

# Independent Monitor Community Report 2008 Operational Period



ENVIRONMENTAL EARTH SCIENCES

Community Report by the Independent Monitor for the Period  
October 2007 to September 2008

Welcome to the second Annual Community Report by the Independent Monitor of the McArthur River Mine (for the period from October 2007 to September 2008)



Aerial photograph of the Tailings Storage Facility (Source: MRM Annual Environment Report, 2009)

## Introduction

Environmental Earth Sciences was appointed by the Northern Territory Department of Regional Development, Primary Industry, Fisheries & Resources (DRDPPIFR) in December 2007 to act as the Independent Environmental Monitor to assess the environmental performance of the McArthur River Mine (MRM) operations.

This Community Report summarises the findings of the Independent Monitor's audit of the Mine's environmental performance over the period from October 2007 to September 2008, which is referred to as the "2008 Operational Period".

Monitoring is undertaken by the mine from October 2007 to September 2008. The monitoring data is then collated and processed by the mine and their consultants into a series of reports which are provided to the NT Government, and in turn received by the Independent Monitor in March

the following year. After receiving the reports, the Independent Monitor undertakes a further field inspection, then aims to report to the Minister in September, allowing sufficient time for the mine to make any adjustments to the Mine Management Plan for the following year. Thus the release of the Independent Monitor Report will always be 12 months behind the monitoring period.

## Who is the Independent Monitor?

The Independent Monitor is a team of specialists lead by Environmental Earth Sciences. Team members specialise in different aspects of environmental monitoring.

**Environmental Earth Sciences** –

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specialise in groundwater, surface water, mine waste geochemistry, dust, soil and sediments and some inspection of revegetation.

**Bewsher Consulting** – specialise in hydraulics of the river diversions.

**Mining One** – specialise in geotechnical issues relating to land stability and the stability of mine assets.

**Outback Ecology** – specialise in flora and fauna monitoring.



Aerial photograph of the Bing Bong Port area c.1995 (Source: NT Department of Infrastructure and planning)



An Independent Monitor Team Member inspecting a section of the McArthur River diversion (Photo by Independent Monitor, June 2009)

## What is our role?

Our role, as the Independent Monitor is to monitor the environmental performance of the McArthur River Mine on an annual basis. We monitor by reviewing and assessing MRM's environmental management systems, monitoring data, and environmental assessments undertaken for each operational period. Audits and environmental assessments of the Mine undertaken by DRDPiFR are also reviewed by the Independent Monitor each year. We also undertake site inspections of the mine site and Bing Bong Port, and conduct interviews with MRM personnel, DRDPiFR personnel and members of the community of Borroloola.

Each year, the Independent Monitor prepares a report on the environmental performance of the mine operations, and provides this report to the Minister for Primary Industry Fisheries and Resources.

An important part of our role is to consult with the community of Borroloola to allow community members to voice any environmental concerns about MRM operations, and also

allow the Independent Monitor to discuss the findings of each Audit with the community.

## Audit focus areas

This audit period, the Independent Monitor focussed upon areas of environmental

monitoring that are considered to be of high environmental significance. These areas included:

- the hydraulic performance of the river diversions;
- revegetation of river diversion banks, and installation of fish habitat within the river diversions;
- monitoring of surface water and artificial waters;
- the stability of the tailings pipeline, which carries tailings slurry from the mine processing plant to the Tailings Storage Facility;
- monitoring of placement of waste rock within the Overburden Emplacement Facility;
- monitoring of the Bing Bong dredge spoil, where marine sediments are placed after each dredging event to clear the Bing Bong Port shipping channel; and
- fugitive dust emissions from the Bing Bong Port facility.



Some of the Independent Monitor Team inspecting the Tailings Storage Facility with MRM personnel (Photo by Independent Monitor, June 2009)

## CHANGES SINCE THE 2006 - 2007 OPERATIONAL PERIOD AUDIT

The previous audit undertaken by the Independent Monitor for the period from October 2006- September 2007 found that MRM demonstrated a high level of procedural conformance with statutory commitments and conditions. However, the technical environmental performance of the MRM operation was difficult to assess due to considerable data gaps in the monitoring results. The Independent Monitor identified a general inadequacy of interpretation of monitoring results both by MRM and external consultants, as well as one non-conformance in that larval mosquito monitoring breeding sites rectification programs had not been undertaken. The Independent Monitor also noted a number of incomplete conformances.

The Independent Monitor identified several monitoring programs that should be improved, and a number of environmental issues that required corrective action over the following 3-5 years. These were:

- improved monitoring and technical interpretation of all water monitoring data around the Mine, particularly the assessment of seepage from the Tailings Storage Facility into Surprise Creek;
- improved management and subsequent reduction of fugitive dust emissions at the Bing Bong load-out facility;
- improvement of dust management practices, particularly at the Tailing Storage Facility;



The Independent Monitor and MRM inspecting the clay layer covering the Tailings Storage Facility (foreground) with fresh tailings in the distance. (Photo by Independent monitor, June 2009)

- improved management and rehabilitation of the dredge spoil dump at the Bing Bong facility; and
- adjustments in analytical suites for the surface water and groundwater monitoring programs.

The Independent Monitor recognises the following programs that MRM has since established to rectify or address issues of concern or non-conformances observed through the previous audit. These rectification measures include:

- the application of a clay layer covering to approximately 2/3 of Tailings Storage Facility Cell 1, and the application of reclaimed seepage to reduce tailings dust emissions from the Tailings Storage Facility;
- engagement of an appropriately-qualified hydrogeologist to evaluate the

groundwater conditions at the Mine; and

- significant re-roofing of the Bing Bong concentrate storage shed has been undertaken, which will assist in reducing fugitive dust emissions.

During the last Audit for 2006-2007, The Independent Monitor reviewed the check monitoring systems and procedures utilised by DRDPIFR. Although the sampling techniques used by DRDPIFR in the field were satisfactory, the procedural documentation for undertaking this work such as sampling manuals, training procedures and checking competency of staff, were not evident. These were later provided to the Independent Monitor.

## ISSUES REQUIRING INVESTIGATION AND REPORTING

The Independent Monitor is required to report to MRM and DRDPFR regarding any issues it considers require urgent investigation and reporting. Following the Independent Monitor's mine site inspection in June 2009, two issues were identified as requiring urgent investigation. These were:

1. Seepage from Cell 1 of the Tailings Storage Facility into Surprise Creek; and
2. Salt discharge through dam walls at the Bing Bong Dredge Spoil Ponds.

### Seepage from Tailings Storage Facility Cell 1

Cell 1 at the Tailings Storage Facility is unlined and in close proximity to Surprise Creek. The presence of alluvium (sands, sandy-clays and silts) and also potential 'paleochannels' (conductive discrete zones of sands and gravels) have resulted in leachate seepage from the Tailings Storage Facility to the creek (as shown in photograph top left). Tailings seepage occurred within two years of commencement of tailings deposition into the facility (circa 1997) and, although it was acknowledged that the tailings may acidify over time, it was considered unlikely in the short-term and unlikely that heavy metals from the tailings would be mobilised.

As part of the approval of the open cut operation, in 2005 a 'geopolymer' barrier system was put in place between the Tailings Storage Facility and Surprise Creek to prevent seepage migration to Surprise Creek. This also augmented the existing seepage recovery bores which were installed in 2004 to help reduce seepage reaching the creek.

During the Independent Monitor's inspection of Cell 1 of the Tailings Storage Facility



Tailings seepage draining from the foot of Tailings Storage Facility Cell 1 into Surprise Creek (above), and Iron sulfate salts at the surface of Cell 1 (below) (Photo June 2009, Independent Monitor).



in June 2009, the Independent Monitor noted that water from the recovery bores was being pumped back to the top of Cell 1 and applied across the surface to minimise dust emissions. This recovered water was seen to form a "moat" around the outer surface

of Cell 1, which eventually drained into Cell 2. Iron sulfate crystals were observed within the moat (see photograph above), which is indicative of acidic conditions (pH of between 3.6 and 3.8). Field testing of this water later in the week by MRM confirmed that the



Salt crystals from Tailings seepage along the edge of Surprise Creek (photo June 2009, Independent Monitor)

pH of this water was between 3.4 and 3.8.

The amount and rate of acid generation from the Tailings Storage Facility and the impact of the acid on the geopolymer barrier continues to be unknown. As such, predicting the impact on the environment and designing the necessary mitigation measures cannot be readily achieved at this time.

The Independent Monitor provided detailed recommendations for further investigation into this matter in a letter to the General Manager of McArthur River Mining and to DRDPIFR. In response, MRM have subsequently undertaken further investigations including:

- external expert consultation;
- additional recovery bores and groundwater monitoring;
- updated groundwater modelling including electromagnetic survey; and
- further tailings dust suppression to eliminate the need to apply water from the recovery bores.

The Independent Monitor will review these activities in 2010.

### Saline seepage from Bing Bong Dredge Spoil

The second urgent issue identified by the Independent Monitor relates

to saline seepage from the ponds that contain dredge material at the Bing Bong Port facility. During the June 2009 site inspection, the Independent Monitor noted significant vegetation die-back and salt crystallisation immediately outside of the dredge pond walls, indicating that saline seepage is migrating through the degraded dredge pond walls. The pond walls and drain design are required to be remediated to ensure that saline seepage does not continue to affect the surrounding land, as shown in the photograph below.

The Independent Monitor recommended that MRM review the future use of the dredge spoil ponds so that this facility can be remediated to meet its environmental and engineering performance objectives in line with generally acceptable industry standards. It was also advised that a Management Plan be developed to include regular environmental and geotechnical inspections and monitoring.

MRM have since undertaken soil sampling around the dredge spoil ponds to investigate the extent and migration of saline leachate impacts, and will also review vegetation dieback through aerial photographs. Recent steps have also been taken by MRM to



Salt-affected land outside of dredge spoil ponds at Bing Bong Port (photo June 2009, Independent Monitor)

reconstruct drains and spillways to divert saline seepage back to sea prior to the next dredging event. The Independent Monitor will review the progress and effectiveness of these and other related mitigation works as part of next year's audit.



Aerial photographs of the Bing Bong Port Facility (photo c.2009, NT Department of Infrastructure and Planning)

## OUTCOME OF PROCEDURAL AUDIT OF MRM

The audit of MRM's monitoring systems and procedures showed a generally high level of compliance with their commitments, although three non-conformances were observed. These related to: the accelerated salt leaching and landform stabilisation of the Bing Bong dredge spoil ponds; inadequate verification of the Overburden Emplacement Facility clay liner; and the absence of mosquito monitoring and management programs (which



The Overburden Emplacement Facility where waste rock from mining is placed (Photo June 2009, Independent Monitor).



Dredge soil pond wall separating the dredge material (left) from the surrounding land.

was also identified as a non conformance last audit). MRM have stated that these non-conformances will be addressed and rectified through: revegetation trials at Bing Bong Port; improved testing of Overburden Emplacement Facility liner materials in accordance with a new procedure; and the commencement of the mosquito monitoring, respectively.

## OUTCOME OF PROCEDURAL AUDIT OF DRDPIFR



A truck depositing concentrate within the Bing Bong Port storage shed (Photo June 2009, Independent Monitor).



Pipeline that carries the tailings slurry from the processing plant to the Tailings Storage Facility (Photo June 2009, Independent Monitor).

The Independent Monitor requested to review audits and assessments undertaken by DRDPIFR to monitor MRM's environmental performance over the 2007-2008 period. The DRDPIFR provided the Independent Monitor with procedures manuals, project management plans, and correspondence between DRDPIFR and MRM. This information was sufficient to demonstrate that DRDPIFR undertakes its own check monitoring of the Mine, however, no formal audit was provided to the Independent Monitor within the designated timeframe for receipt of documents.

The Independent Monitor understands that regular

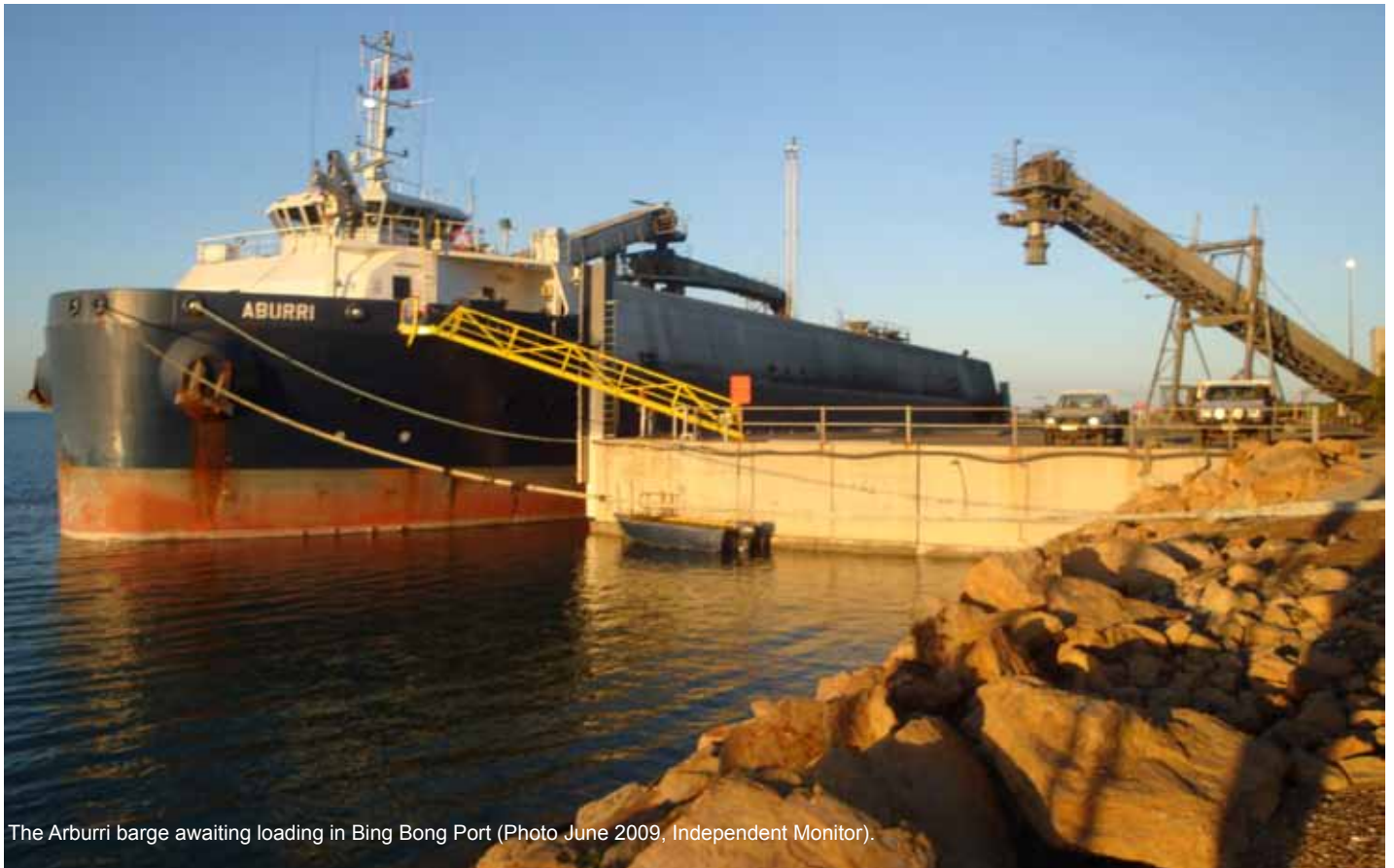
audits of MRM are undertaken by DRDPIFR, which include audits of the environmental performance of the Mine and compliance against Mining Management Plan (MMP) commitments. Although one Mining Management Plan Compliance Assessment report was submitted to the Independent

Monitor, this report was submitted after the cut off-date for receipt of documents for this audit period. As such, the Independent Monitor will review this report as part of a more rigorous audit of DRDPIFR's management procedures within the next audit period during 2010.



A portion of the Barney Creek diversion beneath the mine site bridge (Photo June 2009, Independent Monitor)

## OUTCOME OF TECHNICAL AUDIT



The Arburri barge awaiting loading in Bing Bong Port (Photo June 2009, Independent Monitor).

The Independent Monitor considers the following issues to be significant and require corrective action to improve MRM's environmental performance.

### Bing Bong Port Dust Emissions

The Independent Monitor is concerned about dust emissions from the Bing Bong load-out facility, as zinc and lead-laden dusts from the concentrate shed are known to be carried by wind from the site and deposited within

marine sediments and terrestrial soils. Unfortunately, the doors to the concentrate shed must remain open so that dangerous gases do not build up within the shed, however this requirement increases the potential for dust to escape.

Water sprays are used across



Concentrate within the storage shed at Bing Bong Port, awaiting transport to overseas customers via ship (Photo June 2009, Independent Monitor).



Bing Bong Port load-out facility (Photo June 2009, Independent Monitor).

the Bing Bong facility to limit the potential for dusts to blow from the site. However, the Independent Monitor recommends that a detailed

fugitive dust study be undertaken at Bing Bong to define the nature and extent of dust emissions, and help determine appropriate mitigation strategies.

MRM have committed to undertaking a dust audit within the next six months, which will highlight any sources of dust generation that require improvement or mitigation.



## Revegetation and weed management along river diversions



(Above) Nogoora Burr (*Xanthium occidentale*) (right) and native Eucalyptus (left) observed along the McArthur River diversion channel (Photo by Independent Monitor, June 2009).



(Right) Weed infestation lining a portion of the McArthur River diversion channel (Photo by Independent Monitor, June 2009).

The Independent Monitor will be keeping a close eye on revegetation and weed management along the river diversion channels at the mine site. The Independent Monitor observed infestations of weeds, namely Nogoora Burr (*Xanthium occidentale*), along the river diversion channels during both the December 2008 and June 2009 inspections. Whilst MRM have put considerable effort into weed control along the Barney Creek diversion, including spraying and manual removal, the same efforts had not been applied to the McArthur River diversion. The Independent Monitor recommends that additional efforts are required to minimise weeds in the rechannel works.

Since the Independent Monitor's June inspection, MRM have advised that additional resources will be committed to the ongoing weed control program prior to the 2009/2010 wet season, and acknowledged that this work must be continuous during both the initial rehabilitation stage and throughout the life of the Mine.

### Other issues identified

The following minor issues are considered to require medium-term rectification by MRM and will be reviewed as part of next year's audit.

- A drain and sump at the base of the Run of Mine Pad that failed during the last wet season floods was also flagged by the Independent
- Monitor as requiring improved design and rehabilitation (see photograph above). This sump has since been rehabilitated and the Independent Monitor will examine its effectiveness during next year's site inspection;
- The generation of dust from the Run of Mine Pad towards Barney Creek and its tributary is of concern,



Failed drain and sump at the base of the Run of Mine Pad at the Mine site undergoing rehabilitation (Photo June 2009, Independent Monitor).



Eucalypt along Barney Creek Diversion that has been damaged by cattle or feral donkeys (Photograph supplied by MRM, June 2009).

are continually being improved;

- The Independent Monitor has identified the need for in-place testing of the clay material that lines the base of the Overburden Emplacement Facility. It is important to test this clay liner to ensure that it is physically and chemically suitable to provide geotechnical stability and reduce infiltration of potentially acidic water within the Overburden Emplacement Facility. It is apparent that adequate

testing of this layer has not been undertaken (which was a non-conformance outlined on Page 6), however MRM have stated that this testing will be undertaken as part of future Overburden Emplacement Facility expansions;

- Some asphalted and paved surfaces at the Bing Bong load-out facility were identified as being in poor condition and were recommended to undergo rectification so as to protect the underlying soil from becoming contaminated by site operations. MRM have committed to rectifying these areas; and
- The rapid maintenance of fencing damaged by annual floods must be undertaken by MRM to ensure that cattle and feral donkeys do not hinder rehabilitation efforts along the river diversions by causing erosion and destroying young plants (see photo to the left).

and the Independent Monitor will closely monitor the effectiveness of recently implemented dust monitoring and mitigation measures such as additional sprays and a new dust management plan for the crushing facilities;

- In general, the Independent Monitor considers that the measurement of accuracy, reproducibility and the precision of routine monitoring results by MRM to be inadequate for the audit period. This includes checking field measurements against laboratory results and expected objectives, and using a data quality sign-off sheet for quality assurance. However, MRM maintain that monitoring is undertaken in line with its statutory commitments and



Run of Mine Pad at the mine site (Photo June 2009, Independent Monitor).

## COMMUNITY CONCERNS

During the June 2009 mine inspection visit, the Independent Monitor consulted with Borroloola Community members in relation to any concerns they had regarding environmental impacts of MRM. Three main issues of concern were investigated.



"Ink Berries" *Carissa lanceolata*  
(Photo source: [http://www.alicesprings.nt.gov.au/community/environment/recommended\\_native\\_plants/carissa\\_lanceolata](http://www.alicesprings.nt.gov.au/community/environment/recommended_native_plants/carissa_lanceolata))

The first issue was the reported depletion of "Ink Berries" (referred to as "Jibradidi" in the local language, and which the Independent Monitor believes to be *Carissa lanceolata*) in the area of the Tailings Storage Facility at the mine site. The Independent Monitor spoke with the Northern Territory Parks and Wildlife Service in Borroloola regarding the Ink Berry and is confident that the recent lack of "Ink Berries" is likely to be due to climatic reasons, and not due to MRM operations.

The second issue raised by the Community was the apparent depletion of the Agile Wallaby population (*Macropus agilis*) and Short-eared Rock Wallaby (*Petrogale brachyotis*) (photo above right) in the area of the Bing Bong Port. The Independent Monitor agrees that the recent scarcity of these wallabies may be related to Bing Bong Port operations, and will

continue to monitor this issue closely.

The third item raised by one community member was the concern that MRM had not properly cleaned up numerous zinc concentrate spills from truck accidents carrying the concentrate

on the way to Bing Bong Port over the past eight years. The Independent Monitor reviewed MRM's incident reports for each spill as well as spill cleanup procedures, and is satisfied that clean up of these spills was satisfactory

and did not cause significant environmental harm.



Short eared rock wallaby (*Petrogale Brachyotis*). (Photo Source: <http://www.australianwildlife.org/Wildlife-and-Ecosystems/Wildlife-Profiles/Mammals/Short-eared-Rock-wallaby.aspx>).



(Above) Cut-off section of the old McArthur River at the mine site (Photo June 2009, Independent Monitor).

## PROGRAM FOR 2010

April – June 2010: Community visit and mine site inspection:  
September – October 2010: Independent Monitor Audit report for the 2008-  
2009 Operational Period

If you would like to contact the Independent Monitor about an environmental  
issue relating to the Mine please call:

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or

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For more information, please visit our website at:  
[www.mrmindependentmonitor.com.au](http://www.mrmindependentmonitor.com.au)



Osprey nesting at the Bing Bong Port Facility (Photo June 2009, Independent Monitor).