



DEPARTMENT OF RESOURCES

***Independent Monitor Audit of the  
Environmental Performance of the  
McArthur River Mine:  
2009 Operational Period***

**DEPARTMENTAL RESPONSE TO  
THE AUDIT REPORT**

**October 2010**



## Executive Summary

A review of the *Independent Monitor Audit Report - Environmental Performance of the McArthur River Mine - 2009 Operational Period* (the 2010 Audit Report), prepared by the appointed Independent Monitor (IM) and submitted to the NT Government in September 2010, was undertaken by the Department of Resources (DoR) in October 2010.

The departmental 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) site by McArthur River Mining Pty Ltd (the operator) and regulatory overview by DoR.

In the 2010 Audit Report the IM stated that the operator had demonstrated a high level of conformance with respect to procedures and systems, as assessed through the provision of evidence of the works undertaken and commitments to undertake further work or continual improvement. Of the 64 commitments given by the operator in the 2008–09 MMP, only four were assessed to be non-compliant. This was due to the operator providing insufficient information or evidence of works. Assessed non-conformances included:

- the monitoring of a potential sedimentation zone in the McArthur River downstream of the Bukalara Range;
- the installation of lysimeters in the Overburden Emplacement Facility at various stages to monitor water infiltration;
- water quality and sediment monitoring at the Overburden Emplacement Facility dams; and
- undertaking kinetic leach testing on-site and laboratory columns.

In the 2010 Audit Report, the IM commended the operator for taking actions to reduce the level of risk assessment related to the Bing Bong dredge spoil area, in particular the significant improvements made to the drainage system at the site. A further reduced risk related to the classification of waste rock prior to placement at the Overburden Emplacement Facility. However, like most mines of a similar size and complexity to that of the MRM operation, a range of potential risks from high to low were identified as part of the IM's applied risk assessment process. It is important that such risk assessments are undertaken and reviewed routinely. However, it is also important to make the distinction that such risks are able to be reduced and mitigated over time in line with the application by the operator of best practice methods, systems and processes.

With respect to two issues identified in the previous 2009 Audit Report requiring urgent investigation; seepage from the Tailings Storage Facility (Cell 1) into Surprise Creek; and saline discharge through the dredge spoil dam walls at Bing Bong Port); both the IM and DoR are satisfied that works being undertaken by the operator are assisting to mitigate these issues.

In relation to assessing the regulatory performance of DoR, the IM found that the department had demonstrated thorough administrative procedures as part of its assessment of mining management documentation for the MRM operation, indicating the robustness of its mine site evaluation process.

The IM concluded its report by stating that many improvements had been made to the environmental performance of MRM since its last audit. The department welcomes this finding and is supportive of the majority of recommendations for further improvement put forward in the IM's 2010 Audit Report. Information provided in the report will be used by the department in its review of the operator's Mining Management Plan covering the 2010–2011 operating period.

Having reviewed the findings of the 2010 Audit Report, DoR is satisfied that issues highlighted will, or are, being addressed by the operator through a process of ongoing continual improvement. Further, that the IM's review supports DoR's assessment that mining and related operations at MRM are not impacting significantly on the surrounding environment.

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## **1 OUTPUT**

A review of the *Independent Monitor Audit Report - Environmental Performance of the McArthur River Mine - 2009 Operational Period* (the 2010 Audit Report), prepared by the appointed Independent Monitor (IM) and submitted to the NT Government in September 2010, was undertaken by the Department of Resources (DoR) in October 2010.

The departmental 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) site by McArthur River Mining Pty Ltd (the operator) and regulatory overview by DoR.

The period examined by the lodged Audit Report was from September 2008 to October 2009 (the 2009 Operational Period), which represented those activities covered by the operator's 2008–2009 Mining Management Plan (MMP). However the IM's 2010 Audit Report also includes information from its May 2010 MRM site inspection, as well as updated information provided by both the operator and the department.

## **2 OBJECTIVES AND OVERVIEW OF THE INDEPENDENT MONITOR'S 2010 AUDIT REPORT**

The objectives of the 2010 Audit Report were stated as follows:

1. review the environmental monitoring and assessment practices undertaken by the operator and DoR;
2. identify and report urgent issues requiring investigation; and
3. provide an Annual Audit Report to the Minister for Primary Industry, Fisheries and Resources that:
  - assesses the environmental performance of MRM operations, and
  - recommends improvement measures to increase environmental performance.

The approach taken by the IM to evaluate these aspects included a:

- review of the environmental assessment and monitoring activities, procedures and systems implemented by the operator in order to maintain compliance with statutory commitments and conditions of operation;
- review and assessment of the operator's technical compliance with their conditions and commitments;
- review of the assessments undertaken by the department to monitor the operator's environmental performance;
- formal environmental risk assessment and gap analysis; and
- site inspections undertaken by the IM in May 2010.

### **3 REVIEW OF THE DEPARTMENT'S REGULATORY ROLE**

#### **3.1 Background on mining regulation in the Northern Territory**

##### Mining legislation and regulation

Mining activities do impact on the natural environment, and thus the prime role of regulation is to reduce this level of impact to an acceptable standard, while still allowing an activity to occur where the environmental impact can be balanced by the benefits of social and economic outcomes.

It is the role of governments to determine what the balance should be with respect to fostering mining activities to further economic development, against protecting the environment in its natural state.

The role of the department is to ensure that the activities of mining operations authorised under the Northern Territory's *Mining Management Act* (MMA) are undertaken in accordance with provisions of the Act.

The department uses Mining Management Plans (MMPs), Water Management Plans (WMPs) and the broader MMA 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.

Under section 82(c) of the MMA, the Minister, in exercising a power or performing a function under the Act, must have regard to the outcomes of any environmental assessment of mining activities undertaken under the *Environmental Assessment Act*. This provides the direct linkage between the environmental assessment process undertaken by the Department of Natural Resources, Environment, the Arts and Sport (DNRETAS), and the authorisation and on-going regulation of mining activities undertaken by DoR.

Under the MMA any authorised mining activity that is likely to cause a substantial disturbance requires the posting of a 100% rehabilitation security. Where assessed security exceeds \$50 000, then approval of the level of security is required from the Security Assessment Board (SAB) which includes a representative from DNRETAS.

A formal Memorandum of Understanding (MoU) exists between the department and DNRETAS for the formal referral of proposed new (or any amended) mining activities that trigger agreed referral criteria. Routine discussions occur between agencies on relevant matters (for example water management on mine sites). The off-site discharge of water is regulated by DNRETAS under the *Waste Management and Pollution Control Act* (WMPCA) via the issuing of Waste Discharge Licences. Environmental offence provisions in the MMA are aligned to those in the WMPCA, with penalties for breaches set by the *Environmental Offences and Penalties Act*.

In relation to the activities of MRM, the department reviews the operator's MMP as well as its submitted WMP on an annual basis. Further, as part of this process the department also reviews the level of rehabilitation security applied to the site and this security is held in the form of bank guarantees.



### Inspections and check monitoring activities

The department periodically undertakes site visits, inspections and audits of mine sites including the MRM operations and the port loading facility located at Bing Bong. A detailed three-day site inspection took place in May 2010. Officers from the department's Environmental Monitoring Unit (EMU) also visit the MRM site to conduct specific environmental check monitoring activities. A seven-day monitoring activity of the MRM site and surrounding areas was undertaken by EMU in May 2010. These specific inspections involve the collection of surface and groundwater samples for field measurements and subsequent analysis by a National Association of Testing Authorities (NATA) approved laboratory.

The monitoring points selected and the analyte suites examined are designed to provide a representative sample of the operator's environmental monitoring program to ensure a meaningful comparison of the department's data to the operators. The analytical suite is selected on a mine-by-mine basis with recognition of the dominant analytes in that water body reflective of mining process and surrounding geochemistry. Water quality results are then compared against environmental water quality data supplied by the operator to check that the mine site's data are 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 in comparison with appropriate standards, such as the Australian and New Zealand Environment and Conservation Council (ANZECC) guidelines and appropriate waste discharge licensing criteria. 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.

Assessment of both the operator and departmental analytical data is undertaken as it is 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 WMP.

### **3.2 Independent Monitor's assessment of departmental process and regulation**

In the 2010 Audit Report the IM stated that the department had demonstrated thorough administrative procedures carried out as part of the agency's assessment of mining management documentations. The IM did make a minor recommendation for the development of a formal capability and organisational structure chart to assist with resourcing and matching of mining assessments and reviews with appropriately-skilled personnel within the Mining Performance Group, which is a function already undertaken by Mining Team Leaders through existing in-house processes.

The previous 2009 Audit Report also examined the department's check monitoring activities (as undertaken by EMU) and these were found to be of the required standard.

## **4 RISK ASSESSMENT**

### **4.1 Outcomes of Risk Assessment**

In the 2010 Audit Report the IM commended the operator for taking actions to reduce the level of risk assessment related to the Bing Bong dredge spoil area, in particular the significant improvements made to the drainage system at the site. A further reduced risk related to the classification of waste rock prior to placement at the Overburden Emplacement Facility. However, like most mines of a similar size and complexity to that of the MRM operation, a range of potential risks from high to low were identified as part of the IM's applied risk assessment process.

It is important that such risk assessments are undertaken and reviewed routinely. However, it is also important to make the distinction that such risks are able to be reduced and mitigated over time in line with the application by the operator of best practice methods, systems and processes.

The outcomes of the IM's 2010 risk assessment will be examined by the department as part of its review of the operator's MMP covering the 2010/2011 operating period.

## **5 GAP ANALYSIS**

### **5.1 Background**

The purpose of undertaking a gap analysis is to identify gaps in environmental monitoring and assessment of an operation that may require improvement. The definition of a gap is defined as a discrepancy between what is taking place, and what should be taking place, in order for an activity to be maintained at an industry best practice standard. Typically gap analysis includes a comparison on environmental performance against:

- best practice industry standards;
- expert assessment and recommendations; and
- existing statutory obligations.

### **5.2 Outcomes of Gap Analysis**

In the 2010 Audit Report the IM identified a number of gaps in the operator's ongoing monitoring program, detailed in the Gap Register (MRM IM Report Appendix D). The department concurs with the recommendation of the IM that the operator use the Register to demonstrate how the identified gaps will be addressed or have been closed.

The outcomes of the IM's 2010 Gap Register will be examined by the department as part of its review of the operator's MMP covering the 2010–2011 operating period.

## **6 REVIEW OF MCARTHUR RIVER MINE'S PROCEDURES AND SYSTEMS**

The IM's 2010 Procedural Audit of the MRM operation focussed on the key procedures and systems, and selected commitments and conditions, associated with the following aspects considered significant by the IM. These included the:

- hydraulic performance of river diversions;
- success of revegetation and installation of fish habitat in the river diversions;
- surface water and artificial water monitoring;
- the environmental performance of the Tailings Storage Facility (TSF);
- tailings pipeline integrity and design;
- the design and monitoring of the Overburden Emplacement Facility (OEF);
- the environmental performance of the Bing Bong dredge spoil ponds; and
- Bing Bong Port facility fugitive dust emissions.

In general it was stated by the IM that the operator had demonstrated a high level of conformance with respect to procedures and systems, as assessed through the provision of evidence of the works undertaken and commitments to undertake further work or continual improvement.

Of the 64 commitments given by the operator in the 2008–09 MMP, only four were assessed to be non-compliant. This was due to the operator providing insufficient information or evidence of works (MRM IM Report Appendix F). Assessed non-conformances included:

- the monitoring of a potential sedimentation zone in the McArthur River downstream of the Bukalara Range;
- the installation of lysimeters in the Overburden Emplacement Facility at various stages to monitor water infiltration;
- water quality and sediment monitoring at the Overburden Emplacement Facility dams; and
- undertaking kinetic leach testing on-site and laboratory columns.

## **7 UPDATE ON ISSUES IDENTIFIED PREVIOUSLY FOR URGENT INVESTIGATION AND REPORTING**

### **7.1 Tailings Storage Facility seepage into Surprise Creek and salt discharge at the Bing Bong dredge spoil ponds**

On 6 July 2009, the IM wrote to the operator notifying the company of two separate issues it believed required further investigation. This notification was made under clause 6.4 of the *Independent Monitoring Assessment Conditions* (IMACs). Specific issues identified in the correspondence were as follows:

- TSF Cell 1 – Seepage into Surprise Creek; and
- salt discharge through dam walls at the Bing Bong dredge spoil ponds.

On 7 August 2009, the department wrote to the operator requesting information on what action was being planned and/or undertaken to address the identified issues. On 20 August 2009, the operator responded to the department on the matters raised by the IM. In the letter of response, the operator committed to undertake, or had commenced, a range of actions in relation to the identified issues.

In the 2010 Audit Report, the IM listed the works that had been undertaken by MRM in relation to these two issues. Both the IM and the department are satisfied that works being undertaken by the operator are assisting to mitigate these issues.

## **8 OUTCOMES OF THE TECHNICAL AUDIT OF MCARTHUR RIVER MINE'S ENVIRONMENTAL MONITORING PROGRAMS**

The key areas focussed on by the IM during the Technical Audit undertaken in 2010 included monitoring:

- surface water and artificial water;
- groundwater;
- dust, soil and sediment;
- marine;
- flora and fauna;
- Overburden Emplacement Facility, including works;
- Tailings Storage Facility, including works;
- geotechnical;
- river diversion hydraulics; and
- water balance and flood modelling.

The following section is commentary on the outcomes of the IM's Technical Audit.

### **8.1 Water quality monitoring (surface, artificial and groundwater)**

Surface, artificial and groundwater monitoring programs and the interpretation of the results by the operator have improved markedly over previous years and the department agrees with the IM's statements in the 2010 Audit Report acknowledging these improvements.

These improvements have arisen out of extensive review and discussions between the department and the operator. In particular, the requirement for substantial improvements to the previously required Annual Environment Report (AER) – which had been approved conditionally on stringent requirements to address information gaps and to demonstrate continuous improvement. Since 2009, Northern Territory mine site operators have been required to provide a detailed WMP (superseding the AER), as a separate component of the MMP for approval for authorisation under the MMA.

The recommendations made by the IM regarding the groundwater monitoring undertaken at the MRM operations are consistent with the department's articulated requirements to the operator. These requirements will need to be addressed by the operator in subsequent statutory documentation as commitments for approval under the MMA.

## **8.2 Dust, soil and sediment monitoring**

### **Dust monitoring**

In its 2010 Audit report the IM found that the operator's environmental dust monitoring program was appropriate. Further, it was noted by the IM that improvements to dust mitigation measures at the Bing Bong Port Facility were observed during the May 2010 IM Audit. Similar observations were made by departmental mining officers during their site inspection in May 2010.

The department supports the IM's recommendation for the ongoing development and improvement of dust management strategies. However, the department does not agree with the IM's recommendation to install dust gauges outside the MRM perimeter to capture pre-mining dust levels. Rather, the installation of such dust gauges would be more useful to characterise regional condition under varying wind conditions. The implementation of additional dust monitoring equipment will be supported by the department once it is demonstrated that there is a sound maintenance and monitoring program, supplemented with proper procedures to interpret and report the data associated with their installation.

As detailed in the 2010 Audit Report, the IM advised that the operator plans to implement additional dust mitigation measures. The department will evaluate these measures planned by the operator as part of the review of the operator's MMP covering the 2010/2011 operating period.

### **Soil monitoring**

The department notes the IM's assessment that the soil monitoring program undertaken by MRM is appropriate, and that this program has undergone substantial improvement over past years. Further, it agrees with the majority of recommendations provided in the 2010 Audit Report, particularly in relation to an expanded sampling program and the investigation of heavy metal levels in background soils. However the department does not support a comprehensive human health and ecological risk assessment at this stage as it believes results of the background survey and expanded monitoring program should inform the need for a project of this type.

### **Fluvial sediment monitoring**

The department notes the IM's assessment that the fluvial sediment monitoring program undertaken by the operator is generally appropriate. However, the department does not believe the proposed coring methodology and discreet sampling will more adequately define background concentrations. It is the department's opinion that an expansion of the sampling program to included additional reference sites is more appropriate given that a primary objective of the program is to assess the current potential for biological impact, not to determine deep fluvial metal accumulation.

The department does not believe historic water quality and sediment data supports an extension of fluvial sediment sampling into the marine environment of the McArthur River Delta. If a periodic survey were undertaken by the operator a three to five year interval would seem appropriate.

As mentioned in the IM's 2010 Audit Report, departmental mining officers undertook a detailed field inspection of the Bing Bong Port Facility in May 2010. As part of this inspection the concentrate loading procedures were observed. Officers were satisfied that measures instituted by the operator during the handling and loading process resulted in minimal loss of material to the surrounding environment.

### **8.3 Review of seawater and marine monitoring**

#### **Seawater monitoring**

The department agrees with the IM's assessment that the seawater quality monitoring program undertaken by the operator is generally appropriate and well conducted. Further, the department supports the IM's recommendation to incorporate the seawater results into statutory documents and to continue ongoing annual assessment of water quality indicators. However, the department does not support the IM's recommendation to filter samples using a nominal filter size. The operator's seawater monitoring program is currently undertaken in accordance with Australian regulatory guidelines and there is insufficient evidence to support the IM's comment that the existing seawater monitoring program is yielding false-positive water quality results.

#### **Marine sediment monitoring**

The IM's recommendations with respect to marine sediment monitoring program in the swing basin and shipping channel are consistent with the expectations of the department. With the exception of McArthur River delta sediment sampling (see fluvial sediment monitoring section), all of the IM's recommendations will be considered as part of the review of the operator's MMP covering the 2010–2011 operating period.

### **8.4 Flora and fauna monitoring**

#### **Terrestrial Vegetation Monitoring**

As detailed in the 2010 Audit Report the revegetation of the McArthur River diversion is still in its early stage. However as noted during the IM's May 2010 inspection, there have been positive indications with the observations of self seeding, direct seeding and limited tube-stock growth. These observations concur with those of departmental mining officers who also visited the site in May 2010.

The department notes the IM's discussion points and agrees with the majority of recommendations proposed. Despite the delayed start of re-vegetation activities in the McArthur River diversion, while awaiting Federal Government approvals to recommence all site activities, the department believes that the ongoing monitoring program and continued replanting strategies will direct vegetation establishment toward natural climax communities. Ongoing assessment of these activities will continue through annual MMP/WMP assessment and assimilation of DoR and IM feedback into vegetation monitoring programs which will encourage long term stability.

The department is also continuing discussion with the operator on the emplacement of in-channel large woody debris as an aid to encouraging channel heterogeneity and habitat development.

### **Fauna Monitoring**

The department believes the fauna monitoring programs undertaken by the operator are both diverse and comprehensive. The subset of monitoring programs identified in the 2010 Audit report can be enhanced by implementing the IM's recommendations. The department considers the inclusion of toad traps around the mine site a somewhat futile gesture but the strategy may have positive broader social outcomes that may warrant consideration.

### **Bing Bong Fauna and Vegetation Monitoring**

The IM's recommendations for vegetation monitoring of the dredge spoil area complement the current management strategy supported by this department. The recommendations suggested in the 2010 Audit Report should be implemented by the operator and submitted for review in the annual MMP. Implementation of these modifications will be tracked by submission of amendments to the MMP/WMP.

As stated previously in the department's comments on the 2009 Audit Report, there is agreement with the IM that the migratory sea bird monitoring program should be re-focussed toward a program assessing residential shore birds. The opportunity for this re-focus should be investigated with the relevant federal government department with endorsement for the proposed changes from both the IM and the department.

Although the department agrees with the other recommendations presented by the IM and will support their implementation, the investigation of cessation of dingo baiting on wallaby numbers is not considered an issue requiring investigation from the operator, but rather an investigation by NT Parks and Wildlife. Further, the chronic and sub-lethal effects of metals on flora and fauna should only be investigated if measured sediment and water quality triggers substantially exceed background derived trigger levels.

## **8.5 Overburden Emplacement Facility and Tailings Storage Facility monitoring and works**

### **Overburden Emplacement Facility**

The IM identified a number of failures by the operator in its management of the Overburden Emplacement Facility. The department concurs with the IM's conclusions and further emphasises that it is imperative for relevant information and contingency measures to be explored by the operator prior to undertaking works and monitoring at the facility. In addition, the department supports the IM's recommendation for the operator to undertake further waste rock characterisation and hydrogeological modelling to better understand the risk and closure/remediation options for the Overburden Emplacement Facility. The department has and will continue to evaluate these issues as part of the review of the operator's WMP and MMP submissions.

## **Tailings Storage Facility**

In the 2010 Audit Report, the IM identified a number of inadequacies relating to the monitoring and works undertaken at the TSF. The department agrees with the IM's recommendations regarding the need to improve the management and monitoring of seepage and water quality and quantity issues, in line with industry best practise, such as recommended in the ANCOLD and AWA Dam Safety Review. The department also supports the IM's conclusions that the existing monitoring at the TSF is broadly inadequate. However, the department believes that the IM has reported beyond the scope of works for the 2010 Audit Report by providing targeted recommendations. Instead, the department encourages the operator to undertake further investigation in response to the IM's recommendation to consider, develop and implement best management practises at the TSF. These issues will be examined by the department via the review of the operator's WMP and MMP for the 2010–2011 operating period.

### **8.6 Geotechnical works at Bing Bong dredge spoil and the MRM operations**

#### **Bing Bong dredge spoil geotechnical recommendations**

The department agrees with the IM's comments relating to the general geotechnical works at the MRM operations, including the Bing Bong dredge spoil area, and will consider the recommendations during the review of the operators MMP for the 2010–2011 operating period. With regard to the Bing Bong dredge spoil area, the department supports the IM's recommendations regarding the review of the proposed future use of the facility and that an investigation and design program should be subsequently developed so that the existing structure can be remediated to an acceptable standard. Also following the remediation, a management plan is to be developed for continued operation including inspections, monitoring and usage strategies.

### **8.7 River diversion hydraulics monitoring**

The department agrees with the IM's comment that the protection of the diversion channels is an ongoing process. As such the recommendations presented by the IM should be given consideration by the operator, particularly the use of aerial photographs and digital elevation models. As suggested by the IM the department will expect inclusion of erosion and sedimentation assessments in the 2010–2011 MMP. The expansion of photographic monitoring points to the opposite bank of the diversion channel should be considered when water level and access permits.

### **8.8 Water balance and flood modelling recommendations**

The department acknowledges that the water balance modelling using OPSIM has been subject to ongoing review. Over recent reporting periods the operator has been unable to provide the department with a complete and comprehensive water balance, and has not demonstrated a sound understanding of the water management systems and natural waterways at and around the MRM operations. This has been presented to the operator as an issue which requires addressing. The department supports the comments by the IM and further emphasis on the importance of this information for sound management of water at and around the MRM site.



The department agrees with the IM's comments regarding the inadequacies regarding the HECRAS modelling currently undertaken by the operator, and supports the recommendations to include more information into the flood modelling programs and reporting.

## **9 CONCLUSION**

In its 2010 Audit Report the IM concludes by stating that many improvements have been made to the environmental performance of MRM site since its last audit. The department welcomes this finding and is supportive of the majority of recommendations for further improvement put forward in the IM's report. Information provided in the Audit Report will be used by the department in its review of the operator's MMP covering the 2010–2011 operating period.

In relation to assessing the regulatory performance of DoR, the IM found that the department had demonstrated thorough administrative procedures as part of its assessment of mining management documentation for the MRM operation, indicating the robustness of its mine site evaluation process.

Having reviewed the findings of the 2010 Audit Report, DoR is satisfied that issues highlighted will, or are, being addressed by the operator through a process of ongoing continual improvement. Further, that the IM's review supports DoR's assessment that mining and related operations at MRM are not impacting significantly on the surrounding environment.