution that may be used for ecotoxicity testing.

The gel-forming nature of the test item presented difficulties with respect to ecotoxicity testing, as at elevated concentrations the material would likely physically inhibit test organisms in addition to any potential ecotoxic effects. The test methodology adopted for the preparation of test solutions for these tests generally followed the OECD (2006) *Guidance Document on Aquatic Toxicity Testing of Difficult Substances and Mixtures*. The test solutions were prepared as Water Accommodated Fractions (WAFs), where granules were added to diluent in 2000mL beakers and stirred vigorously using a magnetic stirrer for 24 hours. A single WAF vessel was prepared for each concentration of test item to be tested. At the end of the mixing period, the solutions were poured through a 120µm sieve, and the filtrate used for ecotoxicity testing. Given this test methodology, the toxicity of the test item was reported in terms of the loading rate of test item in solution (ie an EL50 rather than EC50 for the expression of the median effect concentration).

The test data for the cladoceran, micro-algal and fish tests are provided in test reports TR0812/1, TR0812/2, and TR0812/3, respectively. It is difficult to discern to what extent inhibitory effects observed with test organisms was due to physical effects of the gel-like test item, or were related to toxicity. No clumping, aggregation or appearance of gel-like material was observed with the micro-alga *Selenastrum* at the 50mg/L test treatment, the lowest loading rate tested where inhibitory effects were observed. However the presence of the gel may have been observed around some cladocerans *Ceriodaphnia cf dubia* at 250mg/L, the lowest concentration tested where immobilisation was observed.

You have requested us to provide a relative estimate of the toxicity of the test item, and to that end we would relate the respective toxicity of the test item using the NICNAS toxicity classification system, based on the USEPA toxicity classification system (STD/LTD Template Guidance Material: Appendix 3).

LC/EC50 (mg/L)	**Descriptive Rating**
<0.1	Very highly toxic
0.1 to 1	Highly toxic
1 to 10	Moderately toxic
10 to 100	Slightly toxic
>100	Practically non-toxic
EC50 > solubility	Not toxic up to limit of solubility

Using the above NICNAS classification system, the test item would be considered 'Slightly Toxic' using the *Selenastrum capricornutum* micro-algal growth inhibition test, and 'Practically Non-toxic' using the *Ceriodaphnia cf dubia* acute toxicity test and *Melanotaenia splendida splendida* Fish Imbalance Tests.

We understand that the field application rate will be equivalent to between 1000 and 2000mg/L for use in non-natural water bodies, such as pits associated with civil engineering works. The test data presented herein indicates that toxicity would be expected well below these concentrations of the test item, as the Lowest Observed Effect Loading (LOEL) with *Selenastrum capricornutum*, *Ceriodaphnia cf dubia* and *Melanotaenia splendida splendida* being 50, 250 and 500 mg/L, respectively. These results would suggest that control measures should be used to prevent the test item entering protected waters.

Should you have any questions or you require further information, please contact Dr Rick Krassoi on (02) 9420-9480 or email on rkrassoi@ecotox.com.au

Sincerely

Dr Rick Krassoi
Director

Toxicity Test Report: TR0812/1

This document is issued in accordance with NATA's accreditation requirements

Client:	Kempsey Bypass Alliance PO Box 596 Kempsey NSW 2440	**ESA Job #:** **Date Sampled:** **Date Received:**	PR0812 3 November 2011 4 November 2011
Attention:	Abigail Meddings	**Sampled By:**	Client
Client Ref:	Not supplied	**ESA Quote #:**	PL0812_q01

Lab ID No.:	Sample Name:	Sample Description:
5033	SAP HD	Chemical received chilled in apparent good condition

*Ammonia analysis is not covered by Ecotox Services Australasia's scope of accreditation

Test Performed:	48-hr acute toxicity test using the freshwater cladoceran *Ceriodaphnia cf dubia*
Test Protocol:	ESA SOP 101 (ESA 2011), based on USEPA (2002) and Bailey *et al*. (2000)
Test Temperature:	The test was performed at 25±1°C.
Deviations from Protocol:	Nil
Comments on Solution Preparation:	Each test concentration was prepared individually by adding known amounts of sample 5033 'SAP HD' into dilute mineral water (DMW). The solutions were stirred vigorously for 24 hours with a magnetic stirrer. After the 24 hour mixing period, the solutions were centrifuged and the clear supernatant was used for testing. A DMW control was tested concurrently with the chemical solutions.
Source of Test Organisms:	ESA Laboratory culture
Test Initiated:	11 November 2011 at 1330h

Sample 5033: *SAP HD*

Loading Rate (mg/L)	% non-immobilised (Mean ± SD)
DMW Control	100 ± 0.0
DMW Control (stirred)	100 ± 0.0
130	100 ± 0.0
250	0.0 ± 0.0
500	0.0 ± 0.0
1000	0.0 ± 0.0
2000	0.0 ± 0.0

48-hr EL10 = 166.8 (166.8-166.8)mg/L
48-hr EL50 = 180.3 (130.0-250.0)mg/L
NOEL = 130mg/L
LOEL = 250mg/L

Vacant

QA/QC Parameter	Criterion	This Test	Criterion met?
Control mean % non-immobilised	≥90.0%	100%	Yes
Reference Toxicant within cusum chart limits	168.3-402.4mg KCl/L	304.7mg KCl/L	Yes

Toxicity Test Report: TR0812/1

Test Report Authorised by: Dr Rick Krassoi, Director on 14 December 2011

Results are based on the samples in the condition as received by ESA.

NATA Accredited Laboratory Number: 14709

Citations:

Bailey, H.C., Krassoi, R., Elphick, J.R., Mulhall, A., Hunt, P., Tedmanson, L. and Lovell, A. (2000) Application of *Ceriodaphnia cf. dubia* for whole effluent toxicity tests in the Hawkesbury-Nepean watershed, New South Wales, Australia: method development and validation. *Environmental Toxicology and Chemistry* 19:88-93.

ESA (2011) *SOP 101 – Acute toxicity test using Ceriodaphnia dubia*. Issue No. 9. Ecotox Services Australasia, Sydney, New South Wales.

USEPA (2002) *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms.4th Ed.* United States Environmental Protection Agency, Office of Water, Washington DC.

Toxicity Test Report: TR0812/2

This document is issued in accordance with NATA's accreditation requirements

Client:	Kempsey Bypass Alliance PO Box 596 Kempsey NSW 2440	**ESA Job #:** **Date Sampled:** **Date Received:**	PR0812 3 November 2011 4 November 2011
Attention:	Abigail Meddings	**Sampled By:**	Client
Client Ref:	Not supplied	**ESA Quote #:**	PL0812_q01

Lab ID No.:	**Sample Name:**	**Sample Description:**
5033	SAP HD	Chemical received chilled in apparent good condition

*Ammonia analysis is not covered by Ecotox Services Australasia's scope of accreditation

Test Performed:	72-hr microalgal growth inhibition test using the green alga *Selenastrum capricornutum*
Test Protocol:	ESA SOP 103 (ESA 2010), based on USEPA (2002)
Test Temperature:	The test was performed at 25±1°C.
Deviations from Protocol:	Nil
Comments on Solution Preparation:	Each test concentration was prepared individually by adding known amounts of sample 5033 'SAP HD' into USEPA media. The solutions were stirred vigorously for 24 hours with a magnetic stirrer. After the 24 hour mixing period, the solutions were centrifuged and the clear supernatant was used for testing. A USEPA control was tested concurrently with the sample.
Source of Test Organisms:	ESA Laboratory culture, originally sourced from CSIRO Microalgal Supply Service, TAS
Test Initiated:	21 November 2011 at1330 h

Sample 5033: *SAP HD*

Loading Rate (mg/L)	**Cell Yield x10^4 cells/mL (Mean ± SD)**	
USEPA Control	97.1 ± 14.9	
USEPA Control (stirred)	131.4 ± 7.3	
6.3	153.6 ± 25.7	
12.5	149.4 ± 17.9	
25	110.7 ± 20.7	
50	60.7 ± 12.6	*
100	9.3 ± 2.7	*
200	4.4 ± 4.0	*

72-hr IL10 = indeterminable**
72-hr IL50 = 44.2 (34.7-53.3)mg/L
NOEL = 25mg/L
LOEL = 50mg/L

Vacant

*Significantly lower cell yield compared with the USEPA Control (stirred) (Dunnett's Test, 1-tailed, P=0.05)
**IL10 is indeterminable due to stimulated algal growth in the lower test concentrations

Toxicity Test Report: TR0812/2

QA/QC Parameter	Criterion	This Test	Criterion met?
Control mean cell density	≥16.0x10^4 cells/mL	98.1x10^4 cells/mL	Yes
Control coefficient of variation	<20%	15.4%	Yes
Reference Toxicant within cusum chart limits	1.5-4.6g KCl/L	3.7g KCl/L	Yes

Test Report Authorised by: Dr Rick Krassoi, Director on 14 December 2011

Results are based on the samples in the condition as received by ESA.

NATA Accredited Laboratory Number: 14709

Citations:

ESA (2010) *ESA SOP 103 – Green Alga, Selenastrum capricornutum, Growth Test*. Issue No 8. Ecotox Services Australasia, Sydney, NSW.

USEPA (2002) *Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms*. Fourth Edition. EPA-821-R-02-013. United States Environmental Protection Agency, Office of Research and Development, Washington DC, USA,

Toxicity Test Report: TR0812/3

This document is issued in accordance with NATA's accreditation requirements

Client:	Kempsey Bypass Alliance PO Box 596 Kempsey NSW 2440	**ESA Job #:** **Date Sampled:** **Date Received:**	PR0812 3 November 2011 4 November 2011
Attention:	Abigail Meddings	**Sampled By:**	Client
Client Ref:	Not supplied	**ESA Quote #:**	PL0812_q01

Lab ID No.:	**Sample Name:**	**Sample Description:**
5033	SAP HD	Chemical received chilled in apparent good condition

Test Performed:	96-hr fish imbalance toxicity test using the eastern rainbowfish *Melanotaenia splendida splendida*
Test Protocol:	ESA SOP 117 (ESA 2011), based on USEPA (2002)
Test Temperature:	The test was performed at 25±1°C.
Deviations from Protocol:	Nil
Comments on Solution Preparation:	Each test concentration was prepared individually by adding known amounts of sample 5033 'SAP HD' into dilute mineral water (DMW). The solutions were stirred vigorously for 24 hours with a magnetic stirrer. After the 24 hour mixing period, the solutions were centrifuged and the clear supernatant was used for testing. A DMW control was tested concurrently with the chemical solutions.
Source of Test Organisms:	In-house cultures
Test Initiated:	5 December 2011 at 1500h

Sample 5033: *SAP HD*

Loading Rate (mg/L)	**% Un-affected (Mean ± SD)**	
DMW Control	100 ± 0.0	
DMW Control (stirred)	95.0 ± 10.0	
125	100 ± 0.0	
250	90.0 ± 20.0	
500	35.0 ± 19.2	*
1000	0.0 ± 0.0	
2000	0.0 ± 0.0	

96-hr EL10 = 275.3 (155.7-345.9)mg/L
96-hr EL50 = 430.1 (340.6-516.8)mg/L
NOEL = 250mg/L
LOEL = 500mg/L

Vacant

*Significantly lower percentage of un-affected larval fish compared with the DMW Control (stirred) (Steel's Many-One Rank Test, 1-tailed, P=0.05)

QA/QC Parameter	**Criterion**	**This Test**	**Criterion met?**
Control mean % un-affected	≥90.0%	100%	Yes
Reference Toxicant within cusum chart limits	2.8-56.1µg Cu/L	18.4µg Cu/L	Yes

Test Report Authorised by: Dr Rick Krassoi, Director on 14 December 2011

Results are based on the samples in the condition as received by ESA.

NATA Accredited Laboratory Number: 14709

Citations:

ESA (2011) SOP 117 –*Freshwater and Marine Fish Imbalance Test*. Issue No 7. Ecotox Services Australasia, Sydney, NSW

USEPA (2002) Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms. Fifth edition EPA-821-R-02-012. United States Environmental Protection Agency, Office of Research and Development, Washington FC, USA

ecotox
SERVICES AUSTRALASIA

Chain-of-Custody Documentation

Datasheet ID: 601.2
Last Revised: 30 April 2009

Sample Receipt Notification

Attention : Abigail Meddings

Client : Kempsey Bypass Alliance
PO Box 596
Kempsey NSW 2440

Email : Abigail.Meddings@leicon.com.au
Telephone : 02 6560 2551
Facsimile :

Date : 4/11/2011

Re : Receipt of chemical **Pages : 2**

ESA Project : PR0812 ☑ For Review ☐ Additional Documentation Required - Please Respond

Sample Delivery Details

Completed Chain of Custody accompanied samples: **YES**
Samples received in apparent good condition and correctly bottled: **YES**
Security seals on sample bottles and esky intact: **YES**

Date samples received : 4/11/2011
Time samples received : 9:00
No. of samples received : 1
Sample matrix : chemical
Sample temperature : chilled

Comments : Includes 1 x 1L SAP Heavy Duty HD (ESA ID# 5033)

Contact Details

Customer Services Officer : Tina Micevska
Telephone : 61 2 9420 9481
Facsimile : 61 2 9420 9484
Email : tmicevska@ecotox.com.au

Please contact customer services officer for all queries or issues regarding samples

Note that the chain-of-custody provides definitive information on the tests to be performed

Ecotox Services Australia
ABN 45 094 714 904
Unit 27, 2 Chaplin Drive
Lane Cove NSW 2066 Australia

Phone : 61 2 9420 9481
Fax : 61 2 9420 9484
Email : info@ecotox.com.au

Datasheet ID: 601.1
Last Revised: 17 February 2011

Chain-of-Custody / Service Request Form

ecotox
SERVICES AUSTRALASIA

Customer: Leighton Contractors
Contact Name: ABIE MEDDINGS
Phone: 0439 021 960 Email: ABigail.Meddings@leicon.com.au (please provide an email address for sample receipt notification)
Sampled by: ABIE MEDDINGS

Ship To: EcoTOX Services Australasia 27/2 chaplin drive Lane cove NSW Australia
Attention:

Sample Date (day/month /year)	Sample Time	Sample Name (exactly as written on the sample vessel)	Sample Method (eg. Grab, composite etc.)	Number and Volume of Containers (eg 2 x 1L)	Tests Requested (See reverse for guidance)						Comments / Instructions
					Algal growth SC	Acute Cerio	Acute Fit	Algal growth SC	Acute Cerio	Acute Fit	**Note that testing will be delayed if an incomplete chain of custody is received** • Additional treatment of samples (i.e. spiking) • Sub-contracted services (i.e. chemical analyses) • Dilutions required (if different than 100% down to 6.25%) • Sample holding time restriction (if applicable) • Sample used for litigation (if applicable) *Note: An MSDS must be attached if Available* **ESA Project Number: PR_____**
3/11/11	8.35.	Polymer Innovations core: SAPHD	Grab	1 x 1L	Range Finder			Definitive Test			

1) Released By:	Date:	2) Received By:	Date:	3) Released By:	Date:	4) Received By:	Date:
Jeff McDonald	3/11/11	A. Ralph	4/11/11				
Of: Leighton Contractors	Time: 8.45	Of: Ecotox	Time: 0900	Of:	Time:	Of:	Time:

Note that the chain-of-custody documentation will provide definitive information on the tests to be performed.

ecotox
SERVICES AUSTRALASIA

Statistical Printouts for the Acute Test with *Ceriodaphnia dubia*

Ceriodaphnia Acute Toxicity Test-48 Hr Immobilisation

Start Date:	11/11/2011 13:30	Test ID:	PR0812/01	Sample ID:	SAP HD
End Date:	13/11/2011 13:30	Lab ID:	5033	Sample Type:	WAF-Water Accommodated Fraction
Sample Date:		Protocol:	ESA 101	Test Species:	CD-Ceriodaphnia dubia
Comments:					

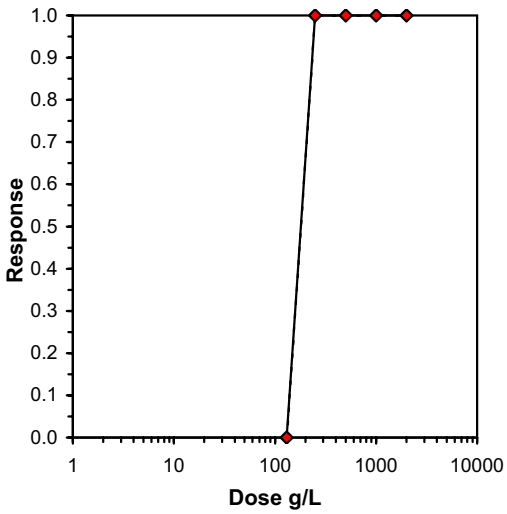
Conc-g/L	1	2	3	4
DMW Control	1.0000	1.0000	1.0000	1.0000
DMW (Stirred)	1.0000	1.0000	1.0000	1.0000
130	1.0000	1.0000	1.0000	1.0000
250	0.0000	0.0000	0.0000	0.0000
500	0.0000	0.0000	0.0000	0.0000
1000	0.0000	0.0000	0.0000	0.0000
2000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Number	Total
Conc-g/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
DMW Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4		
DMW (Stirred)	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	0	20
130	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	0	20
250	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	20	20
500	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	20	20
1000	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	20	20
2000	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	20	20

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	1	0.818		
Equality of variance cannot be confirmed				
The control means are not significantly different (p = 1.00)	0	2.446912		

Graphical Method

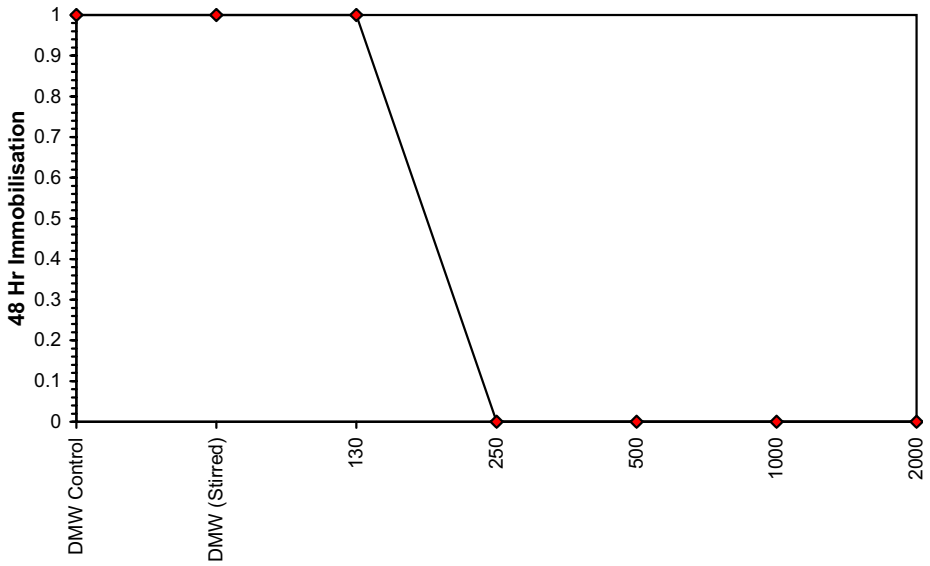
Trim Level	EC50
0.0%	180.28
	180.28



Ceriodaphnia Acute Toxicity Test-48 Hr Immobilisation

Start Date:	11/11/2011 13:30	Test ID:	PR0812/01	Sample ID:	SAP HD
End Date:	13/11/2011 13:30	Lab ID:	5033	Sample Type:	WAF-Water Accommodated Fraction
Sample Date:		Protocol:	ESA 101	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Dose-Response Plot



Ceriodaphnia Acute Toxicity Test-48 Hr Immobilisation

Start Date:	11/11/2011 13:30	Test ID:	PR0812/01	Sample ID:	SAP HD
End Date:	13/11/2011 13:30	Lab ID:	5033	Sample Type:	WAF-Water Accommodated Fraction
Sample Date:		Protocol:	ESA 101	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Auxiliary Data Summary

Conc-g/L	Parameter	Mean	Min	Max	SD	CV%	N
DMW Control	% Survival	100.00	100.00	100.00	0.00	0.00	4
DMW (Stirred)		100.00	100.00	100.00	0.00	0.00	4
130		100.00	100.00	100.00	0.00	0.00	4
250		0.00	0.00	0.00	0.00		4
500		0.00	0.00	0.00	0.00		4
1000		0.00	0.00	0.00	0.00		4
2000		0.00	0.00	0.00	0.00		4
DMW Control	pH	8.30	8.30	8.30	0.00	0.00	1
DMW (Stirred)		8.30	8.30	8.30	0.00	0.00	1
130		7.90	7.90	7.90	0.00	0.00	1
250		7.70	7.70	7.70	0.00	0.00	1
500		7.70	7.70	7.70	0.00	0.00	1
1000		7.70	7.70	7.70	0.00	0.00	1
2000		7.70	7.70	7.70	0.00	0.00	1
DMW Control	DO %	94.70	94.70	94.70	0.00	0.00	1
DMW (Stirred)		94.70	94.70	94.70	0.00	0.00	1
130		94.10	94.10	94.10	0.00	0.00	1
250		95.50	95.50	95.50	0.00	0.00	1
500		97.10	97.10	97.10	0.00	0.00	1
1000		98.00	98.00	98.00	0.00	0.00	1
2000		97.00	97.00	97.00	0.00	0.00	1
DMW Control	Cond uS/cm	177.50	177.50	177.50	0.00	0.00	1
DMW (Stirred)		175.50	175.50	175.50	0.00	0.00	1
130		152.20	152.20	152.20	0.00	0.00	1
250		156.80	156.80	156.80	0.00	0.00	1
500		196.50	196.50	196.50	0.00	0.00	1
1000		266.00	266.00	266.00	0.00	0.00	1
2000		437.00	437.00	437.00	0.00	0.00	1

Ceriodaphnia Acute Toxicity Test-48 Hr Immobilisation

Start Date:	11/11/2011 13:30	Test ID:	PR0812/01	Sample ID:	SAP HD
End Date:	13/11/2011 13:30	Lab ID:	5033	Sample Type:	WAF-Water Accommodated Fraction
Sample Date:		Protocol:	ESA 101	Test Species:	CD-Ceriodaphnia dubia
Comments:					

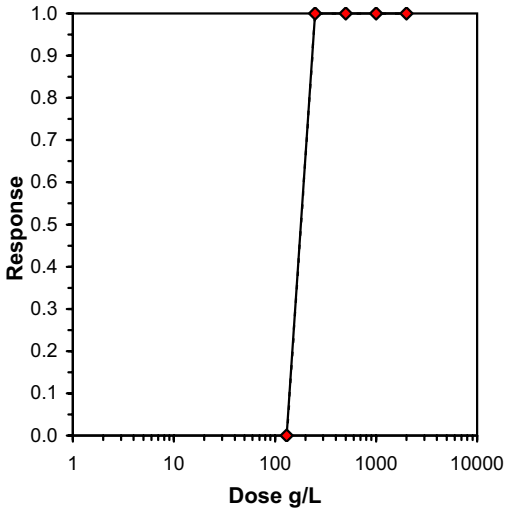
Conc-g/L	1	2	3	4
DMW Control	1.0000	1.0000	1.0000	1.0000
DMW (Stirred)	1.0000	1.0000	1.0000	1.0000
130	1.0000	1.0000	1.0000	1.0000
250	0.0000	0.0000	0.0000	0.0000
500	0.0000	0.0000	0.0000	0.0000
1000	0.0000	0.0000	0.0000	0.0000
2000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Isotonic	
Conc-g/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Mean	N-Mean
DMW Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4		
DMW (Stirred)	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	1.0000	1.0000
130	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	1.0000	1.0000
250	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	0.0000	0.0000
500	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	0.0000	0.0000
1000	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	0.0000	0.0000
2000	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	1	0.818		
Equality of variance cannot be confirmed				
The control means are not significantly different (p = 1.00)	0	2.446912		

Log-Logit Interpolation (200 Resamples)

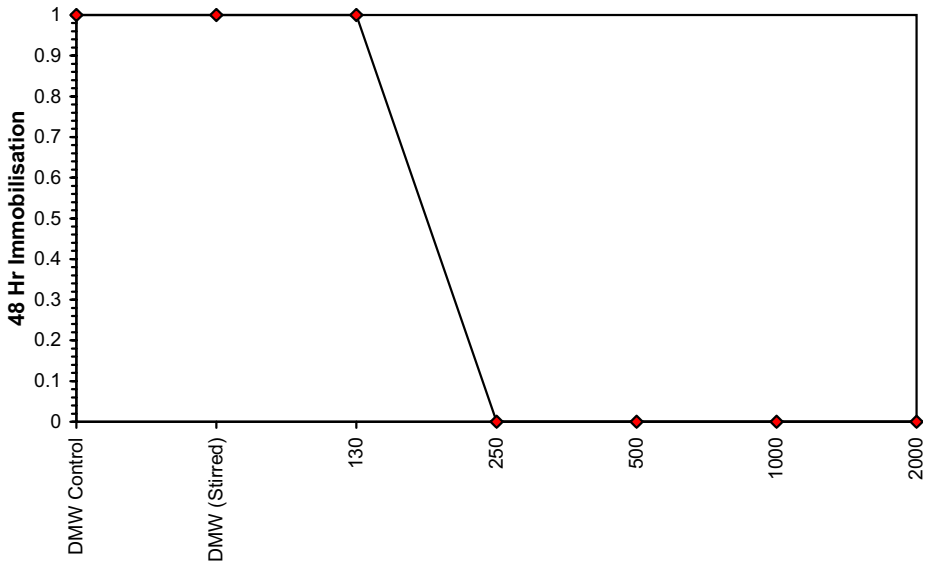
Point	g/L	SD	95% CL(Exp)		Skew
IC05	162.43	0.00	162.43	162.43	1.0076
IC10	166.80	0.00	166.80	166.80	-1.0076
IC15	169.56	0.00	169.56	169.56	-1.0076
IC20	171.67	0.00	171.67	171.67	1.0076
IC25	173.43	0.00	173.43	173.43	1.0076
IC40	177.75	0.00	177.75	177.75	1.0076
IC50	180.33	0.00	180.33	180.33	1.0076



Ceriodaphnia Acute Toxicity Test-48 Hr Immobilisation

Start Date:	11/11/2011 13:30	Test ID:	PR0812/01	Sample ID:	SAP HD
End Date:	13/11/2011 13:30	Lab ID:	5033	Sample Type:	WAF-Water Accommodated Fraction
Sample Date:		Protocol:	ESA 101	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Dose-Response Plot



Ceriodaphnia Acute Toxicity Test-48 Hr Immobilisation

Start Date:	11/11/2011 13:30	Test ID:	PR0812/01	Sample ID:	SAP HD
End Date:	13/11/2011 13:30	Lab ID:	5033	Sample Type:	WAF-Water Accommodated Fraction
Sample Date:		Protocol:	ESA 101	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Auxiliary Data Summary

Conc-g/L	Parameter	Mean	Min	Max	SD	CV%	N
DMW Control	% Survival	100.00	100.00	100.00	0.00	0.00	4
DMW (Stirred)		100.00	100.00	100.00	0.00	0.00	4
130		100.00	100.00	100.00	0.00	0.00	4
250		0.00	0.00	0.00	0.00		4
500		0.00	0.00	0.00	0.00		4
1000		0.00	0.00	0.00	0.00		4
2000		0.00	0.00	0.00	0.00		4
DMW Control	pH	8.30	8.30	8.30	0.00	0.00	1
DMW (Stirred)		8.30	8.30	8.30	0.00	0.00	1
130		7.90	7.90	7.90	0.00	0.00	1
250		7.70	7.70	7.70	0.00	0.00	1
500		7.70	7.70	7.70	0.00	0.00	1
1000		7.70	7.70	7.70	0.00	0.00	1
2000		7.70	7.70	7.70	0.00	0.00	1
DMW Control	DO %	94.70	94.70	94.70	0.00	0.00	1
DMW (Stirred)		94.70	94.70	94.70	0.00	0.00	1
130		94.10	94.10	94.10	0.00	0.00	1
250		95.50	95.50	95.50	0.00	0.00	1
500		97.10	97.10	97.10	0.00	0.00	1
1000		98.00	98.00	98.00	0.00	0.00	1
2000		97.00	97.00	97.00	0.00	0.00	1
DMW Control	Cond uS/cm	177.50	177.50	177.50	0.00	0.00	1
DMW (Stirred)		175.50	175.50	175.50	0.00	0.00	1
130		152.20	152.20	152.20	0.00	0.00	1
250		156.80	156.80	156.80	0.00	0.00	1
500		196.50	196.50	196.50	0.00	0.00	1
1000		266.00	266.00	266.00	0.00	0.00	1
2000		437.00	437.00	437.00	0.00	0.00	1

ecotox
SERVICES AUSTRALASIA

Statistical Printouts for the *Selenastrum* Growth Inhibition Tests

Microalgal Growth inhibition Test-Growth-Cell Yield

Start Date:	22/11/2011 13:30	Test ID:	PR0812/03	Sample ID:	SAP HD
End Date:	25/11/2011 13:30	Lab ID:	5033	Sample Type:	WAF-Water Accommodated Fraction
Sample Date:		Protocol:	ESA 103	Test Species:	SC-Selenastrum capricornutum
Comments:					

Conc-mg/L	1	2	3	4
USEPA Control	862066	823066	1084066	1114066
USEPA (Stirred)	1363066	1387066	1234066	1270066
6.3	1726066	1195066	1744066	1480066
12.5	1489066	1357066	1747066	1381066
25	1069066	1303066	1222066	832066
50	766066	556066	469066	637066
100	103066	52066	109066	106066
200	19066	103066	25066	28066

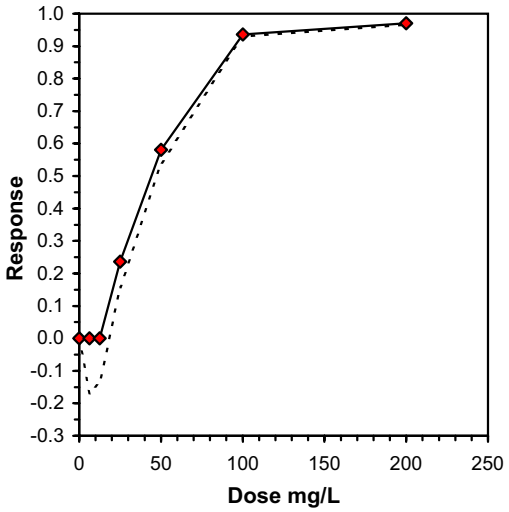
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
USEPA Control	970816	0.7391	970816	823066	1114066	15.394	4					
USEPA (Stirred)	1313566	1.0000	1313566	1234066	1387066	5.571	4	*			1447816	1.0000
6.3	1536316	1.1696	1536316	1195066	1744066	16.755	4	-2.054	2.451	265830.7	1447816	1.0000
12.5	1493566	1.1370	1493566	1357066	1747066	11.950	4	-1.660	2.451	265830.7	1447816	1.0000
25	1106566	0.8424	1106566	832066	1303066	18.718	4	1.909	2.451	265830.7	1106566	0.7643
*50	607066	0.4622	607066	469066	766066	20.799	4	6.515	2.451	265830.7	607066	0.4193
*100	92566	0.0705	92566	52066	109066	29.288	4	11.260	2.451	265830.7	92566	0.0639
*200	43816	0.0334	43816	19066	103066	90.553	4	11.709	2.451	265830.7	43816	0.0303

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.959054	0.924	-0.35567	0.75886
Bartlett's Test indicates equal variances (p = 0.01)	16.23194	16.81189		
The control means are significantly different (p = 6.22E-03)	4.11957	2.446912		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	25	50	35.35534		265830.7	0.202373	1.63E+12	2.35E+10	9.7E-13	6, 21
Treatments vs USEPA (Stirred)										

Linear Interpolation (200 Resamples)

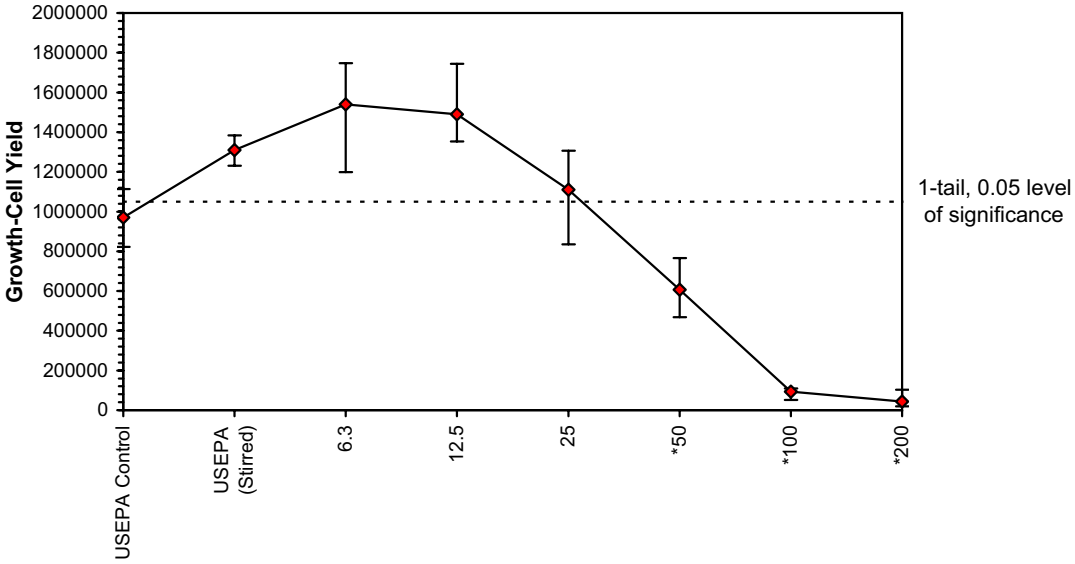
Point	mg/L	SD	95% CL(Exp)		Skew
IC05	15.152	1.643	7.881	18.677	0.3728
IC10	17.803	2.095	11.762	24.894	1.2105
IC15	20.455	2.586	14.195	30.128	0.9315
IC20	23.107	2.942	16.085	33.745	0.6009
IC25	26.036	3.345	17.207	36.421	0.2938
IC40	36.906	3.691	21.418	44.438	-0.7967
IC50	44.152	3.148	34.654	53.251	0.2306



Microalgal Growth inhibition Test-Growth-Cell Yield

Start Date:	22/11/2011 13:30	Test ID:	PR0812/03	Sample ID:	SAP HD
End Date:	25/11/2011 13:30	Lab ID:	5033	Sample Type:	WAF-Water Accommodated Fraction
Sample Date:		Protocol:	ESA 103	Test Species:	SC-Selenastrum capricornutum
Comments:					

Dose-Response Plot



Microalgal Growth inhibition Test-Growth-Cell Yield

Start Date:	22/11/2011 13:30	Test ID:	PR0812/03	Sample ID:	SAP HD
End Date:	25/11/2011 13:30	Lab ID:	5033	Sample Type:	WAF-Water Accommodated Fraction
Sample Date:		Protocol:	ESA 103	Test Species:	SC-Selenastrum capricornutum
Comments:					

Auxiliary Data Summary

Conc-mg/L	Parameter	Mean	Min	Max	SD	CV%	N
USEPA Control	Cell Yield	97.08	82.31	111.41	14.94	3.98	4
USEPA (Stirred)		131.36	123.41	138.71	7.32	2.06	4
6.3		153.63	119.51	174.41	25.74	3.30	4
12.5		149.36	135.71	174.71	17.85	2.83	4
25		110.66	83.21	130.31	20.71	4.11	4
50		60.71	46.91	76.61	12.63	5.85	4
100		9.26	5.21	10.91	2.71	17.79	4
200		4.38	1.91	10.31	3.97	45.46	4
USEPA Control	pH	7.50	7.50	7.50	0.00	0.00	1
USEPA (Stirred)		7.20	7.20	7.20	0.00	0.00	1
6.3		7.20	7.20	7.20	0.00	0.00	1
12.5		7.10	7.10	7.10	0.00	0.00	1
25		7.10	7.10	7.10	0.00	0.00	1
50		7.10	7.10	7.10	0.00	0.00	1
100		7.00	7.00	7.00	0.00	0.00	1
200		7.20	7.20	7.20	0.00	0.00	1
USEPA Control	Conductivity uS/cm	97.00	97.00	97.00	0.00	0.00	1
USEPA (Stirred)		91.50	91.50	91.50	0.00	0.00	1
6.3		89.80	89.80	89.80	0.00	0.00	1
12.5		89.10	89.10	89.10	0.00	0.00	1
25		88.40	88.40	88.40	0.00	0.00	1
50		92.20	92.20	92.20	0.00	0.00	1
100		104.40	104.40	104.40	0.00	0.00	1
200		118.90	118.90	118.90	0.00	0.00	1

ecotox
SERVICES AUSTRALASIA

Statistical Printouts for the Larval Fish Imbalance Tests

Fish Imbalance Test-96 hr Imbalance

Start Date:	5/12/2011 15:00	Test ID:	PR0812/06	Sample ID:	SAP HD
End Date:	9/12/2011 15:00	Lab ID:	5033	Sample Type:	WAF-Water Accommodated Fraction
Sample Date:		Protocol:	ESA 117	Test Species:	MS-Melanotaenia splendida
Comments:					

Conc-mg/L	1	2	3	4
DMW Control	1.0000	1.0000	1.0000	1.0000
DMW (stirred)	1.0000	0.8000	1.0000	1.0000
125	1.0000	1.0000	1.0000	1.0000
250	0.6000	1.0000	1.0000	1.0000
500	0.4000	0.6000	0.2000	0.2000
1000	0.0000	0.0000	0.0000	0.0000
2000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
DMW Control	1.0000	1.0526	1.3453	1.3453	1.3453	0.000	4				
DMW (stirred)	0.9500	1.0000	1.2857	1.1071	1.3453	9.261	4	*		1	20
125	1.0000	1.0526	1.3453	1.3453	1.3453	0.000	4	20.00	10.00	0	20
250	0.9000	0.9474	1.2305	0.8861	1.3453	18.660	4	17.50	10.00	2	20
*500	0.3500	0.3684	0.6245	0.4636	0.8861	32.527	4	10.00	10.00	13	20
1000	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4			20	20
2000	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4			20	20

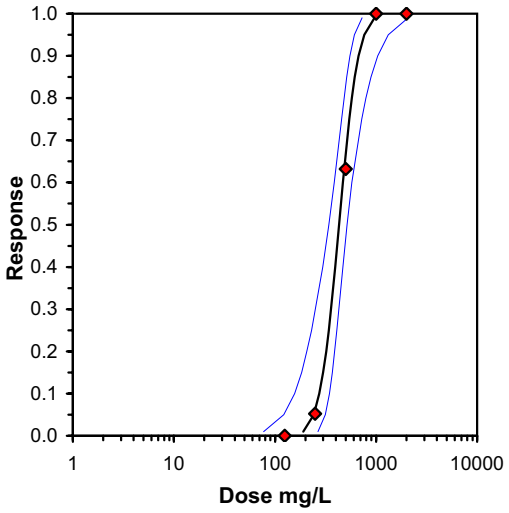
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.916211	0.887	-0.75655	0.906958
Equality of variance cannot be confirmed				
The control means are not significantly different (p = 0.36)	1	2.446912		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	250	500	353.5534	
Treatments vs DMW (stirred)				

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	6.61214	1.675179	3.32879	9.89549	0.05	0.829996	7.814728	0.84	2.63358	0.151237	4
Intercept	-12.4136	4.457058	-21.1494	-3.67776							
TSCR	0.026966	0.02553	-0.02307	0.077004							

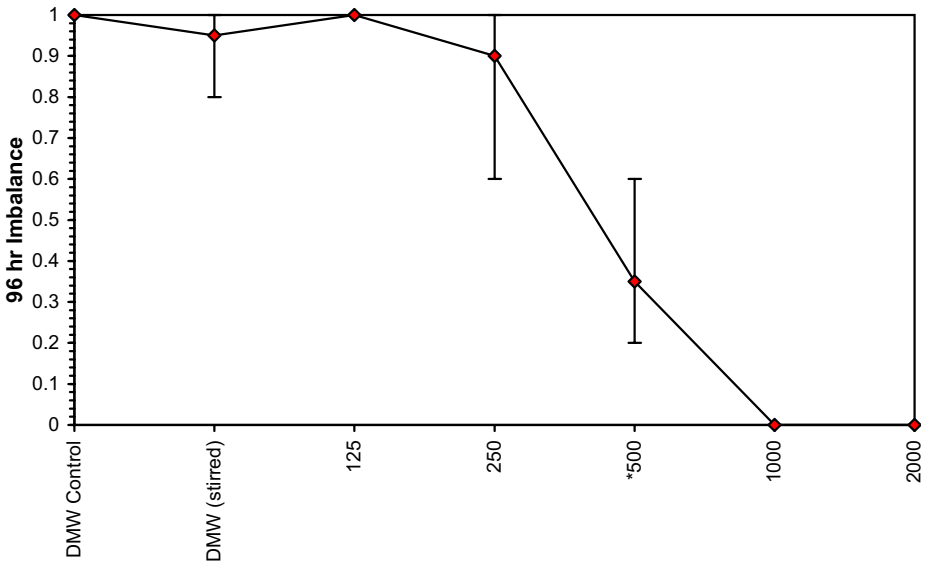
Point	Probits	mg/L	95% Fiducial Limits	
EC01	2.674	191.3155	77.17023	265.5934
EC05	3.355	242.559	122.242	314.806
EC10	3.718	275.272	155.6616	345.8879
EC15	3.964	299.8009	182.7848	369.4734
EC20	4.158	320.8454	207.2401	390.1755
EC25	4.326	340.0731	230.3401	409.696
EC40	4.747	393.7899	296.6802	469.4798
EC50	5.000	430.1105	340.6091	516.8441
EC60	5.253	469.781	385.1911	577.6299
EC75	5.674	543.9861	456.2383	719.7944
EC80	5.842	576.5863	483.1228	793.3049
EC85	6.036	617.0596	513.9204	892.9195
EC90	6.282	672.0444	552.4683	1041.855
EC95	6.645	762.6806	610.5915	1318.916
EC99	7.326	966.9631	727.6925	2077.862



Fish Imbalance Test-96 hr Imbalance

Start Date:	5/12/2011 15:00	Test ID:	PR0812/06	Sample ID:	SAP HD
End Date:	9/12/2011 15:00	Lab ID:	5033	Sample Type:	WAF-Water Accommodated Fraction
Sample Date:		Protocol:	ESA 117	Test Species:	MS-Melanotaenia splendida
Comments:					

Dose-Response Plot



Fish Imbalance Test-96 hr Imbalance

Start Date:	5/12/2011 15:00	Test ID:	PR0812/06	Sample ID:	SAP HD
End Date:	9/12/2011 15:00	Lab ID:	5033	Sample Type:	WAF-Water Accommodated Fraction
Sample Date:		Protocol:	ESA 117	Test Species:	MS-Melanotaenia splendida
Comments:					

Auxiliary Data Summary

Conc-mg/L	Parameter	Mean	Min	Max	SD	CV%	N
DMW Control	% Survival	100.00	100.00	100.00	0.00	0.00	4
DMW (stirred)		95.00	80.00	100.00	10.00	3.33	4
125		100.00	100.00	100.00	0.00	0.00	4
250		90.00	60.00	100.00	20.00	4.97	4
500		35.00	20.00	60.00	19.15	12.50	4
1000		0.00	0.00	0.00	0.00		4
2000		0.00	0.00	0.00	0.00		4
DMW Control	pH	8.10	8.10	8.10	0.00	0.00	1
DMW (stirred)		8.10	8.10	8.10	0.00	0.00	1
125		7.60	7.60	7.60	0.00	0.00	1
250		7.40	7.40	7.40	0.00	0.00	1
500		7.50	7.50	7.50	0.00	0.00	1
1000		7.50	7.50	7.50	0.00	0.00	1
2000		7.50	7.50	7.50	0.00	0.00	1
DMW Control	DO %	100.90	100.90	100.90	0.00	0.00	1
DMW (stirred)		99.90	99.90	99.90	0.00	0.00	1
125		95.40	95.40	95.40	0.00	0.00	1
250		98.70	98.70	98.70	0.00	0.00	1
500		95.70	95.70	95.70	0.00	0.00	1
1000		96.40	96.40	96.40	0.00	0.00	1
2000		95.90	95.90	95.90	0.00	0.00	1
DMW Control	Conductivity uS/cm	174.20	174.20	174.20	0.00	0.00	1
DMW (stirred)		174.50	174.50	174.50	0.00	0.00	1
125		151.70	151.70	151.70	0.00	0.00	1
250		156.40	156.40	156.40	0.00	0.00	1
500		187.20	187.20	187.20	0.00	0.00	1
1000		265.00	265.00	265.00	0.00	0.00	1
2000		426.00	426.00	426.00	0.00	0.00	1

Polymer Innovations Pty Ltd

A.B.N. 29 103 912 349

Hi,

Just to review how we apply Water$ave "PLUG":

- Budget for a minimum of 100 grams for every square metre of the surface area of the dam to be treated.
- We suggest using the recommended rate of product is far more economical and in most cases if we have a good understanding of the problem of each leak, our specific product formula will do its job and create a seal. If more product is required then extra can be purchased to accommodate this.
- Water$ave "PLUG" can be applied by hand directly onto the surface of the dam water. The product should not be broadcast more than 1.5 - 2 metres across the water. If the area is larger than 2 metres, you will require a boat to apply the product to the middle of the dam.
- No need to drain the dam, however the polymer needs a clear path to the soil, if you have any weeds, reeds, leaf litter or deep silt, you may need to remove these before application. Distribute it as if feeding the chooks (wind should be at a minimum) at the recommended rate.
- If you are able to identify where the leak is coming from, then it is commercially advantageous to treat these suspect areas first, we can always add more polymer to other areas at a later date if necessary.
- Please remember to wear gloves and a dust mask if desired and keep the product dry, it is easy to use although with a lineal polymer in there it can be quite sticky when subjected to moisture.

There is no guarantee on this product, but the product will have better results if:

- applied at a minimum rate of 100 grams m² over the water
- applied in an even coverage over the desired area
- It has the maximum water depth (minimum of 1 - 1.5 m)
- There is sufficient clay /soil
- the area is clear of all vegetation (weeds, reeds, grass, leaf litter, rubbish and silt (greater than 4 inches deep)) before application of the polymer.

This procedure will allow the polymer to be drawn directly into the clay/soil in the leaking areas without any obstacles inhibiting the water flow.

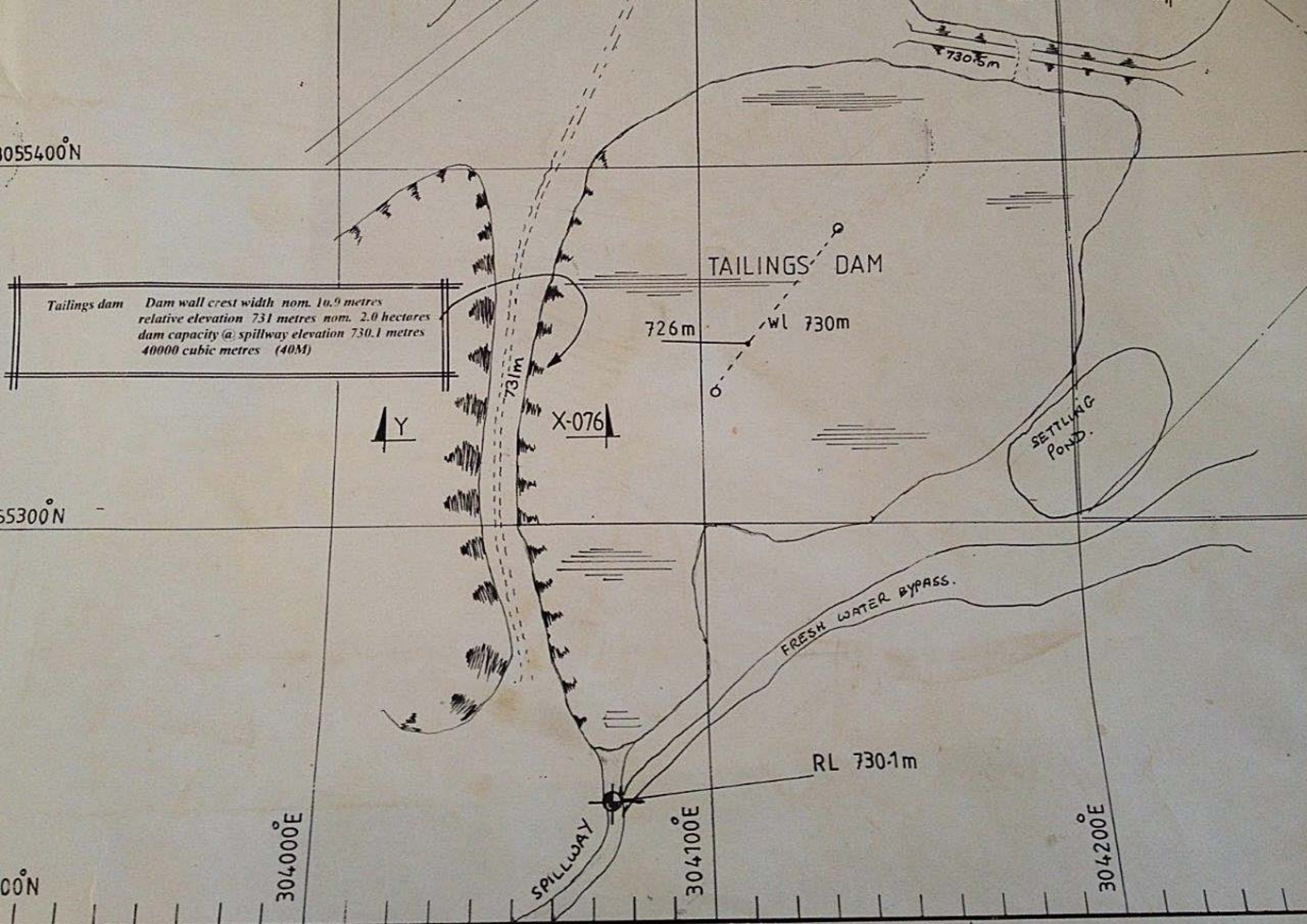
- W$Plug 20 kg bucket is $ 390.00 incl. GST (+ delivery charges) and covers up to 200 m².
- W$Plug-seep 19 kg bucket is $ 375.00 incl. GST (+ delivery charges) and covers up to 190 m².

If you are happy with our product please feel free to email or post us a testimonial along with any photos of your pond so that we can post them onto our website.
If you have any concerns or further questions feel free to contact us at any time.

Kind Regards

Brett Nichols

Brett Nichols
Sales Manager
Polymer Innovations Pty Ltd
PO Box 431, Singleton, NSW 2330
Ph: 02 6571 5177
FX: 02 6571 2505
E:brett@polymerinnovations.com.au
W: www.polymerinnovations.com.au


730.5m
3055400°N
TAILINGS DAM
Tailings dam Dam wall crest width nom. 10.9 metres
relative elevation 731 metres nom. 2.0 hectares
dam capacity @ spillway elevation 730.1 metres
40000 cubic metres (40M)
726m
wl 730m
731m
Y
X-076
SETTLING POND.
55300°N
FRESH WATER BYPASS.
RL 730.1m
304000°E
SPILLWAY
304100°E
304200°E
00°N

APPENDIX F: LANDHOLDER PERMISSION

Sarah Holt

Subject: FW: Compensation Payment due May 2014

From: Stephen Frost [mailto:stephen.frost@mgt.net.au]
Sent: Monday, 22 September 2014 5:42 PM
To: Sarah Holt
Subject: FW: Compensation Payment due May 2014

FYI

Landholder approval to pump upstream to dam

Regards

Stephen Frost

Health and Safety Officer
Mt Veteran Mill

MGT Mining Limited
PO Box 226, , Mt Garnet, Qld 4872.
Telephone : (07) 4097 9256
Mobile : 0428 965 458
Email : stephen.frost@mgt.net.au
Web: www.mgt.net.au

From: Gary Kuo
Sent: Thursday, 18 September 2014 11:29 AM
To: Stephen Frost; rod.finch@mgt.net.au
Subject: Fwd: Compensation Payment due May 2014

FYI

Sent from my HTC

----- Forwarded message -----
From: "Hot Springs Hotel Motel" <hotspringshotelmotel@skymesh.com.au>
To: "Gary Kuo" <gary.kuo@mgt.net.au>
Subject: Compensation Payment due May 2014
Date: Wed, Sep 17, 2014 5:07 PM

Hello Gary,

I give consent for your company to pump water from the Pump Pond back up to the Middle Dam.
Best regards
Roz Burtenshaw
For Coolgarra Station Mt Garnet