

# Independent Monitor Community Report

2009 Operational Period

Community Report by the Independent Monitor of the  
McArthur River Mine, November 2010



Welcome to the Independent Monitor's third annual Community Report on the environmental performance of the McArthur River Mine, NT. This report summarises the findings of our review of MRM's environmental performance over the period from October 2008 to September 2009, which we refer to as the "2009 Operational Period".



The open cut pit of the McArthur River Mine, as viewed by the Independent Monitor during the May 2010 site inspection.

## CONTENTS

Introduction.....	1
What does the Independent Monitor do?.....	1
Update on urgent issues identified last audit.....	1
Bing Bong Spoil Seepage.....	2
Tailings Storage Facility Cell 1 leachate.....	2
Procedural review.....	3
Procedural review of the DoR.....	3
Procedural review of MRM.....	3
Technical Audit of MRM's Environmental Monitoring.....	3
Urgent and significant issues this audit.....	3
Tailings Storage Facility monitoring.....	3
Dust management.....	4
Weeds and revegetation monitoring.....	5
Review of river diversion hydraulics.....	5
Groundwater and surface water monitoring.....	6
Overburden Emplacement Facility.....	6
Flora and Fauna Monitoring.....	7
Contact details and further information.....	8

## INTRODUCTION

**The Independent Monitor has observed many improvements in MRM's environmental monitoring since our last report was issued in 2009, and MRM continue to show commitment to improving their environmental performance in line with our recommendations, however further improvements can be made.**

### What does the Independent Monitor do?

The Independent Monitor is a team of independent scientists and engineers. The team is made up of specialists from: Environmental Earth Sciences, who specialise in soil, groundwater, dust, and waste; Bewsher Consulting, who are specialists in river hydraulics; Mining One, for geotechnical engineering; and Low Ecological Services, who specialise in flora and fauna monitoring.

Each year a technical report is prepared on the environmental performance of the Mine, and submitted directly to the Minister for Primary Industry, Fisheries and Resources. We have been undertaking this task since 2007.

This year, the Independent Monitor team undertook a review of MRM's environmental monitoring data and documentation, completed a mine site inspection and held meetings with key MRM and Department of Resources staff. From this information, the Independent Monitor was able to assess the environmental performance of the mining operation for the 2009 Operational Period.

## UPDATE ON URGENT ISSUES IDENTIFIED LAST AUDIT

During the last audit, a number of environmental issues were identified. The two most urgent issues related to saline seepage from Bing Bong Spoil Ponds and tailings seepage from the Tailings Storage Facility into Surprise Creek. MRM has since taken steps to rectify these two issues as follows.

### Bing Bong Spoil Pond Seepage

Last year we noticed significant vegetation die-back immediately outside the dredge spoil ponds at the Bing Bong Port Facility. The dredge ponds are built to hold marine sediments (spoil) dredged from the Bing Bong swing basin. It was evident that the vegetation dieback was being caused by saline seepage leaking from the salty spoil, through the degraded pond walls and onto the surrounding plain.

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Aerial view of the Bing Bong Port Facility with the Bing Bong Port and concentrate storage shed in the foreground, and the dredge spoil ponds in the background. (May 2010).



**Top:** Salt-affected land and vegetation outside of the Bing Bong Dredge Spoil ponds in June 2009. **Bottom:** The same area in May 2010 after the installation of a perimeter spoon drain, which is seen in the foreground. Vegetation is seen to be regenerating outside of the spoon drain.

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MRM has since installed an outer spoon drain, which drains the saline seepage from the spoil back to sea. Previously-eroded pond walls have also been re-constructed, however due to the poor quality of construction materials, seepage through the pond walls is expected to continue. MRM will be completing additional capital works at the dredge spoil ponds before the commencement of the 2010/2011 wet season.



Aerial view of the northern-most Dredge Spoil pond with perimeter spoon drain, and dredged material and sea water radiating from the central deposit point in the middle of the spoil pond (May 2010).

Although seepage continues, the spoon drain appears to be successful in re-directing saline seepage back to sea and allowing vegetative regeneration in the previously-affected areas. We will continue to monitor the success of vegetation in this area. Further geotechnical assessments of the dredge spoil walls have also been recommended.

### Tailings Storage Facility Cell 1 leachate

The Tailings Storage Facility (TSF) receives tailings waste from the ore processing plant at the Mine. The western side of the TSF, which is adjacent to Surprise Creek is called Cell 1. This cell no longer receives tailings waste as it has been filled over previous years; however leachate from this cell is visibly leaking into Surprise Creek.

Last year, the Independent Monitor provided MRM with recommendations to help investigate and mitigate the leachate issue in addition to measures already undertaken by MRM.

Although leachate is still being expressed at the toe of Cell 1, and is draining towards Surprise Creek, (see picture below), we commend MRM for undertaking additional mitigation measures over the past year, including:

- a sump to intercept surface leachate draining towards Surprise Creek;
- electromagnetic survey to identify key areas of conductivity and likely seepage from the Cell;
- ongoing advice and investigation from external consultants;
- cessation of pumping reclaimed leachate back on top of Cell 1; and
- continuation of the clay capping (which will be completed before the 2010/2011 wet season).

Further recommendations we made are in the process of being actioned, as well as ongoing monitoring and assessment. The Independent Monitor will request to review the results next year.



Leachate draining from the base of TSF Cell 1 towards Surprise Creek. A sump has been constructed to collect some of this leachate, but more work is needed (May 2010).

## PROCEDURAL REVIEW

### Procedural review of the Department of Resources

The Department of Resources (DoR) is responsible for regulating the McArthur River Mine operation in line with the Mining Management Act. The Independent Monitor reviewed relevant documentation and procedures used by the DoR in their assessment of the MRM Operation. We also held a meeting with DoR personnel to clarify roles, responsibilities and actions taken over the monitoring period.

We noticed an improvement in the amount and detail of information provided to the Independent Monitor this year compared with previous years. We consider the procedural documentation provided by the DoR to be an improvement from our last review.

The Independent Monitor recommends that a capability study and organisational structure chart be developed for the DoR to clearly define competencies and expertise. This information could be utilised to improve resourcing and capability of the DoR to assess and review the MRM operation in future.

### Procedural review of MRM

MRM make annual commitments for environmental monitoring. These and other commitments are included in the annual Mining Management Plan, which is reviewed and approved by the DoR every year.

During this audit, the Independent Monitor assessed whether MRM adhered to their environmental commitments of the 2008/2009 Mining Management Plan. In general, MRM demonstrated a high level of compliance with stated commitments.

However, no evidence was provided for the following commitments:

- monitoring of a potential sedimentation zone downstream of the Bukalara Range;
- installation of lysimeters for the Overburden Emplacement Facility (OEF);
- water quality and sediment monitoring at the OEF runoff dams; and
- undertaking kinetic leach testing on-site and in the laboratory.

Two other commitments could not be confirmed due to a lack of documentation provided to the Independent Monitor. A number of observations for improvement were also made as a result of the procedural audit. These have been discussed with MRM.

MRM have responded to our procedural review and have provided assurance that all of these non-coformances will be or have already been addressed. The evidence that these commitments have been met, will be reviewed in the next audit.

## TECHNICAL AUDIT OF MRM'S ENVIRONMENTAL MONITORING

We chose to focus on a number of environmental monitoring areas this year that were either identified as being issues of concern during the last audit, or that presented high environmental risks.

### Urgent and significant issues this Audit

No issues were identified as requiring urgent investigation this audit; however, the following issues are considered significant and require corrective action to improve the Mine's environmental performance.

### Tailings Storage Facility monitoring

The Independent Monitor is concerned about the amount of water being stored within the TSF Cell 2, which is currently receiving tailings waste from the Mine. This excess water storage poses the risk of overtopping the TSF walls or causing the embankment to fail all together. We recommend that the water stored in this Cell be reduced, and that MRM increase quantitative geotechnical monitoring within the embankments.

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There is a large volume of water being stored in TSF Cell 2 as seen above. The water management dam (top left of the photo) receives excess water spillover from Cell 2, but the amount of water stored, in the Cell should be reduced (May 2010).



Independent Monitor team geotechnical engineer inspecting the excess water storage in TSF Cell 2 (May 2010). As seen above, at the time of our inspection, there was only approximately 1 metre of freeboard available in Cell 2. The available freeboard should be increased to reduce the risk of overtopping.

## Independent Monitor Community Report for the 2009 Operational Period

continued from page 3...

MRM are conscious of the amount of water in Cell 2, and as such, are taking steps to increase the use of recycled water.

Leachate migration from Cell 1 into Surprise Creek continues to be an issue this audit. While investigations and some mitigation measures have been undertaken since the last audit (as mentioned previously), further work will be ongoing.

The Independent Monitor recommended:

- geochemical assessment of the tailings in Cell 1;
- increased quantitative monitoring rather than qualitative;
- installation and monitoring of piezometers within the TSF embankments; and
- completion of the clay capping of Cell 1 to limit rainfall infiltration.

Next audit we will request as-built reports for Cell 1, and evidence that the clay cap has been tested to meet design specifications.



The clay capping of TSF Cell 1 was approximately 60% complete during our inspection in May 2010, as seen above. The rest of the capping is to be completed by the 2010/2011 wet season to reduce infiltration of water through the exposed tailings and reduce dust generation.

### Dust management

There are a number of areas and activities at the Mine site and Bing Bong Port that have the potential to generate dust emissions that could contaminate soil and water.

At the mine site, dust may be generated from ore crushing facilities, haul roads, concentrate transport, and from uncovered tailings at the TSF. Dust suppression measures include: water trucks that suppress dust along mine haul roads; the clay capping to cover the tailings at TSF Cell 1 is mostly completed; and all trucks that transport concentrate from the Mine have completely covered loads.

Our primary concern regarding dust at the mine site is the dust generated by the ore crushing plant. The plant, which is a system of conveyors and crushers, has recently been upgraded with double-lipped rubber liners to reduce dust escaping from the sides of the conveyor belts (see photo inset top right). Water sprays are also used throughout the plant, and other dust reduction measures are to be installed.

Results from nearby dust gauges were alarmingly elevated before these mitigation works were undertaken. We will closely monitor results from nearby dust gauges as part of the next audit. MRM's dust management in 2010 will be successful if dust gauges show reduced dust levels.

Fugitive dust migration from the Bing Bong Port concentrate storage shed also continues to be of concern. The roller doors of the concentrate storage shed remain open at all times due to potential sulfate gas build-up within the shed. This practice increases the opportunity for dust to escape from the shed and contaminate surrounding soil, sediments and seawater.

MRM have advised that they are exploring upgrades to shed ventilation so that the doors can remain shut. We commend MRM for undertaking a recent dust audit at Bing Bong, which we will review next year.

Recommended upgrades to dust monitoring system include additional dust gauges, and the upgrading of dust sampling equipment so that they are not affected by heavy rainfall. MRM is currently exploring this option.



Left: Double-lipped rubber liners have been installed on the crushing plant to reduce the amount of ore dust escaping from the sides of the conveyors.

The ore crushing plant that operates on the mine site is a source of ore dust-generation, which can contaminate soil and water. Steps are being taken to limit dust from this facility.



Zinc concentrate is stored within the Bing Bong concentrate storage shed while awaiting loadout onto the Arburri barge for shipment. The doors of the shed remain open to limit gas build-up that corrodes shed infrastructure. However, the open doors also allow concentrate dust to escape and spread via the wind to potentially contaminate soil, water or and sea sediments. This past year, damaged sections of the warehouse corrugated iron roof were replaced with fibreglass roofing that is resistant to the corrosive gases. The upgrade of the roof will assist in reducing dust emissions at the load out facility

## Independent Monitor Community Report for the 2009 Operational Period

### Weeds and revegetation monitoring

Weed management and revegetation are still a high priority along the McArthur River and Barney Creek diversion channels.

Weed management has been carried out along the diversion channels through biological, chemical and physical control. However, increased weed control efforts may be necessary at other mine lease areas such as Bing Bong Port, and upstream/ downstream from the McArthur River diversion to fulfil commitments made in the 2009 Weed Management Plan.

Revegetation along the McArthur River diversion has been slow to establish due to the velocity and volume of wet-season flooding. Previous attempts to establish a dry-season irrigation system along the McArthur River Diversion were not overly successful as high-volume and velocity flood waters destroy irrigation infrastructure. However, the implementation of a sled-mounted irrigation system, which can be moved to higher ground in times of flood, will hopefully aid vegetation establishment over the 2010 dry season.

Revegetation of the Barney Creek diversion has continued to be successful this year, with the establishment of a range of trees and grasses.

Rapid maintenance of the Mine's 17 km perimeter fence following annual flood damage is still an issue this year. The fence must be repaired to keep cattle away out of areas undergoing revegetation and rehabilitation. We support MRM's plan to move sections of the fence (where possible) away from areas that are repeatedly damaged by floods.



MRM have utilised a new irrigation sled to help establish vegetation along the McArthur River diversion channel over the 2010 dry season (May 2010).



Revegetation of the Barney Creek diversion channel is going well. Each audit we have observed increasing vegetation establishment at this location (May 2010).



Minor slumping erosion and scour can be seen along the McArthur River diversion channel. Vegetation establishment, may help stabilise the banks of the diversion throughout the wet season floods. (May 2010)

### Review of river diversion hydraulics

The Independent Monitor reviewed the as-built drawings for the river diversions, which were not available last year. While the report provides a general description of: the Environmental Impact Statement/Public Environmental Report process; the detailed design process; the subsequent design modifications; and the actual construction process for the diversions, it fails to provide specific information to prove it was completed in line with stated commitments and detailed construction plans.

We recommend that the as-built diversion channel works be 'tested' by inserting as-built channel cross sections into the detailed design hydraulic model. This should include

associated reporting as to how the as-built channels compare against the various project commitments and design intents.

Sedimentation and erosion photograph monitoring at intervals along the diversions is considered acceptable, however we also recommend that opposite bank photographs also be taken. Further, we recommend that current erosion monitoring be combined with Digital Elevation Model (DEM) data to provide a clearer and more comprehensive picture of erosion and sedimentation along the diversions.



The above photograph shows the upstream end of the McArthur River Diversion, and the cut off section of the old McArthur River channel to the bottom left. During times of flood, water passes overland between the two.

**Groundwater and surface water monitoring**

MRM have demonstrated improvements in the presentation and evaluation of groundwater, natural and artificial surface water monitoring data compared with last year's audit, although considerable improvement can still be made. This information was presented in the first annual *Water Management Plan* (2009), which replaces the previous requirement for MRM to prepare an *Annual Environmental Report*.

However, the Independent Monitor provided recommendations for improving the monitoring and reporting. These included:

- the provision of groundwater contour maps;
- ensuring bores are decommissioned in line with Australian bore decommissioning Guidelines;
- recommendations for additional reporting and evaluation; and
- discussion of all data points.



Monitoring of artificial surface waters is undertaken at all water dams across the Mine site and at Bing Bong on a monthly basis. The above photograph shows the Concentrator Runoff Pond (CRP) and Anti Pollution Pond (APP) at the Mine site. The 2009 data collected by MRM indicated that the CRP may be leaking, and MRM have proposed investigation and mitigation strategies in response. (May 2010).

**Overburden Emplacement Facility**

Last year the Independent Monitor reported concern that the in-place testing of the Overburden Emplacement Facility (OEF) clay liner was not being undertaken in line with the agreed method. In-place testing is essential to ensure the clay meets chemical and physical requirements of the OEF design.

This year we saw sufficient evidence that the clay is being tested before it is placed at the OEF; however, we have not seen any documented evidence that testing is undertaken after placement. We will again request MRM to provide this next year.

MRM have updated their procedures used in identifying and classifying waste rock destined for the OEF. These procedures were updated following the Independent Monitor's recommendations in 2009 that the differences between the methods used by the mine geologists and those specified in the previous Ore Spotting and Grade Control procedure be reconciled.

We are satisfied that the procedure now reflects the observations made by the mine geologists in identifying waste rock. We commend MRM for undertaking this procedural update.



The Independent Monitor team inspected the progress of the Overburden Emplacement Facility in May 2010. The OEF receives waste rock or 'overburden' from the mine pit. Some of the waste rock has the potential to form acid if it is exposed to water and air, so the proper placement of 'potentially acid-forming' and 'non-acid forming' rocks is essential to avoid environmental damage from releasing acid into the environment.



The clay layer that lines the base of the OEF is an essential part of the OEF design. The clay acts as a barrier to stop the migration of any acid production that may occur within the OEF waste rock. It is essential that the chemical and physical nature of the clay is tested before and after it is placed at the OEF to ensure its suitability. (May 2010).



The Independent Monitor inspected a tributary upstream of the McArthur River Diversion called 8-Mile Creek (above). Freshwater Sawfish have been caught and tagged at this location as part of MRM's Freshwater Sawfish monitoring program. (May 2010).

**Flora and fauna monitoring**

We commend MRM this year for the commencement of the mosquito monitoring program and the inclusion of additional marine monitoring sites. We also acknowledge the receipt of a feral animal removal register.

We believe the freshwater Sawfish is being monitored adequately, and we are pleased that a number of specimens were observed during the 2010 monitoring program. However, we noted a lack of information regarding other threatened species that have been found in the mine area (e.g. Worrell's Turtle and the Northern Quoll). We will request this information next audit as to the current status of these species in the project area, management strategies and/or reasons why they are not currently being monitored.

Further recommendations include additional investigations into seagrass distribution and health at Bing Bong Port, and additional analysis of heavy metals in suspended particles and sediments at the McArthur River delta.

In response to a community concern about the lack of wallabies at Bing Bong last audit, the Independent Monitor has considered the likely causes of the decline. We believe it is likely that the reduction of wallabies is a result of increased dingo numbers in the area due to the recent cessation of dingo baiting.

Other potential factors may include the loss of ground-cover associated with cyclone damage and saline seepage from the dredge ponds. MRM have undertaken some preliminary monitoring in this area to compare dingo numbers with wallaby numbers. We recommend that MRM continue with this program and to investigate the potential impact of habitat loss at Bing Bong.



Signs such as this are placed along the McArthur River to encourage fishermen to alert MRM if they catch and release a Freshwater Sawfish in the McArthur River. This helps MRM keep track of sawfish movements and abundance in the McArthur River. (May, 2010).



This area of the McArthur River, upstream of the diversion channel is used as an analogue site for riparian flora and fauna monitoring. This area provides an ecological benchmark for the eventual revegetation and rehabilitation of the McArthur River diversion channel. (May, 2010).

## INDEPENDENT MONITOR PROGRAM FOR 2011

### **May – June 2011**

Independent Monitor Mine site inspection

### **September 2011**

Independent Monitor Audit Report issued to the Minister for the 2010 Operational Period.

### **November 2011**

Presentation of the findings of the audit report to the Borroloola Community.

## FURTHER INFORMATION

Please visit our website to access the Independent Monitor's complete audit report for this year and for previous years.

**[www.mrmindependentmonitor.com.au](http://www.mrmindependentmonitor.com.au)**

If you would like to contact the Independent Monitor about an environmental issue related to the McArthur River Mine, please contact:

**Philip Mulvey**  
**Independent Monitor Team Leader**  
**(02) 9922 1777**

or

**Laura Boland**  
**Independent Monitor Project Administrator**  
**(03) 8398 4413**



We will continue next year to monitor many of the issues identified during this audit and previous audits, such as the regeneration of salt-affected vegetation outside the Bing Bong dredge spoil ponds. It is anticipated that the recently-constructed perimeter spoon drain (as seen above) will help mitigate this issue. (May, 2010)