



DEPARTMENT OF REGIONAL DEVELOPMENT,  
PRIMARY INDUSTRY, FISHERIES AND RESOURCES

## **RESPONSE TO 2008 AUDIT REPORT:**

**“Technical review of the  
Independent Monitor Report for  
McArthur River Mine, October 2006 –  
September 2007”**

**January 2009**

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## Executive Summary

A review of the *Independent Monitor Audit Report of the McArthur River Mine, October 2006 – September 2007* (“the MRM IM Report”), submitted by the appointed Independent Monitor (IM) consultancy Environmental Earth Sciences Victoria, was undertaken by the Department of Regional Development, Primary Industry, Fisheries and Resources (“the Department”) in January 2009.

The review focused on the compliance and technical issues raised by the IM relating to the environmental condition, management and monitoring of the McArthur River Mine (“MRM” or “the Operator”) site by the Operator and regulatory overview by the Northern Territory Government (NTG).

The MRM IM Report covered the audit and assessment by the IM of four key aspects for the review period October 2006 to September 2007:

1. McArthur River Mine’s compliance-related procedures and systems.
2. The Department’s procedures and systems in relation to check monitoring of ground and surface water monitoring.
3. McArthur River Mine’s technical compliance with legislated conditions and commitments.
4. An overall assessment of the environmental performance of the site.

In its report only minor observations and comments were returned by the IM, with respect to the Department, indicating the robustness of its mine site environmental check monitoring program and other activities undertaken.

In relation to the activities of the Operator, the IM identified a number of issues for the period October 2006 to September 2007 including:

- larval mosquito monitoring programs;
- the improvement of monitoring programs;
- MRM dust management and monitoring;
- Bing Bong dredge spoil management;
- marine monitoring;
- placement of woody debris in the McArthur channel;
- soil monitoring data;
- groundwater monitoring program; and
- the extent of disturbance and or rehabilitation.

A number of issues identified by the IM for the 2006/07 period, were previously identified by the Department, who in turn had sought improvements from the Operator via its assessment and approval process for the company’s next Mining Management Plan (MMP) covering its 2007/08 activities, and its Annual Environmental Report (AER).

The Department uses MMPs, AERs, and the broader *Mining Management Act* to encourage operators to implement best practice methods, systems and processes into their activities. This in turn facilitates continuous improvement and is consistent with the Act’s co-regulatory approach.

Having reviewed the findings of the MRM IM report, the department is of the view that issues raised have, or are, being addressed by the Operator and the Department via a process of continual improvement, and that no significant environmental impact has occurred.



## Table of Contents

1	Output.....	1
1.1	Review focus.....	1
2	General overview of the Report.....	1
2.1.1	Discussion of the IM process .....	1
3	Issues relating to NTG process and regulation.....	3
3.1	Procedural documentation relating to check monitoring:.....	3
3.2	Departmental monitoring – analytical suites.....	4
3.2.1	IM recommends matching analysis suites.....	4
3.2.2	Matching ground and surface water analysis suites.....	4
3.2.3	Comparison and assessment of Operator and Departmental data .....	5
4	McArthur River Mine technical compliance.....	5
4.1	Improvement of monitoring programs.....	5
4.2	MRM dust management .....	6
4.2.1	Dust monitoring gaps .....	6
4.2.2	Dust generated by the tailings storage facility (TSF);.....	7
4.3	Bing Bong dredge spoil management .....	7
4.4	Marine monitoring.....	8
4.5	Placement of woody debris in the McArthur channel.....	8
4.6	Soil monitoring data.....	9
4.7	Groundwater monitoring program.....	9
4.8	Extent of disturbance information and/or rehabilitation.....	9



## 1. OUTPUT

A review of the *Independent Monitor Audit Report of the McArthur River Mine, October 2006 – September 2007* (“the MRM IM Report”), submitted by the appointed Independent Monitor (IM) consultancy Environmental Earth Sciences Victoria (EES), was undertaken by the Department of Regional Development, Primary Industry, Fisheries and Resources (DRDPIFR – “the Department”) in January 2009.

This review focuses on the compliance and technical issues raised by the IM relating to the environmental condition, management and monitoring of the McArthur River Mine (“MRM” or “the Operator”) site by the Operator and regulatory overview by the Northern Territory Government (NTG).

This review does not address the relevance or otherwise of the report to the stated scope of works for the Independent Monitor, nor compliance with agreed timelines as set out in the contract.

### 1.1 Review focus

Whilst only minor observations and comments were returned by the IM, indicating the robustness of the Department’s mine site environmental check monitoring program, it is still considered essential by the Department to benefit from the observations and recommendations made by the Independent Monitor with regards to the Operator.

The review provides a discussion of the following three aspects:

- General overview of the MRM IM Report.
- Issues identified by the IM specifically relating to NTG process and regulation.
- Issues identified by the IM specifically relating to the McArthur River Mine’s environmental condition, process and performance.

## 2 GENERAL OVERVIEW OF THE REPORT

The MRM IM Report covers the audit and assessment by the IM of four key aspects:

1. McArthur River Mine’s compliance-related procedures and systems.
2. The Department’s procedures and systems in relation to check monitoring of ground and surface water monitoring.
3. McArthur River Mine’s technical compliance with legislated conditions and commitments.
4. An overall assessment of the environmental performance of the site.

Whilst not considered a substantially researched or well supported document, it none the less makes a number of valuable observations regarding the environmental management aspects of the McArthur River Mine site.

### 2.1.1 Discussion of the IM process

Three elements are considered by the Department to have the capacity to influence or potentially improve the independent review process for future iterations. They include:

- A recognition of the co-regulatory environment in which the Territory Government manages mining operational performance;
- The potential to improve the scope of assessment by expanding the number of documents assessed by the IM; and
- The timescale over which performance is to be reviewed.

## **A co-regulatory environment and continuous improvement processes;**

The reiteration of the departmental comments by the Independent Monitor regarding the appropriate interpretation and analysis of ground and surface water and other environmental monitoring data serves to illustrate the ongoing consultation undertaken between the Regulator and the Operator during the assessment period of this report.

The IM correctly points out that the department has identified substantial areas for improvement in the Operator's reporting and management systems. To date, operational monitoring, interpreted by the department in association with governmental check monitoring data has indicated no significant adverse off site environmental impacts as a result of activities on site approved under the current Authorisation, and as such significant regulatory intervention has not been warranted.

However, the recognition of these deficiencies in the Operator's reporting have resulted in the requirement for substantial rewriting and resubmission of the Operator's Annual Environment Report (AER) in 2006 and 2007.

Consistent with the *Mining Management Act's* co-regulatory approach and requirement for continual improvement, issues were referred back to the Operator to be addressed to improve future submissions. The most recent submission, of the AER, although outside the time scope of the IM's review, has demonstrated the success of this approach with significant improvement in the interpretation of the environmental conditions on site and associated management activities.

## **Taking full advantage of available data**

Although provided with comprehensive inventories of reports held by the Department, it is of concern that the Independent Monitor limited the selection of these documents on which to base its findings. A reminder to the IM regarding their availability was made, however no further requests for documents were received.

Similarly the Operator, MRM has identified a number of occasions where conclusions were made without the IM taking the opportunity to review all available documentation, as was the case with (but not limited to):

- soil monitoring;
- the analysis and interpretation of results for potable water, seawater and artificial water monitoring programs;
- procedural documentation e.g. sampling manual, training procedures, staff training records;
- laboratory transcripts, chain of custody forms and quality assurance/control interpretation of results;
- field observation data for water in bores on site;

It is considered that should this data have been requested, that a full evaluation may have returned a different and potentially more informed assessment of site processes.

## Meeting the timeframe of the document

Whilst the terms of reference clearly state that the Independent Monitor's review period encompasses October 2006 to September 2007, the department recognises the challenge faced by the IM to keep the assessment within this timeframe as aspects that are identified as issues, may have been remedied since this time e.g. dusting from tailings storage facility cell one, whilst being an issue during the period of the report, has subsequently been addressed by the capping of the cell in 2008.

It is clear that the IM in some instances stepped outside the terms of reference in an effort to provide a more up to date interpretation to the community.

## 3 ISSUES RELATING TO NTG PROCESS AND REGULATION

The IM identified the following issues in the report:

- procedural documentation relating to check monitoring;
- departmental monitoring program analytical suite recommendations;
- the matching of Departmental and Operator monitoring programs;
- recommending ground and surface water analysis suites be identical; and
- the review of check monitoring and Operator analysis results.

### 3.1 Procedural documentation relating to check monitoring:

The Department undertakes what is termed a "check monitoring" of selected mine sites within the Northern Territory. This involves the collection of surface and groundwater samples by the Department's Environmental Monitoring Unit for field measurements and subsequent analysis by a National Association of Testing Authorities (NATA) approved laboratory.

These water quality results are then compared against environmental water quality data supplied by MRM to "check" that the mine site's water quality data is comparable and provide the Department with confidence regarding the overall site data supplied by the Operator. The departmental monitoring also enables interpretation of trends for validation against the Operator's reported performance.

The IM report indicated the following:

*"The audit of the check monitoring systems and procedures used by DRDPIFR revealed that, although sampling techniques used in the field were satisfactory, the procedural documentation for undertaking the work, that is sample manuals, training manuals, training procedures and checking competency of staff, was not in evidence at the time of inspection"* (Excerpt Section 4.1.2, pp10, EES, 2008)

It is noted in Section 4.1.2 of the report that these procedural documents pertaining to the check monitoring were provided by the DRDPIFR after the inspection.

Sampling procedures for field work detailing all processes (through instrument calibration to sample preservation) are stored in the Environmental Monitoring Unit's electronic filing directory. This material was provided to the IM following the inspection.

The noted absence of a training manual has been corrected. A current training manual existed at the time of inspection however it was omitted from the files provided to the IM at the time of review.

### **3.2 Departmental monitoring – analytical suites**

The MRM IM Report indicates (Section 6.1 Recommendations, pp29, EES, 2008) that:

*“The check-monitoring undertaken by DRDPIFR can be improved principally by ensuring that the analytical suites used by DRDPIFR match with those listed in the MRM monitoring requirements, and that the results of the DRDPIFR monitoring are assessed internally against the results provided by MRM (for each commensurate monitoring event).”*

It is considered that the report and this comment raises three separate issues:

- the IM recommendation that the Department’s water quality monitoring analysis suites should match those of MRM’s;
- the IM’s recommendation that the Operator’s ground and surface water monitoring suites be identical, and by extension from the previous point, that the Department’s suite matches this; and
- the subsequent comparison and assessment of the Department’s check monitoring results against those reported by MRM.

#### **3.2.1 IM recommends matching analysis suites**

The validity of this assertion is questioned by the Department on the following grounds. The analytical suite is selected on a mine by mine basis with recognition of the dominant analytes within that water body reflective of mining process and surrounding geochemistry.

For the MRM site, the Department’s elements of interest are the same as the suite of metals outlined by the IM with the exception of Hg (Mercury) and Mg (Magnesium). The IM’s inclusion of Hg is queried and the Department considers that this may be a typographical error and may be intended to read Mg as our analytical suite includes Mg and not Hg.

The only element missing from the suite put forward by the IM (apart from Hg) is NO<sub>3</sub> (nitrates). In this instance the significant contribution of agricultural properties upstream renders the evaluation of NO<sub>3</sub> in an annual monitoring program by the Department meaningless and the department relies on the operational monitoring of this due to the frequency of their program.

As a check monitoring exercise it is considered in this instance that a suite with overlap of 8 of 9 elements is sufficient to assess reliability of data and monitoring.

The Department reviews the suite of elements annually during the mine site environmental monitoring program review, and periodically when results returned from a sampling event (Department or Operator) indicate significant changes in concentrations.

Should a significant change in concentration occur, this will trigger the collection of a broad semi quantitative scan in the next sampling trip which provides parts per billion (ppb) concentrations of 67 elements.

#### **3.2.2 Matching ground and surface water analysis suites.**

The IM has recommended that the MRM ground and surface water analysis suites match with the inference that the Department’s analytical suites should match that of MRM.

The Department considers it unnecessary for ground and surface water sample suites to match particularly for ephemeral streams with little or no groundwater influence. The inclusion of cations in the analysis suite is only considered beneficial in this instance with respect to groundwater and groundwater fed ephemeral streams and not as such particularly relevant to surface water runoff. The inclusion of cations in all suites will provide no substantial scientific benefit, and has significant cost implications that would divert the Department's resources away from the meaningful assessment of other Northern Territory mine sites.

### **3.2.3 Comparison and assessment of Operator and Departmental data**

The IM has indicated a requirement for the comparison and assessment of the Department's check monitoring results against those reported by MRM.

Assessment of both site and Departmental analytical data is undertaken as received throughout the year and a formal annual review of all data forms part of the Department's annual mine site review and monitoring program assessment. Additional formal comparison is undertaken with the review of the Operator's annually submitted Annual Environmental Report (AER). As the IM has been in contact with the Department's technical staff on a regular basis regarding the results from the comparison of the data, it is unclear as to the basis of this observation.

## **4 MCARTHUR RIVER MINE TECHNICAL COMPLIANCE**

The IM identified a number of issues in its audit report. Those issues discussed in this review include:

- larval mosquito monitoring programs;
- the improvement of monitoring programs;
- MRM dust management and monitoring;
- Bing Bong dredge spoil management;
- marine monitoring;
- placement of woody debris in the McArthur channel;
- soil monitoring data;
- groundwater monitoring program; and
- detailed information on the extent of disturbance and or rehabilitation.

### **4.1 Larval mosquito monitoring programs**

MRM are required to undertake the larval mosquito monitoring programs committed to in the environmental assessment process. It was determined by the IM that this had not been addressed.

Progress against this commitment will be assessed in the upcoming submission to the Department of the Annual Environmental Monitoring Report and the Mining Management Plan by MRM.

### **4.2 Improvement of monitoring programs**

The IM provided the following comment:

*"... the Independent Monitor has identified several monitoring programs that can be improved to be more effective and a number of environmental issues that require rectification (corrective action) over the next 3-5 years" (Executive Summary):*

#### *Improved monitoring:*

- improved technical review of all water monitoring data around the mine, in particular the assessment of seepage from the tailings storage facility (TSF) into Surprise Creek.

#### *Corrective action:*

- reduction and improved management and subsequent reduction of fugitive dust emissions at the Bing Bong load-out facility;
- Improvement of dust management practices, particularly at the (TSF); and
- Improved management and rehabilitation of the dredge spoil dump at the Bing Bong facility.”

The Department notes that corrective action is recommended with a 3-5 year outlook.

Under the *Mining Management Act 2008* (the “MMA”), an approval is provided upon acceptance of a document consistent with s40 or s41 of the MMA. If required supplementary documentation will be requested (s53). During the approval process of the 2007/2008 Mining Management Plan (MMP), a request for supplementary information and reports for approval purposes was made. Some 11 documents in addition to the MMP were submitted.

Submission and assessment of annual MMPs and additional information, including providing feedback during the assessment process is conducted with continual improvement in mind to achieve progression in the overall performance of an operation, and is articulated in s3(c) of the MMA.

Approval of the 2007/2008 MMP required the submission of some 114 commitments, many relating to the points above. Evidence of improvement is normally provided in an annual MMP submission.

Improvements and any necessary corrective actions will be progressed during the assessment and review of the 2008/2009 MMP.

### **4.3 MRM dust management**

Dust management was considered as significant by the IM with the audit report noting two issues:

- dust monitoring data gaps; and
- dust generated by the tailings storage facility (TSF).

#### **4.3.1 Dust monitoring gaps**

The IM provided the following comments (Section 4.5.5a, Dust monitoring, pp17, EES, 2008):

*“As specified in Table 4-1 of the AER, dust monitoring should occur every 28-32 days at the 16 locations named, with analysis for total insoluble matter, total solids (assumed to be in g/m<sup>2</sup>/month), total Pb and total Zn.*

*Although some results of total Pb and Zn analysis have been provided, the charts presented in the AER (MRM 2008) provide no indication of the concentrations of total insoluble matter and total solids, and there are monitoring data gaps where either some or all of the results are missing for that time period. If concentrations recorded during the “missing time frames” were below the laboratory detection limit or other issues impeded the reporting of these results, this has not been reported.”*

This matter was brought to the attention of the Operator by the Department for response in the submission of the previous MRM Annual Environmental Report (AER). The requirement for MRM to submit an expanded scope AER addressing a number of issues identified by the Department was met with the submission of the significantly improved 2008 AER.

Concentrations of total insoluble matter and total solids have been included in the AER as requested by the Department.

In relation to the monitoring gaps (assumed to be attributed to access issues during the Wet Season), the reason no data was collected during these time periods was not referenced by the Operator in the AER 2008, and is recognised as a deficiency in the data. The Department notes the IM's observation and will request the Operator to provide an explanation and associated actions for the 2008 AER resubmission in February 2009.

#### **4.3.2 Dust generated by the tailings storage facility (TSF);**

The MRM IM report stated that (Section 4.5.5a, Dust monitoring, pp17, EES, 2008):

*“Observations by the Independent Monitor in May 2008 of the significant amounts of dust generated from the tailings storage facility (TSF), indicate that dust management practices are a critical requirement for measuring the environmental performance of the operation and must be improved, particularly during the drier months of April-November (refer to photograph plates in Appendix D). The Independent Monitor acknowledges that approximately 15 hectares of Cell 1 of the TSF has undergone rehabilitation, which should reduce dust generation in the vicinity of the TSF during the dry season”.*

Dust generated by the TSF was raised in the Department's response to the submission of the 2007 AER by the Operator. This was required to be addressed in a subsequent submission. In response to this issue the Operator commenced the rehabilitation/capping of cell 1 of the TSF in September 2008 and this is anticipated to significantly reduce the quantity of dust generated. This is accompanied by a commitment to improved monitoring equipment maintenance and assessment of effectiveness in 2009.

#### **4.4 Bing Bong dredge spoil management**

It is considered that MRM adequately addressed the IM's report regarding the management of the dredge spoil at Bing Bong in as far as they were able. The comments provided by the IM are somewhat vague and it is unclear what the issues of concern are.

It is noted however that the Department has requested specific information from the Operator regarding the delay in rehabilitation research and potential for progressive rehabilitation of the dredge spoil area, as indicated in the following response to the Operator from the Department:

*“It is unfortunate the research into dredge spoil revegetation is postponed until further notice due to ongoing dredging commitments. Having prior knowledge of successful planting strategies and vegetation requirements should enable progressive rehabilitation and even some trial plots to be established so when full scale rehabilitation is required it doesn’t have to go through exhaustive trial and error”.*

#### **4.5 Marine monitoring**

In Section 4.2.6 (Marine monitoring pp19-22) of its audit report the IM raised a number of concerns regarding research into:

- metal concentrations and Pb-isotope ratios in beach sediments;
- element concentrations in seawater, sediment and oysters; and
- diffusion gradients in thin-film (DGT) devices to monitor bioavailability of metals in seawater.

The Department notes that Parry & Munksgaard have published extensively in the field of trace metal and stable lead isotope analysis.

The Department acknowledges that Charles Darwin University (CDU) standard sediment ICPMS analysis utilises a perchloric/nitric acid digestion which gives a ‘pseudo-total’ metal concentration analysis. Whilst hydrofluoric acid extracts metals from all silicates, it presents additional health and safety issues as hydrofluoric acid is extremely corrosive and a contact poison. As such the acid should be handled with extreme care, beyond that accorded to other mineral acids, in part because of its low dissociation constant, which allows hydrofluoric acid to penetrate tissue more quickly.

The Department agrees with CDU’s interpretation that the trace metal concentration must be in conjunction with stable lead isotope ratios, which are highly sensitive to anthropogenic influence. In this case the anthropogenic influence would be the MRM ore body. The Department considers this method to be acceptable standard practice in the field.

#### **4.6 Placement of woody debris in the McArthur channel**

In Section 4.2.10 (Civil works pp25-26) of the audit report the IM stated the following:

*“During the site inspections, the Independent Monitor observed that large woody debris (LWD) had been emplaced at the minimum number of locations in the Barney Creek diversion, however no LWD was observed within the McArthur River diversion, which was a requirement of the approvals process.”*

This issue was originally identified by the Department in comments returned for the MRM 2008 AER to be addressed prior to acceptance. The comments provided were as follows:

*“Does the absence of Civil contractors in 2009 indicates that outstanding commitments with respect to the placement of large woody debris will not be met?”; and;*

*“It would be beneficial to include a subsection on large woody debris emplacement and stabilisation success as well as some ongoing (annual) channel morphology assessment. It is important to measure the transition from engineered channel to “natural” channel through habitat development and re-establishment of natural river processes”.*

This issue will require addressing in the resubmission of the 2008 MRM AER in February 2009.

#### **4.7 Soil monitoring data**

It was noted by the IM that soil monitoring data was considered insufficient for an appropriate assessment of the area. As stated by MRM in its response to the audit report, this issue has been addressed in the most recent AER, 2008 submitted to the department in October 2008 (which as mentioned above is to be re-submitted in February 2009).

#### **4.8 Groundwater monitoring program**

The IM has reiterated an observation made by the Department in response to the MRM 2007 AER with respect to the company's groundwater monitoring program, interpretation of groundwater data and specifically the issue of "T" bores not being sampled.

This issue has been partially addressed in both the 2007 and 2008 AERs and a request by the Department has been forwarded to MRM to finalise information for the resubmission of the 2008 AER in February 2009.

Comments provided by the Department included:

In review of 2005-07 AER, the lack of interpretation of groundwater was identified as a significant omission; and

*"In both the 2005-07 and 2005-08 AER reviews, we identified the importance of MRM engaging a qualified hydrogeologist (with mining industry experience) to evaluate the current groundwater status and advise future monitoring programs, chemical analyses and monitoring locations".*

Acceptance of the submitted document will be contingent on a response demonstrating sufficient technical rigour with regard to these issues and others identified in the response letter to the Operator.

It should be noted that two previous submissions of the MRM AER have been rejected by the Department. This rejection was consistent with the objectives of the *Mining Management Act*, "... to assist the mining industry to implement programs of continuous improvement to achieve best practice environmental management".

As stated earlier, issues identified will require addressing by the company in the resubmission of its 2008 AER in February 2009.

Operational monitoring in association with the NT Government's monitoring program, did not indicate significant adverse environmental affects and as such, consistent with departmental policy, was referred back to the Operator to be addressed via a process of continual improvement for further submissions.

#### **4.9 Extent of disturbance information and/or rehabilitation**

In the report, the IM noted that *"The AEMR (AER) does not provide any detailed information on the total extent of disturbance information and or rehabilitation"*.

A plan and costing of closure activities is provided to the Department as detailed sections within annual MMPs. This includes disturbance information, rehabilitation conducted and a calculation of security. Submission of this information is required under the MMA and placement in the MMP is consistent with the MMA.