Appendix H
Biting Insect Assessment Andranangoo Creek West and Lethbridge Bay West mining prospects, Tiwi Islands

Synopsis

Background

Matilda Minerals Limited (Matilda) proposes to develop sand mining operations at Andranangoo Creek West (Andranangoo) and Lethbridge Bay West (Lethbridge), Melville Island, Tiwi Islands, Northern Territory. The proposed operation will extract high grade heavy minerals (HM), specifically zircon and rutile, for export to China. It is estimated that a total of 99,000 t of zircon and rutile will be exported during the anticipated sand mining operation over three and half years. A proposal to mine both sites was submitted to the NT Government in the form of a Notive of Intent Document (URS, 2005).

The NT Government determined the project is to undergo formal environmental assessment in the form of an Environmental Impact Assessment (EIS). Part of the EIS process is to conduct a biting insect assessment of the general project areas to determine any public health risks to workers and the potential for mining activities to alter the natural environment and create further biting insect breeding sites. The Medical Entomology Branch was commissioned by URS Australia on behalf of Matilda Minerals to undertake a biting insect assessment at both proposed sandmining sites.

The Medical Entomology Branch was commissioned to;

1. Examine aerial photography to determine potential biting insect breeding sites.
2. Conduct trapping in late September 2005 to determine potential peak late dry season numbers of the salt marsh mosquito and assess the potential abundance of other mosquito species.
3. Conduct brief investigations of natural biting insect breeding sites occurring in and adjacent to the project sites, to determine the potential source of any biting insects at the project sites.
4. Conduct peak season trapping one day before the full moon in November 2005 to determine potential peak seasonal biting midge numbers, trapping one day before the full moon in January 2006 to assess mid wet season abundance of freshwater breeding mosquitoes, and trapping one day before the full moon in May 2006 to assess post wet season peaks in various freshwater and brackish water mosquito species.
5. Conduct an assessment of the project sites during trapping in late September to determine the potential for the creation of new mosquito breeding sites as a result of mining activities.
6. Provide guidance on how to prevent mining activities from creating new mosquito breeding sites.
7. Provide information on how to reduce biting insect populations and prevent mosquito borne disease transmission at the development sites.

Investigation

Late September biting insect trapping was conducted on the night of the 29th September 2005 at the Andranangoo Creek West prospect, and on the night of the 30th at the Lethbridge Bay West prospect. Brief ground investigations were also conducted at the natural actual and potential breeding sites in and surrounding the mining prospects. The following report details the findings of the adult biting insect investigation carried out from the 29th of September to the 1st of October 2005. Results from the other seasonal trapping will be addressed in a supplementary report once trapping in May 2006 has been completed.

Findings

The major findings of the initial trapping and field investigation are;

Biting midges

- Trapping on the night of the 29th and 30th September 2005 for salt marsh mosquitoes was not conducted around the full moon, therefore pest problems from the main human pest biting midge

species *Culicoides ornatus* could not be accurately assessed. Trapping one day before the full moon in November 2005 is likely to give a better indication of potential biting midge pest problems at both prospect areas.

- It is possible that nuisance, and possibly minor to moderate pest problems will be caused by the mangrove biting midge *C. ornatus* at both prospect areas. If pest problems are present, they will originate from the mangrove creeks that are adjacent to both prospect areas.

- Very minor to minor nuisance problems may be caused by the biting midge *Culicoides marksi* at the Andranangoo Creek West prospect area, and possibly at the Lethbridge Bay West prospect area. Breeding sites for this species at the Andranangoo Creek West prospect area will be the Andranangoo Creek reed swamp, while breeding sites for *C. marksi* at the Lethbridge Bay West prospect area will be the upper reaches of the tidal swamp, where seasonal streams flow into the swamp.

- *Lasiohelia* sp. midges may cause minor nuisance/pest problems at both prospect areas. The source of this species is likely to be the closed eucalypt forest areas adjacent to the prospect areas.

- The insecticide control of larval biting midges is not practical, and will not be necessary or warranted.

- If necessary, the reduction of seasonal adult biting midge numbers in the development site can be achieved by using bifenthrin insecticide barrier treatments.

- The development will not remove any biting midge breeding site.

- The elimination of biting midge breeding sites will not be required for both mining prospect areas.

- The Northern Territory Government will not be responsible for any biting midge control or biting insect monitoring in the vicinity of the mining development.

- If and when biting midge pest problems occur at either prospect areas, the work force and visitors should be warned of the potential problem and be advised on personal protection measures.

Mosquitoes

- With the exception of the salt marsh mosquito *Ochlerotatus vigilax,* the initial investigation and trapping did indicate large numbers of most mosquito species. Trapping in January and May 2006 is likely to give a better indication of peak abundance of most other mosquito species.

- The salt marsh mosquito *Ochlerotatus vigilax* will pose a severe pest problem at both the Andranangoo Creek West and Lethbridge Bay West prospect areas. Severe pest problems will be present at both prospect areas during the months of September to January inclusive. Pest problems can be present for up to 2-3 weeks during these months, with pest problems likely to be noticed in shaded areas during the day, and from sunset to sunrise. Pest problems will be present throughout both prospect areas.

- *Ochlerotatus vigilax* will pose a considerable risk for the seasonal transmission of Ross River virus (RRV) and Barmah Forest virus (BFV) at both prospect sites, with December and January being main risk months for transmission of these viruses from *Oc. vigilax.*

- The most productive *Oc. vigilax* breeding site affecting the Andranangoo Creek West prospect area will be the extensive Andranangoo Creek West reed swamp, with possible dispersal from other tidal swamps associated with Andranangoo Creek. The most productive *Oc. vigilax* breeding

site affecting the Lethbridge Bay West prospect area will be the adjacent extensive tidal swamp. Other smaller *Oc. vigilax* sites are likely to be associated with the small tidal creeks adjacent to both prospect areas.

- The common banded mosquito *Culex annulirostris* will most likely be present in high pest numbers at both the Andranangoo Creek West and Lethbridge Bay West prospect sites during the mid wet, post wet and early dry season, and minor pest numbers for most of the remaining months of the year. Pest problems will be noticed after sundown.

- *Culex annulirostris* will pose a seasonally high risk of RRV and BFV transmission at both prospect areas, with December to June being main risk months for virus transmission from this species. This species will also pose a potential seasonal risk for Kunjin virus and Murray Valley encephalitis transmission at both prospect areas, with January to July being the main risk period for Murray Valley encephalitis virus transmission, and December to July being the main risk period for Kunjin virus transmission.

- The most productive *Cx. annulirostris* breeding sites affecting the Andranangoo Creek West prospect area will be the extensive Andranangoo Creek West reed swamp, with the *Melaleuca* swamp in the prospect area being a possible source. The most productive *Cx. annulirostris* breeding sites affecting the Lethbridge Bay West prospect area are likely to be the upper reaches of the adjacent extensive tidal swamp, where seasonal freshwater inflows occur, as there are likely to be semi-aquatic reeds in that section of the swamp.

- The North Australian malaria mosquito *Anopheles farauti s.l.* is likely to be present in moderate to high pest numbers in areas of the Andranangoo Creek West prospect area within 1.5km of the Andranangoo Creek West reed swamp. This species is likely to be present in at least low to moderate pest numbers at the Lethbridge Bay West prospect area within 1.5km of the adjacent extensive tidal swamp. This species is likely to be present in pest numbers during at least the months of March to June, and is likely to be present for most other months of the year. Pest problems will be noticed after sundown.

- *Anopheles farauti s.l,* will pose a high risk of potential malaria transmission at both prospect areas in at least the months of March to June, with a potential risk of malaria transmission likely to occur for extended periods of the year at both prospect sites. The risk of potential malaria transmission will occur if a person infected overseas with malaria is exposed to mosquito bites from this species.

- The most productive breeding sites for *An. farauti s.l.* affecting the Andranangoo Creek West prospect area will be the extensive Andranangoo Creek reed swamp. Breeding sites for *An. farauti s.l.* affecting the Lethbridge Bay West prospect area will be the upper reaches of the adjacent extensive tidal swamp, where there are likely to be semi-aquatic reeds.

- The saltwater *Culex* mosquito *Culex sitiens* is likely to be present in low to moderate pest numbers at both prospect areas, particularly in the late dry and early wet season. This species will pose a low to moderate potential RRV transmission risk in December and January, when numbers are elevated. Breeding sites will be associated with the tidal influenced sections of the large swamps located adjacent to both prospect areas. Pest problems will be noticed after sundown.

- The brackish water forest mosquito *Verrallina funerea* may potentially pose a pest problem during the mid wet season at the Andranangoo Creek West prospect area. It will originate from the *Melaleuca* swamp located in the prospect area, and from any Coastal Vine forest that may flood. This species may also pose a potential pest problem at the Lethbridge Bay West prospect area, when *Melaleuca* and Coastal Vine forest areas flood during the wet season. When present, this

species will pose a potential RRV and BFV transmission risk. Pest problems will only be in areas within 500m of productive breeding sites or dense closed forest.

- Other mosquito species of pest importance only will be present in pest numbers at both prospect areas. The golden mosquito *Coquillettidia xanthogaster* is likely to be present in high pest numbers during the peak months of March to August, and low pest numbers of most of the other months of the year. The black malaria mosquito *Anopheles bancroftii* is likely to be present in high pest numbers at both prospect areas during the peak months of February to July, and low pest problems for most months at the Andranangoo Creek West prospect area. The water hyacinth mosquito *Mansonia uniformis* may be present in low to moderate pest numbers at both prospect sites during the peak months of March to June. Breeding sites for these species will be the vegetated areas of the extensive swamps adjacent to the prospect area.

- Development activities have the potential to create new mosquito breeding sites, especially in those areas where mining will occur adjacent to swamps and drainage lines, such as the Andranangoo Creek reed swamp, the Andranangoo Creek West prospect area *Melaleuca* swamp and associated drainage lines, and the extensive tidal swamp adjacent to the Lethbridge Bay West prospect.

Recommendations

Biting midges

- If required, barrier insecticide treatments can be used to lower biting midge populations around the construction camp. Areas that can be treated include under demountables, external floorboards, walls, insect screens and any dense vegetation surrounding the construction camps. Shade cloth fencing erected around the construction camp and treated with bifenthrin will also enhance the effectiveness of any barrier treatment

Mosquitoes

- All workers should be advised of the high mosquito problems that will occur at both prospect sites, and the high potential for mosquito borne disease transmission at both prospect areas when mosquito numbers are high. Workers should be supplied with a copy of the Medical Entomology Branch handout “Personal protection from mosquitoes and biting midges in the NT”.

- Adult mosquito control using barrier insecticides such as bifenthrin is highly recommended. Areas that can be treated include under demountables, external floorboards, walls, insect screens and any dense vegetation surrounding the construction camps. Shade cloth fencing erected around the construction camp and treated with bifenthrin will also enhance the effectiveness of any barrier treatment

- Any worker returning or sourced from overseas who suddenly experience an onset of fever should be considered as possibly having malaria and be kept indoors away from mosquito bites, until cleared of having malaria or cleared of the infectious stages of malaria by a health care practitioner.

- Rehabilitation of the mining areas should be conducted in a manner that prevents the creation of new mosquito breeding sites which could affect the future use of the land, or disperse to existing or future development areas.