Appendix A
Submissions

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Appendix A Submissions

Appendix A.1

Amateur Fisherman's Association of the NT Letter and Comments

AMATEUR FISHERMEN'S ASSOCIATION OF THE NT Inc.

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Our mission: To represent recreational fishing in the NT and ensure the quality of our sport.

Ms Lyn Allen
Executive Director
Environmental Protection Agency
GPO Box 30
Palmerston
NT 0831

Dear Ms Allen

Attached please find comments from the Amateur Fishermen's Association of the NT Inc. on the Draft Environmental Statement for the proposed McArthur River Mine Open Cut Project.

Please feel free to contact me if you wish to discuss any of our comments.

Yours sincerely

Chris Makepeace
Executive Officer

20 October 2005

AMATEUR FISHERMEN'S ASSOCIATION OF THE NT Inc.

Comments on Draft Environmental Impact Statement McArthur River Mine Open Cut Project

General Comments

The McArthur River Mine (MRM) is situated upstream of one of the Northern Territory's (and arguably one of Australia's) premier recreational fishing locations — the lower reaches of the McArthur River, its estuary, near-shore waters and islands around the Sir Edward Pellew Group. The significance of this area to recreational fishing was recognized by the Northern Territory Government in 2002 when it closed most of the area to commercial barramundi gill netting. In its reasons for that decision in March 2002 the Government stated:

> "The McArthur River is the second most popular spot for recreational fishing in the Northern Territory behind only Darwin Harbour. 11% of the recreational fishing effort in the Territory occurs on the McArthur River. Tourism is the second biggest industry in the Northern Territory and Recreational Fishing forms an important and strategic part of the Territory's tourism economy. Numerous submissions made reference to the increase in tourism that a closure to commercial fishing may bring."

The improvement in the quality of recreational fishing in the McArthur River area since that closure has been nothing short of remarkable and it now draws much greater numbers of visiting fishers than it did in 2002. Although detailed statistics are not available, it is highly likely that it now accounts for considerably more of the Territory's recreational fishing effort than the 11% assessed in 2002. The major service provider for fishers on the river is the King Ash Bay Fishing Club and managers there estimate that, at any one time during the dry season, there are between 300 and 500 people fishing there with that number climbing to 600 in the peak fishing month of April. These visitor numbers clearly justify the decision to protect the area for recreational fishing and, provided the quality of fishing can be maintained, fishing tourism will continue to be a major contributor to regional development, the economy of the region and that of the Territory.

Extending the operation of the MRM into the future will also be important in terms of development in the area and its economic contribution, however, recreational fishing, its

ability to draw visitors and the flow-on beneficial development and economic effects will continue well beyond the projected 25 year life of the mining operation. The view of the Amateur Fishermen's Association of the NT (AFANT) is therefore that any development of the mining operation must be carried out in such a way that it will not be detrimental to recreational fishing and this implies that it must have no adverse impact on fish or the environment that they depend on.

Fish Welfare Issues

Recognising that there are current gaps in knowledge of the biology, detailed movement patterns and environmental needs of the fish and other organisms that contribute to the recreational fishery, a very strong precautionary approach should be taken whenever an action occurs in the mining operation that could possibly impact on them. Also, MRM should be prepared to adapt or modify mine design and/or operations to keep pace with any advances in scientific knowledge and to respond to any indicators that suggest fish are being put at risk.

The Draft EIS places emphasis on fish welfare during the mining phase of MRM but the same level of emphasis is not apparent for the test pit, construction and rehabilitation phases (noting that the test pit phase is already underway). AFANT's view is that there are significant risks in each of these phases of the mine's life and they require equal management attention.

A significant danger to fish is the unintended or uncontrolled release of polluted water (included water with high sediment levels) from the mine site. Another danger is placing impediments in the way of natural fish movement through the river system. While we note that considerable emphasis has been placed on the water management strategy and the quality of the river channel realignment, there are some specific matters we believe need further consideration These are (in the order they are addressed in the Draft EIS document with relevant page or figure numbers):

- P6-8. Any risk of polluted material running down river the first time the decommissioned pit fills and overflows should be eliminated.
- P7-9. The lowest level that PAF cells are placed in the OEF should be above the 1 in 500 year flood level to ensure the integrity of the clay encapsulation. Also, the lower levels of the OEF should be constructed in such a way that they cannot be undermined by floodwaters over time. The storage of PAF must be done in such a way that it will be contained on site indefinitely ensuring no acid run off into the McArthur River in the future.
- P7-14. Noting the point made above, the document provides details of the main OEF and the management of PAF material in it but the handling of overburden and PAF material in the in-pit OEFs is not detailed. How are the two in-pit OEFs constructed, how is PAF to be stored in them and what happens to them when the pit is decommissioned and the main bund is breached? These need to be managed and maintained to the same level as the main OEF and that may involve the removal of all PAF material to be encapsulated in the main OEF.

- P7-28. Seepage recovery is necessary to avoid eventual run off of pollutants from the TSF into the river. How long will MRM maintain the seepage recovery bores after mine decommissioning? How long is it possible for such seepage to occur. Who will monitor seepage and ensure no polluted run off in the future? The TSF is a high-risk area of the mine and its permanent management needs to be addressed now.
- P12-4. Given the lack of information on fish migration correlated to river flows, the increase in flood levels above the mine site (P12-41) are a potential risk to fish migration (and also to permanent upstream waterholes — see below). Consideration needs to be given to either limiting the increase in flood levels or clearly determining that they will not have an adverse impact.
- P12-19. The test pit pond system should be protected from flooding and down river run off, preferably to a 1 in 500 flood level.
- P12-24 Table 12.11. The integrity of the OEF-PAF pond should be maintained at levels above a 1 in 100 flood unless it can be clearly demonstrated that any flood run off will be diluted to safe cattle drinking water standards before it enters the main river channel.
- P12-26. The target overflow possibilities of containment storages should be assessed prior to construction and the containments built to the required standards rather than monitoring during mining and then determining the necessary containment levels.
- P12-42. Any physical barriers to fish movement in the realigned river and creek channels should be removed as construction is underway and not left to be dealt with as part of "additional remedial construction works." A monitoring process needs to be implemented to detect any such barriers during construction.
- P13-41. More study of the changed habitat conditions of the realigned channels is necessary to ensure that they do not deter migration of aquatic species. It is unacceptable to have a "temporary change to fish communities in upstream pools". The importance of these upstream pools to fish welfare in tropical river systems is little understood but a small disruption to them could have multiplier effects elsewhere in the system.
- P 22-26. The biological monitoring program in the Environmental Management Plan needs to be strengthened, particularly the monitoring of aquatic organisms and fish to assess any impacts from the MRM operation during test pit, construction, mining and rehabilitation phases and to implement remedial actions to mitigate such impacts.

River and Creek Channel Realignment Issues

For fishers, there is no doubt that the most contentious element of the proposed MRM construction and operation will be seen to be the need to realign a significant length of the McArthur River channel. MRM might consider producing public information materials detailing plans for these works, showing how the movement of fish and other aquatic organisms has been taken into account and setting out the processes for monitoring the operations to ensure that fish are not being adversely affected.

AFANT understands that the channel length to be replaced does not hold water through the dry season and only provides passage for fish and other aquatic life after wet season

rains. Nevertheless, the realigned river channel and the ability of fish and aquatic life to use it in the same way as they do the existing channel is essential to the health of the river's fishery. This means that, during the mine construction phase, either the existing channel or a realignment completed to its full specifications will need to be in place at all times when wet season flows are possible.

AFANT has had discussions with MRM and, while the plan for the channel realignment appears to take account of all those elements that may impact on the migration of fish and other organisms (except for the two specific matter raised above with references to P12-42 and P13-41) we believe that a specific monitoring program should be put in place for this realignment and those of Barney and Surprise Creeks. The monitoring program should operate during the construction phase to ensure that there are no impediments to migration in the new channels and that they are constructed to be as *fish friendly* as possible. Monitoring should be particularly detailed during the first wet season that the channels are in use and it should continue for the life of the mine.

Although the Draft EIS provides considerable detail of the plans for the McArthur River realignment there is not the same level of detail for Barney and Surprise Creeks. Noting that "some species have a preference for this habitat over the main river" (P13-36) the realignments of these two creeks should be carried out to standards similar to the main river.

The Draft EIS (P13-11) indicates the likelihood of increased sediment flows down river from the new river channel during initial flood events after construction. Steps need to be taken to ensure that the likely level of sediment will not pose a threat to riverside or aquatic vegetation or to aquatic animals in any downstream pools.

Permanent Upstream Pool Issues

Not enough is known about the significance of permanent upstream waterholes to the overall heath of tropical rivers (and their inhabitants) but it is likely that they are particularly important for species like barramundi which are diadromus. Many of these pools are known to hold large numbers of juvenile barramundi and there are also larger fish in many. Adding to the importance of these pools, it is now thought that many barramundi may not move to saltwater areas every year but may skip spawning in some years and hold in upstream pools. With this in mind, the effect of MRM's operations on these upstream pools must be minimised.

We note that the current plans will result in a drop of .5 m in the level of Djirrinmini waterhole by the end of the mine's operation (P11-16). Given the uncertainty of the importance of pools like this, AFANT believes that this is unacceptable and that a more precautionary approach should be taken. Although there is significant fluctuation in the level of these waterholes during the wet/dry season cycle, riparian and aquatic vegetation and aquatic fauna most likely rely on stable dry season water levels to survive. Groundwater management plans should be adjusted to ensure that the mine does not reduce the level of Djirrinmini or any other permanent waterholes.

Also, and repeating a point made above with reference to P12-4 and P12-41, the increase in flood levels above the mine site resulting from the presence of the main bund wall poses a potential risk to permanent upstream waterholes. AFANT would prefer that increased flood levels not result from the mine but, if this is not possible, then an urgent study is necessary to determine if these higher levels will adversely impact riparian and aquatic vegetation and aquatic fauna in pools like Djirrinmini and the Eight Mile.

P12-33 refers to erosion risks in the river reach upstream of the realigned river channel. We assume this includes permanent waterholes such as Djirrinmini. The Draft EIS proposes to "monitor erosion at fixed control locations" and , when erosion is detected, carry out "remedial strategies and/or works." Given what has already been said about permanent waterholes, AFANT's view is that the erosion risk, at least insofar as it may impact on any permanent waterholes, should be eliminated.

Uncontrolled Tailings Release Risk Issues

The Draft EIS recognises that "the largest environmental risk associated with [the current mine's] existing waste management practices is the disposal of tailings" (P7-33). While the TSF proposed for future operations has been designed to operate quite differently to the existing tailings dam it is still rated as a high hazard category "given the potential impacts from an uncontrolled release or embankment failure" (P7-23).

AFANT has some particular concerns about a possible escape of materials from the TSF. We note the proposal to layer tailings in a series of "lifts" in the new facility but we are concerned that this means that the outer tailings containment embankment will be at a level considerably below the level of the upper lifts of tailings (Figure 7.10). Further, although the outer embankment has been designed to the standard required by the Australian National Committee on Large Dams it is not clear to us if it has been designed with the weight of a number of lifts of tailings taken into account. Clearly the outer embankment must be able to hold the full weight of the tailings for the life of the mine and on into the future.

We are also concerned that there may not be sufficient freeboard at the top of the outer TSF cell embankments given the fact that there will be lifts of tailings at levels considerably above the top level of the embankments. The outer embankments will be built to RL 56 m but the top lifts of tailings will be as high as RL 68 m. This will leave only a relatively small area between the embankments and the bottom of the first tailings lifts to contain any rainfall run off.

The multiple lift design is a particular concern in terms of heavy rainfall events. Although the TSF is located above a 1 in 500 flood level it has only been designed to cope with a 1 in 200 year wet season rainfall. An emergency spillway is to be put in place at crest level RL 55 m in TSF Cell 2 with an overflow at RL 54.5 m to allow Cell 1 to run into Cell 2 and thus utilise the spillway. AFANT is concerned that this spillway discharges into Surprise Creek (and then, we assume, into the main river).

It is our view that the TSF should not be able to discharge to the river or wider environment under any circumstances and that some method needs to be found to retain the tailings on site under all but the most drastic conditions. We note that, during the test pit phase, any possible flood overflow from the concentrator pond will be allowed to flow into the pit rather than escape into Barney Creek. Some similar safeguard should be considered for the mining phase which will contain any run off of tailings in something like an enlarged Clean Water Dam with enhanced holding capacity (noting on P12-17 that it has the "greatest potential for overflow" and a Waste Discharge Licence is in place for when it reaches full capacity in heavy rain) or perhaps even the main pit.

Another issue with the TSF is the prospect of continued seepage and the need for recovery bores to operate long after the mine is decommissioned (P7.29). The EIS should address the need to effectively manage the TSF (and indeed the entire sight) in perpetuity and ensure that it cannot become a threat to the environment in the future. For example, if recovery bores are required to operate some 30 years after decommissioning, the implication is that there will be a need for ongoing site infrastructure such as power for that length of time.

Water Monitoring – Whole-of-River Approach

AFANT notes the proposed water monitoring regime for the mine (as proposed P22-23) but believes that the importance of the McArthur River as a recreational fishery requires more of a whole-of-river approach. By assessing water quality throughout the river rather than just around the mine site, MRM will be able to better assess the effectiveness of a major part of its environmental management program (a part that will be of considerable interest to locals as well as Territory and interstate visitors to the region). It will also be able to report on the success of its program in maintaining water quality throughout the river and, in the event that any problems are detected, act on them for the benefit of the river as a whole.

MRM should determine what additional monitoring would be required for this to occur but AFANT believes it could be achieved by locating a monitoring station further upstream of the mine than the current SW7 site (refer Figure 12.7) say at the upstream end of Djirrinmini waterhole. (It may be possible to move equipment from SW7 to this new location.) The other site where monitoring should be undertaken is well downstream at a point just before freshwater begins to mix with saltwater in the early tidal reaches of the river. This downstream monitoring site will be particularly valuable as it can provide data to show if there are any detectable effects from the mining operation on the lower river.

Site Monitoring and Maintenance Post-Closure

To the best of our knowledge, the issue of very long term environmental management of decommissioned mine sites has not been well treated in other mine plans in the Northern

Territory (or the rest of Australia for that matter) and there is an opportunity here for MRM and the NT Government to set new standards.

AFANT notes MRM's Closure Commitmnets (P20-11). We also note that the principal closure strategy for the mine is to minimize the instability of contaminated areas but not to return the site to a state where it will "resemble surrounding areas" (P20-13). While returning the area to a natural state would be desirable, AFANTs principal concerns can be satisfied if any contaminants are contained in a stable condition on the site in perpetuity and there is no off-site run off or escape of potentially polluting materials.

In the section on Post Operational Closure Requirements (P20-23) it states that staff will be maintained on site for monitoring and maintenance of bores and other essential infrastructure for three years with at least one person being on site for a further five years. It then states: "Any management requirements beyond five years would be staffed as necessary" but it makes no mention of any other funding that may be required. Effectively, this means a possible commitment to provide ongoing staffing as required in the years after 2038. Is MRM bound to this commitment by a legal contractual obligation? How will this staffing and any required operational funding be provided if MRM or Xtrata (or successors bound to take up MRM's obligations) do not exist at that time? It is not clear to AFANT if the so called system of *environmental bonds* is adequate for this purpose.

Even with a relatively thorough environmental management plan and close-down strategy such as those proposed by MRM here, it has to be acknowledged that potentially polluting materials will exist on the site for many years and there will be a need for monitoring and, most likely, some level of site maintenance until at least mid-century or beyond. We believe the this longer time frame should be clearly addressed in the final approved plan for this mine expansion and that this should include clear statements of responsibility and sources of assured funding that will be available up to 2050 and beyond.

General Monitoring of Possible Recreational Fishing Impacts

Any adverse environmental consequences from the operations of MRM are likely to impact most heavily on the McArthur River and it is a nationally significant recreational fishing area that must be protected. Recreational fishing is a very important attraction for tourists and, as such, it makes a considerable contribution to the region's and the Territory's development and economy. Carefully managed and protected, it will continue to do this well past the life of MRM.

Because of the particular importance of recreational fishing to the region, AFANT believes that MRM should have in place an environmental management plan monitoring process which has a particular focus on the McArthur River and its recreational fishery. This process should be put in place now so that it can monitor the test pit, construction, mining and rehabilitation phases on the mine's life.

AFANT would welcome the opportunity to be part of this monitoring process and we would welcome the opportunity to discuss with MRM both the nature of this monitoring process and the ways that we can be part of it.

Appendix A.2

Department of Natural Resources, Environment and Arts Comments

Northern Territory Government
Department of Natural Resources, Environment and the Arts

INTERNAL MEMORANDUM

TO:	Rod Johnson, Office of Environment and Heritage	DATE:	18/10/2005
THRU:			
FROM:	Armando Padovan, A/Manager Advisory and Regulatory Services	REF:	EN2005/0031-0012 CNR 80
SUBJECT:	McArthur River Mine Draft EIS Comments		

Following are comments in relation to the draft EIS:

Groundwater

One issue relates to the potential for contamination of groundwater and surface water in the longer term (>30 years) resulting from seepage or erosion of the Tailing Dam. A small but significant contamination plume already exists. It is suggested that the impact of various future scenarios (best to worst case) should be modelled, the risk of these scenarios occurring, the probable resulting environmental impact predicted and management options presented to minimise the risk of these adverse environmental impacts occurring.

Biodiversity Offsets

Five possible sites on Macarthur River station are listed as possible foci for providing biodiversity offsets. The prospect of a positive long-term contribution to biodiversity conservation in the areas is commendable. However, the suggestion that only one of these options may be pursued (section 21.4) should be reconsidered. This is particularly so in light of the scale of mining operations and unprecedented degree of permanent environmental disturbance. This compares with the relatively minor costs of entering into a co-operative management agreement or presumably offering one of the off-set foci for sale to a non-government conservation agency.

Mine Footprint and Bund Wall

There is no rationale in the draft EIS supporting the choice of alignment of the diverted river channel and consequently the size of the area enclosed within flood protection bunds. On the upstream (southern) side of the pit the flood protection bund is 400m from the pit while on the eastern side the flood bund is up to 1.5 km distant.

The position of the flood bund in the east appears to be an artefact of the choice to excavate the channel of Bull Creek to accommodate the redirected flow of the McArthur River and to minimise the haul distance

for excavated material from the proposed river realignment for re-use in the construction of flood bunds.

A diversion channel more closely aligned to the mining pit would avoid the destruction of 2 km of the riparian corridor of the McArthur River and of 4 km of Bull Creek. Costs of establishing and vegetating this shorter diversion channel would also be reduced and haul distances of excavated material for re-use on flood bunds would not be increased. The resulting smaller area between the pit and the eastern flood bunds appears to be more than adequate to accommodate short or long-term storage of potentially acid-forming (PAF) materials and reduce costs related to their return to the pit.

It was stated at a presentation on 6 October that the rationale for the diversion of the McArthur River and the placement of the bund was based on allowing future expansion of the mining operation which may or may not be practical or economically feasible. Information regarding the longer-term intentions of the proponents in the area is important to enable an informed environmental impact assessment process to proceed.

Overburden Storage

The proposed locations of the northern, southern and western (in particular) OEF's all fall over obvious drainage lines (figure 6.1). This is despite geographic features including watercourses being recognised as a physical limitation on the choice of placement areas for waste material (section 6.6).

Storage of overburden some 183 million tonnes over the life of the mine is in close proximity and within the flood zones of the McArthur River. The overburden has the potential to form acid through the oxidation process 6.8.1. While in such close proximity to the flooding channel of the McArthur River there will always be the potential for pollution of the water stream from not only seasonal rainfall but also flood waters. The effects of flooding on the overburden storages needs to be addressed ie what will the effect of flooding have on the storage?

Flood Bunds

At decommissioning it was stated that the bund wall would be breached. Will this result in the flooding regime of the floodplain to revert to a near-natural seasonal pattern of flooding and drying of plains adjacent to the diverted channel? Or would the presence of the bund (albeit breached) still affect flooding and drying cycles?. If the latter could additional breaches in the bund be considered. to be reinstated. Retention of flood protection bunds would obviously retard this cycle?

Drainage Realignment

Mimicking the shape and character of the existing channels in the proposed drainage alignment is a positive (and necessary) approach. The existing river channel includes numerous short side-channels and these

should be included in designs. The proposed design of the channels does not appear to provide for creation of levee banks along its margins. These banks are probably important in re-establishing appropriate stands of fringing vegetation.

There is virtually no mention within the draft EIS of the destruction of a 4km length of Bull Creek that is proposed to be excavated to form the new channel of the McArthur River. The impacts of this aspect of the proposal needs to be fully considered in a supplementary EIS.

Revegetation

A revegetation program is proposed for the realigned river and creek channels but not for any OEF's (a grass cover only is proposed for these e.g.: section 7.2.4) and any remaining flood bunds. If there are sound reasons why full revegetation is not to be promoted these should be explicitly stated, otherwise OEF's and bunds should be included in rehabilitation work and use species common the existing low rises and river levees in the area.

Current revegetation proposals for constructed channels appear to be focussed only on bank stabilisation rather than restoration of a functional riparian corridor. Revegetation efforts should not be confined to the immediate edges of created channels but should extend as far as the previous riparian zone i.e. up to 250 metres from the centre of the main (McArthur River channel and 100 metres from the edges of the minor realigned channels of Surprise and Barney Creeks.

Revegetation of all riparian areas should proceed as soon as practicable following realignment of each watercourse. Species should be planted at higher densities than they naturally occur in the area to allow for initial losses. In addition to plants being placed in spaces between rocks armouring on the lower slopes of banks, areas proposed for revegetation should be mulched and irrigated until plants become independent. Revegetation works should include well-established seedlings developed from local seed sources as well as dispersal of local seed stock. Seed collection and nursery establishment should proceed as soon as possible to ensure sufficiently advanced tree and shrub seedlings are available when new channels are established. Wherever possible, on all other cleared or unstable areas revegetation should occur progressively rather than at decommissioning.

Final Void

Of the four pit closure scenarios given (section 6.12 and 20.3.7), option 4 appears to be the most acceptable, given that not allowing the pit to fill from river flow would apparently result in depletion of ground-water levels in the immediate area over an indefinite period (water balance modelling predicts that pit water levels will stabilise below the regional groundwater level). However, the quality of water flowing back out of the pit and into the river during periodic floods remains a concern, particularly with the

expected contamination of the pit water by seepage from the tailings dam (TSP).

Section 20 Rehabilitation and closing.
The scenarios for rehabilitation of the open cut pit are discussed in terms of 33 years before the water quality returns to normal, with vegetation rehabilitation being maintained for a six year period; however this time frame is not specific. This really needs to be tied down with a water quality monitoring process clearly outlined. Monitoring should only be discontinued when the water reaches a predetermined safe water standard.

Weeds
Section 13.1.5: Table 13.3 has not identified the following Class A and B weeds as identified in the MRM Weed Management Plan 2003 which need to be listed as high priority weeds in the draft EIS :
1. Devils claw (Martynia annua) – Class A weed (to be eradicated)
2. Chinee apple (Ziziphus mauritiana) – Class A weed (to be eradicated)
3. Bellyache bush (Jatropha gossypifolia) – Class B weed (growth and spread to be controlled).

All three of these species are a priority for the project area due to the close proximity to the proposed work site and the District Weeds Officer recently identified and reported to the Environmental Officers of the mine that the devils claw was spreading along the McArthur River.

The chinee apple infestation is located on Bing Bong Station and is in the immediate proximity of the Bing Bong loading facility and given that the fruit of the chinee apple is easily spread by wallabies and birds which are likely to spread into the loading facility. This could have huge implications with the spread of weeds within the loading facility.

Section 22.4.6: To prevent the spread of weeds, this section requires a paragraph on vehicle and machinery hygiene to ensure that all vehicles/machinery are clean of all weed seed and soil when moving into and out of the project area.

ARMANDO PADOVAN
A/MANAGER ADVISORY AND REGULATORY SERVICES

Appendix A.3

Department of Business, Economic and Regional Development Comments

Northern Territory Government
Department of Business, Economic and Regional Development

Chief Executive
2nd Floor Development House
76 The Esplanade
DARWIN NT 0800
AUSTRALIA

Ref: T2005/0959

Ms Lyn Allen
Executive Director Environment and Heritage
Department of Natural Resources, Environment and the Arts
PO Box 30
Palmerston NT 0831

Dear Ms Allen

Thank you for your 19 August 2005 letter and for the opportunity to comment on the McArthur River Mine Open Cut Project Draft Environmental Impact Statement (DEIS).

From the department's perspective, the draft EIS incorporates and deals with many of the issues effectively.

The department supports the conclusion that the project will make a positive economic, social and community contribution to the region and the Northern Territory. There are, however, several matters which warrant further comment or additional attention:

General and Regional Economic and Business Development Issues

The region where the mine is set has potential for continued fundamental economic and business development. The DEIS does not adequately explore all of the avenues where the project proponent could contribute more to wider sustainable economic and business development in the region. The proponent, in the draft statement does not canvass moving to less reliance on fly in – fly out arrangements and greater use of local employees and business support.

Employment and Job Creation

The DEIS notes that the construction workforce will peak at around 150 while the direct operational workforce will fall from 330 at present to 270 workers. Only 4 MRM staff members with 5 dependents are reported as living in the region at present. There appear to be no proposals in the DEIS to encourage the local regional residents to join the MRM workforce, especially where new skills relating open-cut mining are required. MRM's stated commitment to "hiring local people when appropriately skilled personnel are available, and will provide employment and training programs in order to train local people with the necessary skills" (Section 15.4.2) has not been fully demonstrated in past performance.

Indigenous Economic Development Priorities

The DEIS does not adequately explore the interaction between the mine construction and operational plans and the needs and aspirations of the indigenous community in the region. Xstrata could draw on the strategies, programs and operational practices of other mining companies such as Argyle Diamond, Newmont Gold and Alcan to strengthen the project's contribution to Indigenous economic development. Additional attention in the DEIS could be focussed on training, case management, mentoring, employment facilitation and access to employment opportunities. More attention should also be placed on expanding opportunities for local business, especially Indigenous business enterprises in the region, to participate in the construction and operational phases of the project.

Community Development

Opportunities for the proponent to contribute further to general community strengthening in the region would also enhance the draft statement.

Should you require further advice and information on these matters, please contact Mr Ian Prince, Director, Policy, Industry and Economic Policy Group (telephone 8999 7055).

Yours sincerely

MIKE BURGESS

December 2005

Appendix A.4

Department of Environment and Heritage Comments

Australian Government
Department of the Environment and Heritage

Mr R Johnson
Office of Environment and Heritage
GPO Box 1680
DARWIN NT 0801

McArthur River Mine Expansion
(EPBC Reference: 2003/ 954)

Dear Mr Johnson

I am writing to comment on the draft Environmental Impact Statement (EIS) for the above proposal that is subject to assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and is being assessed under the Bilateral Agreement with the Northern Territory Government.

We have a concern with potential impacts of the proposal on the freshwater sawfish *Pristis microdon* and note from the EIS that a targeted survey of the sawfish is planned and based on the findings, a management and monitoring plan is to be developed. It is a concern that neither an outline of the survey design, nor the management plan appear in the EIS. We are therefore particularly interested to be informed of the timing, planning and conduct of the survey and subsequent management approach.

Related to the potential impacts on the sawfish is the management of dry season refuge pools along the McArthur River, particularly the Djirrinmini Waterhole, which may be important sawfish habitat. Predicted drawdown at this waterhole may be a concern considering that it is only 1.5m deep at the end of the dry season. Remedial measures should be prescribed and implemented if monitoring to identify the increase in drawdown of the water level over time identifies a threat to the viability of the Waterhole.

Our other concern is for the impact of the proposal on populations of migratory birds in wetlands at the mouth of the River. Impacts on the wetlands may result from increased sediment load carried in wet season flow. Monitoring of sediment deposition in the wetlands over time would assist in determining if any significant impacts are occurring.

We note that biodiversity offsets are discussed in the EIS and support the development of conservation management in relation to the Upper McArthur River and the Port McArthur Wetlands. We also note that as holder of the pastoral lease for the property that contains these sites, Xstrata has an opportunity to pursue these conservation management initiatives, particularly in relation to management of livestock grazing pressure. We support development of these initiatives within the context of the environmental management plan.

We look forward to seeing the Environmental Management Plan developed and implemented, particularly in relation to the survey of the Sawfish and the management and monitoring plan that will be based on its findings.

Thank you for the opportunity to make comments on the draft EIS.

Yours sincerely

SIGNED

Tim Kahn
Director
Mining & Energy Section
Approvals and Wildlife Division

31 October 2005

Appendix A.5

Department of Health and Community Services Comments

Northern Territory Government
Department of Health and Community Services

Environmental Health Branch
Phone: (08) 8922 7152
Email: envirohealth@nt.gov.au

Reference: DF2005/2947
Facsimile: (08) 8922 7334

Rod Johnson
Environmental Assessment
Office of Environment and Heritage
Department of Natural Resources, Environment and the Arts
GPO Box 1680
Darwin NT 0801

Dear Rod

RE: MCARTHUR RIVER MINE OPEN CUT PROJECT - EIS

Thank you for the opportunity to comment on the above Environmental Impact Statement (EIS). Department of Health and Community Services' (DHCS) Environmental Health and Medical Entomology comments are provided in the attachment.

Should you require any further clarification, please contact Nicola Slavin, Senior Policy Officer for Environmental Health on 8922 7181 or Allan Warchot, Development and General Extension Officer for Medical Entomology on 8922 8337.

Yours sincerely

Tracy Ward
A/Director Environmental Health

19 October 2005

Department of Health and Community Services
Health Impact Assessment
McArthur River Mine Open Cut Project

Part1: Environmental Health Comments

5.0 Infrastructure

5.2 Accommodation
The construction camp and the existing permanent camp need to be registered as boarding houses in accordance with the *Public Health Act and Regulations*. An application form can be downloaded online:
http://www.nt.gov.au/health/healthdev/environ_health/application_forms/boarding.shtml

The dry mess and wet mess of the permanent camp also need to be registered as food businesses under the *Food Act 2004* and should comply with the requirements of the *Food Act 2004 and Food Standards*. An application form can be downloaded online:
http://www.transact.nt.gov.au/ths/healthmanager/HealthNotifications.nsf

All building works must comply with *NT Public Health Act and Regulations* and the Building Code of Australia and be carried out to the satisfaction of the DHCS' Environmental Health Branch. Detailed plans, in relation to work proposed within the terms of the above legislation, must be submitted to DHCS Environmental Health Branch for assessment, prior to any works commencing.

5.3 Water Supply
5.3.1 Accommodation Village
The potable water supply to the construction camp and the existing permanent camp must comply with the NH&MRC Australian Drinking Water Guidelines 1996. Bore setbacks to onsite wastewater disposal shall be in accordance with the *Code of Practice for Small On-Site Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent.*

5.4 Sewerage
5.4.1 Accommodation Village and Mine
The package sewage treatment plant to be used in the construction camp must comply with the requirements of the *Code of Practice for Small On-site Sewage and Sullage Treatment Systems and the Disposal and Reuse of Sewage Effluent.*

7.5 General Operational Waste
7.5.3 On Site Waste Management
It is recommended that solid waste disposal comply with the Department of Infrastructure, Planning & Environment's *Guidelines for the Siting, Design & Management of Solid Waste Disposal Sites in the NT,* which can be downloaded online:
http://www.ipe.nt.gov.au/whatwedo/waste/index.html

7.5.5 Asbestos
Removal and disposal of asbestos products must also comply with the Work Health (Occupational Health and Safety) Regulations.

22.3 Construction Environmental Management Plan
DHCS requests the opportunity to view and make comment on the Management Plans as they are released by the proponent. DIPE shall liaise with DHCS to formalise a protocol for viewing these documents, as they are made available

22.3.1 Waste Management Plan
The Waste Management Plan must also comply with the NT Public Health Act and Regulations.

22.3.8 Incidents and Complaints Management Plan
DHCS requests further details on the community complaints mechanism that will be available during the construction phase.

22.4 Operations Environment Management Plan
DHCS requests the opportunity to view and make comment on the Management Plans as they are released by the proponent. DHCS is particularly interested in the Management Plans for Waste Management, Air Quality, Groundwater, Social and Community Impact and Rehabilitation. DIPE shall liaise with DHCS to formalise a protocol for viewing these documents, as they are made available.

22.4.1 Waste Management Plan
Further information on the monitoring process is requested especially in relation to the surveying of the overburden emplacement facilities and the monitoring of ground and surface water in the vicinity of the overburden emplacement and the tailings storage facilities.

The DHCS requests details on how frequently monitoring will occur and the personnel who will be responsible for the monitoring process.

The Waste Management Plan must also comply with the NT Public Health Act and Regulations.

22.4.2 Air Quality Management Plan
The DHCS requests further details on the monitoring process including how frequently monitoring will occur and the personnel who will be responsible for the monitoring process.

22.4.5 Groundwater Management Plan
The DHCS requests further details on the monitoring process including how frequently monitoring will occur and the personnel who will be responsible for the monitoring process.

22.4.7 Mosquito Management Plan
The DHCS requests further details on the monitoring process including how frequently monitoring will occur and the personnel who will be responsible for the monitoring process.

22.4.8 Cultural Heritage Management Plan
The DHCS requests further details on the monitoring process including how frequently monitoring will occur and the personnel who will be responsible for the monitoring process.

22.4.9 Social and Community Management Plan
The DHCS requests further information on the community complaints mechanism.

Further details are requested on the training and employment opportunities that will be made available to the local Indigenous community.

Part 2: Medical Entomology Comments

General comments

The expansion of this mine should conform to the following Medical Entomology Branch guidelines. The proponent should review these guidelines before construction commences.

Guidelines for Preventing Mosquito Breeding Sites associated with Mining Sites. Medical Entomology Branch Handout.

Construction Practice Near Tidal Areas in the Northern Territory – Guidelines to Prevent Mosquito Breeding. Northern Territory Coastal Management Committee June 1988.

Whelan, P.I. (1997) 'The Prevention of Mosquito Breeding in Sewage Treatment Facilities'. *Bulletin of Mosquito Control Association of Australia,* vol. 10, no.3, pp. 19-28.

Information from the Medical Entomology Branch report 'Montgomery, B. 1995. *McArthur River Mine Baseline Mosquito Monitoring Report.* Medical Entomology Branch Report' is still relevant to this expansion project.

Previous comments made by the MEB on the expansion project have been attached to this letter as Attachment 1. Some comments in the previous letter are still relevant.

Specific comments

Section 3.6 Bing Bong Port

Section 3.6.5 Dredging

The dredge disposal area at Bing Bong Port was identified by Montgomery (1995) as a potential mosquito breeding site. Other disturbed areas were also highlighted as potential mosquito breeding sites by Montgomery (1995). These areas should be rectified (if not already) to prevent mosquito breeding.

It is mentioned that dredge material will be relocated to two designated areas 100m to the west of the channel. Disposing of spoil in the sea will not create any mosquito problems, therefore is seen as a favourable option by the Medical Entomology Branch.

It is mentioned that potentially contaminated material in the swing basin area may be disposed of on land. If this is to occur, the dredge should be stored in a manner that prevents the impoundment of water for periods greater than 5 consecutive days.

Section 5.4 Sewerage

Section 5.4.1 Accommodation Village and Mine

It is mentioned that during the construction phase, a package sewage treatment plant will be installed to cater for the construction workforce, with the treated effluent from the plant to be irrigated in the same manner as the existing sewerage plant effluent. There is no mention of the disposal site. Effluent should be disposed of in accordance with the Medical Entomology Brach guideline 'The prevention of mosquito breeding in sewage treatment facilities'.

Section 7 Waste Management

Section 7.2.4 Overburden Emplacement Facility

Design Concepts – Surface Water Management and Seepage Collection

It is mentioned surface water and seepage from the OEF will be contained within collection ponds. The collection ponds should be constructed in accordance with Section 1 of the Medical

Entomology Branch guideline '*Guidelines for Preventing Mosquito Breeding Sites associated with Mining Sites*'.

Before the commencement of each wet season, the internal area of each collection pond could be slashed and burnt (if vegetation is present), to remove nutrient loads that could encourage mosquito breeding when the ponds flood. Any overflow points from the collection ponds would require erosion protection.

Final Rehabilitation – Surface water control
It is mentioned that the surface profiling on the top of the OEF will allow rainfall from small rain events to be captured and utilised to sustain vegetation. The captured water should not be allowed to pool for periods greater than five consecutive days, to prevent mosquito breeding.

Section 12 Surface Water
Section 12.8.2 Test Pit Project
Drainage Facilities
The bund runoff pond between the pit and the flood protection bund should be constructed in accordance with Section 1 of the Medical Entomology Branch guideline '*Guidelines for Preventing Mosquito Breeding Sites associated with Mining Sites*'.

Impact on Existing Drainage System
It is mentioned that the existing anti-pollution pond and concentrator runoff pond will be increased in size for the new development. The new internal margins should be steep sided (e.g. 1:1 slope), to discourage marginal vegetation growth.

Section 12.9 Proposed Water Management Strategy
Section 12.9.1 Mine Site – Proposed Mine Water Management System
All new water holding features should be constructed in accordance with Section 1 of the Medical Entomology Branch guideline '*Guidelines for Preventing Mosquito Breeding Sites associated with Mining Sites*'.

It is mentioned in Table 12.10 that the Bund Wall Runoff Pond overflows to the McArthur River. Erosion prevention structures would be required at the Bund Wall Runoff Pond overflow point/s, to prevent the formation of eroded pools and downstream siltation of the McArthur River, both of which could lead to mosquito breeding. It is not mentioned how the Bund Wall Runoff Pond overflow is to be conveyed to the McArthur River (i.e. formalised channel, sheet flow). Erosion prevention structures would be required at any erosion vulnerable points in the area that will receive overflow from the Bund Wall Runoff Pond.

Overflow Risk Objectives for Containment Ponds
Any pond likely to overflow will require erosion protection structures at the water overflow points, to prevent the creation of eroded pools and downstream siltation of water features, both of which could lead to mosquito breeding.

Section 12.10.6 Impacts on Water Quality
Flushing and Risk of Stagnation
The isolated reaches of the McArthur River upstream and downstream of the mine should be sampled for the presence of mosquito larvae during the post wet season. Sampling of these sites should be part of a larval mosquito monitoring program, to be developed under the guidance of the Medical Entomology Branch.

Section 13 Biology
Section 13.6 Biting Insects
Section 13.6.2 Mosquito species
It should be noted that there have been some taxonomic changes to mosquito species names and genus's. *Aedes normanensis* and *Ae. vigilax* are now *Ochlerotatus normanensis* and *Oc. vigilax. Anopheles annulipes* and *An. farauti* are now referred to as *An. annulipes s.l.* and *An. farauti s.l.*

Bing Bong
The mosquito referred to as '*Cx. sittens*' in this paragraph has been misspelt, is should be spelt '*Cx. sitiens*'.

Section 13.6.5 Project Effects and Management Strategies
Tailings Storage Facility
The management practices for the TSF should also be applied to all other water storage facilities at the McArthur River Mine.

Construction
To be added to Dot Point 1, all drainage channels/spoon drains should have erosion prevention structures at all erosion vulnerable points in the drain, such as bends in drains and drain end points.

To be added to Dot Point 2, rock bars placed in channels to trap sediment should be made free draining. i.e. do not lead to the upstream impoundment of water in the drain for periods that will enable mosquito breeding.

A new dot point should be added that mentions potential mosquito breeding sites created at Bing Bong Port, as highlighted in the report by Montgomery (1995), that have not been rectified, be rectified to prevent possible mosquito breeding.

Section 20 Rehabilitation and Closure
Section 20.2.2 Progressive Rehabilitation
Bing Bong Port Facility
The ponds created in the marine spoil emplacement area to increase infiltration and leaching of salts should be inspected for mosquito breeding during the wet season, as part of the larval mosquito monitoring program. The Medical Entomology Branch should be contacted for advice on mosquito control if mosquito breeding is found. The ponds should be deep and steep sided, to prevent the creation of shallow isolated areas suitable for mosquito breeding.

Section 20.3.4 Closure Commitments
It should be added that the mine site and Bing Bong Port will be rehabilitated in a manner that ensures no actual or potential artificial mosquito breeding sites remain.

Section 20.3.7 Closure Strategy – Mine

Open Pit and New River/Creek Channels

Where possible, large growing native trees should be planted around the open pit void, as large trees create a shading effect that discourages margin vegetation growth, in turn discouraging mosquito breeding. The open pit void should be stocked with fish as soon as it begins to fill with water.

Overburden Emplacement Facility

Please refer to Section 7 comments in this letter.

Section 20.3.8 Closure Strategy – Bing Bong

It is mentioned that all areas will be drained through the Bing Bong site runoff pond as much as possible. Ideally once the area has been revegetated and erosion is likely to be minimal, the pond should be filled and appropriately graded to prevent ponding on the filled surface. This is as the pond will most likely become a mosquito breeding site when it is left un-maintained after the mine closure.

It is mentioned the depression where the shed was located will form an additional sediment trap. It is advised that the depression where the shed was located be filled, as it will be a source of salt marsh mosquitoes if left to pond water.

It is mentioned that water from the front of the conveyer area will flow directly into the ocean down a purpose built spoon drain. The spoon drain should be as shallow and wide as possible to prevent water ponding within the drain, whilst being capable draining upstream areas within at least 3 days.

Section 22 Environmental Management Plan

Section 22.4.7 Mosquito Management Plan

Monitoring

A mosquito monitoring program at MRM should consist of adult monitoring, larval monitoring and exotic mosquito monitoring.

It is recommended that larval mosquito monitoring be conducted throughout the year at selected locations (eg. any water ponds, drains, overflow areas, at selected points in the cut off sections of McArthur River, at selected points in the diverted sections of the McArthur River, Bing Bong Port spoil disposal area). As some sites will be wet season breeding sites only, and some sites have greater importance in the post wet season, a comprehensive larval mosquito survey program will need to be developed to work out the frequency of sampling required at certain sites during the year.

It is recommended that adult mosquito monitoring be conducted monthly during the dry season and fortnightly during the wet season, at three sites at the McArthur River Mine and one site at Bing Bong Port.

It is recommended that ovitrap monitoring (monitoring for exotic dengue carrying mosquito species) be conducted at three sites at the McArthur River Mine and three sites at Bing Bong Port.

For further discussion on the mosquito monitoring program, including ideology and training of MRM staff, the proponent is advised to contact the Medical Entomology Branch.

Appendix A.6

Department of Primary Industry, Fisheries and Mines Comments

Northern Territory Government
Department of Primary Industry, Fisheries and Mines

Chief Executive
4th floor, Centrepoint Building
Smith Street Mall
DARWIN NT 0800
AUSTRALIA
john.carroll@nt.gov.au

Our ref: MR2005.0235
Your ref: EN2005/0031~0016

Lyn Allen
Executive Director
Office of Environment and Heritage
GPO Box 1680
DARWIN NT 0801

Attention: Rod Johnson

Dear Ms Allen

RE: MCARTHUR RIVER MINE OPEN CUT PROJECT– DRAFT ENVIRONMENTAL IMPACT STATEMENT

I refer to the Draft Environmental Impact Statement for McArthur River Mining – McArthur River Mine Open Cut Project located in the Gulf Region, which was referred to our agency for comment on 19 August 2005.

Comments from this Department have been included in Attachment A for your consideration.

Should you have any queries with regard to the above, please do not hesitate to contact John Miller on telephone 89 996567.

Yours sincerely

RICHARD SELLERS
Executive Director Minerals & Energy

October 2005

Attachment A

Comments on
McArthur River Mine Open Cut Project - Draft Environmental Impact Statement

1.7.2 Potential for Additional Development

Information detailed in this draft EIS is based on a decrease in production and workforce.

Additional Environmental Assessment may be required should future planning consider aspects such as;
- Significant mining and production increases,
- Progressing to refining zinc on site,
- Changes to power supply as a result of gas or other fuel alternatives.

3.2 Management Systems

Xstrata HSEC Management standards are to be incorporated into the site EMS by the end of 2005 and including aspects of ISO14001 and AS4801 requirements. In section 2.4.3 it states Open cut development will be incorporated into existing HCSE management systems. It would be reasonable to expect that during 2005 the majority of the HCSE risk management planning activities associated with the open cut will be developed.

How will the proponent ensure that parallel activities in 2005/2006 of 1) HCSE systems upgrade and roll out and 2) Application of HCSE process to the open cut development activities are consistent?

Considerations may need to be given to bridging documentation or other transitional management strategies to cover this issue.

4.2.4 Pit Stability

Additional aspects of design considerations for open cut mining that should be considered include;
- Open pit and underground interface management, where voids, weak-ground, unstable support in underground workings need to be accurately identified and hazard remedied,
- Appropriate blast pattern designed, charged and initiated with a view to protect high wall,
- Appropriate monitoring systems to recognise and review decision process.

4.2.4 Pit Stability

Haul Ramp Design

Final truck selection has yet to occur and industry practice is to design haul road width to be three times the width of the largest truck to be used. Inadequate haul ramp width may have significant impacts particularly toward the end of open cut operations where large vertical haulage distances are required.

Has consideration been given to a contingency distance in the width of the haul ramp to allow the fleet variations / evolving equipment nature over the 25 years of operation?

4.2.5 Mining Activities

Drilling and Blasting

Australian jurisdictions have agreed to adopt COAG principals regarding the implementation of a regulatory regime for transportation, storage, handling and security management of ammonium nitrate as a Security Sensitive Substance.

Has the proponent obtained a security sensitive ammonium Nitrate (SSAN) licence from NT WorkSafe including the submission of security plan detailing as a minimum
- Licensing details
- Storage facilities
- Authorised Personnel
- Records and Incident reporting

4.2.7 Industrial Facilities

Blasting agent storage compound and detonator magazines will be located 650m East of the hardstand area. The location of explosive facilities however is not diagrammatically detailed in figure 4.2 as per this sections statement.

Some form of diagrammatic representation of the explosive storage facilities would assist in assessing the risks associated with selected location.

4.3.3 Process Outputs

From Table 4.10 it is estimated that 32 Mt of tailings will be produced over a 25 year life

How will lessons associated with historical issues and remediation requirements for site tailings management be incorporated into the design of future tailings dam aspects including;

- Management of any neutral drainage issues,
- Contingencies such as use of geopolymers and recovery bores,
- Emergency water discharge management.

4.6.3 Flood Protection Bund Construction

Bund Design

An "as built report" supported by testing of materials, interpretation on result and decision process's will be required to be submitted to the DPIFM Minerals and Energy Group to ensure the construction is completed as per design.

It is recommended that the performance of bund wall be reviewed periodically by an appropriately qualified professional and performance reports made available to regulatory agencies.

5.6 Airstrip

It is stated the number of flights will increase slightly during the construction phase. With 150 additional people on site during construction this represents approximately 50% increase in workforce.

What are the estimates on increased flight activities during the construction phase?

7.2 Overburden Management – Open Cut Operations

There is concern regarding the identification of PAF as the only material requiring active management. It may be expected that NAF or even AC material will create neutral mine drainage with elevated sulphate and zinc levels if there is any mineralisation present at all. The material between the horizons may be expected to contain some minor amounts of metals.

The operator should include details on the following in their waste management plan

- Control criteria on metals concentration in addition to Sulphur.
- Action levels derived from NEPM guidelines for encapsulation should control criteria be exceeded as per the PAF material.
- Effective block modelling and appropriate positioning of material. This will also facilitate the diagnostic process if the waste dump's performance deviates from expectation and remedial measure required.

7.2.2 Geochemical Nature of Overburden

Section 7.1 provides information on ARD studies conducted to date and this section commits to using this information **and/or** active bench face samples.

It is recommended that a bench testing regime for ARD characteristics be the preferred characterisation option throughout the mining activities and that waste management plans detail management parameters, including sampling representation, number of samples per activity and cut-off criteria.

7.2.2 Geochemical Nature of Overburden

The section states that referenced report URS (2005a) contains the geotechnical data for 656 selected drill core samples. The equation: acid producing potential(APP) minus ANC = NAPP is overly simplistic as it assumes that all of the neutralising ability is available, that it also will be available at the same rate that acid is produced and that the neutralising material is homogenously mixed with acid producing material. In the field none of these conditions generally occur. MRM appear to recognise this although still appear to rely heavily on these results.

If samples PAF & NAF have been done on the basis of the samples NAPP there is the possibility that the potential to produce acid under real conditions has been underestimated and it would be suggested that this is recognised in modelling and geochemical management.

Is this data referenced in URS (2005a) available as part of the Environmental Assessment

7.2.2 Geochemical Nature of Overburden

Kinetic test as opposed to static testing (acid base accounting) are designed to reproduce the natural oxidation conditions found in the field sometimes under accelerated time scales

Has kinetic testing of the waste rock been undertaken? If so how do the results compare with column leach testing?

7.2.3 Metal Concentration

It is indicated in this section that W-fold Shale and Teena Dolomite are “most suitable for outer wall construction”.

Is there a break down of speciation in each of the geological formations to validate this statement?

7.2.3 Metal Concentration

Leach column Testing

This section states that metals in runoff/seepage from overburden materials will remain within ANZECC(2000)/NEPM (199a) concentration guidelines criteria for livestock drinking water under neutral or alkaline pH conditions.

There is no mention of the consequences should the leachate turn acid. This should be discussed.

7.2.4 Overburden Emplacement Facility

Final Rehabilitation – Surface Water management

Engineered rock chutes are proposed in final rehabilitation to assist in control of discharged water.

Would the engineered rock chute have a beneficial effect below the completed lifts of OEF during the operational phase? This gives an opportunity to test the performance of such structures, helps reduce the infiltration and eventually less environmental impact both in terms of contamination and erosion control.

Performance of rock chutes at other NT mining operations for surface water control, suggest sides should be graded in rock size when abutting top layer material to minimise remedial management activities.

7.2.4 Overburden Emplacement Facility

Base Preparation

How thick is the base layer? Even with a permeability of 10-8m/sec (permeability is usually in cm/sec) this is meaningless if the base layer is only 1.5cm thick. Evidence suggests that if a low permeability layer is required, permeability’s in the range 1x10-7cm/s would be required.

A better indicator would be to use nett percolation which is the result of thickness and permeability and has meaning. Has this indicator been considered?

7.3.2 Tailings/Decant Management

Figure 7.7 is not available as referenced and would provide useful information on the current structure of the tailings dam.

7.3.3 Tailings Characterisation

Based on acid forming nature uncertainty and increasing NAPP values described in this section, are there contingencies/ management plans should the materials trend towards PAF status. This is particularly relevant to any potential seepage issues or overflow during abnormal events.

7.3.3 Tailings Characterisation

The statement 'Inhibit the onset of acid conditions for a significant period of time' this implies that at some stage it is expected that there will be acid generated.

What is a 'significant period of time'?

7.3.3 Tailings Characterisation

The test work indicates that metals will be present in the leachate at elevated levels compared to drinking water guidelines. As this may seep into a freshwater ecosystem they need to investigate seepage management issues more closely.

How doers the conclusion that at neutral pH most metals will remain within drinking water guidelines reconcile with Appendix G, where column leach test results indicate increasing metal levels with time eg Zn, Mg, Mn, Co, Cd

7.3.6 Cell 1 Closure Strategy

What is the target design for this cover ie 100-200 500yrs?

7.5.2 Waste Management Strategies

Waste jet fuel is utilised in the cleaning of workshop floors. (Table 7.8)

Does this waste water/fuel then report to a collection point for cleaning purposes or does it report to the pollution pond through surface run-off.

7.5.3 On Site Waste Management

Tailings storage facility

Contaminated waste to be buried in TSF will include waste oils, xanthate, laboratory wastes and sewerage sludge. (Table 7.8)

Summary details on site procedure ENV SOP 0054 for management of waste disposal areas would assist in determining appropriateness of disposal methods.

Does the TSF seepage monitoring program include parameters appropriate for these contaminated materials?

7.5.3 On Site Waste Management

Site Refuse Facility

Currently two main disposal methods on site, the trench method and area fill method.
This section describes the application of the area fill method but no details on the use of the trench method.

What wastes are disposed of by the trench method?

7.6 Construction Wastes

Where possible wastes will be segregated.

How will wastes segregation be encouraged i.e. use of different coloured bins, education etc.

8.4.1 Macarthur River Mine

Dust Deposition

Figure 8.1 shows the predominate wind direction in the area is from the NE to SE throughout the year. Figure 8.2 identified the key dust monitoring points as D23 which is directly north of the processing facilities and D13 which is NE of the tailings facilities.

The statement in this section that D13 and D23 where selected " as typical sites to represent areas downwind of the tailings storage facility and process areas respectively" need to be validated.

9.7.3 Blasting Noise and Vibration

It is proposed that if blasting noise does disturb camp residents then one of the control options that may be investigated is "only blasting when winds are from the SW quadrant.

The information provided in figure 8.1 suggests wind from the SW occurs less than 5% of the year, how effective would this control measure be.

11.9.1 Pit Dewatering Rates

This section discusses and subsequently discounts the use of a cut-off trench to mitigate water inflows from the palaeochannel intersecting the southern perimeter of the proposed mine pit.

What alternatives to a cut off trench have been investigated to control groundwater inflows to the pit from the palaeochannel?

12.9.1 Mine Site (Proposed Water management Strategy)

Table 12.10 describes inflows to the Water Management Dam including underground storage transfer. Figure 12.11, proposed water management schematic does not indicate how this will occur.

Clarification on this discrepancy should be addressed.

13.1.5 Weeds

How will weeds be managed within the newly formed diversion creeks and rivers?

13.4.3 Tailings Storage Facility (13.4 Fauna Impacts and Management)

What is the potential for cattle having access to areas affected by tailings dam seepage?

15.4.2 Operations Phase (15.4 Social and Community Effects)

With a 25 year lifespan there are positive opportunities to consider longer term regional competency and skills development.

What additional investigations on local regional employment initiatives have been undertaken

18.9.2 Contractors and Visitors

During development of the open cut there is the potential for large numbers of contractor companies from a variety of backgrounds often with their own SMS requirements on site to be managed

How are contractor management systems (particularly with larger companies), aligned with MRM system components? Does the risk management system include contractor management requirements?

18.10 Job Safety Analysis and Standard Operating Procedures

A MRM webpage has been developed to allow access by all employees to all JSAs SOP's, risk assessments, training packages.

Will MRM webpage be available to construction personnel or have alternative communication methods been investigated.

19.7.2 Emergency Response

Emergency Response Manual

MRM emergency procedures will be modified as necessary to incorporate all relevant aspects of the open cut project.

What aspects of construction and open pit operations have been considered in the potential modification of emergency response procedures?

20.3.3 Closure Criteria

Low Risk to Biota : Monitoring results should indicate an improving trend not only that they are 'not declining'. What are the specified guidelines referred to in this section?

20.3.5 Final Land Use

It is stated the due to the long timeframe on closure, agreement with relevant stakeholders for the final land use of the site is not yet in place.

Significant aspects of the operation such as open pit voids, TSF and OEF, should have preferred broad closure options incorporated into front-end design as soon as reasonably practicable.

Objective of closure and the criteria needs to be agreed by all relevant stakeholders but it should not hold company from concurrent rehabilitation for the purpose of reducing operational impact.

20.3.7 Closure Strategy – Mine

Geotechnical risk is considered the primary post closure risk,

Systemic geochemical risks such as negative trending water quality should also be considered as high risk with ongoing consideration in all design and closure strategies recommended.

20.3.7 Closure Strategy – Mine

Overburden Emplacement Facility

The closure plan for the site needs to ensure runoff and seepage from the OEF meet recognised guidelines at the point of expression/collection. For example, the OEF runoff needs to meet (as a minimum) livestock water quality during all periods water seepage/pondage is present and this should be a measurable target.

20.3.7 Closure Strategy – Mine

Open Pit and New River/Creek Channels

If allowing flow through of the pit but keeping the realigned river channel be the preferred option (Option 4), considerations should include;

- Identification of the system of flow through ie Does the water enter and exit from the same breach in the bund wall or is there a discreet entrance and exit point?
- Pit water quality is maintained at a level of solute concentrations where overflow water quality will still meet the designated level of environmental protection for the downstream environment. As a minimum, livestock drinking water quality should be the target for final pit water quality.

Appendix A.7

Department of Local Government, Housing and Sports Comments

TO: EXECUTIVE DIRECTOR
FM: DIRECTOR, GOVERNANCE DIVISION

XSTRATA McARTHUR RIVER MINE DRAFT ENVIRONMENTAL IMPACT STATEMENT

Comments on the Draft Environmental Impact Statement that was lodged with the NT Government in August, 2005 in relation to the proposed Xstrata McArthur River Mine Open Cut Project.

OVERALL COMMENT

Generally the draft EIS contains a number of errors which with closer editing by Xstrata could have been avoided. The information is incorrect and provides a false impression of the region and Xstrata's role in the region. Examples are *that Borroloola is serviced by a general practitioner*. This has not been the case since September 2003. Currently there is a doctor from Remote Health Services servicing Borroloola on three days per week rotation; *the mine is 45 km from Borroloola;* This statement locates the mine in the middle of the Caranbirini Nature Reserve; and *MRM contributes to the local ambulance service.* The ambulance is attached to the Health Centre and is fully funded by the Department of Health and Community Services.

This level of inaccuracy begs the question that if Xstrata is content to allow this document to be publicly scrutinized, nationally and internationally, with these and a range of other errors, what credence can be placed on the rest of the EIS and the overall management of the existing project and the proposed open cut operations?

There has been inadequate consultation with the Gulf region residents, particularly the Indigenous population who rely on the McArthur River and the waters surrounding the Sir Edward Pellew Island for hunting, fishing and cultural activities. There have been two public meetings regarding the EIS in the past two weeks and another is planned for 25th October to be hosted by the Northern Land Council.

As an outcome of the meeting held 8th October a request has been put to the Department of Primary Industries, Fisheries and Mines for an extension of the comment period.

SPECIFIC COMMENTS

Areas of specific concern in relation to the EIS.

- An open cut mine directly over the McArthur River will result in the changing of the natural course of the McArthur River for 5.5km to flow along a constructed channel and bund wall and changing the natural course of Barney and Surprise Creeks for 2.5km to flow along a constructed channel and bund wall;
- Construction of a 50m high bund wall exposed to erosion and leaching. This wall is to be constructed of overburden which will contain relatively high lead levels and other minerals such as cadmium; (Cadmium, often a by product of zinc production, and solutions of its compounds are highly toxic, with cumulative effects similar to those of mercury poisoning).
- Storage of lead contaminated waste in tailings dams;
- Rehabilitation of the pit after 25 years.

The EIS is silent on the mitigation process should the bund wall breach. A bund wall breach is considered a minimal risk by Xstrata. However, the open cut will be in the middle of a flood plain in a region prone to heavy rainfall and cyclones. In relation to the rehabilitation of the pit after 25 years there is a proposal for only the over flooding of the McArthur River to enter the pit. It is unclear from the report as to the contamination levels of the water that will eventually fill the pit from natural seepage, flooding and rain. The pit will be 210m deep, 1400 m long and 750m wide covering an area of 83 ha.

The 50m bund wall proposed around the open cut mine will contain material with some lead content. Two overburden (containing lead) emplacement facilities are proposed alongside the bund wall. Material from the test pit is to be used on the bund wall. The EIS and therefore Xstrata cannot guarantee that this wall will not leach or erode from the effect of normal river flows, flood conditions, in addition to heavy rainfall for the 25 year life of the mine and beyond. Silt and lead will continue to enter the McArthur River system for generations, potentially affecting the sea grass plains, fishing areas and navigability of the river. Lead and other minerals in the food chain will affect all marine species impacting of recreational and commercial fishermen, tourism, and more importantly the people of the Gulf region. Xstrata does not currently monitor heavy metals and other minerals in fresh water aquatic life. This is of extreme concern as this life is a very good indicator of change and would provide an alert for lead and other mineral pollution.

Every impact of land use and/or mining activities that enters the McArthur River upstream will settle in the river bed particular in the shallower, slow moving areas and will flow out to the islands, mangroves and sea grass meadows along the coast.

The Sir Edward Pellew Islands and the McArthur River is important country to the people of the Gulf region, particularly the Indigenous people. The McArthur River system is one of the most extensive and significant rivers in the Northern Territory and comprises of a myriad of creeks, channels and waterways. Because of the size of this river, the Carrington Channel and the location of its mouth, its flow has a direct influence on the entire offshore area of the Sir Edward Pellew Islands and adjacent coastal areas.

The waterways of the McArthur River, the coast and the islands are all heavily used by the vast majority of residents of the Gulf region. Indigenous people continue to live on the surrounding coast and the islands and hunt traditionally for dugong and turtle, and fish for other marine species. The Sir Edward Pellew Islands and the McArthur River also attracts ever increasing numbers of amateur fishermen from all over Australia for its exceptional wild fish stocks. Sixty percent of the annual NT crab fishery income comes from this region. In addition to commercial crabbing, this area supports at least 2 Barramundi licenses.

The Sir Edward Pellew Islands and the mouth and coast off the McArthur River have biological and faunal values of international and national significance. These values are documented in the draft Parks Masterplan on the Gulf Marine bioregion map.
(Peter, a copy of this map is available from Stuart Gold, Senior Planner, Parks and Wildlife)

- One of the top four national dugong populations;
- The largest dugong population in the Northern Territory;

- Significant nesting areas for endangered Flatback turtles and Green turtles;
- Feeding areas for 5 species of sea turtles including the endangered Loggerhead and Olive Ridley sea turtles;
- One of the most extensive mangrove and sea grass habitats in northern Australia;
- The largest rookeries in the world for Crested and Roseate terns and significant rookeries of the Little Tern;
- Two hundred species of birds including shorebirds, waders and seabirds;
- Important habitat for the little known *Irrawaddy* dolphin.

This sea country has such high cultural and conservation values, a Sea Country Plan has just been completed by Dr John Bradley so that traditional owners can manage this area effectively for the long term. The long term view is to declare the area surrounding the mouth of the McArthur River and the Sir Edward Pellew Islands a marine park. The draft Gulf Regional Development Plan also supports this proposal.

IMPACTS ON THE REGION

In terms of economic benefit to the region there will be little change economically on the Gulf region with the development of the open cut facility. Currently Xstrata do not support the local economy by sourcing supplies from Borroloola. This policy will not change; nor will the employment numbers as the mine will continue the fly-in fly out practice in relation staff. A small number of employment opportunities will continue to be available to the residents of the Gulf region. However, the majority of employment opportunities will be for specialist operators and sourced from outside the Gulf region.

In terms of social benefits Xstrata has developed a Community Benefits package to support a range of social and cultural activities which is conditional on the open cut operation gaining NT Government approval to proceed. This package includes an operational subsidy for the proposed Borroloola Swimming Pool which is an aspect of the pool project that has yet to be fully funded.

Xstrata has recently provided an unconditional $600,000 grant towards the swimming pool.

There will be no change in the shipping operation out of Bing Bong other than a decrease of 20000 tonnes in the tonnage shipped each year. The impact of this reduction on the joint venture partnership between the Mawurli and Wirriwangkuma Aboriginal Corporation is not detailed in the EIS.

BENEFITS OF THE PROJECT

The EIS states that that the project will be of direct and indirect benefit to the NT and Australia by:

- Continued contribution to the NT and Australian economies;
- Increase capital investment;
- Increase the mine life to 25 benefiting the future of the mine, its output and employees;

- Construction employment will create an average of 290 jobs in the NT and 570 within Australia (these figures include flow on effects);
- Operational employment will be 610 (including flow effects); and
- Local economy activity will provide opportunities for local employment and provision of local services.

Although an economic study of the actual economic benefits generated by Xstrata and how they impact on or benefit the Gulf region has not been carried out, anecdotal evidence suggests that the benefits are minimal in comparison to the size of the Xstrata operation.
There are instances of benefits, e.g MOU for training, that mine management will highlight every time they are asked this question but in terms of long term sustainable benefit they are found to be wanting in many areas.

Xstrata will also nominate the 115km sealed double lane road as a benefit that the mine has bought to the region and while the region recognises this is true what is not acknowledged is that this 115km of road has for the past 5 years accounted for the majority of the road repairs and maintenance budget with no contribution from Xstrata for maintenance despite the high heavy loading use.

The recently announced Xstrata Community Benefit Fund contains a number of sustainable projects which would benefit the entire Gulf region however implementation of the initiatives nominated for funding is reliant on the approval by the NT Government of the open cut project.

Christine Hart
Development Coordinator
Gulf Region
14 October, 2005

Appendix A.8

Department of Planning and Infrastructure Comments

Northern Territory Government
Department of Primary Industry, Fisheries and Mines

Chief Executive
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AUSTRALIA
john.carroll@nt.gov.au

Our ref: MR2005.0235
Your ref: EN2005/0031~0016

Lyn Allen
Executive Director
Office of Environment and Heritage
GPO Box 1680
DARWIN NT 0801

Attention: Rod Johnson

Dear Ms Allen

RE: MCARTHUR RIVER MINE OPEN CUT PROJECT– DRAFT ENVIRONMENTAL IMPACT STATEMENT

I refer to the Draft Environmental Impact Statement for McArthur River Mining – McArthur River Mine Open Cut Project located in the Gulf Region, which was referred to our agency for comment on 19 August 2005.

Comments from this Department have been included in Attachment A for your consideration.

Should you have any queries with regard to the above, please do not hesitate to contact John Miller on telephone 89 996567.

Yours sincerely

RICHARD SELLERS
Executive Director Minerals & Energy

October 2005

Attachment A

Comments on
McArthur River Mine Open Cut Project - Draft Environmental Impact Statement

1.7.2 Potential for Additional Development

Information detailed in this draft EIS is based on a decrease in production and workforce.

Additional Environmental Assessment may be required should future planning consider aspects such as;
- Significant mining and production increases,
- Progressing to refining zinc on site,
- Changes to power supply as a result of gas or other fuel alternatives.

3.2 Management Systems

Xstrata HSEC Management standards are to be incorporated into the site EMS by the end of 2005 and including aspects of ISO14001 and AS4801 requirements. In section 2.4.3 it states Open cut development will be incorporated into existing HCSE management systems. It would be reasonable to expect that during 2005 the majority of the HCSE risk management planning activities associated with the open cut will be developed.

How will the proponent ensure that parallel activities in 2005/2006 of 1) HCSE systems upgrade and roll out and 2) Application of HCSE process to the open cut development activities are consistent?

Considerations may need to be given to bridging documentation or other transitional management strategies to cover this issue.

4.2.4 Pit Stability

Additional aspects of design considerations for open cut mining that should be considered include;
- Open pit and underground interface management, where voids, weak-ground, unstable support in underground workings need to be accurately identified and hazard remedied,
- Appropriate blast pattern designed, charged and initiated with a view to protect high wall,
- Appropriate monitoring systems to recognise and review decision process.

4.2.4 Pit Stability

Haul Ramp Design

Final truck selection has yet to occur and industry practice is to design haul road width to be three times the width of the largest truck to be used. Inadequate haul ramp width may have significant impacts particularly toward the end of open cut operations where large vertical haulage distances are required.

Has consideration been given to a contingency distance in the width of the haul ramp to allow the fleet variations / evolving equipment nature over the 25 years of operation?

4.2.5 Mining Activities

Drilling and Blasting

Australian jurisdictions have agreed to adopt COAG principals regarding the implementation of a regulatory regime for transportation, storage, handling and security management of ammonium nitrate as a Security Sensitive Substance.

Has the proponent obtained a security sensitive ammonium Nitrate (SSAN) licence from NT WorkSafe including the submission of security plan detailing as a minimum
- Licensing details
- Storage facilities
- Authorised Personnel
- Records and Incident reporting

4.2.7 Industrial Facilities

Blasting agent storage compound and detonator magazines will be located 650m East of the hardstand area. The location of explosive facilities however is not diagrammatically detailed in figure 4.2 as per this sections statement.

Some form of diagrammatic representation of the explosive storage facilities would assist in assessing the risks associated with selected location.

4.3.3 Process Outputs

From Table 4.10 it is estimated that 32 Mt of tailings will be produced over a 25 year life

How will lessons associated with historical issues and remediation requirements for site tailings management be incorporated into the design of future tailings dam aspects including;

- Management of any neutral drainage issues,
- Contingencies such as use of geopolymers and recovery bores,
- Emergency water discharge management.

4.6.3 Flood Protection Bund Construction

Bund Design

An "as built report" supported by testing of materials, interpretation on result and decision process's will be required to be submitted to the DPIFM Minerals and Energy Group to ensure the construction is completed as per design.

It is recommended that the performance of bund wall be reviewed periodically by an appropriately qualified professional and performance reports made available to regulatory agencies.

5.6 Airstrip

It is stated the number of flights will increase slightly during the construction phase. With 150 additional people on site during construction this represents approximately 50% increase in workforce.

What are the estimates on increased flight activities during the construction phase?

7.2 Overburden Management – Open Cut Operations

There is concern regarding the identification of PAF as the only material requiring active management. It may be expected that NAF or even AC material will create neutral mine drainage with elevated sulphate and zinc levels if there is any mineralisation present at all. The material between the horizons may be expected to contain some minor amounts of metals.

The operator should include details on the following in their waste management plan

- Control criteria on metals concentration in addition to Sulphur.
- Action levels derived from NEPM guidelines for encapsulation should control criteria be exceeded as per the PAF material.
- Effective block modelling and appropriate positioning of material. This will also facilitate the diagnostic process if the waste dump's performance deviates from expectation and remedial measure required.

7.2.2 Geochemical Nature of Overburden

Section 7.1 provides information on ARD studies conducted to date and this section commits to using this information **and/or** active bench face samples.

It is recommended that a bench testing regime for ARD characteristics be the preferred characterisation option throughout the mining activities and that waste management plans detail management parameters, including sampling representation, number of samples per activity and cut-off criteria.

7.2.2 Geochemical Nature of Overburden

The section states that referenced report URS (2005a) contains the geotechnical data for 656 selected drill core samples. The equation: acid producing potential(APP) minus ANC = NAPP is overly simplistic as it assumes that all of the neutralising ability is available, that it also will be available at the same rate that acid is produced and that the neutralising material is homogenously mixed with acid producing material. In the field none of these conditions generally occur. MRM appear to recognise this although still appear to rely heavily on these results.

If samples PAF & NAF have been done on the basis of the samples NAPP there is the possibility that the potential to produce acid under real conditions has been underestimated and it would be suggested that this is recognised in modelling and geochemical management.

Is this data referenced in URS (2005a) available as part of the Environmental Assessment

7.2.2 Geochemical Nature of Overburden

Kinetic test as opposed to static testing (acid base accounting) are designed to reproduce the natural oxidation conditions found in the field sometimes under accelerated time scales

Has kinetic testing of the waste rock been undertaken? If so how do the results compare with column leach testing?

7.2.3 Metal Concentration

It is indicated in this section that W-fold Shale and Teena Dolomite are “most suitable for outer wall construction”.

Is there a break down of speciation in each of the geological formations to validate this statement?

7.2.3 Metal Concentration

Leach column Testing

This section states that metals in runoff/seepage from overburden materials will remain within ANZECC(2000)/NEPM (199a) concentration guidelines criteria for livestock drinking water under neutral or alkaline pH conditions.

There is no mention of the consequences should the leachate turn acid. This should be discussed.

7.2.4 Overburden Emplacement Facility

Final Rehabilitation – Surface Water management

Engineered rock chutes are proposed in final rehabilitation to assist in control of discharged water.

Would the engineered rock chute have a beneficial effect below the completed lifts of OEF during the operational phase? This gives an opportunity to test the performance of such structures, helps reduce the infiltration and eventually less environmental impact both in terms of contamination and erosion control.

Performance of rock chutes at other NT mining operations for surface water control, suggest sides should be graded in rock size when abutting top layer material to minimise remedial management activities.

7.2.4 Overburden Emplacement Facility

Base Preparation

How thick is the base layer? Even with a permeability of 10-8m/sec (permeability is usually in cm/sec) this is meaningless if the base layer is only 1.5cm thick. Evidence suggests that if a low permeability layer is required, permeability’s in the range 1x10-7cm/s would be required.

A better indicator would be to use nett percolation which is the result of thickness and permeability and has meaning. Has this indicator been considered?

7.3.2 Tailings/Decant Management

Figure 7.7 is not available as referenced and would provide useful information on the current structure of the tailings dam.

7.3.3 Tailings Characterisation

Based on acid forming nature uncertainty and increasing NAPP values described in this section, are there contingencies/ management plans should the materials trend towards PAF status. This is particularly relevant to any potential seepage issues or overflow during abnormal events.

7.3.3 Tailings Characterisation

The statement 'Inhibit the onset of acid conditions for a significant period of time' this implies that at some stage it is expected that there will be acid generated.

What is a 'significant period of time'?

7.3.3 Tailings Characterisation

The test work indicates that metals will be present in the leachate at elevated levels compared to drinking water guidelines. As this may seep into a freshwater ecosystem they need to investigate seepage management issues more closely.

How doers the conclusion that at neutral pH most metals will remain within drinking water guidelines reconcile with Appendix G, where column leach test results indicate increasing metal levels with time eg Zn, Mg, Mn, Co, Cd

7.3.6 Cell 1 Closure Strategy

What is the target design for this cover ie 100-200 500yrs?

7.5.2 Waste Management Strategies

Waste jet fuel is utilised in the cleaning of workshop floors. (Table 7.8)

Does this waste water/fuel then report to a collection point for cleaning purposes or does it report to the pollution pond through surface run-off.

7.5.3 On Site Waste Management

Tailings storage facility

Contaminated waste to be buried in TSF will include waste oils, xanthate, laboratory wastes and sewerage sludge. (Table 7.8)

Summary details on site procedure ENV SOP 0054 for management of waste disposal areas would assist in determining appropriateness of disposal methods.

Does the TSF seepage monitoring program include parameters appropriate for these contaminated materials?

7.5.3 On Site Waste Management

Site Refuse Facility

Currently two main disposal methods on site, the trench method and area fill method.
This section describes the application of the area fill method but no details on the use of the trench method.

What wastes are disposed of by the trench method?

7.6 Construction Wastes

Where possible wastes will be segregated.

How will wastes segregation be encouraged i.e. use of different coloured bins, education etc.

8.4.1 Macarthur River Mine

Dust Deposition

Figure 8.1 shows the predominate wind direction in the area is from the NE to SE throughout the year. Figure 8.2 identified the key dust monitoring points as D23 which is directly north of the processing facilities and D13 which is NE of the tailings facilities.

The statement in this section that D13 and D23 where selected " as typical sites to represent areas downwind of the tailings storage facility and process areas respectively" need to be validated.

9.7.3 Blasting Noise and Vibration

It is proposed that if blasting noise does disturb camp residents then one of the control options that may be investigated is "only blasting when winds are from the SW quadrant.

The information provided in figure 8.1 suggests wind from the SW occurs less than 5% of the year, how effective would this control measure be.

11.9.1 Pit Dewatering Rates

This section discusses and subsequently discounts the use of a cut-off trench to mitigate water inflows from the palaeochannel intersecting the southern perimeter of the proposed mine pit.

What alternatives to a cut off trench have been investigated to control groundwater inflows to the pit from the palaeochannel?

12.9.1 Mine Site (Proposed Water management Strategy)

Table 12.10 describes inflows to the Water Management Dam including underground storage transfer. Figure 12.11, proposed water management schematic does not indicate how this will occur.

Clarification on this discrepancy should be addressed.

13.1.5 Weeds

How will weeds be managed within the newly formed diversion creeks and rivers?

13.4.3 Tailings Storage Facility (13.4 Fauna Impacts and Management)

What is the potential for cattle having access to areas affected by tailings dam seepage?

15.4.2 Operations Phase (15.4 Social and Community Effects)

With a 25 year lifespan there are positive opportunities to consider longer term regional competency and skills development.

What additional investigations on local regional employment initiatives have been undertaken

18.9.2 Contractors and Visitors

During development of the open cut there is the potential for large numbers of contractor companies from a variety of backgrounds often with their own SMS requirements on site to be managed

How are contractor management systems (particularly with larger companies), aligned with MRM system components? Does the risk management system include contractor management requirements?

18.10 Job Safety Analysis and Standard Operating Procedures

A MRM webpage has been developed to allow access by all employees to all JSAs SOP's, risk assessments, training packages.

Will MRM webpage be available to construction personnel or have alternative communication methods been investigated.

19.7.2 Emergency Response

Emergency Response Manual

MRM emergency procedures will be modified as necessary to incorporate all relevant aspects of the open cut project.

What aspects of construction and open pit operations have been considered in the potential modification of emergency response procedures?

20.3.3 Closure Criteria

Low Risk to Biota : Monitoring results should indicate an improving trend not only that they are 'not declining'. What are the specified guidelines referred to in this section?

20.3.5 Final Land Use

It is stated the due to the long timeframe on closure, agreement with relevant stakeholders for the final land use of the site is not yet in place.

Significant aspects of the operation such as open pit voids, TSF and OEF, should have preferred broad closure options incorporated into front-end design as soon as reasonably practicable.

Objective of closure and the criteria needs to be agreed by all relevant stakeholders but it should not hold company from concurrent rehabilitation for the purpose of reducing operational impact.

20.3.7 Closure Strategy – Mine

Geotechnical risk is considered the primary post closure risk,

Systemic geochemical risks such as negative trending water quality should also be considered as high risk with ongoing consideration in all design and closure strategies recommended.

20.3.7 Closure Strategy – Mine

Overburden Emplacement Facility

The closure plan for the site needs to ensure runoff and seepage from the OEF meet recognised guidelines at the point of expression/collection. For example, the OEF runoff needs to meet (as a minimum) livestock water quality during all periods water seepage/pondage is present and this should be a measurable target.

20.3.7 Closure Strategy – Mine

Open Pit and New River/Creek Channels

If allowing flow through of the pit but keeping the realigned river channel be the preferred option (Option 4), considerations should include;

- Identification of the system of flow through ie Does the water enter and exit from the same breach in the bund wall or is there a discreet entrance and exit point?
- Pit water quality is maintained at a level of solute concentrations where overflow water quality will still meet the designated level of environmental protection for the downstream environment. As a minimum, livestock drinking water quality should be the target for final pit water quality.

Appendix A.9

Environment Centre Northern Territory Comments

The Environment Centre N Inc

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McArthur River Mine Open Cut Project.
Comments on the Draft Environmental Impact Statement, October 2005.

General comments

The Environment Centre NT (ECNT) is strongly of the view that the McArthur River Mine Open Cut Project does not meet acceptable environmental standards and that the project should therefore not be approved.

At a time when the Northern Territory Government has set a course towards providing a greater level of protection for NT rivers through its proposed Living Rivers initiative, and at a time when the environmental and financial disaster at Mt Todd mine has highlighted the expensive legacy that the irresponsible management of mine wastes can leave for the community, it would be negligent in the extreme to approve this particular mining proposal. Permanently altering the channel of such an important Top End river is unacceptable. Excavating a large open pit right on top of the river, involving the removal and relocation of millions of tonnes of rock waste, a significant proportion of which has the potential to contribute to an ongoing acid mine drainage problem, is also unacceptable.

MRM's own water quality monitoring data shows that some heavy metal concentrations in the McArthur River are already twice the level downstream from the mine as they are upstream. This indicates that discharges from the existing underground mining operation are already having a detrimental impact on the receiving environment. ECNT is not convinced by the information presented in the Draft Environmental Impact Statement (EIS) that the Open Cut Project will lead to improved environmental outcomes.

The ecological footprint of the open cut proposal is considerably larger than the existing operation. The pit will be 210 metres deep, 1400 metres long and 750 metres wide (an area of 83 hectares); the waste rock dump will cover 255 hectares, rise up to 50 metres in height and hold 185 million tonnes of overburden material; the McArthur River will be re-routed over a 5.5 kilometre stretch with a second 2.5 kilometre channel to re-align Surprise and Barney Creeks; 23 million cubic metres of tailings will eventually cover approximately three times the area used to this point in the life of the underground mine; 7,700 tonnes of contaminated waste will be disposed of in the tailings storage area every year; groundwater drawdown by the end of the 25 year life of the mine will be more than 200 metres around the open cut itself; and over 300 hectares of native vegetation will be destroyed, including at least 3.6 kilometres of valuable riparian habitat. It is also clear from the Draft EIS that not all of the toxic materials produced at the mine over its life can be contained on-site, or managed in a way that will not lead to substantial environmental degradation.

There are many additional reasons why ECNT believes this project should not be approved, including the lack of adequate consultation with Aboriginal Traditional Owners, the lack of research and monitoring carried out on the downstream impacts of the mine, the potential impacts on threatened species such as the Freshwater Sawfish and the Purple-crowned Fairy-wren, and the poorly conceived rehabilitation strategy. We will now outline our specific concerns with the Draft EIS in greater detail.

Specific comments

Section 2. Objectives and Benefits

The Draft EIS justifies the need to change to an open cut operation as follows: 'The underground operation would require backfill paste after 2005 and this additional cost results in the mine becoming uneconomical as a bulk concentrate producer' (2.2. Project need). Why then was this obviously forseeable problem with the viability of the existing operation not discussed in the original 1992 Environmental Impact Statement? This raises serious questions about the operational planning capabilities of MRM.

Section 3. Existing Operations

The Draft EIS states that the channel at MRM's Bing Bong port has filled with sediment since the 2001 cyclones. Dredging will therefore be undertaken progressively over the next 5 years or so, starting in 2004. 400,000 to 500,000 cubic metres of sediment will need to be relocated to return the channel to the original drainage depth (3.6.5. Dredging).

What are the likely impacts of further cyclones on this dredging program and will it need to be continued for the life of the operation? What other areas for the relocation of sediments are available once the designated areas, 100 metres to the west of the channel, are full?

Section 4. Proposed Open Cut Operations.

Question marks remain over the stability of the proposed open cut pit in proximity to underground workings (4.2.4. Pit stability). We are, however, told that selected voids will be targeted for backfilling (4.2.5. Mining activities) and that a range of other operational practices, such as drawing the water table back to at least 100 metres from the walls of the pit by drilling weep holes to drain water out of the rock, will suffice. However, with the large amount of ground water set to accumulate in the pit, requiring dewatering at a rate of 6.3 million litres per day by year 17 of the mine, ECNT has major concerns that pit stability will be an ongoing and significant risk to workers and the environment. Surely this issue requires much more study before any approval can even be contemplated for a move to open cut.

Over 3 million tonnes/year of process and decant water will be used in the mining process as well as 6,635 tonnes/year of copper sulphate pentahydrate (see Table 4.9. for other inputs e.g. isopropyl xanthate, MIBC). How toxic are these particular chemicals to humans and to aquatic ecosystems?

Section 6. Alternatives

There is no discussion of the environmental benefits of not proceeding with the open-cut project (6.14. No Project).

Section 7. Waste Management

ECNT has the following concerns about the information presented in the Draft EIS regarding the management of the potentially toxic mine waste overburden:

- According to the Draft EIS 11 percent of the total overburden, or 21.8 million tonnes of waste rock, could be Potentially Acid Forming (PAF) (7.2.1. Overview). There are high metal concentrations present in the overburden rock types (arsenic, up to 800mg/kg; cadmium, up to 236 mg/kg; copper, up to 979 mg/kg; manganese, up to 15,700 mg/kg). These are all highly toxic materials.

- The wide concentration range depicted in Table 7.3., however, does not provide a sufficient picture. The high end of the range is many times over the ANZECC Environmental Investigation Level for soils (7.2.3. Multi Element Nature of Overburden). Were most of the samples towards the higher end of the range or the lower end?

- It is deeply worrying that the company does not know what effect elevated metal concentrations in potential outer cover materials will have on rehabilitation of the Overburden Emplacement Facility (OEF) (p 7-6). This, we are informed in the Draft EIS, will require field trials.

- Seepage from PAF overburden materials may contain elevated levels of soluble metals (generally Cd, Fe, Mn, Pb and Zn) and sulfate compared to relevant livestock drinking water criteria. Tests showed that soluble metals in runoff/seepage from overburden materials will remain within ANZECC /NEPM concentration guidelines criteria for livestock drinking water under neutral or alkaline pH conditions (7.2.4. Overburden Emplacement Facility). But what about under acid conditions?

- Infiltration could saturate and ultimately penetrate the clay surround to the PAF cell within the western zone of the Overburden Emplacement Facility (OEF). However, MRM admits to being unsure yet of the actual permeability characteristics of the clay (7.2.4).

- Whilst the PAF pond is designed to exclude a 1 in 100 year ARI flood, the pond will have an emergency spillway to discharge excess water in extreme rainfall conditions (which will go straight into Surprise Creek). The actual size of pond is not shown on Figure 7.3.

- The Draft EIS says that runoff from the surface of the OEF will encounter Non Acid Forming (NAF) and PAF materials and therefore should be of acceptable quality to be released into the environment (7-10). We presume this is meant to say that runoff will encounter NAF/AC materials, as stated on 7-11.

- Surface and seepage flows from the eastern zone of the OEF will eventually end up in Barney Creek, including some increased sediment load. How much water will eventually end up in the creek and will there be elevated heavy metal concentrations in the water? If so, what will the long term and downstream impacts be?

- Section 7 does not discuss the key problem of ongoing acid leaching once the OEF has been rehabilitated. This is unacceptable.

ECNT has similar concerns about the expanded Tailings Storage Facility (TSF):

- According to the Draft EIS, recent tests on near-surface tailing samples at the Tailing Storage Facility (TSF) indicate that some near-surface tailing materials are likely to be PAF if exposed to oxidising conditions for a significant period of time (7.3.3. Tailing characterisation).Table 7.6 shows a high concentration of arsenic in the existing tailings - also lead, manganese and zinc. Leachate may contain elevated soluble levels of Cadmium, Manganese, lead and SO_4.

- We are told in the Draft EIS that the existing tailings dam was designed not to leak. However, in June 1997 seepage was discovered in Surprise Creek adjacent to the Tailings Storage Facility (TSF). There are also significant areas of surface soils containing permeable sands and gravels. Underlying siltstone is also relatively permeable and containing karst features (7.3.4 Seepage).

- We are also told that there is evidence of elevated salinity levels and soluble sulfate concentrations in seepage from the existing TSF. Some metal concentrations in seepage/groundwater can be greater than ANZECC water quality guideline criteria for fresh water ecosystems (7.3.5. Groundwater quality).

- Furthermore, the Draft EIS states that runoff collected from the revegetated surface of Cell 1 of the TSF following rehabilitation of the cell will be discharged 'in a controlled manner' to Surprise Creek. How much water is likely to run into Surprise Creek and what are the likely environmental impacts? Why will this water not be contained within the Water Management System? (7.3.6. Cell 1 Closure Strategy).

- 7,700 tonnes of contaminated waste per year, and an unquantified amount of sludge, is to be disposed of in a 'designated section' of the TSF (7.5.2. Waste management strategies). Which section of the TSF will the waste be disposed of in? Is MRM going to continue to use the area in the south-east of the TSF? Insufficient detail is provided here. Moreover, what will the effects of this contaminated waste be on seepage water, or on any water that spills into Surprise Creek during extreme rainfall events?

- The hazard category of the TSF is rated as high given the potential impacts from an uncontrolled release or embankment failure. An emergency spillway from Cell 2 will allow for overflows in extreme weather conditions, discharging to Surprise Creek. The design of the spillway is to incorporate the probable maximum flood on the highest pond level in normal year; or the worst wet season on record less water returned to plant, plus 100-year average recurrence interval (ARI) storm plus waves. Why are there two design condition options given here? Which one is MRM more likely to adopt? (7.4.3. Design of the TSF). It is not entirely clear to ECNT how often Cell 2 water will spill into Surprise Creek.

The inadequacy of the Draft EIS in dealing with these crucial issues raises concerns that environmentally damaging seepage into surrounding creek and river systems will occur again with the new, expanded TSF. How can we have confidence in the design objectives (7-25) when they so plainly failed with the existing TSF? (7.4.7. Seepage analysis). This is especially so when we are told that groundwater recovery bores may need to be operated for 30 years or longer after decommissioning to avoid surface expression of the seepage.

Section 8. Air Quality

There is no discussion of the possible implications of climate change on extreme events. The proponents should refer to, and discuss the implications of, the CSIRO report *Climate Change in the Northern Territory* (Hennessy et al 2004) (8.1.3. Extreme events).

According to the Draft EIS, there are elevated levels of lead and zinc concentrations in soils at some sites close to Barney Hill. But as no background data has been collected at these sites, it is not possible to say whether it is due to dust deposition (8.4.1. McArthur River Mine). More information based on solid research is required here.

176,919 kg/annum of Total Suspended Particulates from the open cut operations will be less than 10 microns, compared to 87,000 kg/annum currently. Lead emissions will be 2,226 kg/annum, an increase of 926 kg/annum from current operations (8.5.1 Fugitive emissions). This seems like an excessive increase.

The Draft EIS argues that because changing to open cut will have no significant effect on emissions, an offsets program is not warranted (8.14.4. Management of GHG emissions). However, given that MRM says the mine would close if it does not change to open cut (6.14. No project), and therefore zero emissions would occur, an offsets program is definitely warranted. Annual CO_2 emissions will be approximately 120,000 tonnes (8.14.3. Projected GHG Inventory to 2012). Extrapolating this over the 25 year life of the mine, the mine will result in 3 megatonnes of greenhouse gas emissions. This is the amount that MRM should offset.

Furthermore, there is no discussion of the life-cycle greenhouse gas emissions arising from the export of lead/zinc bulk concentrate.

Section 9. Noise.

What are the possible impacts of blasting and mine operations on surrounding wildlife? Will 40dB have an impact on birds and other animals?

Section 10. Terrain and Soils

ECNT is very concerned about the increased potential for soil erosion during the duration of the proposed open cut project. The Draft EIS states that in some locations gully erosion is already occurring e.g. on the river backplains where there are extensive areas of brown and grey cracking clay soils which tend to have dispersive soil layers (10.5.1. Erosion potential). The proposed Barney Creek realignment crosses deep cracking and highly erodable clay soils (10.3.1. Physical characteristics (soils)). Moreover, 1,225,000 cubic metres of topsoil and 1,400,000 cubic metres of subsoil (Table 10.3) will be stripped and used for rehabilitation and revegetation (10.3.3. Topsoil management). ECNT believes it is inevitable, despite the mitigation measures outlined in the Draft EIS, that this large-scale disruption of the soil layer will lead to an unacceptable increase in sediment loads in the McArthur River and affected creeks.

Section 11. Groundwater

Groundwater inflow into the pit is a huge potential problem for this mine proposal. The Draft EIS states that alluvial and bedrock aquifers in the area are unconfined and are in hydraulic connection where large-scale permeable structures in the bedrock, such as faults, underlie the major river channels (11.2. Groundwater geology and groundwater occurrence). The Draft EIS also says that the paleochannel is approx 800 m wide across the southern perimeter of the proposed mine pit and could represent a significant source of groundwater inflow into the pit (11.2.1. Alluvium). Moreover, the exact location of the paleochannel is not yet known within the area of the proposed open cut. Tests, we are told, are to be completed by the end of August 2005. An additional drilling transect is also being undertaken at Djirrinmini Waterhole to confirm aquifer characteristics (11.2.4. Further field investigations). Obviously, no environmental approvals should be considered until this work is completed and independently reviewed.

Added to these concerns is the geochemistry of the groundwater itself. According to the Draft EIS, large concentrations of SO_4 in the groundwater in the upper weathered rock area are due to sulphide materials being common in the area. In both the bedrock and alluvial groundwaters, lead and zinc are elevated (11.6.1. Mining area).

By the end of mining, the depth to groundwater will be approx 230-240 metres in the bedrock at the open cut. This will result in a total drawdown of about 210 to 220 metres below the initial static groundwater level. It is of great concern that the drawdown cone will migrate significant distances along the more permeable structures that intersect the pit, such as faults (11.11.1. Magnitude of groundwater drawdown). How far away from the pit area will the drawdown cone migrate, and what impacts will this have?

Again, we can not stress highly enough that insufficient research has been conducted to date on groundwater issues around the mine pit area. In ECNT's opinion this should be reason enough to reject this open cut proposal.

More information is also required on the groundwater/ surface water relationship upstream and downstream of the mine. The discussion presented in the Draft EIS is based on only one stream gauging study conducted in June 2005 (11.7. Stream Flows). The importance of Djirrimini waterhole as an ecological refuge should not be underestimated. The language used in the Draft EIS to describe the impacts on the waterhole is unconvincing i.e. there was *likely* to be enough groundwater inflow (in June) to maintain water levels and there *appeared* to be enough outflow to minimise salt build up as a result of evaporation.

The Draft EIS also maintains that modelling of water levels at Djirrinmini Waterhole indicates a 0.5m reduction in the levels of both the weathered bedrock and alluvial aquifers after 25 years. This will reduce lateral flows to the waterhole at the end of dry season (11.11.4. Potential McArthur River impacts). This is a very significant predicted decrease in water levels after 25 years of mining. Given the knowledge gaps that exist regarding the hydrogeology of the pit area and surrounds, ECNT must

consider this to be a minimum expected decrease in water levels, not a maximum as stated in the Draft EIS.

Section 12. Surface Water

Already, from the operation of the underground mine, an increased environmental load of toxic materials in surrounding watercourses is evident.

- Downstream median sulfate concentrations are approximately 60 percent higher than upstream median concentrations. The Draft EIS speculates that this could be due to natural sulfate concentrations in Barney and Surprise Creek catchments and minor historical seepage from the existing Tailings Storage Facility into Barney Creek (12.7.1. McArthur River Water Quality Monitoring Program).

- Throughout the McArthur River system, concentrations of copper, lead and zinc frequently exceed ANZECC 95th percentile trigger values of 1.4, 3.4 and 8 micro grams/L respectively. The downstream copper median concentration is 2.3, lead 3.9 and zinc 23. Downstream Zinc concentrations are therefore already almost 3 times the ANZECC trigger value! Upstream concentrations are closer to the guidelines at 2.2, 3.2 and 9 respectively.

The Draft EIS claims that the ANZECC guidelines are considered unsuitable for tropical freshwater systems. In such instances, it says, where 'adequate' water quality data are available, interim trigger levels can be used (*note: surely this should be where there is 'insufficient information on ecological effects' as in ANZECC 2000 s.3.3.2.4*). MRM therefore analyses water quality at the downstream test site using the 80th percentile reading at the upstream site (5.8, 9.1 and 34.4 micro grams/L for copper, lead and zinc respectively). The Draft EIS concludes: 'consequently it is considered unlikely that adverse impacts on aquatic ecosystems have occurred to date from elevated metal concentrations'.

ECNT disputes the adoption of the 80th percentile reading at the upstream site and the conclusions reached by MRM. We fear a lower environmental standard than the norm is becoming acceptable practice. The water quality monitoring program has already accumulated almost 10 years of data, so we question why it has taken so long to develop more ecologically appropriate trigger values. It is also essential, in our view, that any new site-specific trigger values currently being negotiated with DPIFM (formerly DBIRD) are independently reviewed and based on the precautionary principle.

We must also point out that downstream copper, lead and zinc concentrations can be up to 100 micro grams/L early in the wet season, three times the 80th percentile trigger value. Figure 12.9 also shows some alarming spikes in metal concentrations from 2001, which are not even acknowledged in the Draft EIS (e.g. lead concentrations of 130 micro grams/L in early 2003). What are the ecological impacts of these late dry season/ early wet season increases in concentrations downstream of the mine?

Water quality data in Surprise Creek and Barney Creek show signs of elevated lead and sulfate concentrations. There is also elevated zinc in Barney Creek, 'probably as a result of runoff from the processing area, from dry season dust or historical tailings seepage'. Surprise Creek has elevated levels of sulfates, 'probably sourced from leachate from the northern side of the Tailings Storage Facility' (12.7.2. Surprise and Barney Creeks). It is disturbing that there is not a clearer picture than this of the cause of these elevated concentrations. Again, the ability of MRM to manage a mine with a significantly expanded ecological footprint has to be challenged.

The Draft EIS states that concentration of sediment and metals tends to decline downstream of the mine to Borroloola as a result of dilution with cleaner water. It also maintains that in the estuarine reaches, the concentration of suspended sediment decreases rapidly due to flocculation caused by increasing salinity and pH from tidal waters (seawater). However, no studies or monitoring reports to prove this claim are cited in this all too brief section (12.7.3. Water quality influences downstream of the mine).

In Section 13 the Draft EIS recognises that water quality downstream could be degraded by mine activities. A strategic peak wet season release procedure is to be implemented opportunistically to discharge excessive accumulation of cleaner waters in the mine water management system to the McArthur River when it is carrying greater than a pre-determined flow rate (13.5.6. Project effects and management). This needs to be clarified as the only release into the McArthur River that ECNT can see in Fig 12.11 is from the Bund Wall Runoff Pond.

Other concerns that ECNT has about the proposed water management system and the realignment of McArthur River and Barney Creek are as follows:

- It will take 50 years or more for the realigned channel hydraulic roughness to eventually become similar to the existing channel. It is very worrying that a 5-year ARI flood will lead to wide-scale erosion of the new channel or upstream reaches sufficient to alter river form in the alluvial sections. There will also be a higher sediment load in the new channel during low flow period (20-100 cubic m/s) (12.10.2. Hydraulic impacts on river stability and geomorphology). Again this is an unwarranted permanent alteration of the hydrology and geomorphology of the river.

- The Draft EIS states that significant sedimentation well downstream of the mine is extremely unlikely. It argues that increased sedimentation that is expected to occur in the 2-3 km stretch of the river between the new channel and the Bukalara Range may not be due to the new channel, but to cattle grazing and other factors. What are these unspecified 'other factors'?

- In the following section of the Draft EIS it is stated that during dry years when river flows cease the predicted vertical leakage through alluvial sections of the new channel will not significantly extend the no-flow period (13.5.6. Project effects and management). What is meant by 'significant' here?

- For a 5-year ARI flood, water levels upstream of the mine will increase by 2.3 metres in the long term. What are the biological impacts of this significant increase in flood levels? The Draft EIS does not address this important question (12.10.3. Impacts on flood levels).

- The Draft EIS says that flow velocities in the new channel may exceed the swimming ability of fish. However, there is no quantified data on swimming velocities of fish species known to inhabit the river. It is proposed that post-construction surveys be undertaken to confirm the minimal impact on fish passge. Yet surely the research on fish swimming velocities should be undertaken prior to seeking approvals for the construction of the new channel (12.10.4. Impacts on fish passage).

- There are elevated levels of metals in material that will be used for the levee construction (sourced from the new river channel). The Draft EIS explains that elevated metal concentrations are common throughout the area as a result of the natural geology. However, this reasoning should not be used as a justification for digging up this potentially hazardous material and exposing it to the wider environment (12.10.6 Impacts on water quality).

<u>Section 13. Biology</u>

No flora sampling was completed directly where the open cut or the Tailings Storage Facility or where most of the river realignment will go (see Fig. 13.1) (13.1.1 Introduction). ECNT considers this to be an extraordinary state of affairs. Further sampling must be taken in these areas before approval of the mine project can even be considered.

Very few aquatic plants were observed within the project area during the flora surveys (just 8 species). But how many sites were actually surveyed in the river channel? The Draft EIS does not specify. Given that the yellow flowering fringe lily *Nymphoides crenata* was found in 'an isolated pond on a minor drainage way', located within the area of the proposed Overburden Emplacement Facility, ECNT considers it likely that more comprehensive sampling will turn up more aquatic plants (13.1.4 Aquatic plants).

According to the Draft EIS, two Traditional Owners and one Senior Custodian said that the local flora had no cultural significance, apart from one plant that had historically been used for food (13.1.6 Significant flora species). This is clearly not a wide enough consultation process, particularly with communities downstream of the mine, or in the Bing Bong and coastal areas. A similar criticism can be made with regards to the stated lack of animals with any cultural, spiritual or traditional use significance (13.3.5 Significant fauna species).

The total area of native vegetation to be cleared is not specified (13.2.1. Clearing schedule). The loss of approximately 3.6 kilometres of valuable riparian habitat, to be replaced by a manufactured channel, is unacceptable and will constitute a clear breach of NT land clearing regulations such as the NT Planning Scheme – Clearing of Native Vegetation. Part 2 stipulates that the clearing of native vegetation is to 'avoid impacts on drainage areas, wetlands and *waterways*' as well as avoid impacts on 'sensitive vegetation' such as riparian vegetation.

The Draft EIS says that lowering of groundwater levels will not have a significant environmental impact as most flora in the area are likely to rely on soil moisture (rather than the water table) for survival. Is there any real evidence for this, apart from the observation that groundwater levels are already 10-15 m below ground surface over most of the area (but only away from the major drainages)? (13.2.4 Drawdown from water extraction). More information is required here.

A perennial species of Mitchell grass was found at a single site on the black soil plain on the eastern side of the McArthur River. The Draft EIS goes on to say that some local populations of this species could be lost during construction of the new channel. However, we are informed, there is no evidence to suggest that this species is confined to the local region (13.2.7. Effects on significant species). This is hardly reassuring. There is no evidence provided by the proponents to demonstrate that it is not confined to the local region or that the population will not be severely impacted by this project.

The Draft EIS also says that some species of high conservation significance may remain undetected by flora surveys within the project area (13.2.7. Effects on significant species). Surely this just reinforces the need for additional flora surveys in the areas that will be directly affected by the project.

As the Glyde River component of the project is no longer relevant, it turns out that there were only 4 new fauna sampling sites in the project area in 2002/03. This is not sufficient and perhaps explains why only one species of small mammal (common rock-rat) was trapped (13.3.1 Introduction).

ECNT is particularly concerned about the *potential impacts on threatened and significant fauna species*. One of our major concerns, based on information provided to date, lies with the NT-listed Near threatened Purple-crowned Fairy-wren. We highlight the plight of this bird in the following discussion. The flaws in the treatment provided in the Draft EIS regarding the potential impacts of the mine project on the Fairy-wren also raises grave doubts about how other threatened or significant species may be affected should the open cut project proceed.

The Draft EIS says that the Purple-crowned Fairy-wren and White-browed Robin (near threatened – NT) are common species found in suitable riverine habitat along both the McArthur River and Glyde River. The wren is also seen in adjacent grasslands. Astonishingly, the text of the Main Report does not mention that the Purple-crowned Fairy-wren was found at sites F4 and F5, right in the area of the proposed open cut (see Appendix I). The Draft EIS surmises that the Fairy wren and Robin are not dependent on a continuous riverine habitat corridor for dispersal (13.4.1 Open cut and river realignment), though this is based on one set of observations in the Glyde River area rather than on any solid research.

Previous research on the western race of this bird species (*coronatus*) has shown that it is generally confined to riparian vegetation, often within 10 metres of permanent rivers or associated swamps (see Rowley 1993). Recent (as yet unpublished) PhD research confirms that the Fairy-wren is rarely seen dispersing through any vegetation other than riparian habitat, which they require for nesting (Annmarie van Doorn: pers. comm). Even in *Chionachne cyathopoda* (river grass) dominated habitat on the Victoria River, populations are generally restricted to 200-300 metre lengths of the corridor. Individuals

have only been seen on 3 occasions foraging away from this habitat and never more than 40 metres away (whilst in pandanus habitat the restrictions on dispersal are even greater) (Annmarie van Doorn: pers. comm.). Unless the behaviour of the local species (*macgillivrayi*) is markedly different, and there is no reason that ECNT is aware of to suspect that it is, the loss of 3.6 kilometres of riparian corridor along the McArthur River will therefore almost certainly lead to increased population fragmentation, and hence vulnerability, of the near-threatened Purple-crowned Fairy-wren. ECNT therefore rejects the proponent's claim that there will be no significant impacts on the Purple-crowned Fairy-wren.

Other threatened and significant species that ECNT has concerns about, given the inadequate fauna surveys to date, include:

- The Red Goshawk (listed as Vulnerable – IUCN; EPBC; NT) was tentatively recorded from the mine project area in 1992, but not since. But it has been recorded elsewhere in the McArthur River region (13.3.5 Significant fauna species).

- The Australian Bustard (Near threatened - IUCN; near threatened - NT) is present in low numbers in open woodland and grassland habitat on the McArthur River floodplain. In fact, according to Appendix I, it was found during the fauna survey at site F7 on the area proposed for the Overburden Emplacement Facility.

- The Northern Quoll (Vulnerable – NT), it is stated in the Draft EIS, is *likely* to be locally extinct in the project area, but populations may still exist in the sandstone ranges. Indeed, Appendix I, shows that it was found at F1 in the Glyde River area.

- The Carpentarian grasswren (endangered – NT) was observed in Glyde River area in the mid-1980s and has been seen recently at Caranbirini Conservation Reserve. The Draft EIS says that it does not occur in the vicinity of the proposed open cut project. However, the Gulf-Fall and Uplands Bioregion map, released recently as part of the *Draft NT Parks and Conservation Masterplan*, indicates the presence of the Carpentarian grasswren in the vicinity of the mine project area. This clearly needs to be examined further.

- Worrell's turtle (near threatened – NT), we are also told, is poorly known and there are no indicators of threat. However, it is a very common inhabitant of the McArthur River system. Again, there is no excuse for neglecting to mention in the Main Report that this species was found at sites F4 and F5 in the area of the proposed open cut.

- The Gouldian finch and Carpentarian rock-rat (endangered), occur in the region, but have not been recorded in the vicinity of the project area. There will also be a potential loss of habitat for the Spectacled hare-wallaby (13.4.4. Effects on significant species).

- The Draft EIS states that the distribution and ecology of threatened terrestrial invertebrates is poorly known, but these species are not likely to occur in the project area. No surveys have been conducted.

- Of further concern is that nine species of migratory birds listed under the EPBC Act are present on the McArthur River mine project area.

- Freshwater sawfish were not recorded in more recent surveys, but there is no reason why it should not still be present. It was anecdotally observed upstream of the mine project area recently (13.5.4. Aquatic fauna species).

The lowering of water levels in Djirrinmini Waterhole by 0.5 metres after 25 years of mining activity is unacceptable. Inadequate discussion is provided on the likely impacts on aquatic flora and fauna in the waterhole.

The Draft EIS recognises that the Port McArthur Tidal Wetlands System is ecologically significant, i.e. it is in the Directory of Important Wetlands; it is a Shorebird migration stop-over area; seagrass beds are a major breeding area for prawns and important feeding area for dugong; and it is an important seabird breeding area (13.7.1. McArthur River Estuary). However, there is no discussion of the cultural, spiritual or traditional use significance of these areas for Traditional Owners. Moreover, there are major concerns within local communities in this area about impacts on dugong, fish and turtle (such as the Hawksbill) of lead concentrations in the water of the McArthur River as a result of discharges from the existing mine. These concerns must be fully acknowledged and addressed in the Draft EIS.

The Draft EIS assure us that, regionally, there have been no impacts identified as a result of the Bing Bong operations (13.7.2 Bing Bong). However, it is ECNT's understanding that there has been no Department of Health involvement in the monitoring of cadmium, copper, lead and zinc in seawater, surface sediment, molluscs and seagrass.

Moreover, we are told in the Draft EIS that the concentration of lead and zinc in surface sediments from the beach immediately west of the channel have shown elevated levels since 1996. The PhD research into the rate of metal dissolution from the sediments in the swing basin is not yet completed, nor has it been independently reviewed, so it is premature for the Draft EIS to base its environmental health assurances on this one study.

Section 14. Cultural Heritage

During surveys for the Test Pit project, two archaeological sites were found that will be destroyed by the open cut project – one assessed as having moderate to high significance. This certainly calls into question the integrity of the 2002 archaeological survey conducted for MRM, which had concluded that no further investigation of sites was required. ECNT believes that the forthcoming additional archaeological survey discussed by MRM in the Draft EIS should cover all areas to be affected by all components of the open cut project (14.4.3. Test pit survey).

Section 15. Social & Community Effects

There is a weak and unconvincing discussion of employment benefits for local people, i.e. they 'may be enhanced due to open cut operation requiring a different level of skills for some workers' (15.4.2. Operations phase). Flow-on employment effects will also not be as great as for the existing mine. Training benefits should also not be oversold. From 2000-02 STEP trained 19 Aboriginal participants, but only 6 have ended up working at the mine permanently.

Fig 15.1 on visual impact is surely designed to mislead. Most people will see this project from the ground, not from the air.

The section contained no discussion of the potential impacts on Aboriginal people – no history of opposition and protest or outline of the concerns of Traditional Owners downstream of the mine. Moreover, Section 16 on Community Consultation simply lumps together all Traditional Owners and local elders, with another group named 'local Indigenous women'. There is very little attempt to differentiate between local language or clan groups, which may have different perspectives and concerns about the project proposal.

Section 19. Risk Management

It is not clear exactly what the hazardous inputs into the process operations are (19.1.2 Hazardous substances).

Table 19.4. is a worry. There are some risks with major consequences considered likely to occur once in 10 years (e.g. inadequate management of on-site water; less than adequate understanding of flood impact; adverse impact of open cut on permanent waterholes). The risk of modified fish habitat and adverse impact on sacred sites are assessed as possible once per year (19.4.2. Open Cut Project).

Other risks with catastrophic consequences are considered rare and given a likelihood of once per 30 to 100 years, so are not ruled out once in the life of the facility (e.g. structures not designed for flood velocities; inadequate civil design for the bund wall). These risks are far too great to allow the project to be approved.

There is also an increased risk of haul road accidents on the Carpentaria Highway to Borroloola. Five accidents have resulted in spillage since 1999 (19.5.3. Risk analysis).

In the case of a minor spill at the loading facility no recovery is planned unless routine monitoring detects a significant and adverse impact on the environment. What is a minor as opposed to a major spill? (19.5.4. Risk management and control).

Section 20. Rehabilitation and Closure

Table 20.2. makes some unwarranted claims, including that groundwater contamination will pose no risk to biota following rehabilitation. It also falsely states that no archaeological sites exist on the disturbed area (yet see 14.4.3).

The goal for rehabilitation is to return all disturbed areas to stable landforms to minimise off-site deleterious effects (20.3.4. Closure commitments). It is not proposed to rehabilitate tailings, the overburden dump and contaminated hardstand areas to resemble surrounding areas (20.3.7. Closure strategy – mine). It is not clear whether any consultation with Traditional Owners or the wider community has contributed to these very modest and inadequate rehabilitation objectives.

ECNT considers that MRM's preferred option - Rehabilitation Scenario 4 - namely to maintain the McArthur River in the new river channel but breach the flood bund wall to allow flood flows of 400 cubic m/s and greater to enter the pit, constitutes irresponsible environmental management. It is not specified in the Draft EIS exactly how long it would take the pit to fill up with sediment. Even under Scenario 3 – putting a permanent breach in the flood bund to allow the river to take its orginal course – it would take 77 years to completely fill the pit. Presumably then it will take hundreds of years under Scenario 4. The open cut project, should it proceed, will therefore leave a very long-term scar on the landscape, which will require long-term, and potentially expensive, management and monitoring.

Furthermore, sulfate levels in the void water will be at best 60 percent higher than existing surface water concentrations. We note that the mass balance modelling of water quality in the final pit void does not simulate any chemical reactions or changes that may occur. There is no discussion about the reliability of the results, given the methodological constraints.

Surface water runoff from the Overburden Emplacement Facility will flow to sedimentation ponds. Will these eventually fill up? How quickly? Where will the water go?

At Bing Bong, the Draft EIS states that contaminated material will be cleaned out of the site run off pond, which will remain as the site catchment and discharge point. This will collect contaminants and sediments from erosion. The discharge will be allowed at the southern wall to reduce the volume contained. Discharged to where? What are the likely effects? (20.3.8. Closure Strategy – Bing Bong).

An 8 year monitoring program will be conducted upon mine closure. But there will be only a 5 year management program (thereafter staffed as necessary). What about the seepage water from the Tailings Storage Facility, which will need to be collected for 30 years or more? Which will be the responsible agency for carrying out this task? (20.3.9. Post operational closure requirements).

ECNT is also of the view that for a mine proposal of this nature, with such a strong likelihood that it will leave a series of ongoing and long-term environmental problems needing to be contained or remedied, the current rehabilitation bond of A$12 million is grossly inadequate (Appendix E.2 pE-16).

Section 21. Biodiversity Offsets

ECNT finds it highly ironic that Glyde River Gorge is now being discussed as a possible biodiversity offset when two years ago, MRM was proposing to dam it (21.3.2. Glyde River Gorge). ECNT does not support the notion that one area of high conservation value can be sacrificed in order to protect another. The 5 options under consideration (Abner Range, Glyde, Upper McArthur, Caranbirini Conservation Reserve expansion, Port McArthur Tidal Wetlands) should be accorded a higher level of protection and conservation management regardless of whether the open cut project proceeds or not. ECNT considers this to be an issue of responsible biodiversity and land management on the part of McArthur River Station, the NT Government and the broader community, independent of the mine proposal. Conservation objectives are more appropriately pursued as part of the implementation of the NT Parks and Conservation Masterplan.

Section 22. Environmental Management Plan

The plan to pump water to the Tailings Storage Facility from the underground void storage should a level of 2100ML be reached and to then upgrade the water management system at a trigger value of 2300ML, needs additional detail (22.4.4. Surface Water Management Plan).

There has been an inadequate level of social impact assessment conducted and detail provided about future actions (22.4.9 Social and Community Management Plan).

The Draft EIS proposes to continue the operation of interception bores at the toe of the Tailings Storage Facility perimeter wall for a period of at least 15 years and possibly longer to ensure that the risks of future seepage to Surprise Creek are limited (22.4.11 Rehabilitation Management Plan). Again, given that MRM is seeking relinquishment before this 15 year period ends, which agency will undertake this task?

Conclusion

The Draft EIS for the McArthur River Open Cut Project is deeply flawed, reflecting the environmentally unsustainable and inappropriate conception and design of this project proposal. Accordingly, the NT Government should reject this proposal outright on environmental and social impact grounds. The defects in the Draft EIS outlined in this submission are of such a serious nature that in ECNT's opinion they can not possibly be addressed adequately in any subsequent Supplementary EIS statements, Environmental Management Plans or Mining Management Plans.

The valuable ecosystems of the McArthur River, and the local communities that depend upon the ecosystem services that the river provides, deserve much better than this highly polluting mining proposal.

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Appendix A.10

Environment Protection Agency Northern Territory Comments

epa northern territory

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Mr Warren Crabb
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22 Corunna St
ALBION QLD 4010

Dear Mr Crabb

The NT Environment Protection Agency has examined the draft Environmental Impact Statement (draft EIS) for the proposed McArthur River Mine Open Cut Project and submits the enclosed comments. These comments are additional to those of other NT Government agencies submitted under separate cover.

The format of this submission follows the basic heading structure of the draft EIS document.

Any queries with regards to these comments should be directed to Rod Johnson on telephone (08) 8924 4002.

Yours sincerely

LYN ALLEN
Executive Director Environment and Heritage

October 2005

Attach.

General comments

The Draft EIS is not clear on the significance of lead in the mining process. Clarify the relationship between lead and zinc in the concentrate and include information on the importance and uses of lead as an export product of the mine.

From a broader resource use and development policy perspective, in light of the potential for extensive environmental impact resulting from building an open cut mine in the middle of a significant river that flows into a significant marine environment, consideration should be given to the economic values provided in the draft EIS contrasted with the potential costs to tourism and fishing industries in the region, particularly in the gulf, and to the natural values inherent in the less-disturbed environment.

Section 3 Existing operations

3.5.2 Concentrate storage and haulage
The draft EIS indicates that fugitive dust is minimised by the material's moisture content of approximately 12%. Given that much of the concentrate is less than 38µm particle size and there is evidence that lead-contaminated dust is mobilised on the site, can this be relied upon as an adequate dust control measure?

Section 4 Proposed open cut operations

Outline or include the 'current site land disturbance procedures' and the 'permit to clear' methodologies under which vegetation will be cleared.

Section 7 Waste Management

7.2.1 Overburden management overview
Clarify the reasons for encapsulating potentially acid forming (PAF) material in the Stage 1 overburden emplacement facility (OEF) with 1m clay when only 0.6m encapsulation thickness is proposed for the Northern OEF.

7.2.2 Geochemical nature of overburden
Will a procedure for waste rock management be developed, which includes sampling, classification and handling of waste rock?

7.2.3 Multi element nature of overburden
Leach test results show that runoff from non-acid forming (NAF) material should be neutral but may have elevated metals and be slightly brackish. The draft EIS concludes that the enrichment of some metals is simply a signature of natural mineralisation; however, no analysis of background geochemistry is provided to gauge the

significance of elevated metals. The document says that background soil *will* be tested but infers that this is to assess any impacts that elevated metals may have on the success of establishing vegetation on the OEF.

There is no plan presented for what material will be used on the outer zones of the OEF. The W-fold shale & Teena Dolomite are described as most suitable geochemically, however these only comprise 8% of the waste rock and therefore may not be sufficient to cover the facility. The breccias are described as physically suitable and generally NAF but may be difficult to selectively handle. No geochemistry is presented for the breccias.

There are contradictory statements in the Leach Column Testing section that runoff/seepage *may exceed* and then *will remain within* livestock drinking water quality criteria. Why is the livestock category used and not ANZECC levels of protection? What are the implications of elevated metals and salinity for on-site and downstream environments and how will these be managed?

7.2.4 Overburden Emplacement Facility
What is the long term management plan for seepage from the OEFs, particularly the PAF pond?

Will the clay cap over the PAF cell overlap the outer edges of the PAF cell walls to minimise the potential for rainfall seepage infiltration?

The running surfaces on each lift of the OEF will direct any infiltration to the edges. Depending on the waste material used on the outer layers of the OEF, an outer bund may be constructed on each of the lifts. In the long term these are likely to fill with sediment and eventually overtop and fail. Has any modelling work been done on this waste rock dump design? What evidence is there that this design will be stable in the long term?

7.4.3 Design of the Tailings Storage Facility
Will there be monitoring undertaken of the tailings storage facility (TSF) capping to make sure this is meeting expected performance and that post-closure seepage recovery is not significantly longer than the 30 or so years predicted?

There is concern that the disposal of tailings into the new cells could exacerbate seepage into Surprise Creek as the additional seepage may push the plume further in this direction and possibly widen the plume. The potential impacts and management of this should be considered.

7.4.8 TSF closure

The EIS states that Seepage Water Disposal from the tailings storage facility will be pumped into the mine pit void after the plant is closed. How long will this continue for? Where will power for this be sourced?

Section 8 Air quality

The EIS states that the nearest sensitive receptor to the mine is the accommodation village, where modelling shows that NSW and NEPM standards will not be exceeded.

It should be noted that although modelling shows that NSW and NEPM standards will not be exceeded at the accommodation village, concentrations of pollutants such as lead are 20 times the NSW standard in proximity to the pit. This will need to be taken into consideration as a health and safety issue.

Despite modelling having been undertaken for dust, modelling for smaller particulate matter such as PM10 and PM2.5 should also be considered as these particulates will have a greater impact on human health. The report notes that there will be a monitoring program. Details should be provided on the duration and design of any such program. Lead monitoring should be undertaken in accordance with AS2800-2005.

In view of the peak concentrations of lead in the vicinity of the McArthur River, the proponent should consider the impacts of high concentrations of lead as particulate matter entering the river system should a change in wind direction occur.

The appendices do not contain any of the details of the air quality modelling undertaken. Rather than directing the reader to the National Pollutant Inventory, the proponent should specify each of the current emissions from the site and compare them to projected emissions from construction and ongoing operations.

The air quality management plan for construction is vague; the target should include quantitative limits rather than referring to environmental nuisance. Environmental nuisance is not measurable or easily understandable. Reporting from construction phase will also need to be included in the NPI.

The Air Quality Management Plan for ongoing operations needs to specify the locations, methods and timing of monitoring programs. Reporting also must be provided to the NPI annually.

8.14 Greenhouse gas
It is pleasing to see that a greenhouse gas emissions inventory has been kept since 1998. According to the draft EIS, in 2002/03 MRM produced 117,300 tonnes CO2-e - primarily from electricity

generation, with a significant contribution also from diesel use (refer Table 8.11). Based on the 2002 NT inventory, approximately 0.7% of the NT's greenhouse emissions are attributable to MRM. For the NT stationary energy sector alone, MRM contributes approximately 2% of the NT's emissions. MRM should commit to continuing their monitoring of greenhouse gas emissions and abatement measures. The NT Government has committed to introducing mandatory public reporting of greenhouse gas emissions by major industry and it is likely that MRM would meet the definition of 'major industry'.

Greenhouse gas emissions are projected to increase as a result of the open cut proposal, but not significantly. In 2008 greenhouse gas emissions are projected to be 124,100 tonnes CO2-e. This is within the emissions range for the operation since 2000/01. The greenhouse efficiency of the operation (tCO2-e/tonne of lead and zinc in concentrate) is expected to improve; however, this is due to an increase in lead and zinc in the concentrate rather than a reduction in energy use or identified energy efficiency measures.

The draft EIS does not consider the greenhouse gas emissions associated with proposed land clearing for the open pit (53 hectares) and overburden emplacement facilities (255 hectares). The loss of low open woodland in these areas would generate greenhouse gas emissions and this should be considered in the Supplement.

It is stated in the draft EIS that as MRM are an existing operation and the proposal is not projected to lead to a significant increase in greenhouse gas emissions, a greenhouse gas offsets program is not warranted. MRM is a significant contributor to the NT's greenhouse gas emissions. Greenhouse offsets can be an important emissions abatement measure, particularly where limited reductions in emissions can be made on site. MRM should not rule out offsets options and should commit to ongoing consideration of opportunities for offsetting greenhouse gas emissions from their operations.

The draft EIS fails to consider the potential impacts of climate change on the proposal. At the very least, potential impacts should be considered over the 25 year life of the open cut operations. For example, what are the implications of climate change to water management if cyclone frequencies and intensities increase? Can the OPSIM model be used to run simulations of various scenarios?

Section 11 Groundwater

11.2.4 Further field investigations

Additional hydrogeological work has been completed to improve the groundwater modelling accuracy. Interpretation of the results of this work and further modelling iterations should be included in the Supplement.

11.10 Effect of water storage in the underground mine voids
Minimisation of acid generation in the underground voids in the long term is dependent on breaching the flood protection bund so that the voids fill with water. What alternatives are available to minimise impacts to groundwater from contaminated void inflows if bund wall breach is not an option or floods fail to fill the void?

11.11.4 Potential McArthur River impacts
There is no explanation as to why the predicted vertical leakage will not significantly extend the no-flow period during dry years. Define 'significant' in this context.

Section 12 Surface water management

12.7.1 McArthur River water quality monitoring program
There appears to be relatively few points both upstream and downstream of the proposed open cut mine that have been monitored for physico-chemical parameters and changes in river morphology. More statistical power is needed in the design, particularly with respect to baseline data collection for a future monitoring program.

12.9 Proposed water management strategy
The water management diagram in 12.11 and 12.10 should be updated to incorporate design volumes and median annual anticipated flow rates between each component of the water management system.

Will runoff/seepage from the NAF pond be discharged to Barney Creek? If so, this is not shown in Figure 12.11. What is the predicted volume coming from the NAF storage and is this volume included in the water balance calculations for the site? What is the predicted water quality of the NAF seepage?

If a discharge is planned, minimum dilution requirements in Barney Creek for all toxicants being emitted from NAF, and details of the proposed discharge regime to achieve water quality objectives should be included in the Supplement.

Is the seepage from the TSF incorporated in the water budget? If a clay liner is not part of the final TSF, what impacts will seepage have on groundwater quality, and where will this seepage ultimately drain?

12.10.2 Hydraulic impacts on river stability and geomorphology
Biannual cross-section surveys are not going to determine excessive rates of sedimentation without downstream historical sedimentation data. Is there baseline data for this reach that gives some indication of regular sedimentation patterns? A benchmark survey will only provide a 'snapshot' of the river in time. The proposed high resolution aerial

photography will need to be taken prior to mine expansion works and following flood events. Again, temporal data may be lacking.

The EPA is currently seeking external advice regarding river morphology issues and, depending on the outcomes of this advice, further information requirements may be forthcoming.

12.10.6 Impacts on water quality
The proposal to expand the mine surface water quality monitoring program to include the isolated upstream and downstream reaches needs to be a commitment. What actions will be taken if these reaches become stagnant?

Section 14 Cultural heritage
14.4.4 Proposed Survey of the Open Cut Project Area
Further archaeological surveys of the Open Cut project area were undertaken by Begnaze in September. The Supplement should include this survey report and recommendations for mitigative measures for the sites of high archaeological significance found in the Open Cut Project Area. HCS have received a draft copy of this report and are currently undertaking comparative research into stone quarries in the region and their importance in the archaeological record.

Section 16 Community consultation
It is acknowledged that consultation with various sectors of the community has been undertaken for the current proposal, albeit quite late in the project development process. There is no indication, however, of the effectiveness of the consultation program in addressing stakeholder concerns. Does MRM have a way of monitoring the attitudes and responses received as a result of engagement with the community? Aside from the specific meetings held with stakeholders for this proposal and an indication that MRM 'maintains contact' with various stakeholders, what formal and informal structures are in place to ensure that effective ongoing stakeholder engagement is occurring? Is there an intention to continue with these engagement processes throughout the proposed mine's operational life and how do these processes inform decisions made with respect to mine operations within the context of managing social impact? Has follow-up action been undertaken to gauge stakeholder responses following initial consultation in August?

Section 19 Risk management
Table 19.4 identifies the H15 risk category as an event that is likely to happen once per life of the facility with catastrophic results. Does this mean that a tailings spill and a breach in the bund wall are expected during the life of the facility? If so, measures to minimise these eventualities should be seriously considered in the Supplement.

Section 20 Rehabilitation and closure

Special consideration needs to be given to the final void left after operations are completed. All of the four options will result in an ongoing significant change that may be an ongoing threat to the environment values of the McArthur River and the Gulf of Carpentaria for decades. The proponent's preferred option of pit flushing requires a breach in the bund to allow flows into the pit at a certain repeat frequency. How will operation of this flushing system be assured and maintained post closure?

Detailed consideration needs to be given to water management of the mine pit void once river inflows commence after mine closure. The mine pit needs to be treated as a stratified water body. Modelling should be undertaken to predict how this 'lake' will behave in the long term and how flows from the pit might impact the downstream environment of the McArthur River.

In the draft EIS, MRM states that the Rehabilitation Strategy will be "sustainable and, where ***operationally practicable***, undertakes ongoing rehabilitation and contaminated site remediation". While understandable that mining practices may change and may affect availability of areas ready for rehabilitation, this statement provides an outlet for the mine to forego progressive rehabilitation of the OEF. The Supplement should provide an indication of timing with respect to the areas that will become available for rehabilitation or proposed field trials if mining plans change. This will be essential to determine what works at the site and to provide opportunities for monitoring rehabilitation success prior to mine closure.

If the rock-lined drainage chutes become the preferred option for the waste rock dump, there is some doubt that their integrity will be maintained in the long term with the continual concentration of water flowing through them. This should be discussed in the Supplement.

There is concern that the NAF sediment pond capacity could be significantly reduced over time due to sedimentation and that run-off water could be contaminated from the waste rock material. The pond will need to be regularly maintained and discharge from the pond will need to be monitored. Discuss a program of monitoring and maintenance to minimise the risks here.

It is understood that a low permeability layer on the top and berms of the OEF is planned to minimise the risk of water entering the clay-encapsulated PAF material. What are the implications of this for revegetation? The design concept for the rehabilitated OEF states that vegetation will consist of grasses. Why are 'grasses' specified? Are there any problems anticipated with deeper-rooted vegetation? Indicate how the PAF material will be protected in the long term from penetration by deep-rooted species. Include information on how this might be monitored.

20.3.3 Closure criteria
Explain why the final year of reporting in year eight signals the completion of rehabilitation. Is this a sufficient amount of monitoring time to determine "long-term stability"? It is noted that the establishment of a revegetated, stable landform will be met if monitoring results demonstrate that vegetation has stabilised over five consecutive seasons. What actions are proposed if results indicate that vegetation has not stabilised at the year eight final stage of reporting? It is also noted that revegetation assessment will be conducted using transects for ***six*** years after establishment – why not eight years? Monitoring of fauna in the rehabilitation should be considered given the importance of fauna to succession in revegetated sites, and landscape function analysis should also be discussed.

Table 20.2 states that "long term visual impact should be minimised by creating acceptable landforms, preferably compatible with adjacent landscape". The Supplement should consider the revegetation of the OEF batters, which will be highly visible and will form the majority of visual impact. This should be discussed with reference to the nearest comparable landform, Mount Stubbs.

Rehabilitation Management Plan
There is some doubt that the proposed seeding rate of 2-5kg/ha will be adequate for rehabilitation if a mixture of woody, herbaceous and grass species are used and if seed viability is taken into account.

Appendix A.11

Mabunji Aboriginal Resource Association Comments

MABUNJI ABORIGINAL RESOURCE ASSOCIATION INC

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McArthur River Mine Open Cut Project
Comments on Draft Environmental Impact Statement, August, 2005

Project Objectives and Benefits ES-3
Project Need

The following statement is incorrect in ES-3 that 'Should the open cut not proceed, mining at McArthur River will cease…This will result in…detrimental socio-economic impacts in the region'.

To date, MRM's contribution to the Borroloola community has been negligible or nonexistent. After 10 years of underground operations at this mine, there have been no significant investments into the Borroloola community in the areas of health, education, employment, roads or infrastructure. In addition, there is a long list of broken promises from the negotiations for the existing mine operation, that are still clearly remembered by many Traditional Owners in this community. If MRM were to cease its operations today, it would not have any wide ranging impact on the general community.

The majority of the 80% indigenous proportion of the population are living below the poverty line and the town has a number of social and economic problems including unemployment, alcohol and substance abuse, domestic violence and sexual abuse.

Borroloola has a long history of being under resourced. Although this responsibility rests ultimately with the NT Government, MRM has not contributed to the principal areas of this community. There currently exists a critical housing shortage for its Aboriginal population, and all the township's internal roads are in a deplorable condition. Highly utilised local access roads (Searcy Street and King Ash Bay Road/Batten Point Road) remain unsealed, corrugated in the dry season and boggy in the wet. Until recently, access to the local waterways and the coast has been extremely restricted, and inaccessible during the wet season, with no all season access roads and boat ramps (except one boatramp for the whole region at King Ash Bay). Boatramp facilities are presently under construction at Mule Creek near Bing Bong, and Rocky Creek in the Borroloola township in 2005, due to a successful grant application by Mabunji Aboriginal Resource Association for NT Government Recreational Fishing Infrastructure funding. Mabunji collected 331 signed letters from all sections of the community to accompany this application.

Despite its tropical location, with all waterways identified as crocodile habitat, this township does not have a swimming pool. Prior to, and for the past 10 years of MRM mine operations, adults and children have continued to swim in sections of the McArthur River (primarily at the crossing) to get some relief from the excessive heat during the summer months. Only recently, there have been plans released by the Local Council (with funding received from the NT Government) to undertake the construction of a swimming pool in the near future. We acknowledge that MRM has made a major contribution to this project – by sheer coincidence, this was announced at the first presentation for this new open cut project held at Mabunji Aboriginal Resource Association on 2 August, 2005.

To date, the Borroloola CEC continues to be under resourced and does not provide a level of education comparable to national standards. Health facilities are inadequate to cope with increased health problems. It is well understood that indigenous populations and isolated communities in the Northern Territory experience more health problems than those in regional centres.

In *15.3.3 Economics and Employment 15-7*, unemployment in the Gulf was identified as 4.4% in 1996. CDEP's 16 hours per week does not constitute full time employment. Borroloola has one of the highest unemployment rates in Australia and this is one of the causes of its many social problems. Employment of indigenous people at MRM is less than 10%, and the vast majority of these are unskilled positions. Mabunji Aboriginal Resource Association and the Borroloola Community Government Council each employ higher numbers of Aboriginal people from Borroloola than MRM. The EIS states categorically that employment will primarily be sourced from Darwin on a fly-in, fly-out arrangement. *15.4.1 Construction Phase 15-12* states that 'The majority of the construction workers will be employed on a fly-in/fly-out (FIFO) arrangement.' *15.4.2 Operations Phase 15-13* also establishes there will be no changes to the minimal effort by MRM to provide enhanced employment opportunities to indigenous people in Borroloola – 'Any new employees required as a result of new skills required for the change from underground to open cut mining <u>will be hired predominantly from Darwin or other regions</u> where skilled labour is available. However, MRM is committed to hiring local people (indigenous??) when appropriately skilled personnel are available, and will provide employment and training programs in order to train local people (indigenous??) with the necessary skills (apprenticeships??)'.

The community benefits outlined in *Social and Community Effects on ES-17* outlines that it has been 'active in pursuing partnerships and agreements on community development'. In this section, community development partnerships and agreements identified are scholarship and sponsorship post-education opportunities for students, mineral awareness promotion in schools and some support for hearing impaired students. Whilst this input is acknowledged, it again demonstrates MRM's poor record of commitment and investment into the Borroloola community over the last 10 years with no substantial outcomes, even in employment.

Open Cut Tailings Storage Facility ES-10
Seepage

The tailings storage facility has been leaking into Surprise Creek since 1997. It is still leaking today in 2005. Prior to 1997, Surprise Creek was always a dry creek bed during the dry season. Since 1997, it has never been dry and has contained permanent spoils from the Tailings Storage Facility.

In November, 2001, the wall of this tailings dam was breached and waters were subsequently released. On 2 August, 2005, Mr Brian Hearne General Manager MRM stated at the public presentation held at Mabunji Aboriginal Resource Association, that the waters released from the tailings dam in 2001 were 'drinking water quality'.

In ES-10 it states that 'Water in the creek (Surprise Creek) was found to contain some sulfate (positive indication of tailings origin) but only background levels of lead and zinc. Regular monitoring of the water in Surprise Creek indicated no or minimal transport of lead and zinc.' In ES-13 it states 'Water in Surprise and Barney Creeks is showing signs of elevated lead and sulfate concentrations…elevated levels of sulfates, probably sourced from leachate from the northern side of the TSF.' These contradicting statements promotes doubt as to the transparency of information presented in the EIS.

Pit Dewatering
Drawdown ES-12

At year 17, the maximum of groundwater abstraction from the open pit mine will be 2 770kL/day and 3 560 kL/day. The EIS states that this dewatering will lower the groundwater levels 'significantly in the immediate area of the open cut' (where the McArthur River has flowed for millenium). In *11.11.4 Potential McArthur River Impacts* it states that 'at low-flow times during the dry season, significant loss to groundwater recharge could alter flow amounts or extend the duration of no-flow periods.'

The EIS contains insufficient data to establish that the 'very large drawdown' of groundwater for the 25 year life of the open cut mine will not affect the diversity of habitats, species and available flow for the downstream areas of the McArthur River particularly during the extensive dry season when rivers and creeks in the northern Australia are particularly dependent on groundwater flows for the maintenance of river ecosystem health.

The effects of the groundwater drawdown contained in the EIS are largely from modelling. In *7.1 Conclusions 7-1,* it states that 'The hydrogeology of the area is complex and groundwater occurrence away from the mining area is largely unknown…regional groundwater flow and occurrence have been based only on regional geology.' 'Because of the lack of regional groundwater data, the groundwater model is only approximate'.

Surface Water Management ES-13

This section of the EIS states 'For containment storages that have large catchment areas and hence are vulnerable to rainfall influences, **overflows to the receiving environment only occur in very large and rare rainfall events or from rainfall event sequences.'**

This region has experienced 3 flooding events in the past 10 years. During these floods, the MRM minesite which sits within a floodplain and a catchment area for the McArthur River system was subjected to these floods, to such a critical level that in 2001, that if floodwaters had continued to rise a minimal amount it would have flooded the underground operation through the air vent ceasing all operations. This EIS does not clearly outline or address that dramatic weather influences are normal in this region including annual heavy rainfall, periodic floods, cyclone induced rainfall together with the relationship of this open cut mine project proposal located in its entirety in a floodplain. Even if exceptionally heavy rainfall events are 'rare', the EIS has an obligation to address the full extent of all possible impacts. This mine operation may have a 25 year lifespan but its legacy will remain forever.

McArthur River and Barney Creek realignments ES-14

Firstly, whilst it may be possible to engineer a channel to change the course of the McArthur River, this cannot be undertaken without impact.

It has already been identified that lead and sulphates have been entering the McArthur River system since 1997, from the leaking Tailings Storage Facility via Surprise and Barney Creeks, particularly when their creek bed sediments are flushed downstream during heavy rainfalls experienced in the wet season, and of course, when the Tailings Storage Facility was released via Surprise and Barney Creeks in 2001.

In addition, with the realignment of these waterways, there is the potential for increased sediment loads to enter the McArthur River from the major earthworks in association with the 50m bund wall, the 5.5 km of recently excavated channel to divert the McArthur River and those for Barney and Surprise Creeks. 'The first 1,700 m of the realigned river channel will pass through alluvial materials…' is particularly susceptible to erosion.

The McArthur River system is one of the most extensive and significant rivers in the Northern Territory and comprises of a myriad of creeks, channels and waterways. Because of the size of this river, the Carrington Channel and the location of its mouth, its flow has a direct influence on the entire offshore area of the Sir Edward Pellew Islands and adjacent coastal areas. In the 2001 wet season, cane toads from the mainland arrived on every island except North Island from the flow of the flooded McArthur River onto these islands. In January, 2003, a fish kill that occurred in the McArthur River was transported over 30km out to sea where dead fish were found along the entire west coast of Vanderlin Island, which is the largest and outermost island in the group. During flooding periods, fresh water can be tasted at Centre Island, 10 km out to sea.

The EIS describes the McArthur as a 'major surface water feature in the region and is relatively large for the tropical north of Australia' in *12.2 Regional Surface Water Systems and Catchment Context.* In the same section it makes another gross understatement 'The exclusion of the very small mine footprint (less than 10 km^2) (of total catchment area)…will have no significant effect on the river flows.'

Every impact of land use and/or mining activities that enters the McArthur River upstream will flow out to the islands, mangroves and seagrass meadows of this sea country.

The potential impacts include additional heavy metals (particularly lead, cadmium, zinc and the cocktail of metals found in the bulk concentrate) entering the river system from the Tailings Storage Facility which continues to leak to the present day; erosion of overburden material containing potentially acid forming sulfates from rainfall and river flow, with resultant metal components entering the food chain through direct uptake by marine organisms e.g. oysters, fish and/or primary producers e.g. seagrass.

In addition, higher sediment loads entering the McArthur River are likely, particularly in the first wet season when the McArthur River is realigned. Increased sediment loads pose potential significant changes to the health and diversity of habitats found along the McArthur River, and the river as a major ecosystem. In addition, increased sediment loads flushed out onto coastal areas during floods will potentially reduce seagrass areas through smothering.

Biology ES-15
Fauna

The reference that the Tailings Storage Facility will continue to provide a 'habitat' for 'many species of waterbirds, including listed migratory species' demonstrates MRM's grasping at environmental credibility to the extreme. On this basis, if a tailings dam, which is essentially a containment facility to protect the receiving environment because of its potency containing a concentrated cocktail of heavy metals, constitutes a 'habitat', then all of MRM's environmental standards become questionable. We would also strongly suggest that any wildlife be actively discouraged from any association with this toxic facility.

Aquatic Ecology ES-16

'The only fish of conservation value in the area is the freshwater sawfish'. This poorly written sentence again reflects the effort made by this EIS to demonstrate their environmental capacity. All the fish species in the McArthur River are of conservation value including highly valued recreational and commercial species e.g. barramundi. The aquatic ecology of all downstream areas of this river are relevant to this open cut mine operation – not just the immediate area of operation.

Community Consultation ES-18

This is one of the major inadequacies of the EIS and the open cut mine project. MRM has not consulted widely or appropriately with Aboriginal people in the Borroloola region.

MRM has restricted its consultation to a few individuals, has adopted the inappropriate method of isolating and consulting a few individuals, instead of whole of community engagement. Those who have any experience in undertaking appropriate and comprehensive consultation with Aboriginal people uphold that the practice undertaken by MRM to date is culturally inappropriate and acts to promote divisions in the community.

MRM has not undertaken widespread consultation regarding this open cut mine project with all of the four major language groups in Borroloola. For example, the Yanyuwa people have not been consulted and the absence of any reference to their sea country in the EIS demonstrates that MRM considers it irrelevant to include both the downstream areas in the EIS or engage with its rightful owners. The inadequacy of the EIS in respect to the downstream areas will be addressed further into this document.

Past consultations for the 2003 proposal *16.2 EIS Consultation (2003-2004)* and *16.1 General Consultation 16-1* are not relevant to the current open cut mine project and EIS released in August, 2005. These consultations were in relation to components that are not included in the 2005 proposal.

It is an injustice to claim that adequate consultation has occurred to date. A number of public presentations or briefings, as referred to in the EIS, have been undertaken in Borroloola, King Ash Bay and to other major stakeholder groups. Only small numbers of Aboriginal people attended this presentation. These presentations market the open cut mine to the general public and do not provide adequate detail to enable an informed assessment of the implications of this new proposal. In terms of Aboriginal people, who comprise of 80% of Borroloola's population, who possess varying degrees of literacy, this presentation does not constitute adequate consultation. The information presented to date has not been modified for Aboriginal people. The majority of Aboriginal people do not understand what is happening at the mine site, what this new proposal entails and importantly, have not received the adequate information to make an informed decision.

We wish to make a very important comment regarding the public promotion of this proposal. This comment concerns the EIS document, the marketing materials and the briefing presented by MRM to the public. In all of the above, this mine is consistently delivered as a 'zinc mine'. In the EIS in **Section 2.0 Objectives and Benefits 2.1 Market Opportunities for Zinc, 2-1** a detailed outline is presented for zinc only. During the public presentations it is consistently called a 'zinc mine'. This is misleading, false advertising and a clear tactic to deceive the public and play down the potency of the heavy metals produced. Lead has immediate connotations for the general public. MRM produces a bulk concentrate that is comprised of lead, silver and zinc. The open cut mine project will also produce the same bulk concentrate.

3.6.5 Dredging 3-8

Although permitted under existing operations, this current activity is relevant as it demonstrates MRM's poor environmental practices to date.

The Bing Bong port facility is strategically located at the southern extent of a long length of coastline that stretches from the Sir Edward Pellew Islands to the Limmen Bight. This stretch of coastline and the Sir Edward Pellew Group support seagrass areas so extensive that they support the feeding grounds for the largest dugong population in the Northern Territory, which also ranks in the top four dugong areas in Australia. The dugong population found in this region has the highest population density in Australia. As Australia is the last stronghold for viable dugong populations this area is of international significance. These feeding grounds also support marine turtles and are important nursery grounds for the commercial prawn industry.

The EIS identifies that dredging of the Bing Bong channel began in 2004 and will continue for the next 4 years. The dredged material is placed on tidal flats because it is 'cost effective' and high turbidity levels occur during these operations. The EIS states 'Seagrass in the area is adapted to recover from these natural fluctuations'.

This statement infers that 'seagrass' bounces back and that seagrass dieback is negligible.

Firstly, turbidity from dredging is not a 'natural fluctuation'. Secondly, some seagrass species are extremely light sensitive and die under extended reduced light conditions. Seagrass can take years to recover from sediment smothering or light deprivation conditions - seagrass only begins to recolonise after 12 months, and do not fully recover for up to 10 years.

Seagrass availability and the protection of this habitat is critical to dugong which is a Listed Migratory Species, vulnerable green turtles, fish, prawns and other marine species.

4.2.2 Pit Excavation 4.3

The open cut mine is an enormous pit with long term impacts on the landscape beauty.

This area is part of the Savannah Way and its potential for tourism has been identified in the EIS. Tourism provides one of the few options for Aboriginal people to derive a livelihood into the future. A scarred landscape nor the potential downstream impacts will not enhance these opportunities.

6.6 Overburden Emplacement Facility Location 6.3

There are 8 Overburden Emplacement Facility locations (selected 'to achieve minimum costs') proposed over an extensive area around the mine, all located in the same floodplain that is inundated during flooding periods of the McArthur River. How can MRM guarantee that for the life of the mine, and in the absence of maintenance after this 25 year period, these huge mounds containing potentially acid forming sulfates waste will never leach into this catchment area into the long term future.

12.7 Existing Surface Water Quality
12.7.1 McArthur River Water Quality Monitoring Program 12-12

There are 2 sites for monitoring river water quality on the McArthur River established in 1995, one located upstream (SW7) of the minesite and the second less than 3 km downstream (SW6). No other monitoring is undertaken along the entire 120 km of this major river system from the mine to the coast.

In the absence of comprehensive monitoring of heavy metals in the downstream areas of this river, how can the EIS propose in *Metals 12-14* that 'Throughout the McArthur River system, concentrations of copper, lead and zinc frequently exceed ANZECC (2000a) trigger values'. Is this statement intended to mask the levels of heavy metals entering the McArthur River from mining activities as 'natural occurrences'?

In MRM's "*Annual Monitoring Report July 2001 – June 2002"*, p.15 elevated levels of lead, zinc, copper and sulphates at SW6 triggered investigations. It states that 'The lead concentration at SW6 (downstream) exceeded the trigger level several times throughout the reporting period (Jul 2001 – Jun 2002)...relatively high zinc concentration was likely from the first flush events from high rainfall on the 26th of October…The copper concentration at SW6 (downstream) exceeded the trigger concentration level during March 2002…The sulphate concentration exceeded the trigger concentration during June 2002…There were also some exceedences of the trigger concentration prior to when the trigger values were developed (January 2002)'.

In the same report 'High concentrations of lead and zinc were encountered' at the 2 monitoring sites along Barney Creek as follows:
LEAD SW3 min 6.1 to **max 36.0** ug/L and SW5 min 9.3 to **max 34.6** ug/L;
ZINC SW3 min 49.7 to **max 256.8** ug/L and SW5 min 54.1 to **max 258.8** ug/L).

The EIS presents Surprise and Barney Creek as sites of minimal impact. In *12.7.2 Surprise and Barney Creeks 12-15* in the EIS it states that 'Water quality in Surprise and Barney creeks shows signs of elevated lead and sulfate concentrations…Water in the creek was found to have…only background levels of lead and zinc…Regular monitoring of the water in Surprise Creek indicated no or minimal transport of lead and zinc in the water from the tailings.'

In the July 2001 – June 2002 report, sulphates in Surprise Creek were significantly higher at the downstream monitoring site (**Lead 44.9**; **Zinc 365.5**; **SO4 1204.0** µg/L) compared with the upstream site (Lead 8.3; Zinc 53.6; SO4 20.6 µg/L) in July 2001 – June 2002. In this report it states categorically that 'Seepage from the cell 1 of the tailings dam (adjacent to Surprise Creek) has been identified as the cause…'

Stream sediments are also monitored by MRM. The 2001-2002 report mentioned above tables consistently higher levels of lead and zinc in the sediments of the McArthur River in the downstream monitoring site compared to the upstream site.

In the same report in January and October, 1999, lead in the stream sediments was recorded at 162.0 and 167.0 mg/kg respectively at the downstream site on Surprise Creek compared to 10.0 and 13.0 mg/kg respectively at the upstream site. In addition, 'Stream sediments show that concentrations of contaminants built up during the dry season' in Surprise Creek before being flushed out during the wet season rains. Similarly, 'there was a notable increase in concentration from the upstream site to the minesite, and further increase to the downstream site. Lead and zinc showed particularly high concentrations at the downstream sites' (in Barney Creek).

'Individual dust gauges surrounding the tailings dam are showing elevated deposition rates of lead and zinc specifically during the dry season'.

Four soil data sites 'exceeded NEPM guidelines for both lead and zinc.' The 2001-2002 report adds that 'Concentrations of metals (in soils) have exceeded guideline concentrations since the start of monitoring in 1992.'

In the conclusions of the aforementioned report it states categorically that 'There has been evidence of continued influence from the cell 1 of the tailings dam on both surrounding groundwater and Surprise Creek.'

Groundwater monitoring in July 2001 – June 2002 revealed high lead and zinc concentrations in the groundwater immediately adjacent to the Concentrator Runoff Pond although this was dismissed as an anomaly 'caused by either use of contaminated sampling equipment or an error in the laboratory'.

In the EIS in *Metals 12-14*, it states that 'it is considered unlikely that adverse impacts on aquatic ecosystems have occurred to date from elevated metal concentrations.'

Firstly, the EIS does not acknowledge the extent of heavy metals entering the drainage area of the McArthur River via Barney and Surprise Creeks as outlined above.

Secondly, the EIS does not undertake to provide data on, or acknowledge relevance of, not only the downstream stretch of the McArthur River, but also the extensive coastal and offshore areas adjacent to the Sir Edward Pellew Islands. The extent of reference made to this extensive and rich coastal and offshore area is limited to 9 lines in *13.7.1 McArthur River Estuary*.

This is one of the most glaring shortfalls in this EIS. Coupled with nil consultation of saltwater people, MRM have not undertaken any comprehensive baseline studies of this valuable region. These were not undertaken for the underground mining operation in 1995, or for this new open cut mine proposal. There are no benchmarks established to monitor trends or impacts. Limited monitoring has been undertaken but this is restricted to the area in the vicinity of the Bing Bong port. How are we to monitor whether impacts have occurred to iconic marine species like dugong or turtle which are important for conservation and Aboriginal culture? Dugong are well known bio-accumulators of heavy metals. Heavy metals in sediments are taken up by seagrass.

Given the absence of comprehensive scientific data for the downstream areas the statement made in *Metals 12-14* 'it is considered unlikely that adverse impacts on aquatic ecosystems have occurred to date from elevated metal concentrations' again highlights MRM's level of environmental best practice – **production** first, **environment** second.

There is biological data contained in the EIS a large proportion of which relates to the Glyde River – this data has no relevance to the new open cut mine proposal.

13.4.4 Effects on Significant Species 13-33 is restricted species occurring on the mine site with no consideration of downstream areas.

The Sir Edward Pellew Islands and the McArthur River is important country to all Aboriginal people (and other community residents) in the Borroloola region. Aboriginal people use the waterways of the McArthur River, fish on the coast and visit the islands. It provides for their livelihood and community well-being. Aboriginal people continue to live on these islands and hunt traditionally for dugong and turtle, and fish for other marine species such as fish and crabs in this sea country.

The Aboriginal people of this area started an indigenous Ranger program in 2002 to look after this sea country because it is so important to them. Through this program, Traditional Owners have worked with scientists and are now involved with the local Rangers in long term research of dugong, sea turtles and sea grass.

This sea country has such high cultural and conservation values, a Sea Country Plan has just been completed by Dr John Bradley through National Oceans Office, so that Traditional Owners can manage this area effectively for the long term. At present Aboriginal people are working towards making this area a marine park. This area has been identified in the draft NT Parks and Conservation Masterplan as a potential area for a marine park.

The Sir Edward Pellew Islands and the McArthur River also attracts ever increasing numbers of amateur fishermen from all over Australia for its exceptional wild fish stocks.

This region is of national and international importance. Briefly, it supports:

- One of the top four dugong populations in the whole of Australia;
- The largest dugong population in the Northern Territory;
- Significant nesting areas for vulnerable Flatback and Green turtles;
- Feeding areas for 5 species of sea turtles including the endangered Loggerhead and Olive Ridley sea turtles;
- One of the most extensive mangrove and sea grass habitats in northern Australia;
- The largest rookeries in the world for Crested and Roseate terns and significant rookeries of the Little Tern;
- Two hundred species of birds including shorebirds, waders and seabirds;
- Important habitat for the little known Australian Snub-nosed dolphin;
- Habitat for four threatened mammals namely vulnerable (NT) Northern quoll, vulnerable (NT) Northern Brush-tailed phascogale, vulnerable Carpentarian antechinus, endemic (NT) Canefield rat, endangered Carpentarian Rock-rat;
- 60% of annual NT mud crab fishery income;
- at least 2 viable commercial Barramundi licences

13.7.2 Bing Bong
Monitoring Program

This section in the EIS states that 'Regionally, there have been no impacts identified as a result of the Bing Bong operations.' This statement is misleading and incorrect. Monitoring is not undertaken 'regionally' but only at sites in the vicinity of the Bing Bong port. At the sites monitored, impacts from MRM's operations have been recorded as per the following.

In MRM's "Annual Monitoring Report July 2001 – June 2002" p.44 it states 'The results show that the levels of metals in marine sediments within the swing basin have showed greater concentrations than the levels in the channel or at the control site. This is consistent with each of the metal elements. The high metal concentrations in the swing basin indicate that there has been some contamination of the marine sediments sinc(e) McArthur River Mining has been operating at the Bing Bong Loading Facility. **There is a marked change in metal concentration in the Bing Bong shipping channel and swing basin**.'

p.50 of the same report states 'The annual marine sampling program results showed that there was some impact on the areas immediately adjacent to the Loading Facility'.

p.53 states 'The results…show that increases in zinc and lead concentrations recorded in soil at Site BB2 (Bing Bong) has continued.'

In "BING BONG 2002 ANNUAL MONITORING PROGRAM: Metals in seawater, sediments and biota. For McArthur River Mining Pty Ltd, January 2003":

3.1 Seawater

- 'The TSS (total suspended solids) at most sites (except 8 and 109) were elevated relative to previous years'

- 'The cadmium concentration recorded for site 107 (174 ng/L) is…without any precedent during 1998-2002'

- 'The recorded Cu (Copper) concentrations exceed the guideline level' (ANZECC Water Quality Guidelines 2000)

3.2 Sediment

- 'The Pb (lead) and Zn (zinc) concentrations in the surface sediments from the beach west of the wharf are elevated compared to the concentrations on the beach east of the channel and all other off shore sites'

3.2 Biota
Oysters

- 'Oysters from sites 107 and 109 have, relatively high concentrations of Cu (Copper) compared to sites 104 and 105. This has been observed in all previous samples from site 107 but the 2002 concentrations are the highest recorded for site 109'

- ‘Cd (Cadmium) concentration in oysters (2.124 & 2.328 mg/kg) from site 105 was above the maximum permitted concentration (MPC) for molluscs (2.0 mg/kg – ANZFA, 1996), as have been reported in previous years.’
  (NB. In “BING BONG 2002 ANNUAL MONITORING PROGRAM: Metals in seawater, sediments and biota. For McArthur River Mining Pty Ltd, January **2002”**, the cadmium in the oysters (2.0 mg/kg) at site 105 was at the maximum permitted concentration (MPC)).

Telescopium telescopium
- ‘The concentrations of Cu, Zn and Cd in animals west of the load-out facility were some of the highest recorded since 1998’

Terebralia semistriata
- ‘Zn concentrations in terebralia were significantly higher west of the load-out facility than east of it’

Seagrass
- ‘there was an increase in leaf and root Cd and Pb concentrations in 2001 compared to the previous three years.

Conclusions
- ‘Metal concentrations in unfiltered seawater were the highest recorded during 1998-2001’

- ‘There were elevated levels of Zn and Pb in the sediments from the beach west of the load-out facility’
  (NB. In “BING BONG 2002 ANNUAL MONITORING PROGRAM: Metals in seawater, sediments and biota. For McArthur River Mining Pty Ltd, January **2002”**, it states ‘Lead isotope ratios confirm that the elevated concentrations of Pb and Zn are due to MRM ore concentrate’).

- ‘The concentrations of Cu, Zn and Cd in animals from the western beach were some of the highest recorded since 1998.’

20.3.7 Closure Strategy – Mine 20-13

The nature of a mining operation that produces bulk concentrate containing heavy metals like lead and zinc results will result in a contaminated site after 25 years operation. The scenarios proposed do not provide satisfactory rehabilitation or containment of this site or provide satisfactory assurance that the lack of maintenance of the site including the Overburden Emplacement Facilities will not continue to impact on this region forever.

Appendix A.12

Museum and Art Gallery of Northern Territory Comments

MCARTHUR RIVER MINE - OPEN CUT MINE EIS

Comments on McArthur River Mine Open Cut Project - Draft EIS

GENERAL COMMENTS:

Overall, this a comprehensive report. Proper acknowledgment is made of the areas in which there is incomplete understanding of natural systems, and undertakings are given to conduct further research, to expand monitoring programs, and have an ongoing process of review and introduction of improved methodologies. However, it is very difficult to find relevant information easily – it is scattered throughout the EIS, forcing the reader to wade through most of it as well as search the CD. A number of statements could not be verified as the data either was not there or very difficult to find.

This is a major project that, from a terrestrial and aquatic perspective, will have significant adverse impacts. Specifically, the realignment of the McArthur River (also Barney and Surprise Creeks) and development of an open cut mine will affect resident populations of terrestrial and aquatic fauna. Judging by the flora and fauna survey results the site is biologically rich, but does not contain any highly significant biological units (habitats or rare/endangered species). A few species classed as *Vulnerable* or *Threatened* have been recorded at the site, but these are generally widespread taxa that also inhabit a much greater area of similar surrounding habitat.

Principal concerns are the affects on aquatic fauna. A particular concern is the construction, and first wet season water flow of the section of realigned river bed. This impact is compounded by the lack of downstream monitoring to assess impacts of increased sedimentation, etc. on aquatic fauna downstream of the project. The impacts on aquatic fauna are inadequately addressed and a major concern. The past practice of MRM has not been exemplary. The McArthur River system is listed by ANZECC as “slightly to moderately disturbed”, with sulphate and lead leaching from the present tailings facility since 1997. It took MRM till 2005 to install a polymer barrier to stop pollutants leaching into Barney Creek. Not best practice.

SPECIFIC COMMENTS:

4.2.3, Test pit. This appears to be little else than an open cut mine, with approval gained from NTG by just a ‘modification’ to MRM’s mining plan. The open cut has begun and it will just be uneconomical to stop.

4.6.3, Flood bund. This bund construction and river diversions will happen during the 2006 and 2007 dry seasons. There is no mention of any effects that this enormous bund will have on shifting surface water drainage patterns and potential scouring during the west season.

7.2.1, Overburden. There is potential for high acid-forming material to react; the overburden mountain must remain separate from the outside environment

with all safeguards (aquatic organisms don't do well in acidic water). There also appears to be insufficient information as to how the overburden will behave. Further testing and modelling should be carried out **before** approval to proceed is granted.

A detailed rehabilitation strategy has not been developed. As the overburden will be placed right next to the rechannelled Barney Creek (Fig. 7.6), we should be reassured more than we are that this large pile of material will be safe. Sediment from the settling ponds can enter the creek.

7.3.4. Tailings facility. The existing facility has failed – it leaks despite being "designed not to leak". EIS says that some seepage into Surprise Creek is expected to continue. Why are remedial bores not installed? Isn't this supposed to be a best practice mine? It does not instil confidence that the much larger open cut mine will be benign and not pollute the existing environment further.

7.4.7, Seepage analysis. The new tailings facility will increase levels of groundwater beneath it. The recovery bores will need to run for at least 30 years after the mine has closed (25 year mine life). MRM must be responsible for running and maintaining these – this does not seem to be stated anywhere.

7.6, etc. Water quality standards and a need to nominate some trigger values under which discharges will be treated as 'incidents' or 'failure-to-comply

There should be no doubt as to what standard counts with respect to water quality (here or anywhere else in the report). As the declared beneficial uses for the McArthur River and its catchment are 'Aquatic Ecosystem Protection' and 'Recreational water quality and aesthetics', the environmental (higher) rather than stock water tolerance (lower) standard should be upheld. Point taken that natural (background) levels of e.g. some metals exceed the higher standard (7.19; 12.13, 12.14), and that seepage from the mine workings might still be acceptable for stock-watering purposes. However, it is suggested that special criteria should be nominated for this project for any parameter that 'naturally' exceeds ANZECC (2000a), so that there is an explicit threshold (trigger value) above which a discharge will be recorded as an incident or a failure-to-comply under 22.3.4, 22.4.4 and anywhere else where this might be relevant.

10.5, Soil erosion. No mention of erosion relating to bund.

11.2.1, Groundwater. The palaeo-channel of the former river bed is about 34m below the surface in the thickest area of alluvium sediments – this palaeo-channel will make contact with the open pit in several places and groundwater can flow from palaeo-channel to the pit in several places (water exchange). The EIS states that it is not quite sure exactly **where** the palaeo-channel is, and that further testing will be carried out to determine the extent of the aquifer. Why wasn't the EIS release delayed until this important

information was obtained and included? Groundwater effects e.g. contamination are undesirable.

11.7, Stream flows. The EIS did not study the possible upstream effects from aquifer changes until June 2005. Not a lot of data on which to base assumptions requires further work.

11.8.1, Surface runoff. Here, the present McArthur River is assumed to be in direct contact with groundwater. The same groundwater that can make contact with the open pit and exchange water with the pit. No comment in EIS as to significance.

11.11.4, Groundwater drawdown impacts on river. The open pit will be dewatered, so the depth to groundwater will be about 20 m lower than the bottom of the pit. As the pit is in the (real) riverbed, the alluvial channel will be connected with the groundwater, so that river flows may be reduced if groundwater levels are lowered very far, and groundwater recharge may not occur.

Dry season loss (evaporation) will be 60-170 kl/day, or 10% of river flow. The EIS says this is insignificant, but **is** it? The EIS says that the loss "will not significantly extend the non-flow period", but no data is presented. There's no reference to Appendix C, which contains the data – exactly two days' gauging during June 2005 - and which states that "Any impact on groundwater inflow rates to these pools [i.e. two permanent pools just upstream of the open cut pit] is likely to have a negative effect on pool water levels and salinities during the dry season". This would appear to be NOT an 'insignificant' impact.

12.3.3, Surface water. Table 12.4 presents average daily wet season flows, related to fish movements during the wet season. However, there is no comparable discussion as to what happens during the dry season, a time when fish and other aquatic organisms are likely to be most stressed by changes in water levels, chemistry, temperature etc. The EIS surely should have some water quality data from May to October. And why does the DIPE gauge apparently only show 75% of the data? Lack of maintenance?

12.6, River morphology. The original condition of the river is briefly described, but much is left out. What percentage of woody debris, submerged and emergent plants, overhanging vegetation, gravel and different particle-sized sands are present in the existing river (all the standard things noted when characterising a river habitat)? What microhabitats are available for fish and invertebrates? It is very poorly documented in the EIS. What is the water chemistry? What will the chemistry of the water in the channel be like (running over fresh substrate – will this change anything)? What are the ranges of water quality during wet and dry seasons?

The EIS does not even **mention** Bishop *et al*. (2001), which gives comprehensive water quality data for fishes in the Alligator Rivers region, and is directly relevant here (data includes a range of seasons and conditions). Bishop *et al*. (2001) is the most detailed work published on the habitat

requirements of fish in the monsoon tropics. The EIS acknowledges that the McArthur River is already “slightly to moderately disturbed” – it will be even further disturbed by its channelisation. Each species of fish, at each stage of its life history (e.g. eggs, larvae, adult) will have slightly different tolerance to environmental stresses. These tolerances are not known for most species. The EIS should include relevant information in Pusey *et al*. 2004 too.

Four sections of the McArthur River have exposed bedrock on the river bed or banks – will this be duplicated in the channel? Will the anabranchs be duplicated?

From modelling (pp 12.9-10), the EIS indicates that river sinuosity will increase, as the new channel will be 400 m longer than the river. But sinuosity appears to be an engineering/mathematical concept, because the new channel does not appear to be very sinuous at all (sinuous = winding). In all of the illustrations provided, the channel is smoothly curved then almost straight for half its length as it approaches the existing river bed downstream of the mine. To an observer, or an organism living in this channel, it is not sinuous.

p.12-14, here it states again that seepage from the tailings facility shows up in waters below the mine. Surprise and Barney Creeks have high levels of lead and sulphate, while Barney Creek also has high zinc levels downstream. This needs to be **remedied**. What is the process for monitoring that the mine is actually trying to manage this pollution correctly? The statement that there is no ANZECC trigger level for sulphates and the impact of these levels on aquatic organisms needs to be addressed.

12.8.1. Discharge of ‘dirty’ mine waters

On p.12.16 a stated management principle is to ‘*maintain a non-release system for ‘dirty’ mine waters, except under extreme conditions, as approved*.’ Firstly, purely in terms of presentation, ‘extreme conditions’ need to be defined (threshold values specified), and the terms and procedures of the agency that approves this need to be explicitly set out. Is this part of the NRETA waste discharge licence 103 (referred to at 12.17)? If it isn’t already in the report, then a copy of it should be included, as it forms part of the waste management process.

At p.12.17, reference is made to the ‘clean water dam’. From the flow diagram (fig. 12.10) and associated text, an extreme condition occurs when the ‘clean’ water dam gets filled up with ‘dirty’ water because the re-use / treatment / underground void storage system can no longer cope, at which time the operator is permitted to use ‘clean’ environmental water out of the river to dilute its ‘dirty’ water to the point where it can be considered ‘clean’. This then is a licence to pollute, although it is appreciated that the procedure is a harm minimisation aspect of the strategy (13.43).

Any discharge of ‘dirty’ water, however, is a serious matter as it shows that the design capacity of the system has been breached or exceeded, and every discharge made under licence should have to be reported immediately to NRETA. Again, there is nothing explicit under Section 22 to indicate that this

is already a licence condition, and merely listing discharge events as part of an annual report is unsatisfactory.

12.8.2, Overflows. There is a high likelihood of overflow into Barney Creek with the test pit project. This should be continually managed, not just "… in the event of a 1 in 3 year event".

12.9.1, Bund wall runoff pond. The description of this pond for the "areas between bund and edge of open pit" is unclear. Does this mean everything contained within the bund wall? The diagrammatic Fig. 12.11 shows the overflow going into the McArthur River? Further explanation or a better diagram is needed here. **What** is entering the river? This pond is not mentioned in Sect. 4 (bund). There is also no mention of any changes in surface water runoff and effects on Barney Creek catchment by the presence of this enormous wall, if any.

Fig. 12.12 shows the proposed new channel (replacing about 5.5 km of river) to be very smoothly curved to almost straight. While the EIS has given some consideration to stream bed profile and depth, the engineers have overlooked the fact that natural rivers bend, twist and wriggle through the landscape. It is strongly suggested that the proposed channel be provided with some bends and twists (sinuosity!). As it is proposed it is a true channel, a drain, not a river.

P12.24 - The operator has nominated 2,100 ML of underground void storage as the threshold at which water will begin to be pumped to the Tailings Storage Facility, and 2,300 ML as the threshold at which it will begin to take steps to upgrade its TSF capacity. The two thresholds seem fairly close, though we're assured that these provide ample lead time for expanding the TSF.

Is there a requirement that any substantial upgrade to the TSF should require a supplementary Environmental Impact Statement? If there isn't, then something of this nature should be required in the event that the water management system as it is designed is demonstrably not adequate to meet the conditions of operation. What would constitute a substantial upgrade (>20% extra capacity …)? An appropriate threshold should be set.

12.10.1, River channel. It seems that a 'hydraulic model' is all that has been designed, and The EIS has decided that this model is sufficient for impact assessment purposes. There is no clear illustration of what the proposed channel will actually look like. An EIS should provide sufficient information for the assessors to decide what impact there may be on the environment.

Furthermore, will the bedrock present in the bank sections of the existing river be duplicated? Figure 12.14 looks very nice with lots of trees – but how long do riparian trees take to grow? This data is not presented in the EIS.

On p.12-29 the EIS states that rock armouring will be placed at either end of the channel. Also, it says that “localised protection works” will be needed where the channel joins the existing river. What are these ‘works’?

12.10.2, Roughness. It is strongly suggested that trees, stumps and other wood debris (e.g. from knocking down riparian vegetation along the real river) be added to the new channel to provide immediate habitat and stream bed stabilisation. The EIS does not exactly say that it will do this at the beginning of the channel formation – it should.

Rapid vegetation of the banks is essential also. The EIS is very vague as to the amount of time required to revegetate the channel banks, when there must be plenty of expertise available from whom this information could be obtained. It is strongly suggested that the largest trees possible be planted, to speed up the revegetation process. Progress on revegetation must be monitored, e.g. after big storm events, flooding.

On p.12-33 the EIS admits that it will take at least 50 years for the channel to resemble the river in flow and hydraulic roughness. Channel velocity will be high (p.12-33) because the riparian vegetation and associated roots and stumps will be absent. High to very high velocity will occur over rock-bed portions of the channel. Another reason that the channel velocity will be high, which the EIS does not mention, is that the proposed channel is very smoothly curved to straight, not sinuous like a real river. The EIS does not say whether it will monitor and replace young planted vegetation swept away by flooding; it should.

In short, about 6 km of the McArthur River will be a very difficult place to be for aquatic organisms during high water and flood events. Additionally, low-flow periods will be more frequent and for longer periods, so there will be less regular flushing of the system. Sediment accumulation and erosion may be considerable in the new channel. There appears to be little data available as to where the upstream sediment actually comes from, and the EIS does not provide information. Basically the channel will be a dynamic system, eroding and filling with sediments in an unpredictable manner for about 6 km of the McArthur River. Despite all the site photography and monitoring that The EIS says it will do, it has not provided options as to what could be done to mitigate sediment deposition downstream along the Bukalara Range portion, for example (where the river narrows).

12.10.3, Flooding. The EIS’s modelling predicts an increase in flood levels, mostly upstream of the channel and bund. Flooding upstream of the channel will be very extensive just in a 2 year ARI (average recurrence interval), mostly caused by the presence of the immense bund around the mine. From Fig.12.17, it looks possible for floodwaters to enter the mine site by the back of the bund, and this is based on a 100 year ARI – what happens during a 500 year ARI (quite possible due to the Greenhouse Effect working)? The EIS states the bund will protect the open cut pit from floods of **up to** 500 year ARI. Natural events usually don’t occur quite as models predict. The downstream effects of the site being breached could be catastrophic.

12.10.4, Fish passage. The EIS states that 'general principles' for fishway design as applied to large structures can be applied to the channel and considers that impacts on fish passage "… can be avoided". Movement is a critical aspect of a range of life history stages of many northern Australian freshwater (and estuarine) fishes. The EIS should note that the references they cite (Cotterell 1998 and Harris 1997) and the fisheries guidelines (NSW Fisheries 1999) are mostly about fishways and weirs on the east coast of Australia – quite different country to the monsoonal tropical rivers of northern Australia, which have characteristic extremes of seasonality and flow pulses.

The channel design must include input of an experienced fish biologist (EIS considers that this is needed only for checking for barriers to fish passage); the biologist should be involved with the whole channel design. It is not just an engineering problem, it is also a biological systems problem. After reading the section on the proposed channel, it appears that there has not been any biological input, just that of engineers and modellers, working on examples from the east coast.

On pp.12-43 onwards, the EIS discusses critical flow conditions, which are presented as an engineering problem, not a biological one. Harris's (1997) suggestions for flow speeds for fishways are quoted and data presented in tables 12.16 and 12.17 which are very general and based on average flows, from which the EIS concludes that flows will not be an impediment to fish passage. There are a lot of assumptions here. Real rivers have many still or low-velocity sections and indentations, where fish live or pause. The channel, which is smoothly curved or straight, will have few of these. The EIS seems to assume that the uneven substrate will provide these low-velocity areas, when what are also needed are uneven **banks**. The channel does not mimic a natural watercourse, it has no sinuosity. Microhabitats in terms of substrate as well as flow velocities are required. On p. 12-45 the EIS says "Offstream pools will provide an opportunity for fish resting areas" – but does not explain how fish are going to use these and how many there will be? Do fish have to wait for floodwaters to transport them to these pools? Are these intended to mimic natural oxbow lakes (i.e. billabongs)? But these pools are no substitute for irregular banks and real river morphology. Microhabitats must be considered when constructing the channel.

On p.12.45, remedial mitigation is discussed, in that someone will go out and look at the channel after it's been built – will this be during the wet? But it does not say that flows will be measured as soon as channel starts to flow after first flush from rains. If the channel is built in a sinuous manner, with banks indented, some sloping, some steep, and rocks, boulders and plenty of woody debris installed, this may reduce the amount of remediation needed. It may be more expensive in human time and money, but this is a very long-term project and it is better to get as much right at the beginning as possible.

12.10.6, Water quality impacts. Construction of the channel will be done over two dry seasons; the EIS does not state what will happen in the case of the first part of the channel filling with water after the 2006 wet season. There are

‘dispersive clay soils’ along parts of the channel – very good for increasing turbidity, so monitoring must include documenting turbidity. However, there are apparently only two water quality monitoring sites for the whole mine. It is recommended that there be one downstream (to show that there is no effect?). There also should be a monitoring site on Barney Creek or the tailings facility, as the tailings have already been shown to cause aquatic pollution problems.

13.2.2, New channel impacts. The EIS states that about 4 km of riparian vegetation will be destroyed – but elsewhere there is reference to nearly 6 km of river to be ‘moved’? What about the rest? Revegetation of the channel is of considerable importance to aquatic fauna, for shading, nutrients, food (many NT freshwater fish are omnivorous and a number eat fallen fruit and seeds) for example. Direct planting of trees is essential, not waiting for years for seeds to grow, to get riparian cover up and going as soon as possible.

13.2.3, Barney Creek channel. Will there be an increase in sedimentation? EIS makes no comment on any remediation or concern for the aquatic fauna of this watercourse.

Terrestrial invertebrates get a brief mention here – No survey was undertaken. There are a number of poorly known butterfly species for example.

13.5.2, Aquatic surveys. Why no sampling sites downstream of the junction with the Glyde River? Downstream effects of this mine are barely acknowledged in this EIS. Aquatic fauna such as large fishes and flying insects may use large parts of the McArthur River watercourse, surely it is better to get a broad knowledge of the fauna that may inhabit the river. It is difficult to agree with the statement that the McArthur River is a “relatively minor” part of the Gulf drainage system. It has a very large and braided estuary, debouching onto the Sir Edward Pellew Islands, and obviously has influence over a complex of interconnected habitats. It is a major feature of the NT part of the Gulf of Carpentaria.

13.5.4 (and appendix J). Aquatic fauna. It should be noted that two species of the fish *Glossogobius* are probably present in the river system, *G. aureus* and *G. giuris*. The two species are often misidentified (MAGNT holds specimens of *G. aureus* from the McArthur, but none of *G. giuris*).

The EIS states that none of the fish are specialised or restricted in their distributions. However, the freshwater sawfish may satisfy this, as the species in northern Australia may or may not be the same as that in Indonesia for example. Poachers and recreational fishers are still a real threat to this species. Individual sawfish resting in dry season refuge holes may be operating below optimum – their accidental capture may cause considerable stress or death (there are many unknowns with this species).

Aquatic invertebrates are largely overlooked despite their ecological importance. The Appendix consists only of a table of species. Similar to the fish section, there is no interpretation or comment.

13.5.6, Effects of realignment. The EIS states that initially the changed habitat and flow conditions may deter or limit upstream movements of fishes, and that this will change over time. But it gives no hint of **what** time period is involved. The life span of terapontid grunters for example, may be several years (e.g. sooty grunters do not even breed until they are 2-3 years old), but many of the abundant small schooling fishes do the opposite. Glassfish, which form dense schools and which migrate, may only live 2 years (3 years for the largest species *Ambassis macleayi*; these ages are estimates by Bishop *et al.* 2000 based on their field data). The well-known and abundant rainbowfish (*Melanotaenia* species) live only 1-2 years, 3 at the most, in the wild, and blue-eyes (*Pseudomugil* species) live 1-2 years (Pusey *et al.* 2004 data). These fish are among the most visible seasonal migrating species. They cannot wait 5-10 years for the channel to stabilise flows and habitats; they don't live that long. This channel has the potential to essentially break the river in two and create a barrier to migration.

13.22 - A minor discrepancy noted in the EIS was on page 13.22 where, under 'trapping results', it is stated that "five species of a small skink were trapped in the program". It is presumed this means "five specimens of a small skink" or "five species of small skink", however appendix I.2 (cited on page 13.22) indicates that only three specimens were trapped and these represented three different species.

On p.13-45 the EIS states again that velocities along the entire channel could be **constant**, at greater than 0.3m/sec, with no relief areas of less speed than this. Fish need low velocity areas (still spots). Off-stream pools at end of the channel are not the answer – the fish are still faced with 5 km of fast flows. Put bends in the channel, irregularities in the banks.

EIS states that a specific survey for *Pristis microdon* will be carried out. By whom and what time of year? Accurate data on this species is needed, and any survey work should be carried out by one of several sawfish projects presently being carried out across northern Australia.

21.0, Biodiversity offsets. These are things that MRM might do to compensate for the damage its mine may cause – but it is all very academic and still under discussion. The section does not say anywhere that MRM would actually put money towards any of the projects.

22 transparency and public accountability

MRM will provide annual reports on its performance to NRETA and other stakeholders etc. The principle government agency responsible for oversight (NRETA) should ensure that these reports are publicly accessible on its website to ensure the kind of transparency and accountability that is expected. This should form part of the formal process of accountability. The expected life of the mine is 25 years, MRM anticipates at least 8 years of

decommissioning with some potential risks identified as extending for 30 or more years beyond mine closure. This is a long timeframe over which few individuals are likely to have continuous involvement. The regulator should therefore guarantee a continuity of record that remains publicly accessible.

Appendix A.13

Northern Land Council Comments

Our Ref: 2003/0177

8 November 2005

Mr Rod Johnson
Office of Environment and Heritage
GPO Box 1680
DARWIN NT 0801

Dear Sir,

Xstrata McArthur River Mine Expansion: Draft EIS

Please find attached the Northern Land Council's (NLC) submission regarding the Draft Environmental Impact Statement (EIS) submitted by McArthur River Mine.

The NLC's submission identifies a number of significant concerns regarding the potential impact of the proposed expansion. The chapters of the EIS assessed by the Northern Land Council are chapters 1 to13 inclusive, 19, 21 and 22. Consideration was also paid to relevant scientific data and the Guidelines presented in Appendices A to C inclusive and F to K inclusive.

Yours sincerely

Norman Fry
CHIEF EXECUTIVE OFFICER

Xstrata McArthur River Mine Expansion: An appraisal of the scientific content of the Environmental Impact Statement.

This current document provides an appraisal of the scientific content of XStrata McArthur River Mine's draft Environmental Impact Statement, prepared for the proposed development of an open cut mine in the Borroloola region. It does not address social or cultural issues.

This document has been prepared and draws extensively upon reviews of the EIS conducted by Trevor Ward of Greenward Consulting (Ward, 2005) and Howard Smith of the Northern Land Council (Smith, 2005). It includes further information gathered from concerns of Traditional owners expressed at an NLC consultation held in Borroloola on the 25th and 26th October 2005.

General concerns with the EIS documentation.

This section addresses matters that may (or may not) be significant in terms of the overall plans for management of environmental impact, but that require some degree of clarification. They represent internal inconsistencies found within the EIS, and perceived failures to meet the Guidelines for the Environmental Impact Statement originally issued by the Northern Territory Government in March 2003[1]. It is important to note that no amendments to these Guidelines are indicated within the draft EIS.

The draft EIS has attempted to address all of the NT Guidelines, with the exception of:

- 5.4.2 – Limestone supply and processing.
- 6.2.3 – Impacts on the biological environment. The draft EIS makes no reference to impacts on several listed species of conservation significance, particularly the migratory species Great knot (*Calidris tenuirostis*), Red knot (*Calidris canutus*), Red-necked stint (*Calidris ruficollis*), Sharp-tailed sandpiper (*Calidris acuminata*) and black-tailed godwit (*Limosa limosa*); – despite specific instruction made under the Guidelines to do so.

[1] XStrata Draft Environmental Impact Statement: Appendix 1.

In addition, the detail provided in the draft EIS with respect to assessing impacts does not meet the general requirement of Guideline Section 6 – which requires an in-depth description of the McArthur River wetlands and the Bing Bong area *sufficient to serve as a benchmark against which the impacts of the project may be assessed over an extended period*[2]. The draft EIS treats the requirements of section 6 (and especially sections 6.2.3 and 6.2.4 – impacts and mitigation) in a superficial manner. These requirements need to be addressed fully in the supplement so that risks and, if necessary, options for mitigation can be developed, supported and more clearly explained.

Three documentary inconsistencies were found within the EIS. These were:

- Statements made in section 13.2.5 appear to be inconsistent with figures 4.1 and 4.2. The report states "the open cut project will not require any expansion of the tailings storage facility (TSF) beyond the footprint area that is currently occupied for underground operations"[3]. Figures 4.1 and 4.2 clearly show an expanded TSF occupying a footprint larger than exists for the existing TSF. A definition of what comprises the TSF footprint may assist with resolution of this matter.
- A statement made in section 13.2.7 appears to be inconsistent with data presented in Table 13.4. The report states that "no endangered, vulnerable or near threatened plant species have been recorded from sites affected by the proposed open cut mine"[4]. However, table 13.4 lists *ophioglossum gramineum* as a near threatened species.
- A number of time series plots and tables presenting on-going monitoring data in the document are not current. Although this information is dated 2005 and was presumably prepared in 2005, only data up to 2001 or 2002 is displayed, thus precluding a comprehensive appraisal of existing environmental impacts in the period 2002 to 2005. These include figures 8.3, 8.4, 12.9 and table 12.7.

These matters need to be addressed in the supplement so that transparency in reporting of relevant environmental information is ensured.

[2] Xstrata Draft Environmental Impact Statement: Appendix 1. Guideline 6; 6.2.3 and 6.24.
[3] Xstrata Draft Environmental Impact Statement: Section 13.2.5, p13-16
[4] Xstrata Draft Environmental Impact Statement: Section 13.2.7, p13-17

Background.

Although the underlying deposit (formerly known as 'Here's Your Chance') was discovered in the late 1940's, McArthur River Mines has operated an underground mine there for only the past twelve years. In spite of this shortened operational time span, it should nevertheless have been sufficient to allow the company to gather enough operational and scientific information to make predictions regarding potential impacts of the planned expansion, particularly when referenced against earlier baseline data. The data and knowledge available should therefore allow a much higher degree of certainty to be applied to prediction of potential impacts than would be the case for an EIS for a Greenfield mine site. Consequently, this EIS should be able to make use of available existing data and experience in the assessment of issues and development of plans for management and mitigation of those issues.

The draft EIS describes the major issues and predictions regarding the type, magnitude and extent of possible impacts resulting from the planned expansion. The major structural features that contribute to environmental impact are identified as:

- Relocation of the McArthur River for a distance of approximately 5.5km;
- Relocation of the channels of the adjacent ephemeral Barney and Surprise Creeks;
- A large pit void that intersects the existing river bed;
- A large overburden stockpile that is not planned for return to the pit void; and
- An extended Tailings Storage Facility, the contents of which are not planned for return to the pit void.

The perceived and potential impacts of these structural features on the immediate and more distant, but affected environment, follows.

Construction and Engineering Considerations

Long-term landscape stability does not appear to have been addressed by the draft EIS. Computer models (e.g. SIBERIA) now have widespread acceptance as tools for predicting stability of landforms over periods up to thousands of years, and could be applied to the Tailings Storage and Overburden Emplacement Facilities to provide some form of surety for public consideration. Despite plans to encapsulate potentially acid forming materials inside benign clays, continued erosion of the Overburden

Emplacement Facility would ultimately leave them exposed to the atmosphere and could result in significant contaminant and acid drainage into surrounding watercourses.

Similarly, the question of consolidation of tailings – which is critical to landform stability of the Tailings Storage Facility - does not appear to have been satisfactorily addressed. The proposed means of tailings consolidation is one of discharge to produce a series of thin layers followed by natural drying and compaction. The use of sub-aerial deposition may result in development of inconsistent tailings density across the surface making it prone to localised subsidence in the future.

Subsidence may also be a problem during periods where upstream lifts of the tailings dam are required. It is assumed here that additional bunding required during upstream lifts would need to be installed at a time when settling and compaction of tailings may be incomplete. The draft EIS is unclear about how the company intends to ensure that upstream lift walls do not sink or become distorted during their construction should subsidence occur. It also gives no clear indication of what protective covering is to be applied to the 10m gap on the tailings surface between the successive embankments (refer Figure 7.10) during upstream lifts to prevent erosion or loss of fines to the atmosphere.

The potential effect of climate change has not been adequately addressed in the draft EIS. The proposed water management system has been developed using models based on only 33 years weather data from specific to McArthur River Mine from which 1 in 100 year flood events and other extreme conditions have been estimated. A dataset based on such a short period could be considered insufficient to support the assumptions made (particularly as to what constitutes a 1 in 100 year event) and thus conclusions drawn. There does not appear to be any reason why extreme data taken from outside the boundaries of the dataset could not be modelled to at least produce an “indication” of what could be expected from more severe cyclones and storm events predicted for further climate change; and to link this to modelling of long-term stability of minesite generated landforms.

Construction of large Overburden Emplacement and Tailings Storage Facilities on the surface adjacent to a pit void has the potential to seriously disrupt normal groundwater flow through sub-surface aquifers. Both facilities have the potential to generate a significant hydraulic head, resulting in downward pressure and seepage of contaminated water from the base of each construction. Groundwater seepage from beneath the Tailings Storage Facility into Surprise Creek as surface water runoff has already been observed[5] and it is reasonable to assume that this will continue into the future, increasing in volume as the height of the facility increases. As it is also stated in the draft EIS that little is known about connectivity of aquifers and paleo-channels in the area of the pit[6], so it is not possible to confidently assess where seepage from these facilities will travel and how much of this water will flow into the pit void.

Plumes of contamination tend to move slowly through groundwater aquifers and thus pose a long-term threat to its suitability as a water source. Mitigation of release of chemical contamination and potential acid drainage by encapsulation in natural alkaline materials or clays and use of clay liners at the base of the Overburden Emplacement and Tailings Storage Facilities are commendable. However it must be understood that even seemingly impermeable clays ultimately become saturated and permit transport of contaminants to groundwater aquifers which may express themselves in the McArthur River or Barney and Surprise Creeks.

Chemical and Geochemical Considerations

The pit is expected to consume a surface area equivalent to 83ha and reach a final depth of 210m. In the long-term, it has the potential to become a source of acid discharge, particularly if sulphidic rock remains exposed on the pit walls and continued contact with fresh water does not occur.

The pit is expected to generate around 183Mt of waste rock material, which will cover approximately 225ha of land at a height reaching 50m. This overburden stockpile will remain a long-term and significant point source for potential release of acid discharge (predominantly sulphuric acid) and hazardous substances such as *arsenic* (As), *cadmium* (Cd), *copper* (Cu), *manganese* (Mn), *lead* (Pb) and *zinc* (Zn).

[5] Xstrata Draft Environmental Impact Statement: Section 7.3.4, p 7-18
[6] Xstrata Draft Environmental Impact Statement: Section 11.2.4, p 11-3

During processing, it is anticipated that 23Mm^3 of tailings will be produced and stored above ground in a Tailings Storage Facility covering a total surface area of approximately 210ha. This material is extremely fine (nominally containing >80% of material at <7µm particle size)[7] and will remain as a long-term and significant point source for potential discharge of the hazardous substances listed above. Concentrations of many of these substances are expected to be higher than those encountered in the overburden stockpile.

As correctly stated in the draft EIS, *metal solubility is strongly pH dependent and a decrease in pH can significantly increase the solubility of environmentally important elements*[8] and by definition, environmentally hazardous elements. A plethora of studies available from the public domain indicate that once the pH drops to a value close to 6 or increases above 8, hazardous species such as As, Cd, Pb and Zn rapidly become more mobile in solution - a matter which is not clearly addressed in the draft EIS. The need to create and operate management strategies capable of maintaining water quality within this pH range would seem to pose a challenge to this project.

Chemical species derived from the hazardous substances As, Cd, Cu. Mn, Pb and Zn therefore represent a significant concern because if they are released, they will impact the environment and enter the food chain via a number of routes – principally; surface water runoff; groundwater and aerial deposition.

Predicted Impacts

This section outlines the main impact issues that do not appear to have been properly addressed in the draft EIS, and that have the potential to leave the planned operation some important risks that have not been adequately considered or mitigated. These issues are not presented in any specific order as all appear to represent important gaps in knowledge, and therefore impinge upon the process of assessing potential impacts and result in lack of mitigation strategies being proposed.

[7] Xstrata Draft Environmental Impact Statement: Section 7.3.1, p 7-14
[8] Xstrata Draft Environmental Impact Statement: Section 7.2.3, p 7-6

Impact upon Surface Water

This part of the review focuses on potential effects of hazardous chemical substances transported to the environment during the course of surface water runoff, which would predominantly be a concern during the wet season, or in the event of unplanned release from the process.

The draft EIS proposes a water management system that is designed to limit the amount of contaminated or process water that can be released into surface and groundwater flows. Principal impacts upon surface water will related to the load and type of chemical species emanating from the process, and especially from the Tailings Storage Facility. This includes metal contaminants (As, Cd, Cu, Mn, Pb and Zn), and may also include spent Xanthate flotation chemicals[9]. Although some of these chemicals are analysed routinely (and it is noted that key chemical species such as As, Cd and Xanthates are not), the data provided in the EIS is curtailed around 2001 or 2002 – dates that appear to correspond to significantly increased chemical values in the McArthur River[10].

The draft EIS does not define acceptable environmental discharge limits and indicates that site-specific trigger values for water quality in the McArthur River are yet to be determined in conjunction with DPIFM[11]. While the argument for developing site specific trigger values where guidelines do not exist is an acceptable management practice[12] , high reliability freshwater and marine values have been determined for species such as As[13], Cd[14], Pb[15] and Zn[16], and also need to be considered. In addition, the draft EIS does not detail the rationale being used to develop values for these triggers, or whether they are to be determined and applied on the basis of consumption by cattle (which seem to feature prominently in the draft EIS), or will consider human consumption of aquatic foods from both the freshwater and marine environments.

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[9] Xanthates such as sodium iso-butyl xanthate, sodium ethyl xanthate, sodium n-butyl xanthate, sodium iso-propyl xanthate and potassium amyl xanthate are commonly used in the minerals separation process.

[10] Xstrata Draft Environmental Impact Statement: Section 12, Figure 12.9

[11] Xstrata Draft Environmental Impact Statement: Section 12.7.1, p 12-15

[12] ANZECC Guidelines Section 2.2.5 & Section 3.3.2

[13] ANZECC Guidelines Section 8.3.7.1, pp8.3-107 to 8.3-108

[14] ANZECC Guidelines Section 8.3.7.1, p 8.3-113

[15] ANZECC Guidelines Section 8.3.7.1, p 8.3-127

[16] ANZECC Guidelines Section 8.3.7.1, p 8.3-154

Failure to provide information for any chemical species monitored beyond 2001 and 2002 is a major concern, as the extent of environmental impact from this mine for the past three years has not been made a matter for public consideration. Failure to produce any analytical data for Cd compounds the matter given that it is one of the water quality parameters required under terms of the company's Water Discharge Licence (Controller of Water Resources, 2003). It is also alarming that this information is not available in the public domain; making public scrutiny impossible at the time comment for the draft EIS is due. Without access to this data, full appraisal of the minesite's impact and potential impact for the proposed expansion as required by law is simply not possible.

In addition, the EIS does not appear to fully consider any potential impact upon the wetland downstream at the mouth of the river – even though this is required under section 6 of the Guidelines[17]. Dilution effects of the Glyde River, and flocculation at the freshwater/saline interface may reduce chemical concentrations to values within environmentally acceptable limits, but this has not been demonstrated in the EIS. In any event, wetlands and coastal regions near Port McArthur will remain the ultimate, long-term repository where any hazardous materials released from the extended operations will accumulate.

Under essentially neutral pH conditions, toxic chemical species such as Cd and Pb will be absorbed onto river sediments but readily remobilised when pH falls (Appel and Ma, 2002). The extent of the damage caused will thus be dependent upon the volume of acidic material and other contaminants released from the minesite during either planned or unplanned events; and Xstrata advise that overtopping of the Tailings Storage Facility is expected at least once over a 20 year period – which equates to possibly twice during the 25 year life of the open cut mine[18] - and more frequently should extremely wet weather conditions patterns progressively develop over a number of years. The mitigation strategies in place appear to be sufficient, but their success cannot be fully ascertained until such events occur.

[17] Xstrata Draft Environmental Impact Statement: Appendix 1.
[18] Xstrata Draft Environmental Impact Statement: Section 12.8.1, p 12-17

Impact upon Groundwater

This part of the review focuses on potential effects of hazardous chemical substances transported to surface systems via creation of groundwater contamination plumes. It also refers to the effects that drawdown of significant quantities of groundwater may have on those systems.

Tropical rivers in the wet-dry climate typically have little surface water flow during the dry season, and especially towards the end of the dry season. Pools that remain standing along river beds depend heavily upon recharge from sub-surface flows of groundwater to retain freshness and quality. While water quality deteriorates through evaporation and natural concentration (including available oxygen, conductivity, nutrients and turbidity), the species that inhabit these pools are well adapted to withstand normal variations. However, the chances of survival of fauna are greatly enhanced where strong inflows of good quality sub-surface water occur. Should the water contain significant quantities of contaminants, adverse effects on fauna survival will be expected.

The section of the draft EIS dealing with environmental flows makes no account of groundwater flow in the river paleo-channel, or the local region of the river. Groundwater flows are crucial for maintenance of pool water quality during the dry season and may be an important factor in maintaining sub-surface flows in the McArthur River – even given the confluence with the neighbouring Glyde River. The proposed pit void will intercept sub-surface flows creating a major sink for groundwater.

Removal of large quantities of groundwater for operational purposes will result in a net loss to the environment which may have significant impacts on downstream groundwater flow at crucial times for fish, reptiles and invertebrates trying to survive in downstream pools during the dry season. The extent to which abstraction will interrupt groundwater flow into downstream refuge pools is uncertain. In addition, modelling provided in the draft EIS[19] uses incomplete data (the draft EIS indicates that *there is a lack of understanding of the true geometry and extent of the river paleo-channel and alluvial deposits that run along the McArthur River valley and are*

[19] Xstrata Draft Environmental Impact Statement: Section 11.

in hydraulic connection with stream flow)[20] and therefore provides little assurance that downstream flow of sub-surface water in the dry season will be adequate to maintain quality of water in downstream refuge pools.

Impact on the Freshwater Sawfish (*Pristis microdon*)

This part of the review deals specifically with potential impacts on the freshwater sawfish, a matter that was not fully considered in the draft EIS.

The EIS correctly acknowledges that this fish is widespread in the north of Australia and occurs in some neighbouring tropical countries (Pogonoski et al, 2005). It is a large fish, normally attaining several metres in length (but reputed to grow up to 7m) and is highly prized in overseas markets. It has a high vulnerability to most forms of fishing, but especially net fishing, and with the increasing destruction of the riverine habitats where it is thought to breed it is rapidly becoming a rare fish, both within Australia and overseas.

Increasing concern about its conservation status has led to it being listed as "vulnerable" under the EPBC Act and as "endangered" on the IUCN Red List. Intense impacts affecting populations and habitats, and the extreme paucity of information related to life history has led to more recent calls to raise the Red Listing to "critically endangered" (World Conservation Union, 2005). The fact that no specimens of *Pristis microdon* were recorded in fauna surveys undertaken for this EIS should be a serious concern as the McArthur River has previously been considered an important site for this fish.

The draft EIS deals very poorly with potential for impacts of the planned operation on *Pristis microdon*. Several key issues have thus been identified and these need to be addressed:

- The conservation status of the sawfish should be a key factor driving the design, mitigation strategies and acceptability of the mining operation – yet it is not specifically described in the draft EIS as a key constraint to the design of the operation;

[20] Xstrata Draft Environmental Impact Statement: Section 11.8.2, pp 11-9 to 11-11

- The requirements for assessment and monitoring of this species should be a key driver for the design of the aquatic fauna monitoring system – yet this is not apparent in the EMP;
- Despite the focus of the draft EIS on ensuring unimpeded fish passage through the diverted watercourses, characteristics of sawfish life, including the breeding habitat, appear largely unknown and thus passage and habitat requirements around the planned mine are unknown.
- Drawdown of groundwater in the dry season may affect estuarine areas and river pool, and is thus likely to pose a major threat to survival of sawfish during the dry season. While the draft EIS deals with impacts upstream of the planned operation, the risk of likely impacts due to groundwater draw-down on water quality and flora and fauna of pools downstream of the operation needs a good deal more consideration.
- Little is known of distribution of the sawfish, its critical habitat requirements or critical water quality thresholds for its survival during the dry. The need to take a precautionary approach to mitigation of any possible impacts on both upstream and downstream water quality in dry season pools, and to monitoring the effectiveness of such design and mitigation arrangements has not been demonstrated in the draft EIS.

The draft EIS considers only passage and some upstream water quality issues and therefore fails to provide any realistic form of monitoring for the critical issues listed above. On these grounds alone, the draft EIS would appear to fail to meet both basic monitoring requirements and the need to adopt a highly precautionary approach for a species listed as "vulnerable" under the EPBC Act.

It is recommended that, to ensure that the diversion of the river results in no adverse effects on sawfish abundance and distribution both upstream and downstream of the minesite, the freshwater sawfish (*Pristis microdon*) should be the target of a well-designed and focussed survey, and assessment and monitoring programme.

Downstream impacts on river fauna.

This part of the review deals with impacts expected on other river fauna downstream of the mine, including species resident in and transient to the marine locations adjacent to Port McArthur.

The draft EIS details predictable impacts and mitigation measures planned to prevent these from being of an unacceptable level, albeit appearing to have been done a selective basis only. The risk of impact related to site release of surface water is not

properly addressed because the existing ecosystems of the McArthur River wetlands and freshwater reaches remain virtually undescribed – in direct contrast to the requirements of section 6 of the Guidelines.

Despite twelve years of operation, no data relating to metal concentrations in flora and fauna downstream of the mine is offered and no aquatic ecology survey sites downstream of the planned expansion are identified. A thorough search of available literature including numerous university databases has indicated a dearth of available information related to on-going studies of aquatic toxicology – and results from external studies performed (XStrata, 2003) have yet to be published.

Information is restricted to a study by dealing with seawater, sediments and biota in the Bing Bong area (Munksgaard and Parry, 2002; Munksgaard et al, 2003) and is thus not applicable to the freshwater environs of the McArthur River. While some baseline studies in the marine environment around Centre Island were completed (MIM, 1992), MRM has yet to present any firm evidence showing that this has developed into an on-going monitoring programme nor expanded into one that considers freshwater fauna.

Hence there is virtually no useful data upon which predictions about new or ongoing impacts can be established. This would seem to constitute a major failing of the EIS in the context of the highly valued river system and the wetlands at the mouth of the McArthur River. Absence of benchmarks or baselines relating to metal concentrations in riverine aquatic biota, either near the minesite or in the downstream wetlands ecosystems leaves Xstrata potential exposed to corporate risk, because this lack may be credibly used by third parties to infer post-commissioning impacts that had in fact previously existed or may be due to some other cause. It is therefore surprising that Xstrata has not considered this a priority in strategic planning and that such benchmarking or baseline information is not provided in the draft EIS.

The lack of a well designed metals monitoring system in river fauna and flora means that distribution of metals in the river system due to any accident or release cannot be reasonably assessed in terms of potential impact. This is extremely disappointing given that recommendations for such programmes were made during public discussion around the original EIS (Ward, 1993; CCNT 1992) and that world class

facilities for such work are available through ERISS in Darwin[21]. The technology and capacity is available within the Northern Territory to allow high quality cost-effective world class monitoring systems to be developed, yet there is little evidence of plans to deploy this scientific capacity to deal with the issues discussed within the draft EIS.

Accumulation of metals in aquatic foods

This part of the review deals with the possibility of bioaccumulation of toxic substances in aquatic fauna. It is possibly a significant consequence of downstream impacts mentioned above.

The McArthur River wetlands and freshwater reaches are commonly fished for recreational purposes. In addition, it is reasonable to assume that there is some subsistence fishing and collecting activities undertaken by indigenous communities and local residents of Borroloola and Bing Bong.

The river system appears naturally high in metals and thus it seems likely that not only sediments, but also many of the aquatic food species that live in the region would have somewhat elevated concentrations of metals. Even though it may not be an acute risk, resultant increased metal contamination in aquatic foods due to contamination from the planned expansion has not been considered in the draft EIS. Given these foods may be caught and consumed by the local population, it would seem incumbent upon Xstrata to develop a strategic approach to this issue and to have made an informed assessment of the potential risk to public health from their planned activities.

Failure to include any form of downstream monitoring of metals in aquatic foods is a strategic risk that Xstrata have accepted. However, in the context of accountability and transparency, monitoring of metals in the highest risk food species would appear to be a high priority aspect of the planned expansion. The lack of a detailed and appropriate programme for on-going monitoring of aquatic foods appears to be another crucial area of weakness inherent to this draft EIS.

[21] Environmental Research Institute of the Supervising Scientist.

Overfishing

The draft EIS does not consider 'Camp cook syndrome', which is the situation where workers from isolated outposts have the opportunity to consistently fish down key reaches of a river over a limited period of time. During the dry season fish are constrained to pools and if these are easily accessed on a regular basis, stocks become rapidly depleted. Where this occurs in remote areas, there is a propensity for highly destructive fishing methods (such as use of explosives, nets or poisons) to be used which could be detrimental to less resilient species of fish and possibly waterfowl.

Mechanisms to manage and mitigate such impacts have not been raised in the draft EIS as overfishing appears not to have been considered a risk to river ecology, particularly during construction phase when the population of the camp is expected to reach its maximum. It is recommended that Xstrata develop a series of control measures based on species permitted to be harvested with monitoring through series of random cheques and adequate penalties capable of being applied for infringements.

Coastal contamination and impacts

This part of the review deals with impacts at the mouth of the McArthur River, and along the coasts towards Port McArthur and Bing Bong harbour.

Potential contamination of the coast around Bing Bong is very poorly addressed and the standard of data presented is grossly inadequate and very poor in comparison to other sections of the draft EIS (such as the vegetation survey and impact assessments). Similarly, contamination at the mouth of the McArthur River and along the coast towards Port McArthur to the east has not been considered. From this paucity of quality information, it could easily be interpreted that there are serious issues concerning the Bing Bong and Port McArthur environments that Xstrata are not willing to discuss or present for proper public scrutiny.

The draft EIS implies that some spillage of concentrate and dusts occurs in the vicinity of the channel, the loading facility and the land-based storage facility[22] but there is insufficient data and evidence provided to allow the public to determine the amount of spillage or level of the risk – other than a statement to the effect that it is "*minimised by the material's moisture content of approximately 12%"*[23]. The basic information cited from key scientific references is highly limited, relating to some specific scientific interests in metal cycling in marine ecosystems in general, and the amount of substantiating evidence does not allow informed judgement on level of risk, hence it is unclear how it specifically relates to the main concerns expressed in the draft EIS.

Key information presented deals with sediments (Munksgaard and Parry, 2002) but is not closely relevant to the problem of assessing metals distribution in the Bing Bong locality. The study provides only basic details (covering 7 sites in less than 5m of water, sampled over four consecutive years) and cannot therefore be used as strong evidence of lack of contamination or impact, without support of other extensive research. Additionally, its principal objective was to examine background levels - and not the extent of contamination of the Bing Bong coastal area. Under these circumstances, site selection would comprise areas known to be removed from risk of contamination from anthropogenic sources, and subsequent low levels of metals at those sites should come as no surprise.

Analysis of metals in seawater and ephemeral species (e.g. seagrass) are not usually highly informative in assessment of long-term spatial distribution of metals in shallow marine ecosystems, but can provide invaluable information on ecological cycling and determination of risk specific to any given species. Significant assessments of coastal ecology of the Bing Bong – Port McArthur region also appear to be few (McKeown, 1987; Poiner et al, 1992; Marsh, undated), resulting in a situation where it is impossible to properly assess the impact that the existing mine has had on those regions and to make any reasonable predictions about what is likely to happen if the planned expansion occurs.

[22] Xstrata Draft Environmental Impact Statement: Section 3.5.2, p 3-6
[23] Xstrata Draft Environmental Impact Statement: Section 3.5.2, p 3-6

It is clear that the extent and effects of coastal contamination will need to be further assessed with detailed scientific studies aimed specifically at detection of metal contamination in coastal sediments and using evidence from sentinel species of fauna. It is recommended that any study be of sufficient spatial range to ensure that redistribution effects are taken into account and that it is based on a design of such rigour that adequately replicated sites and samples are collected to permit statistically robust analysis of metal distribution patterns. If this survey identifies spatial metal distributions leading to impacts of concern, specific monitoring procedures will be required for implementation in the EMP.

Environmental Management and Monitoring

Environmental Management systems proposed in the draft EIS[24] take a useful and commendable approach to establishing an overall structure – highlighting performance indicators, targets and corrective actions in relation to Xstrata's objectives. However, uncertainty related to movement of groundwater, possible loss of tailings or concentrate into the river during planned or unplanned releases, behaviour and habitat of the freshwater sawfish and loss of concentrate at Bing Bong have not been properly matched with the necessary monitoring systems.

It is therefore suggested that the following systems and improvements be put into place to guard against the occurrence of currently undetected impacts:

- Biological Monitoring
    a) A programme to monitor the abundance and distribution of the freshwater sawfish throughout upstream, downstream and estuarine reaches of the river, including the diversion channel.
    b) A programme to monitor passage of fish using a time-space gradient design. Measurement should be performed prior to construction, at the end of construction (but prior to diversion of the river) and annually thereafter for a minimum of five years.
    c) Redesign of the programme for sampling of aquatic biota to ensure that a balance of sampling from upstream and downstream of the diverted river is achieved.

[24] Xstrata Draft Environmental Impact Statement: Section 22.

- Metals contamination of the river

  A monitoring programme for sentinel accumulators in the river should be established to assess the availability and potential impacts of metals in the river and estuary that may have been derived from the operation. This is the most basic of assurance programmes and it is inconceivable that a mining operation of this magnitude on such a sensitive river system would not already have this safeguard in place.

- Metals in aquatic foods

  a) Baseline metals in aquatic foods from the river and estuary should be established (or re-established) as a matter of urgency with respect to established standards for human consumption.

  b) A programme aimed at routine monitoring of a representative selection of high-risk species should be established to produce a profile of metal exposure to human consumers, and provide assurance that recreational and subsistence harvested foods are maintained within safe health limits.

     This could include a profile of consumption patterns as well as a survey of metals present in the species consumed. This would enable design of a focused monitoring system designed to detect increases in levels of metals that may be derived from the expanded operation.

- Contamination of coastal regions

  a) A scientifically robust survey for assessment of metals contamination near the Bing Bong facility should be developed, followed by a series of seasonal surveys to ensure that metal levels (and especially lead and the highly mobile zinc) are maintained within key biological indicators and sediments at environmentally acceptable levels.

  b) A similar programme for assessment of metals contamination near Port McArthur and the wetlands should be developed.

- Surface Water Monitoring

  a) The existing monitoring system is too restricted and the proposed expanded monitoring is not expansive enough. Inclusion of trigger values for other toxic chemical species of concern such as As and Cd has not been considered, despite these chemical species having been identified within the EIS as major contaminants within both the Tailings Storage Facility and the Overburden Emplacement Facilities[25].

  b) The frequency of monitoring is insufficient and needs to be increased. Grab samples are not representative of total flow of material from the minesite and consideration needs to be given to use of on-line and continuous monitoring systems for gross chemical parameters such as pH and electrical conductivity

[25] Xstrata Draft Environmental Impact Statement: Section 12; Tables 7.3 (p 7-5) and 7.6 (p 7-17)

c) Existing sampling site S6 is in a position that will be bypassed by run-off from the spillways at the eastern edge of the Northern Overburden Emplacement Facility. Its current location would also preclude capture of impacts emanating from seepage at its northern edge that may transport into the un-named creek system to the north.

d) The total number of sampling points used (SW6 and SW7) and the frequency at which samples are collected (monthly when there is flow) cannot be considered to be representative of the full extent of impact from existing operations, let alone operations under the planned expansion.

Impacts on Terrestrial Environment.

This part of the review deals with potential impacts on the terrestrial environment, including flora and fauna. Vegetation surveys appear to have been a strong point of the draft EIS and have generally been well performed. It is however unfortunate that valuable information that may have been obtained from a study of bioavailability and heavy metal tolerance to flora and fauna has not been included to supplement existing data (ACMER, 2004).

The single most important terrestrial impacts related to the proposed extended operation arise from deposition of aerial transported dusts from around the Tailings Storage Facility is poorly addressed in the EIS. Dust generated from dried tailings should be considered highly toxic because of high concentrations of As, Mn, Pb and Zn and represents a serious risk in the short to medium-term, particularly while the processing plant is in operation.

The extremely fine grain size of this material has the potential to exacerbate toxicological effects as the extremely fine particulate size (<7µm) allows for easy distribution through the environment and inhalation into the lungs. The engineering solution proposed in the EIS appears to be inadequate because, while the management strategy includes "*maintaining a minimum moisture condition to inhibit formation of oxidation products from drying tailings beaches and to prevent dust generation*"[26], such fine control over moisture in a drying solid is difficult to practically achieve. The more realistic and perhaps satisfactory option – maintenance of a water layer

[26] Xstrata Draft Environmental Impact Statement: Section 7.4.2, p 7-21

across the tailings surface – has been precluded by the same strategy that indicates "*water will not be stored across the tailings surface*"[27].

Biodiversity Offsets

The draft EIS suggests that biodiversity offsets could be used as a means of allowing sacrifice of one area of high biodiversity to protect another. Although this may be an initiative worthy of further exploration, and an important opportunity to engage with Xstrata about the possible benefits to be derived, the EIS is unclear as to how these would be delivered or what is needed to bring them to fruition.

A superficial assessment of the McArthur River wetlands option indicates that there is little direct benefit to be gained for biodiversity or for community benefit. However, further details need to be provided before it is possible to begin to understand what might be achievable for both biodiversity and for resource users.

Transparency and accountability

This part of the review deals with the public perception of Xstrata's credibility as a responsible environmental manager. It is largely interpretive and draws upon observations made from the entire content of the draft EIS, and wider reporting of environmental performance.

The draft EIS contains several areas where the approach to community involvement, transparency accountability and environmental responsibility are being highlighted as key features of Xstrata's approach to responsible environmental management. However, it is painfully evident that there are instances where these principles have not been effectively applied.

Important features of a transparent and accountable approach to environmental management are the availability and public access to data upon which management decisions are made, and the suitable involvement of stakeholders in the decision making process. Neither of these are in evidence in relation to coastal impacts, wetland impacts or general surface and groundwater monitoring discussed in the draft

[27] Xstrata Draft Environmental Impact Statement: Section 7.4.2, p 7-21

EIS. Similarly, information relating to overall environmental performance and incidents during the course of the past twelve years has been reduced to little more than anecdotes, summary statistics and references made during Parliamentary discussion.

Failure to provide public access to scientifically credible data relating to marine impacts at Bing Bong, Port McArthur and the wetlands at the McArthur River mouth and failure to provide access to data related to downstream metal contamination and impacts is suggestive of lack of transparency. Failure to produce or procure such information could just as easily be considered to be an act of negligence or of accountability. Either way, failure to provide this information in an Environmental Impact Statement does nothing to improve the credibility of Xstrata's environmental management systems in the public arena and may lead to adoption of an ultra-cautious approach when weighing the available evidence.

Data and evidence used to support a number of scientific assertions raised within the EIS are limited and derived from student projects at the Northern Territory University, or date back to the 1990's and the 1970's in some instances. It is considered here that student projects do not constitute a suitable substitute for properly planned and executed research that is focussed on key impact issues and questions. The apparent willingness of Xstrata to relegate important issues to student project status suggests a lack of genuine commitment to assessment of risks and issues associated with existing and planned operations.

Monitoring of suitable organisms (e.g. freshwater mussels) if conducted in a comprehensive and thoroughly designed programme would provide clear and unequivocal assurance to the public, regulatory authorities and downstream users that the management systems were effectual in controlling impacts at the site and thus protecting the values and uses of river resources downstream of the mine.

Fish kills during 2003 have been blamed upon release of contaminated water from the minesite. Anecdotes surrounding release of water from the mine, along with suggestions of discharge of supposedly contained toxic wash down waters into the Gulf of Carpentaria at Bing Bong exist. Even though there may be no hard evidence to support these anecdotes, they can create a perception amongst the local community

that the company is not responsible with respect to environmental management. The situation becomes all the more confused when critical information is omitted from the EIS, or when releases from the plant occur without any reference to stakeholders.

It has been observed that, "*operators such as McArthur River Mine have been impossible to get information from or to work with*" (National Oceans Office, 2003) – and one must question why. The onus should now be upon McArthur River Mines and its parent company Xstrata to rectify this situation if it wishes to succeed with this project and it would seem that the easiest and most responsible way of dealing with these problems would be to adopt a system that fully embraces stakeholders within the environmental management process.

Conclusions

While many of the engineering aspects of the proposed open cut expansion have been adequately considered in terms of environmental attributes, assessment of risks and mitigation of those risks, a number of flaws and weaknesses remain evident in the draft EIS.

These weaknesses are particularly evident in the following areas:

- Assessment, prediction and mitigation of risks to the freshwater sawfish;
- Assessment, prediction and mitigation of risks to the aquatic fauna of the downstream and estuarine reaches of the river system – and particularly the wetlands at Port McArthur;
- Assessment, prediction and mitigation of risks from the spillage and loss of concentrate at the coastal loading and transport facility;
- Assessment, prediction and mitigation of risks from accumulation of metals in aquatic foods that may be taken for human consumption;
- Assessment of long-term stability of proposed landforms that contain hazardous chemical species; and
- Provision of a surface water monitoring programme that is satisfactory both in terms of frequency of sampling, and breadth and scope of analytes measured.

The principle flaw with the draft EIS is its failure to provide adequate scientific information required for baseline measures and to address certain assumptions and claims that have been made. As a consequence, it has been difficult to conduct a full appraisal of the environmental impacts that could be expected from the extended

project. This lack of information appears to be inconsistent with any form of best practice and could be interpreted as a breach of transparency and accountability – matters which should reflect the main tenets of Xstrata's business principles: "*that success is possible only through genuine partnerships with our stakeholders, which are characterised by integrity, cooperation, transparency and mutual value creation*" (Xstrata, 2004). Clearly, this flaw needs to be more fully addressed in the supplement to the draft EIS.

Recommendations

In light of this review of McArthur River Mining's draft EIS, the following general recommendations are made to the Northern Territory Government and mines regulators. Specific requirements proposed to meet these recommendations have been discussed more fully in the preceding text of this document.

1. Issues relating to sawfish and aquatic fauna are of extreme importance and represent critical weaknesses in the draft EIS. It is therefore considered that development consent should be withheld until they are fully resolved.

2. Issues relating to a number of listed avian species have not been considered. It is therefore considered that development consent should be withheld until they have been fully addressed.

3. The remaining issues are matters for environmental management, but development consent should be withheld until appropriate programmes and strategies have been designed, agreed to between all stakeholders and implemented as part of the EMP.

4. Issues surrounding transparency and accountability to stakeholders (especially those downstream of the minesite) need to be significantly improved. A system similar to that applied to the Alligator Rivers Region would go a long way to creating public perception of Xstrata as a credible and responsible environmental manager, and should be implemented prior to construction, or immediately upon commencement of construction of the proposed development.

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Appendix A.14

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November 1, 2005

Att. Rod Johnson

I would like to provide the attached submission in regard to the Draft Environmental Impact Statement August 2005 for the Mc Arthur River Mine Open Cut Project.

I appreciate this opportunity to comment on the Draft EIS

Cheerio

David Farlam

Summary of Executive Summary 7.

ES7
Concern that the viability of mine is subject to annual or market assessment when this is a large project and involves the creation of a new river channel. The mine should be able to demonstrate how viable it will be.

The current tailings facility is not adequate and is leaking into the Surprise Creek. Although a geo polymer has been used to stabilize the leakage it is yet to be seen that it will be successful in the longer term. The new tailings dam walls have not been engineered to satisfactorily prevent leakage.

Waste rock to be stored in the new OEF, contains oxides of various minerals including cadmium. The OEF will be left exposed and run off could leach into the Mc Arthur river on the surface and via the ground water as this stock pile is so close to Barney and Surprise Creeks and the Mc Arthur River, this is particularly so during a flood event, as during a flood river water backs up into and settles in this area.. The OEF should be located as far away from water courses and ground water as possible

At the moment only 90% of zinc and 70% of the lead can be recovered by the mines current operation. As there is a risk of this material leaking from the tailings dam, the mine should be extracting 99% of all lead, zinc and other minerals that are processed or storing them in a manner that prevents leakage and allows for future processing. The market value of lead should not determine how the lead is treated or stored.

Summary of section 2 Objectives and Benefits

2-2
MRM currently only produces 10% of Australia's production of zinc concentrate.
2-3
The underground mine should have had a life of 25 years but only ran for 10 years. As the proposed open cut viability will vary, can it really be expected to last 25 years. MRM should be able to adequately demonstrate the economic viability of the mine, as the proposed mine expansion has significant environmental impacts. The EIS suggests the mine could close if the strip rates are too high, the quality of the ore is low or the price of zinc falls, MRM should present this information before diverting a major river.
2-5
The mine does not currently monitor heavy metals and other minerals in fresh water crustaceans and molluscs .The 1992 EIS for the original mine in table 11.1,safeguards, stated that" a survey of the aquatic biology in the vicinity of the mine site is planned to provide an adequate base line. This is of extreme concern as these species are very good indicators of change and they are utilized by Aboriginal people and fishermen.

Summary section 3 Existing Operations

3-6-5
The current practice of depositing dredged material off shore is not sustainable. The dredged material slowly washes back into the water. All dredged material should be deposited on shore at the DSE.

Summary section 4 Proposed Open Cut Operations

4-2-3
The current test pit bund wall is made from various materials from the pit. The majority of these materials contain oxides of minerals that have the capacity to leach into the river system and ground water. The proposed bund wall for the open cut will be made of the same materials.
The test pit wall is currently lower than a 1:500 year flood interval.

4-6-3
The proposed bund wall will be made from material from the open cut. Zone 3 material will contain oxides of minerals inc. cadmium, during the wet season and flood events this material will leach and be eroded into the river system and ground water.

The 1m thick layer of durable rock material to be placed as the final layer on the bund wall is likely to cause more erosion than prevent erosion, by creating greater turbidity around the rocks.

I have interpreted from this section that the mine may add material to the bund wall at any time after construction. The wall should not be used as a dump for waste rock.

Summary of section 6 Alternatives

6-6
All the proposed/alternative waste rock OEF's are to close to water courses.

6-12
The MRM should be able to give a definitive indication of the environmental impacts of the pit at the end of the mining operations.

Summary of section7 Waste Management

7-2-3

The expected metal concentrations in the overburden/waste rock are likely to be higher than the environmental standards. This material, primarily the PAF oxidizes rapidly when exposed to the air and sunlight, as can be seen from the recent core samples from the test pit. The OEF will be left exposed during the mine life for extensive periods, there is a great risk this material will leach into the river system and ground water. The EIS does not adequately describe the how much PAF material is expected to be exposed and whether there is enough NAF material to cover the PAF and at what intervals the PAF material will be covered over with the NAF material. Water naturally backs up into this area and settles there during a flood event.

7-3-4
The current tailings facility is not adequate and is leaking into the Surprise Creek. Although a geopolymer has been used to stabilize the leakage it is yet to be seen that it

will be successful in the longer term. The new tailings dam walls have not been engineered to satisfactorily prevent leakage and are constructed with contaminated rock.

Summary of section 12 Surface Water

12-6-3
The typical river cross sections do not truly represent the existing river channel in a flood situation. The construction of a new channel needs to consider the local drainage into the channel either side of the channel along its length.

The flood out area extends up to 2km either side of the main channel, in the existing river channels the topography gently slopes in towards the main channels. This has not been replicated in the modeling.

Creation of a new river channel will result in new areas of alluvial soils and newly built up material, being eroded during flood events, increasing the sediment load in the river. Downstream, particularly below the Burketown Crossing and King Ash Bay, the river becomes wider and shallower. These slow moving sections of the river is where the increased sediment load will be deposited.
12-10-2
The stream flow predictions for the realigned channel indicate, that in the event of a 2 year flood event there will be increased erosion. There will be on going erosion each year there is higher flood flow. Even if these flows are the same or less than flow rates in other sections of the river, there will be greater sediment load from this 5.4km section of realigned channel.

The report does not take into consideration the topography either side of the new channel and its likely effect on stream flow and erosion. I find it hard to believe that a bull can be compared to a bulldozer in their comparative effect on disturbing the soil that leads to erosion, 12-39. Although the EIS states the new river channel will be rehabilitated with local native plants. They will take a minimum of 5 years of growth before they are able to stabilize the soil and reduce erosion during a flood event.

Summary of section 16 Community Consultation

16-2
There has not been adequate consultation with the Traditional Owners and other affected Aboriginal people in relation to the change in operation from underground to open cut. Aboriginal people who rely on the Mc Arthur River and the coastal margins for food and water have been concerned about the impacts on the environment from the MRM current operations.

Aboriginal people have taken it for granted they can drink the water and eat the food directly from the river. MRM has not presented the EIS to the community in a form that they can understand.