

A2 Description of creekside monitoring with results for 2001–02 Wet season

A2.1 Background description

In this form of monitoring, effects of Ranger mine waste water dispersion are evaluated using responses of aquatic animals held in tanks on the creekside to effluent waters. The responses of two test species are measured over a four-day period:

- reproduction (egg production) in the freshwater snail, *Amerianna cumingi*, and
- survival of black-banded rainbowfish, *Melanotaenia nigrans*, larvae.

Animals are exposed to a continuous flow of water pumped from upstream of the mine site (control site) and to water collected from the creek at gauging station GS8210009, some 5 km downstream of the mine. At the end of each 4–day trial, the mean number of eggs per snail pair and mean number of fish surviving per replicate, are noted and compared for each of the upstream and downstream sites. ([Description of creekside monitoring approach and photo of facilities](#)) Specifically, when data from the upstream site are subtracted from those at the downstream site, a set of ‘difference’ values can be derived. These difference values may be compared statistically for different parts of the time-series. For example, ‘difference’ data for the Wet season of interest may be compared with those from previous years; if they differ significantly, using a Student’s *t* test, it may indicate a mine-related change. Technical details of the statistical design and data analysis procedures may be found in Humphrey et al (1995) and in [Appendix 4, volume 2, ANZECC & ARMCANZ \(2000a\)](#). Additional developmental work may be found in Supervising Scientist (2001, pp 49-50).

Since about 1996, creekside trials have been performed approximately every other week during the Wet season. Trials usually commence in December and cease in early April, the period of significant creek flow in Magela Creek.

A2.2 Nature and origin of the creekside data

The results of the creekside trials are plotted as part of a continuous time series of actual and ‘difference’ data in [figure A](#) for snail egg production, and in [figure B](#) for larval fish survival. As described on [section 1.1 of the Background document](#), part of this time series of data was acquired by ERA because of the earlier intent for the company to routinely conduct chemical and biological monitoring. As part of the technology transfer process, including data quality assurance, *eriss* conducted from time to time tests in parallel with ERA. In the event, data quality for the fish trials conducted by ERA (1996-2000) was generally not sufficient to incorporate in the time series, apart from the results of trial 23 (2000) shown in [figure B](#) (ERA data). ERA’s snail egg production data were generally suitable for reporting, and in the time series shown in [figure A](#), ERA provided data for the 1st, 2nd and 3rd trials of 1996, all trials for 1998, 1999 and 2000, and for the 5th, 6th, 7th and 8th trials of 2001.

The snail egg production data depicted in figure A differ from those reported in Supervising Scientist (2001, pp 21-23) in that corrected 1996 data now replace earlier data shown in figure 2.2 of the Supervising Scientist’s (2001) report, while other values may also vary slightly. The earlier 1996 data were replaced because of a recently-discovered transcription error while additional, though very minor, changes have been made to other values arising from new data validation procedures. Note that these changes do not affect the conclusions

drawn in the earlier Supervising Scientist (2001) report concerning possible effects arising from the Ranger mine.

A2.3 Results for the 2001–2 Wet season

Over the December 2001 to April 2002 period, 7 valid snail and 4 valid fish tests were conducted. Using the data shown in figures A and B, ‘difference’ values for 2001–02 were compared with those from previous years. The results for the snail egg production analysis showed no significant difference in the ‘difference’ values of 2001–02 data compared with data from previous years ($P > 0.05$). For larval fish survival data, similarly, no significant difference in the ‘difference’ values of 2001–02 data were observed when these data were compared with data from the period 1992 to 2000 ($P > 0.05$). (Larval fish survival data from 2001 were not included in the analyses because relatively poor survival was observed in this year at the control site – see Supervising Scientist (2001, pp 21-23) for details.)

From these results, it is concluded that there were no adverse effects of mine waste waters on either of the creekside test species over the 2001–02 Wet season.

A2.4 Reference

Supervising Scientist 2001. Annual Report 2000–2001. Supervising Scientist, Darwin.