

Independent Monitor Community Report

2010 Operational Period

Community Report by the Independent Monitor of the
McArthur River Mine, November 2011



Welcome to the Independent Monitor's fourth 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 2009 to September 2010, which we refer to as the "2010 Operational Period".

INTRODUCTION

Introduction

This audit period, MRM have continued to show a willingness to improve their environmental performance. We are satisfied that many monitoring programs such as: flora and fauna monitoring; surface water monitoring; fluvial sediment monitoring; and structural monitoring of the river diversions are undertaken appropriately.

However, we have again highlighted the need for MRM to improve many monitoring programs to reduce significant environmental risks. This community report outlines our significant findings for the 2010 Operational Period.

About the Independent Monitor

The Independent Monitor is a team of independent scientists and engineers who review MRM's environmental performance each year. The team is made up of specialists from:

- Environmental Earth Sciences, who specialise in soil, sediment, groundwater, surface water, dust, and mining waste;
- Bewsher Consulting, who are specialists in river hydraulics;
- Knight Piésold, who provide geotechnical engineering advice; and
- Low Ecological Services, who specialise in terrestrial and marine flora and fauna.

The team assesses the Mine's environmental performance by reviewing MRM's environmental monitoring data and documentation, conducting a mine site inspection, and holding meetings with key staff from MRM and the Department of Resources (DoR).

Our annual report is submitted directly to the Minister for Primary Industry, Fisheries and Resources. The detailed report is available at www.mrm-independentmonitor.com.au

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Aerial view of the Tailings Storage Facility (TSF) Cells 1 and 2. Cell 1 has now been covered with a clay to suppress tailings dust. Cell 2 is receiving tailings waste from the Mine, but was also storing more water than it should in May 2011

SIGNIFICANT FINDINGS THIS AUDIT PERIOD

Seepage from the Tailings Storage Facility

The issue of seepage flowing from the foot of the Tailings Storage Facility (TSF) Cell 1 and flowing towards Surprise Creek continues to be a significant issue this audit. An investigation into the geochemical nature of the tailings and water levels within TSF Cell 1 has been undertaken since the last Independent Monitor audit.

Whilst we consider the investigation report to have some inadequacies at a technical level, the data infers that acid drainage will occur in future. Planning for the long term acidification of these tailings and mitigation of acidic seepage is likely to be the most significant issue for mine closure.

MRM have recently engaged a peer reviewer to verify the outcomes of the tailings geochemistry report, which is a positive step forward.

Excess water storage in the Tailings Storage Facility

The volume of water held within TSF Cell 2 is again of concern this audit period. At the water levels we observed in May this year, the TSF would not be able to contain additional rainfall water if a 1 in 200 year rainfall event were to occur, which could lead to the instability of the TSF walls or contaminated water overtopping spillways.



Tailings 'beach' recently deposited at the edge of TSF Cell 2, with excess water in the background - Photo taken in May, 2011.

MRM have since reduced the water level in the TSF through evaporation on tailings beaches (see photo left), through evaporative fans, and water recycling at the Mine site. We will continue to monitor this issue closely over the next monitoring period.



View from the top of the OEF looking at the clay base, with waste rock piled in the foreground.

Waste rock from the mine pit is placed in the '**Overburden Emplacement Facility**' (OEF). This facility will be a permanent structure that can produce acid leachate or become unstable in future if not managed appropriately.

Waste rock classification and placement

Some types of waste rocks at the mine will produce acid in the OEF if exposed to water and oxygen, so it is important to know which types of rocks are 'potentially acid forming' (PAF), and which are 'non-acid forming' (NAF) so they can be placed in certain areas. Waste rock is classed by MRM geologists as being

Above: 'PAF' waste rock from the mine pit is dumped by trucks at the top of the OEF according to a plan.

either PAF or NAF using *visual* assessment in line with a geological model/map. However, the Independent Monitor is concerned with this visual method for classifying waste rocks, as there is a potential for miss-classification and miss-placement of PAF rocks within the

OEF. MRM are currently undertaking a further drilling program to improve and revise their waste classification methods, and will investigate in-place testing of waste material in 2012.

The OEF design must minimise acid generation by stopping rainwater infiltrating through the PAF rock. It does this by placing a clay layer over the top of the PAF material and at the base of the OEF (see photo top left). Only part of the clay cover was completed at the time of our inspection, and we have recommend that it be completed and armoured prior to the heavy rainfalls of the wet season. A careful watch of the clay placement also needs to be maintained so that the correct thickness is achieved.



The 'PACRIM' ore crushing plant is the primary source of contaminated dust generated at the Mine site. Dust needs to be further reduced here.

Dust monitoring

Dust management is an ongoing environmental issue at the Mine site and the Bing Bong Port. Fine dust, contaminated primarily with lead and zinc may be transported via wind and water where it can accumulate in soil and river/marine sediments.

Tailings dust blown from surface of TSF Cell 1 has been an issue during previous audits, and has been contaminating stream sediments in Surprise Creek. However, further dust generation has now been mitigated by the completion of a clay cap which covers the dried tailings in TSF Cell 1 (see photo top of Page 1).

The ore crushing machinery at the Mine site known as the 'PACRIM' (see photo left) is the primary source of contaminated dust at the Mine. Water sprays are being used throughout the crushing system, however, lead and zinc dust is still escaping from this area and settling over the nearby landscape. The laboratory results from nearby dust monitoring gauges on the Barney Creek floodplain indicate that the amount of contaminated dust has not improved.

Further efforts to control fugitive dust emissions are needed at the Mine site, particularly in the PACRIM area to avoid further unnecessary contamination. However we do note that zero dust emissions may not be possible at this facility.

The main source of contaminated dust at Bing Bong Port comes from the concentrate storage shed. This year we observed that the doors to the shed still remain open, which is necessary to avoid gas-build-up in the shed. We have previously recommended that the doors to the shed remain shut to stop lead/zinc dust being carried by wind and contaminating the surrounding soil and marine sediments.

MRM have indicated that updates to the shed have now been approved, including an venting system, which will allow the shed doors to remain shut - these updates will begin in 2011.

MRM have also placed additional dust monitoring gauges as requested by the Independent Monitor, and are planning to implement more reliable dust sampling equipment.

The **Bing Bong Dredge Spoil Ponds** hold marine sands and sediments that have been scooped up ('dredged') from the Bing Bong Port channel. Dredging is necessary to keep the channel deep enough for barge passage to deliver the zinc/lead/silver concentrate to ships in the Gulf of Carpentaria.



Vegetation affected by dredge spoil seepage

Vegetation dieback surrounding the dredge spoil has been caused by saline seepage from the spoil ponds. This has been an issue raised by the Independent Monitor in previous audits. In 2009, it was flagged as an urgent issue requiring immediate attention. In response, MRM constructed a spoon drain outside the dredge spoil walls to redirect saline seepage back out to sea and reduce the effects on the surrounding vegetation. The Independent Monitor has inspected the spoon drain in 2010 and 2011, and it appears to be effective (see photos right).

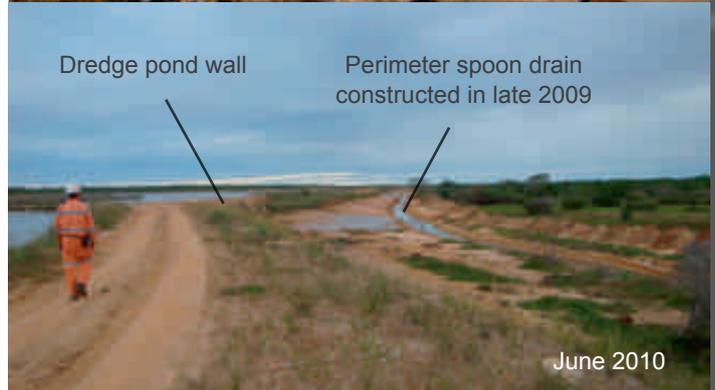
MRM continue to monitor salt levels in soil, and have been monitoring the areas of vegetation dieback through aerial survey photos of the dredge pond area. However, MRM has not provided any interpretation or discussion of the photos. We recommend that MRM compare yearly photographs to identify any quantitative changes in vegetation cover in salt-affected areas. Judging from our photographs and site inspections, there has been no significant visible increases in the vegetation coverage at this stage, but this is likely to be a slow process. We will continue to monitor this issue.



Dredge spoil wall stability

At the time of our site inspection in May 2011, the Bing Bong dredge spoil was dry, appeared to be stable and not likely to fail. However, there is still no information available regarding the geotechnical stability of the pond walls. We have recommend that MRM consider conducting a complete geotechnical review of the walls prior to the 2011/2012 wet season to determine their level of stability.

MRM have advised that further earthworks have recently been undertaken to clean out the spoon drain and repair the dredge pond walls prior to the 2011/2012 wet season.



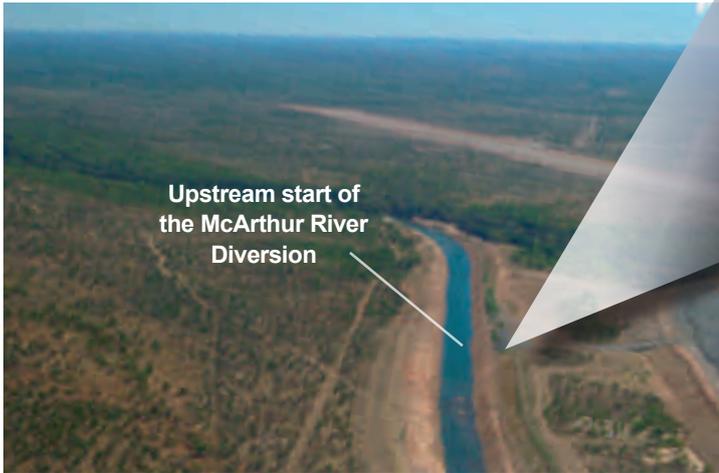
Dredge spoil revegetation

A PhD student from Charles Darwin University (CDU) was scheduled to undertake a plot trial study on the dredge spoil to investigate how future revegetation might be achieved. In preparation for this study, MRM constructed a number of plot trial areas at the dredge spoil (see photo below). However, the revegetation study did not commence due to the student pulling out. MRM are discussing alternatives such as contracting the work to a consultant.



Above: Series of photographs taken in 2009, 2010 and 2011, showing the outer toe of the spoil ponds, with the spoon drain subsequently installed in late 2009 to redirect saline seepage out to sea.

Left: Dredge spoil revegetation plot trial area constructed on the dredge spoil by MRM in preparation for a PhD student study, which has not yet eventuated.



May 2008



May 2009



June 2010



May 2011

McArthur River Diversion revegetation

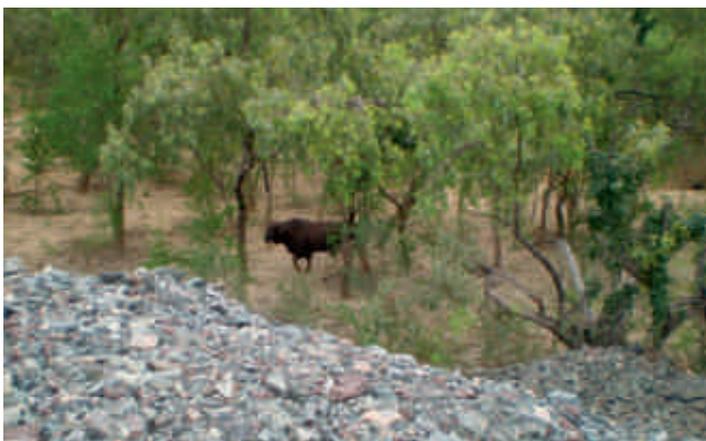
Revegetation of the McArthur River diversion is an ongoing priority issue for MRM. The Independent Monitor team once again inspected the revegetation efforts along the upstream section of the McArthur River diversion (see photo above and right). The vegetation growth seen this year is a significant improvement compared with previous years.

MRM have advised that approximately 40,000 trees were planted in 2010, and the same amount was aimed to be planted in 2011, before and during the wet season.

Revegetation has only been undertaken on the mine-side bank of the diversion at this stage, and the opposite bank still remains un-vegetated. Furthermore, most of the revegetation efforts have been undertaken on the upstream section of the McArthur River Diversion. Due to access restraints caused by the recent wet season, the downstream section of the Diversion could not be inspected by the Independent Monitor this year.

Although the McArthur River Diversion does not yet provide a functioning habitat for riparian birds, MRM is moving in the right direction with revegetating the Diversion. However, we note that high flood velocities and accessibility issues make revegetation of the McArthur River Diversion a challenge.

Cattle still remain to be a problem, as they trample revegetation efforts and cause river bank erosion when they enter the site through broken fences after the wet season. Sections of the perimeter fence have now been re-located away from flood waters, however, fence damage is still likely to occur seasonally. Any damage needs to be fixed rapidly after each wet season.



Above: Progressive establishment of vegetation on the mine side of the McArthur River Diversion from 2008-2011. Revegetation is improving, however further works downstream and on the opposite bank are required in coming years.

Left: Cattle also need to be kept away from areas undergoing revegetation.

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Re-vegetation of the Barney Creek Diversion is progressing well, as we have observed over the past four years of monitoring.

Barney Creek Diversion revegetation

Barney Creek Diversion vegetation growth has continued to improve since the Independent Monitor's last inspection. We note that flood velocities are not as high along this part of Barney Creek, which have allowed for successful revegetation in this area. Also, this area was planted one year prior to revegetation at the McArthur River Diversion, so it exhibits additional growth.

Cane grass was observed to be providing habitat for the Purple Crowned Fairy Wren during our site inspection in May 2011. This suggests that revegetation of cane grass is proving successful in these early stages (see photo below).

Revegetation focus on the Barney Creek Diversion is shifting to species composition rather than mortality in an attempt to achieve a community that more closely resembles the original Barney Creek riparian section. The Independent Monitor understands that MRM aims to plant targeted tubestock along Barney Creek in 2011, and that irrigation is being removed from areas in Barney Creek where it is no longer required.

Further revegetation efforts downstream in the Barney Creek Diversion are still required in coming years.



Quality of reporting by MRM

MRM have made some improvements to the quality and content of their reporting since the last audit. However, the level of data analysis and interpretation presented in reports is still insufficient for many monitoring programs, and would be considered *below* leading practice industry standard. This is concerning, as thorough interpretation and discussion of monitoring results is essential for every monitoring program, so that early signs of environmental damage can be detected, and further degradation can be mitigated.

This has been a recurring concern during past audits. To report in line with basic leading practice standards, MRM need to improve their reporting by: presenting, comparing and discussing monitoring data over time; presenting quality assurance and quality control data to confirm that the monitoring results are correct; and utilise the monitoring results to improve the monitoring programs. We consider this to be basic scientific practice that is not being undertaken in many cases.

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Woody debris placed in the river diversions provides essential shelter for fish.

Flora and fauna monitoring and management at MRM appear to be moving in a positive direction. Most of the concerns raised by the Independent Monitor last operational period have since been addressed, however, a few issues still need to be addressed or completed.

Fauna monitoring

The significant issue regarding seepage from the TSF into Surprise Creek (see Page 1) has resulted in heavy metal accumulation in macro invertebrates and fish tissue. This issue requires close ongoing monitoring, and if an increasing trend is confirmed, remedial action will be required.

Freshwater Sawfish monitoring was again carried out in 2010.

Fish recaptures in the tagging program have begun to provide information on fish movements. The placement of woody debris also appears to be improving habitat for fish in the McArthur River Diversion. We observed approximately 10 fish species around one of these log jams during the May 2011 site inspection (see photo top left).

Elevated levels of lead and zinc were recorded in two gastropod species as well as in surface sediments from the beach immediately west of the Bing Bong Port Facility. Although the concentrations were still below relevant health guidelines, any further increases need to be investigated by MRM and mitigated.

Flora monitoring

Weed management is an ongoing commitment, and MRM has made appropriate efforts to control weeds in the mining lease during 2010. Weeds have been controlled through spraying by helicopter, quad bike, basal spraying, manual removal and burning. However, weeds continually enter the river diversions from large infestations upstream in non-lease areas. Cattle roaming in the mining lease are also a potential source of weed spread along the diversions. During our May 2011 inspection, we observed individual weeds or seedlings emerging along the McArthur River Diversion, however, there were no significant visible infestations along the inspected sections of the channel.

Results of the 2010 survey of seagrass adjacent to the Bing Bong Port facility indicate that the overall seagrass distribution, density and species richness has increased since the 2009 survey, but has not returned to the levels recorded in 2007.



Bird monitoring and riparian bird monitoring was continued appropriately in 2010. MRM are using the results of riparian bird monitoring as a tool to direct plant revegetation along the river diversions.

Surface Water and groundwater monitoring

The monitoring program for surface water quality appear to have been undertaken appropriately during the monitoring period. However, we have recommended minor adjustments such as an additional sampling point within Surprise Creek and at a location where seepage from the OEF was reported as an incident during the monitoring period. We also emphasise that quality assurance and control reporting should be presented and discussed in reports.

Groundwater monitoring and reporting has improved since the previous audit periods and additional groundwater bores have been added at the TSF (see photo left) and at Bing Bong. However, groundwater monitoring results prepared by both MRM and external consultants were found to be poorly discussed and inadequate to detect impacts to natural groundwater systems. We have made recurring recommendations for MRM to provide appropriate discussions of results as well as undertake quality control and quality assurance reporting. These requests have not yet been met.



Independent Monitor Hydrogeologist, Geordie McMillan inspecting two new groundwater bores installed within the TSF Cell 1.

Issues raised by the Community

During the last audit, the Independent Monitor reviewed an investigation regarding white material deposited on rocks and sediment at Burketown Crossing. This issue was initially raised in January 2010 by a member of the community of Borroloola, and so falls within the 2010 monitoring period. We reviewed a report by the Australian Institute of Marine Science (AIMS), which concluded that the white material deposited on rocks and sediments was likely to be salt that was unrelated to mining operations. We are satisfied with this outcome.

More white material was reported at the Surprise Creek Bridge in December 2010 by the Environment Centre NT (see photo right). The area of impact was inspected by the DoR on 13 December 2010, yet the DoR officers inspecting the area observed only minor amounts of white material (likely to be salt) on rocks along the bank of the Creek. The DoR advised MRM that this area should be added to the MRM monitoring program.

In response to community concerns raised in previous operational periods, MRM commissioned an investigation into whether MRM operations were affecting Agile Wallaby numbers in the Bing Bong area. The Independent Monitor is satisfied that the study carried out addresses this concern, and is satisfied with the conclusion that MRM operations are not likely to be affecting Agile Wallaby numbers in the Bing Bong area.

We encourage the community to continue to monitor potential mine impacts through observation as well as physical monitoring, and report any concerns to the Independent Monitor (see contact details on back cover), MRM representatives or the Department of Resources. During the Independent Monitor site visit this year, we took some of the Li-Anthawirriyarra Sea Rangers through some basic training on surface water sampling techniques, and we encourage that further training and experience continue.



Geordie McMillan from the Independent Monitor team showing members of the Sea Rangers how to collect surface water sample for laboratory analysis.



Photograph of white material in Surprise Creek taken by a member of the Environment Centre NT. The photograph was sent to the Department of Resources, and was investigated by MRM and the DoR in December 2010.



Aerial photograph of the Bing Bong Port Facility. Ore concentrate is stored in the large shed on site until it is loaded onto the Aburri Barge (photo right). As show above, a second surface runoff pond was constructed at Bing Bong in 2010 to store the large volume of runoff water from the site during the wet season. This runoff water is potentially contaminated with concentrate dust which escapes from the storage shed.



Potential concentrate spillage during loadout

In 2010, anonymous claims were made in the *Northern Territory News* (4 May 2010) that concentrate dust had been spilt and washed off the Aburri Barge during loading and cleaning. The Independent Monitor inspected the concentrate loading process this year (see photo above) and found it to be entirely closed, with no observable dust on the pavement or coming from the loading plant.

Although we cannot rule out the possibility that small amounts of concentrate have been accidentally spilled through previous barge loadings, our observations indicate that the loading plant and procedures are satisfactory and that there is minimal opportunity for concentrate to escape during loading as long as procedures are followed correctly.

PROCEDURAL REVIEW OF MRM AND THE DoR

Department of Resources

This audit period, the Department of Resources (DoR) provided the Independent Monitor with thorough and appropriate administrative procedures that the DoR uses to check the monitoring and approvals of the MRM operation. Check-monitoring of the MRM operation for surface water and groundwater impacts appears to be generally appropriate.

A compliance audit of MRM undertaken by the DoR was also supplied to the Independent Monitor and was reviewed together with two site inspection reports. While the audit and inspections appeared to have been carried out appropriately in line with procedures, the Independent Monitor has made recommendations for more thorough and complete reporting from the DoR.

The DoR has agreed with the recommendations. The DoR have also expressed their support for the majority of the Independent Monitor's recommendations regarding MRM's monitoring, and are satisfied that MRM will address, or is already addressing the issues highlighted this audit period.

Assessment of MRM's commitments

As in previous years, MRM have demonstrated a high level of compliance with their statutory commitments made in the annual Mining Management Plan (MMP). Only one non-compliance was identified in this audit, which relates to a lack of shaping of the clay cap of the tailings storage facility (TSF) Cell 1 (see photo right). Nine commitments were considered to be incomplete compliances.

PROGRAM FOR 2012

May – June 2012:

Independent Monitor's annual inspection of the McArthur River Mine, and Community visit.

August – September 2012:

Delivery of the Independent Monitor's Audit Report for the 2011 Operational Period.

November 2012:

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



TSF Cell 1 Cap with mesh fence to stop erosion. The cap needs to be shaped next audit.

FURTHER INFORMATION

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

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:

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Aerial photograph of the Bridge over the Barney Creek Diversion at the Mine site, Taken 1 June 2011. The Diversion will need to undergo further re-vegetation in coming years.