

SUPERVISING SCIENTIST'S OVERVIEW

The Supervising Scientist plays an important role in the protection of the environment of the Alligator Rivers Region of the Northern Territory through the supervision, monitoring and audit of uranium mines in the Region, as well as research into the possible impact of uranium mining on the environment of the Region.

Ranger is currently the only operational uranium mine in the Region, and is owned and operated by Energy Resources of Australia Ltd (ERA). Production commenced at Ranger in August 1981, and current plans will see mining of the Ranger 3 deposit cease in 2012 with milling of stockpiled ore expected to continue through until 2020. Recent proposals by ERA to include a heap leach facility at Ranger has not affected the current mining and milling operations timetable but could potentially increase production over the same period.

As the time of mine closure and rehabilitation draws closer, the work of the Supervising Scientist includes a focus on these themes as well as operational issues. Staff have been engaged with stakeholders in discussions and research activities associated with rehabilitation and closure.

Apart from rehabilitation and mine closure planning, staff of the Division remain active in ongoing supervision, inspection and audit, radiological, biological and chemical monitoring, and research activities in relation to both present and past uranium mining activities in the Region. Significant work has continued in developing improvements to the Supervising Scientist's surface water monitoring program. This program is relevant to both the operational and rehabilitation phases of mining.

During the year there were no reported incidents that resulted in any environmental impact off the immediate minesite. The extensive monitoring and research programs of the Supervising Scientist Division confirm that the environment has remained protected through the period.

At Ranger mine the 2008–09 wet season was below average with rainfall of 1186 mm. As a result there was less pressure on the pond water component of the mine's water management system than for the previous three years and this has allowed the pond water inventory to be significantly reduced. However, due to delays in commissioning of the process water treatment facility, process water levels remain high.

A further three metre lift of the walls of the Ranger tailings storage facility to RL 54 m was completed and an application to increase the maximum operating level is under consideration. In addition to operational flexibility for ERA, this lift provides an enhanced level of environmental protection in process water management following the decommissioning of Ranger Pit 1 as the active tailings storage facility late in 2008 and pending commissioning of process water treatment, which should commence during the latter half of 2009.

During the year there were concerns raised that seepage from the Ranger tailings storage facility (TSF) of the order of 100 cubic metres per day had the potential to impact on Kakadu National Park. Monitoring by ERA, the NT Department of Regional Development,

Primary Industry, Fisheries and Resources and SSD indicates that lateral seepage from the TSF is of a significantly lower volume than this and confirms that its extent is restricted to within a few hundred metres of the dam impoundment along a number of discrete geological structures. There is no evidence of seepage extending from the base of the TSF into Kakadu National Park. The potentially larger proportion of seepage indicated by modelling would be located below the floor of the TSF and this water will need to be recovered and treated following the decommissioning and during rehabilitation of the facility. Independent reviews of the operation and modelling of the tailings facility commissioned separately by ERA and by SSD concur with the view on the restricted lateral distribution of seepage. ERA has undertaken to conduct an electrical geophysical survey over the perimeter of the dam that will map the current distribution of seepage plumes and permit an informed review of the current groundwater monitoring program.

The Jabiluka project remains in long-term care and maintenance, and the next stage of the project is a matter for discussion between ERA and the area's traditional Aboriginal owners.

The Nabarlek mine in western Arnhem Land was decommissioned in 1995 and the rehabilitation of this site remains under ongoing assessment. During the year Uranium Equities Limited's new Mining Management Plan for operations on the site was approved and a revised rehabilitation bond posted under the provisions of the Northern Territory *Mining Management Act*.

Details on research outcomes of the Environmental Research Institute of the Supervising Scientist (*eriss*) are published in journal and conference papers and in the Supervising Scientist and Internal Report series. Some important programs have been described in this annual report.

In particular, the water quality monitoring program continues to be improved with refinements to the operation of continuous monitoring of pH, electrical conductivity and turbidity in Magela and Gulungul Creeks upstream and downstream of Ranger mine. From the continuous monitoring results indications are that water quality variations, both natural and mine-related, can occur on a shorter time base than weekly and the continuous monitoring program therefore has potential to be superior to the weekly grab sampling technique that is currently employed. Further research is in progress to determine what, if any, implications this may have in regard to trigger levels for responses to observed pulse events.

The principal biologically-based toxicity monitoring approach from 1991 until 2008 was creekside monitoring in which a continuous flow of water from the adjacent Magela Creek is pumped through tanks containing test animals. As indicated last year, assessment of the parallel creekside and in situ monitoring (test organisms deployed directly in containers within the creek itself) determined that the in situ method is as effective as the creekside method and the creekside program was discontinued in favour of the more efficient in situ method during the 2008–09 wet season. It is planned to extend this in situ monitoring program to include Gulungul Creek during the 2009–10 wet season.

Comparison of the composition of minesite waters with composition of the water from Magela Creek upstream and downstream of the mine enables a risk assessment to be made

of those metals that are of most potential concern. A detailed chemical assessment of the full trace metal profile of minesite waterbodies and major catchment runoff lines had not been carried out since the cessation of mining of Ranger 1 and the start of mining of Ranger 3 in 1996. Since that time the exposed waste stockpiles have come to be dominated by material from Ranger 3, and it is possible that the trace element composition of runoff and seepage water could have changed as a result of the different provenance of this second orebody. Consequently, contemporary trace element data have been collected and the results analysed. The results from this study provide a high degree of confidence that the routine water quality and bioaccumulation sampling programs conducted by SSD are not omitting any potential metals that could be of concern from either toxicological or bioaccumulation perspectives.

Determination of radionuclide levels in mussels from Mudginberri Billabong has been a continuing element of the SSD monitoring program downstream of Ranger. Over the years samples have been collected from a variety of locations within the billabong and the question of the significance of the location of the sampling has been posed. During the past year research has found subtle variations in the relative contribution of radionuclides in the tissue of freshwater mussels which appear to be mainly influenced by the proportion of fine sediments at the sampling site. Importantly, ^{226}Ra and ^{210}Pb activity concentrations in mussels, which dominate the dose received via the ingestion of mussels, are not statistically different among sites and it is concluded that the data of previous mussel collections that have been conducted from several locations in the billabong over the years can be directly compared, taking into account factors such as mussel condition, timing of mussel collection or the duration and intensity of the preceding wet season.

A trial landform was constructed by ERA during late 2008 and early 2009 adjacent to the north-western wall of the tailings storage facility at Ranger mine. The trial landform will be used to test landform design and revegetation strategies to be used once mining and milling have finished. SSD is involved in erosion studies on the trial landform to assist in longer term modelling of the performance of ultimate landform created during rehabilitation of the site.

In May 2006, the Australian Government announced funding of \$7.3 million over four years to undertake rehabilitation of former uranium mining sites in the South Alligator River Valley in the southern part of Kakadu National Park. The Supervising Scientist Division continues to provide advice and assistance to the Director of National Parks as the rehabilitation works progress.

The Alligator Rivers Region Technical Committee (ARRTC) continues to play a vital role in assessing the science used in making judgements about the protection of the environment from the impacts of uranium mining. The Committee concluded revision of its definitive 'Key Knowledge Needs' (KKNs) document during 2007–08 and a copy of the revised KKNs is appended to this report.

Professor Colin Woodroffe from the University of Wollongong was appointed to ARRTC as the independent scientific member with expertise in geomorphology replacing Professor Jonathan Nott, who resigned from ARRTC last year.

During the reporting period, SSD has provided advice to the Approvals and Wildlife Division of DEWHA on referrals submitted in accordance with the EPBC Act for proposed new and expanding uranium mines associated with the following projects:

- Nolan’s Bore Project, NT
- Crocker Well Project, SA
- Olympic Dam Expansion, SA
- Ranger Mine Heap Leach proposal, NT
- Ranger Mine Exploration Decline proposal, NT
- Beverley Four Mile Project, SA

In 2008, a working group of representatives from the NT Department of Regional Development, Primary Industry, Fisheries and Resources (DRDPIFR), NT Department of Natural Resources, Environment, the Arts and Sport (NRETAS), Commonwealth Department of Resources, Energy and Tourism (DRET), the Northern Land Council (NLC) and SSD was formed to review the environmental status of the former Rum Jungle minesite located near Batchelor to the south of Darwin. Funds have been provided in the 2009–10 Federal Budget for a four-year program to progress and implement environmental maintenance activities, conduct appropriate environmental monitoring programs and develop contemporary site rehabilitation strategies. The Rum Jungle Technical Working Group (RJTWG) has now convened and some activities have been initiated. SSD has participated in the work of the RJTWG.

Finally, I would like to offer my personal thanks to all the staff of the Supervising Scientist Division for their enthusiasm and efforts during the year. The commitment and professionalism of the Division’s staff remains a vital factor in the Division being able to fulfil its role in environmental protection.



Alan Hughes
Supervising Scientist