



FAILED AGAIN!

Revised McArthur River mine plan fails Minister's 9 point test

In March 2006 Europe-based mining company Xstrata failed to get approval for its proposed mine expansion at McArthur River. Mines Minister Vatskalis rejected the plan (EIS), citing NINE major environmental areas of concern that the company needed to address in any revised proposal. These nine areas were documented in his media release of 20 March 2006 (and are listed below).

A revised McArthur River mine expansion plan was submitted by Xstrata in July 2006 in the form of a 'Public Environment Review' (PER) report.

In August 2006 the EPA released its assessment of the PER: 'EPA Assessment Report 54'. This EPA report, including its Appendices, shows that Xstrata has FAILED the '9 point environment test' set by Mines Minister Vatskalis and accordingly cannot be given mining approval.

On Friday 13 October new Mines Minister Chris Natt 'approved' the mine expansion – in spite of all the evidence that it will be an environmental disaster.

1. The proposed realignment of McArthur River and Barney and Surprise Creeks.

EPA findings August 2006 (EPA Assessment Report 54):

"Approximately 5 km of the natural riverine (riparian) vegetation along both banks of the McArthur River will be removed and a diversion channel created. **This will create a barrier to movement of wildlife and a highly visible scar on the landscape. There is a significant risk that it will not be possible to re-vegetate the diversion to mitigate these effects.**" (EPA Assessment Report 54, p. 18)

"The proposed development will destroy about 6.5 km of a largely intact natural river system (McArthur River and Barney Creek), with **consequential direct substantial impact on the aquatic biota** in that area, and potential consequential impacts **more broadly across the river system** because of loss of or reduction in the natural dispersal routes required by many aquatic species...The proposal aims to ameliorate these impacts through creation of a replacement diversion channel that has features comparable to that of the natural system. **There are no close precedents for this substitution, and the proponents have not trialled examples of the methodology.** [EPA p.25]

"The banks of the diversion channel will be rock-lined to control erosion until protective riparian vegetation can be established. This re-establishment is predicted to take **more than 10 years**...Immediately following construction, **sediment plumes will be heavy downstream of the diversion channel.** First flush flows and bank-full events will send large quantities of unsecured topsoil, construction mud and silt downstream, **as well as any contaminants exposed from freshly mined fascia rocks.** Low stream volumes early in the first wet season will concentrate first-flow contaminants, **adding stress to downstream ecosystems.** Heavy erosion is likely of topsoil superficially applied to the rocky embankments, and **bank-full floodwaters will threaten newly planted seedlings above the diversion channel and wash away unsecured seeds.**" [EPA p. 21]

"The modified designs for the diversion channels **should** be stable but would need to be monitored at least annually until riparian vegetation is re-established. The EPA Program is

satisfied that the design modifications provided **should** be sufficient to provide for **relatively** stable realigned channel for the McArthur River." [EPA p.21]

"The PER acknowledges that there may be some formidable obstacles with the development of riparian vegetation alongside the diversion channel, with particular problems due to floodscouring of inadequately rooted plants and difficulty of plants developing root systems in rocky locations...The rehabilitation plan for the diversion channel provided in Appendix I of the PER indicates that the anticipated growth rate of plants of 1 metre per year is '**unsubstantiated**' and **the percentage that survive following a wet season is 'in the lap of the gods'**. (EPA p. 23)

2. The performance and long term management of the Tailings Storage Facility (TSF) (including post mine closure).

EPA findings August 2006:

Tailings Storage Facility: Summary

"In the context of seepage issues, it is concluded that the TSF design is **inappropriate and should be revisited** for the following reasons:

- the impacts of current seepage from the existing TSF are not fully understood and the legacy issues related to this seepage (future impacts to receiving waters) have not been modelled;
- there has **not been an assessment of alternative, more appropriate TSF sites** that would not contain permeable alluvial soils, that in turn would limit seepage from the TSF and hence reduce environmental risk;
- based on available guidelines, it seems unlikely that the TSF design **would be approved in Queensland or Victoria**;
- during the period of mine operations, contaminated groundwater from the seepage recovery bores may be pumped back to the TSF in the dry season. This could cause a **long-term deterioration of seepage water quality**, thus extending the time for seepage recovery; and
- post-closure, the TSF would **not be self-sustainable** and therefore does not meet ANCOLD (1999) guidelines." [EPA p. 32]

"Concerns have continued to be raised regarding seepage and impacts upon river and groundwater systems from the TSF both within the mine's life, and in the long and very long term. **To date the TSF has expressed high sulfate seepage into Surprise Creek and created an estimated groundwater plume 400m to 2.5km long, moving toward the McArthur River and underground workings.**

"There is a **significant risk that contaminated seepage from mining and milling operations will enter regional ground water**. The approach proposed by the company relies on **reactive rather than preventative** management strategies. This is **not considered to be industry best practice and there is an increased risk of contaminants reaching the river.**" [EPA p.18]

TSF Location:

"**No assessment was presented in the EIS/PER of alternative, more appropriate TSF sites that would not contain permeable alluvial soils, that in turn would limit seepage from the TSF and hence reduce environmental risk.** This issue was subsequently addressed in further information provided at the request of the Minister. **The existing TSF is located close to Surprise Creek and contains tailings placed in direct contact with highly permeable soils, encouraging direct seepage into groundwater aquifers.** According to the Draft EIS, '*Groundwater can occur in open vugs or solution channels, fractures, joints and faults within the fresh bedrock.*' Aquifers are known to exist within the underlying dolomitic siltstone rocks. It is proposed to locate the tailings facility for the expanded operation adjacent to the existing cell. Further information provided in URS (2006c) analysed the flood risk of the proposed location as having a ground level close to the Q50 flood level, with the TSF embankment crest significantly higher than the Q500 flood level. Soils were considered to be similarly porous at other alternative locations, **although serious analysis of alternative locations was not presented.**" [EPA p.31]

"The designs of both the existing and proposed TSF contain **no seepage limiting /containment layer beneath the facility**, to create higher tailings consolidation and densities. This permits a smaller footprint, higher tailings structure to be built, and **reduces initial capital and ongoing construction costs**. However, **the approach permits much greater seepage from the tailings to underlying aquifers and hence groundwater contamination...**The lack of a seepage limiting layer **minimises initial capital costs** but **maximises post-closure operational costs, where liability for costs and risk is more likely to be borne by the NT government. This is not considered 'best practice' and does not meet ANCOLD (1999) guidelines relating to integrated life-cycle management of tailings-storage facilities, nor would meet standards of Victoria or Queensland.**" [EPA p. 29]

"The PER indicates that there is a **plume of contaminated water extending from the existing TSF, however its full extent has not yet been measured**. The PER indicates an easterly flow of groundwater from high elevations near the TSF (up to RL 42 m) to lower elevations near the McArthur River (down to RL 20 m). The draft EIS describes groundwater quality with salinity levels and sulfate concentrations **greater than those recommended in relevant ANZECC (2000) guidelines. Some metal concentrations (Cd, Cu, Fe, Mn, Pb and Zn) in seepage/groundwater were stated as greater than ANZECC (2000) water quality guidelines criteria for fresh water ecosystems**. According to URS (2006), groundwater quality data indicate that the pH of groundwater at the existing TSF is near neutral." [EPA p.29/30]

"Predictions of seepage recovery **vary significantly** from the draft EIS to the additional information provided by the proponent (URS (2006). For example the draft EIS predicts a total pumping rate of 200kL/day over **30 years or more**. The PER predicts total abstraction of 1,980 kL/day during mine operations and 390 kL/day after 10 years. The additional information suggests 1,846 kL/day during the period of mine operations, 745 kL/day after 5 to 10 yrs and 548 kL/day for 10 to 25 yrs post operation.

"**This uncertainty makes it impossible to predict the actual life of recovery bore system beyond the end of mining operations**. This is further exacerbated by the 'worst case' scenario modelling undertaken for the purposes of the PER which indicate that seepage rates are lower and the time taken to lower the head of water within the TSF is increased. Therefore the period for operating the recovery bores is longer. The basis upon which pumping is ceased (post-operations) is not clear. [EPA p. 30]

"It is stated in the PER that if there is insufficient capacity in the dam (for storage of water pumped from seepage recovery bores) that seepage water will be spread as low rate irrigation over the TSF active cell during dry weather, at rates that do not result in runoff or ponding. This could result in a salt build up at the surface of the tailings as a result of evaporation, which will be leached into the tailings mass each wet season. **It is therefore likely that the water quality of seepage passing through the base of the tailings dam will deteriorate over time**. Alternatively in the dry season contaminated groundwater from the seepage recovery bores may be pumped back to the TSF. **This could cause long-term deterioration of seepage water quality by accumulating salts.**" [EPA p.30]

"**Long-term seepage recovery (post closure) means that the MRM site is left with a significant environmental liability at the time of closure. In the event that MRM withdrew from the site at this time, the Northern Territory Government would need to utilise available funds held in trust on behalf of MRM or other funds to manage a liability over a period of 30 to 50 years.**"

"According to Qld EPA (1995) in MCMPR/MCA (2003), there are a number of objectives that need to be considered when planning the final land form of a tailings storage facility. These include '*containing/encapsulating tailings to prevent leaching into ground and surface waters*' and '*designing the closure to minimise post-closure maintenance*'. The design of the TSF, including cover design, indicate that the tailings **are neither contained or encapsulated to prevent leaching into groundwater and post-closure seepage recovery requirements is indicative of substantial post-closure maintenance...The risks, both economic and**

environmental, of the future operation of this recovery bore system post mine closure would be borne by the Northern Territory Government in the event that the company or its successor was unable or unwilling to adequately maintain the recovery bore system.” [EPA p. 31]

3. Location and management of the Overburden Emplacement Facility (OEF).

EPA findings August 2006 (EPA Assessment Report 54):

“Concern exists that the OEF which is close to the Barney Ck diversion and the McArthur River and up gradient of the groundwater flow, may contribute contaminants from PAF/NAF drainage to groundwater aquifers expressing into the river system...While the proposed OEF is designed to capture lateral seepage, concerns exist that the OEF is not engineered to a conservative level to reduce seepage escape and contaminants through the floor of the repository.” [EPA p. 37]

“Concerns were raised during both the EIS and PER processes regarding placement of the OEF **in a drainage line, and flood plain, where regular wet season inundation of 5m depth occurs** (draft EIS 12.3.2). **The location in the floodplain increases the potential for contaminated water (acid and non-acid rock drainage) to enter Barney Creek and the McArthur River particularly during recessional flows after flood events.** This means there needs to be a greater emphasis placed on the characterisation of waste material, OEF design and management of discharge...

“Except for the clay lined PAF cell, the design of the OEF would not prevent infiltration by floodwaters. No clay is incorporated into outer walls of the OEF. Runoff and infiltration is directed through the pile itself to drain at ground level directly downhill or along the OEF fringes to the PAF pond in the west, or to the sediment ponds on the southern corner. **Floodwaters appear to have the potential to inundate the base of the OEF, in particular the southern corner, including the NAF sediment ponds. Receding floodwaters would mobilize sediments and contaminants from within the first lift of the OEF, back to the river.**” [EPA p.27]

Leachate Management

“Concern exists that the full potential for the generation of acid leachate has not been taken into account and therefore management measures proposed may not be sufficient...Case studies exist from Australia where waste rock dumps with high theoretical net acid neutralising capability have become sources of acid mine drainage **due to the actual kinetics of the reaction not conforming with the simple acid production versus consumption calculation** (TEAM NT (2004)).[EPA p.27]

Summary of findings

“There is concern about the proponent’s use of reactive management techniques for dealing with potential acid drainage from waste rock. The proponent’s management approach involves the collection of seepage and disposal to the tailings dam, rather than isolation and encapsulation of all problematic material including NAF material...By relying on seepage management and monitoring techniques the final closure of the waste dump may be uncertain or problematic as active intervention may still be required as part of the closure options.” [EPA p.28]

4. The potential for reduced water quality in the McArthur River.

EPA findings August 2006 (EPA Assessment Report 54):

“While the hardness-modified trigger values used by MRM for freshwater in Appendix C are appropriate, **the use of livestock water quality values for determining trigger values for runoff derived from NAF and PAF materials is questionable and the rationale behind their use has not been explained.** Controls based on trigger values derived from livestock guidelines would permit the company to **release excessive amounts and loads of water-soluble contaminants into the McArthur River...**Permitting the use of livestock standards for derivation of trigger values would be inconsistent with the declared beneficial

use of 'aquatic ecosystem protection' for the environment downstream of the MRM and would possibly result in the company **breaching the Water Act.**" [EPA p.34]

"Monitoring programs are proposed in the PER for discharges from the OEF NAF, TSF embankment and flood bund sediment dams. Contingency management responses have been proposed for breaches of pre-determined water quality thresholds of the OEF sediment pond (s2.3.7). The EPA Program notes that monitoring is proposed of discharges from the sediment ponds on the flood bund and TSF (for 2 years), but the PER does not mention these contingencies being linked to further management contingencies if thresholds are exceeded." [EPA p.34]

"The PER guidelines required the proponent to address contaminated water from the pit being returned to the river and any of the potential impacts on aquatic ecosystems. **However these issues were not further discussed in the PER...Water quality issues associated with release of water from the pit remain unresolved.**" [EPA p.35]

"The ability to increase the capacity of the water management dam is unlikely to be available **at the time it is required** resulting in **additional contaminant loads to Barney Creek and subsequently to the McArthur River. Alternatives to this reactive approach need to be examined.** [EPA p.36]

"Concern exists that the OEF which is close to the Barney Ck diversion and the McArthur River and up gradient of the groundwater flow, **may contribute contaminants to groundwater aquifers expressing into the river system...**While the proposed OEF is designed to capture lateral seepage, concerns exist that the OEF is not engineered to a conservative level to reduce seepage escape and contaminants through the floor of the repository." [EPA p. 37]

"It is of some concern that the PER (s8.5) presented sediment monitoring data in graphical form relative to inappropriately high trigger thresholds that do not represent values for protection of aquatic ecosystems. The proponent used as a trigger Interim Sediment Quality Guidelines-High, (ISQG-High) thresholds, which represent a recognised concentration threshold above which effects would be expected to frequently occur in aquatic ecosystems rather than ISQG-Low thresholds which represent concentrations below which biological effects would possibly occur.

5. Uncertainty of mine pit closure.

EPA findings August 2006 (EPA Assessment Report 54):

The closure plan for the existing operation requires that the overburden be returned to the 'test pit'. The costs and benefits of opting for a similar closure strategy for the open cut operation were briefly analysed in the PER, but did not fully examine the environmental costs and benefits of this option.

"Comments received predicted a delayed pollution pulse from the TSF to the groundwater after the recovery bores cease operation. Once pumping ceases, the water content of the tailings is predicted to build due to infiltration and eventually contact a raised hydraulic head, caused by the mass of the TSF. The first post-pumping contact of water within the tailings facility with the hydraulic head **is predicted to transmit the high level of accumulated reactants, and resume contamination of groundwater aquifers.**

"Limited detail has been provided of rehabilitation plans for the completed OEF. The rehabilitation is proposed to be progressive, as sections reach their fill capacities. Outer exposed layers of NAF rock are to be layered into terraces/rises and contoured to disperse drainage yet minimise erosive flows. The contoured surface is to be covered by a 'nominal' 50cm of topsoil and oversown with grasses, while sloped embankment walls will be left exposed. A post rehabilitation monitoring plan is planned to address any developing erosion sites.

"Concerns exist that if the seepage/runoff from the OEF NAF section is found to be acidic or contaminating, then the proposed 0.5m topsoil cap would need to be redesigned. The current

design allows significant water infiltration and would perpetuate seepage. Concern exists as to whether the proposed 0.5m thick topsoil cap could support vegetation any more substantial than seasonal grasses and weeds, before washing away.

Security

Current Northern Territory Government policy requires mining companies to lodge a security equivalent to 100% of the estimated cost of rehabilitating their disturbance. The calculations underpinning these estimations focus on remediation of physical disturbance.

The MRM operation is situated in the immediate flood plain of a major river and relatively close to a thriving estuarine environment which supports a range of fishing and other food gathering activities. Contaminants have a relatively short pathway from the mining operation to the river and downstream environments. The security held by Government for the underground and test pit operations does not take into account potential remediation associated with seepage from the existing tailings storage facility – the company is currently actively working to address this problem.

Similar arrangements have not been proposed for the MRM expansion. In the event that the company or its successors are unable or unwilling to fix a problem, there is the potential for long term liability for environmental issues being shifted to Government. Security for any expanded activities should take these risks into account in setting the amount.

6. The performance of the proposed flood protection bund.

EPA findings August 2006 (EPA Assessment Report 54):

“The bund has been designed to include an emergency overflow section which, if overtopping occurs, would erode a 250m wide area into the open cut, as this will be the lowest point in the interior of the bund. The open cut will then become filled with floodwater. As the floodwaters recede, the outflow through the breach will be at a much slower rate than the inflow, and the resistant base and sides to the breach will minimise further erosion. Water levels in the open cut will drop until the top of the eroded breach is reached. Should erosion of breach materials occur during the outflow, the proponent anticipates that they will be deposited near the outside of the breach, as the breach is located in a relatively quiet backwater of the bund, away from the main flow paths. The proponent does not anticipate that this relatively small volume of material would cause any more contamination of the aquatic environment of the McArthur River than would normally be expected in a flood event with a recurrence interval in excess of 500 years. These assumptions would require ongoing monitoring to determine whether or not the bund is behaving as predicted or whether other erosion controls are required. **As the proponent did not consider that significant sedimentation or contamination of the river environment would occur from a bund breach, no discussion was offered regarding impacts or contingencies to mitigate impacts.**” [EPA p.35]

7. Community consultation methods.

EPA findings August 2006 (EPA Assessment Report 54):

“The proponent has failed to capitalise on the opportunity that exists when working within a community where a cooperative relationship based on trust is established. MRM have operated at Borroloola for over 10 years and there appears to be little trust within some parts of the local community. An opportunity was presented to start working with a component of the community through respecting and using the communication channel presented by the BTOG. However the proponent put in place its own CRG of which the key operative element is information provision, rather than true consultation.”

“Xstrata has not presented a social impact analysis, assessment or plan in either the EIS or the PER, even though the PER states that a key activity of the MRM Community Relations Team (none of which are identified members of the CRG) is the development of social impact management plans – *‘detailed plans of impact of the mine and its community (employees,*

contractors, movement of products etc) in or on the local community and actions to minimize or mitigate the potential impacts.”

Conclusions

“• the Indigenous population of Borroloola **remains strongly opposed to the river diversion**, even if they favour the continuation of mining, despite commitments by the company to invest in community infrastructure.”

8. The potential for impact on freshwater sawfish populations (listed as vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999).

EPA findings August 2006 (EPA Assessment Report 54):

“However, the 2006 survey confirms that freshwater sawfish at least transit through the proposed project area. This transit, to upstream dry season refugial pools, **may be necessary for the long-term maintenance of the local population of sawfish in the McArthur River, and hence it is important that the proposed development does not result in impedance of this movement...**[T]here remains some uncertainty about the extent to which the designed rock riffles at the upstream portion of the diversion channel may act as a barrier to sawfish dispersal; and some uncertainty about the feasibility and timing of construction of a suitable diversion channel relative to the proposed timing of severing of the natural river channel. It is difficult to be more precise in the assessment of dispersal patterns, and the likelihood that development will affect these patterns, because **there has been no baseline study of dispersal of freshwater sawfish in this river system. This is a notable limitation in the material presented.**

“**Other aspects of the proposed development pose risks to this local population of freshwater sawfish.** The PER notes that aquifer drawdown will reduce the volume of water maintained in Djirrinmini Waterhole, particularly during the late dry season. The PER asserts that this waterhole is suboptimal as a dry season refuge for freshwater sawfish, **but this assessment is based largely on a single wet season sampling**, supported by generalisations about its presumed resource requirements. The proposed development will reduce habitat quality at this site, one of the few persistent pools in the mid- to upper-reaches of the McArthur River. The PER also notes that the lower McArthur River (notably the estuarine delta) may support more substantial populations of freshwater sawfish, at least during some times of year. There may be some risks to this potentially important population associated with either catastrophic release of contaminants from the mine or low-level chronic reductions in water quality. **The 2006 survey does not represent a particularly comprehensive nor substantial baseline for the ongoing assessment of impacts upon freshwater sawfish; and does not provide any detail on dispersal patterns.**

“The limited survey data demonstrate that the freshwater sawfish currently disperses (presumably as an essential component of its life history) along the McArthur River through the project area. Characteristics of this dispersal pattern remain unknown. **There is substantial risk that this dispersal will be detrimentally affected by the proposed development.**

9. Impacts on groundwater (and subsequent impact to the river, including the Djirrinmini Waterhole upstream from the mine).

EPA findings August 2006 (EPA Assessment Report 54):

“Groundwater use for the proposed development will reduce the dry-season water levels in Djirrinmini Waterhole, one of the few permanent pools in the mid- and upper- reaches of the McArthur River. **This will reduce the value of that waterhole as a dry-season refuge for aquatic and water-dependent biota.** While this impact is probably not significant for the threatened freshwater sawfish, it may be **locally detrimental for many other species.** The proponents should ensure that alternative sources of appropriate water are provided to this waterhole, such that any reduction does not exceed 10% of the average dry-season pre-disturbance volume.

"The proposed development may affect downstream aquatic values through changes in water quality, either because of unpredictable catastrophic failure or because of more chronic low level changes in chemical or physical features. The PER asserts that neither of these is likely.

"As with some assessment for the freshwater sawfish (described in section 10.1.1), the risks are associated either with a very low probability of largely unpredictable catastrophe (notably a single episode of major spillage of contaminants) or low level chronic changes in water quality. The EIS and PER recognise that there may be some instance of the latter associated with the Bing Bong loading area, notably in the increased contamination levels of sampled marine invertebrates: *'concentrations of zinc, cadmium and lead in surface sediments from the beach immediately west of the channel have shown elevated levels since 1996 ... copper from Rocky Reef, west of Bing Bong had an unexplained increase in 2005. **Heavy metals in the two mollusc species from the beach west of the load-out facility have remained elevated, and lead isotope ratios indicate an uptake of core-concentrate derived lead dispersed from the load-out facility towards the west'*** (PER p.11-13).

"The coastal and marine environments around the lower McArthur River (extending to the Bing Bong area) contain biodiversity values of national significance. There is some risk that the proposed project may detrimentally affect those values, although this risk is difficult to predict or quantify. Evidence presented in the EIS and PER indicates that **there has been (and probably still is) at least some localised contamination of marine systems associated with the loading facility at Bing Bong.**"

Alternatives

The Guidelines to the PER required the proponent to discuss alternate proposals, which may still allow the objectives of the project to be met, detailing reasons for the selection and rejection of particular options. The Guidelines requested short, medium and long-term impacts of each of the options be considered, but this analysis was not provided. It is noted that in the detail discussions of alternatives consideration was principally given to economics, technical viability, ore-body recovery and safety, rather than a comparison of potential environmental impacts/ benefits.

The analysis provided by the proponent **dismisses other options** than that presented in the EIS/PER largely on the associated technical viability and cost of their implementation. Based on the comparative analysis of the options the proponent concluded that open pit mining to be the safest, most economically productive option, which maximised resource extraction. **The proponent has not discussed how their preferred option compares with other options from an environmental and social/ cultural perspective.**

NOTE:

The EPA Assessment Report contains three appendices. One of these appendices is a report by the independent scientific organization EWL Sciences Pty Ltd titled "**McArthur River Open Cut Mine Expansion: Review of seepage issues related to the Tailings Storage Facility (TSF)**".

This report shows that the existing and proposed tailings facilities (or dumps) are badly sited and prone to leaking: "*The impacts of the **historic and current seepage** from the existing TSF are not fully understood....There has been **no assessment of alternative, more appropriate TSF sites** that would not contain permeable alluvial soils...It is **unlikely that the TSF design would be approved** in other states...Post-closure the TSF would **not be self-sustainable** and therefore does not meet ANCOLD (1999) guidelines...It is recommended that other designs for the TSF are developed and assessed **with the prime objectives of limiting seepages to the underlying groundwater system...**"*

ENDS