supervising scientist

Investigation of the Stockpiling and Reporting Incidents at Ranger and Jabiluka 2002

Supervising Scientist
Environment Australia

Environment Australia
Department of the Environment and Heritage

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1 Introduction

Energy Resources of Australia Limited (ERA) operates the Ranger uranium mine and the Jabiluka project which are surrounded by, but which do not form part of, Kakadu National Park in the Northern Territory. Milling of uranium ore commenced at Ranger in 1981. Mining has not commenced at Jabiluka, although some surface facilities have been constructed and limited underground development to access the orebody has been undertaken.

Ranger and Jabiluka are regulated by the Northern Territory Department of Business, Industry and Resource Development (DBIRD) under the *Mining Management Act 2001*. The Supervising Scientist Division (SSD) of Environment Australia undertakes environmental research, monitoring and supervision activities on behalf of the Commonwealth, under the *Environment Protection (Alligator Rivers Region) Act 1978*.

The purpose of this report is to summarise the Supervising Scientist's findings arising from his investigation of two incidents that occurred at Ranger and Jabiluka during January and February 2002. These were:

- the incorrect management of the Grade 2 Stockpile at Ranger
- the failure by ERA to immediately notify authorities of the exceedence of action levels in Swift Creek downstream from Jabiluka.

On 28 February 2002, the Supervising Scientist requested a full report from ERA on the Grade 2 Stockpile incident. A preliminary report (attachment 1) was provided on 1 March 2002 and a full Investigation Report (attachment 2) was provided on 22 March 2002. In preparing this report, the Supervising Scientist has taken into account the information provided by ERA in these reports. In addition, staff of the SSD undertook a number of site visits, held discussions with relevant ERA staff, compared ERA and SSD data sets and had discussions with staff of the Northern Land Council (NLC) and the NT DBIRD. The views of the Traditional Owners were also sought at a meeting held in Jabiru on 9 April 2002.

2 The Grade 2 stockpile incident

2.1 Management of excavated material

Excavated material at Ranger is classified on a seven-point scale according to the amount of uranium it contains. The Grade 1 stockpile material is waste rock containing less than 0.02% uranium by weight. The concentration of uranium in the Grade 2-7 material increases from 0.02%-0.08% for Grade 2 material to greater than 0.5% for Grade 7 material. Currently only material in Grades 5-7 are considered to be economically viable for extraction of uranium in the mill circuit.

In the absence of a specific approval granted by the regulator to the contrary, rainfall runoff from ore stockpiles (grades 2-7) is required to report to Retention Pond 2 (RP2) on the Ranger Project Area, either directly or via sumps. Similarly, any surface expression of water that has infiltrated ore stockpiles is required to report to RP2. This seepage and the portion of surface runoff that does not flow directly to RP2 is collected in sumps and then either drains to RP2 via a pipe under gravity or is pumped to RP2.

Water collected in RP2 is managed by a combination of strategies including evaporation, wetland filtration and irrigation within the Ranger Project Area. The purpose of this management regime is to ensure the protection of the environment downstream of Ranger in

Kakadu National Park and to minimise the impact of mining within the Ranger Project Area itself.

Approval is only given for alteration of the above water management regime for ore stockpiles if the authorities are satisfied that a stockpile management plan is to be implemented that will ensure the continued protection of the environment of Kakadu National Park and will minimise impact on the Ranger Project Area.

2.2 Management plan for the Grade 2 Stockpile

Rainfall that falls on an ore stockpile will either run off the stockpile as surface flow or will infiltrate into the stockpile and subsequently express at the surface as seepage water. In general, the quality of seepage water is very much poorer than that of surface runoff due to the longer contact time of the water with the ore. Hence it is good practice to separate seepage from surface runoff. ERA has conducted a number of investigations of compaction techniques to enhance surface runoff and of the water quality resulting from these techniques. Formal reports on these investigations will be published shortly (Hollingsworth & Zimmerman 2002, Puhalovich et al 2002, Hollingsworth & Welch 2002). The information obtained in these studies has formed the basis of the modification of the water management regime for the Grade 2 Stockpile.

On 12 September 2000, ERA submitted an application to divert surface runoff from a compacted 2.5 ha area of the Grade 2 Stockpile through the Corridor Creek wetland filter system on the Ranger Project Area. Compaction of the surface of the stockpile minimises infiltration and improves the quality of surface runoff. The application was considered and supported by the members of the Ranger Minesite Technical Committee (RMTC) (RMTC members are ERA, DBIRD, NLC and OSS) and approved by the Northern Territory Minister for Resource Development on 9 November 2000. Seepage from the stockpile was required to report to RP2.

On 28 March 2001, ERA applied to extend the area of the Grade 2 Stockpile from which surface runoff was directed to the Corridor Creek wetland filter system. The extended area was to be compacted in a similar manner to the original 2.5ha area. The application described the establishment of a bunding system to direct first flush runoff from recently placed material on the Grade 2 Stockpile to the Low Grade Ore Sump. After consideration by members of the RMTC, this application was approved by the Northern Territory Minister for Resource Development on 26 April 2001 subject to surface runoff from the first 200mm of wet season rains reporting to RP2 (via the Low Grade Ore Sump) or electrical conductivity in surface runoff waters falling below 400 microSiemens per centimetre (µS/cm). These conditions were placed on the approval to ensure that the first flush of the stockpile was contained in RP2. Once again, seepage from the stockpile was required to report to RP2.

In summary, the approved management plan for the Grade 2 Stockpile is as follows:

- Seepage reports to RP2 via the Low Grade Ore Sump
- Surface runoff from areas of the Grade 2 Stockpile which have been compacted is directed to the Corridor Creek wetland filter system after the first flush of these areas has been collected in RP2 via the Low Grade Ore Sump
- Surface runoff from areas of the Grade 2 Stockpile which have not been compacted is diverted using bunds to RP2 via the Low Grade Ore sump.

2.3 Operational management of the Grade 2 stockpile

The surface of the Grade 2 Stockpile was compacted in October 2001 in preparation for the 2001/02 Wet season consistent with the approved management plan. Drainage structures from the Grade 2 Stockpile leading to a new wetland filter in the headwaters of the Corridor Creek wetland filter system were constructed and the bund to direct first flush surface runoff to the Low Grade Ore Sump was in place. After 200 mm of rainfall had occurred at the mine site, the diversion bund was removed on 28 November 2001 and surface runoff was directed to the Corridor Creek system.

However, during the evening of 26 February 2002, the ERA Environment Manager advised the Supervising Scientist, the NLC, DBIRD and the Chairperson of the Alligator Rivers Region Technical Committee (which was meeting at that time in Jabiru) that fresh grade 2 material had been placed on the Grade 2 Stockpile during January and February, contrary to the approved management plan. The ERA Environment Manager also advised that some of the surface runoff from the 4/7 laterite stockpile, which is required to report to RP2, may have joined surface runoff from the 4P stockpile, which is required to be managed in an identical manner to the Grade 2 Stockpile, and may have entered the Corridor Creek wetland filter system. Remedial work to cover the incorrectly dumped material on the 2 stockpile and to correct drainage inadequacies near the 4/7 stockpile were underway at that time.

The Assistant Secretary of the Office of the Supervising Scientist inspected the Grade 2 Stockpile on the morning of 27 February 2002 and observed the incorrectly dumped material and work underway to cover and compact it (Figure 1.). ERA provided a preliminary written report on the incident to DBIRD, OSS, and NLC on 1 March 2001 (appendix 1).

ERA submitted its Investigation Report (appendix 2) on 22 March 2002. This report notes that 80,900 tonnes of weathered grade 2 material and 3,600 tonnes of weathered grade 3 material were dumped on the Grade 2 Stockpile between 14 January 2002 and 26 February 2002. This material was not compacted and was placed on an area of the 2 stockpile from which surface runoff was directed to the Corridor Creek wetland filter system. Some of the material was pushed over the western batter of the Grade 2 Stockpile after initial emplacement on top of the western edge of the stockpile. This is inconsistent with the approval given by the NT Minister for Resource Development to direct surface runoff from the Grade 2 Stockpile to the Corridor Creek wetland filter system.

2.4 Environmental and human health impacts

The weathered material which was incorrectly placed on the Grade 2 Stockpile was not compacted. Hence, a relatively high proportion of incident rainfall infiltrated this material and the resulting seepage contained relatively high concentrations of uranium. This seepage joined the surface runoff from the compacted surface of the Grade 2 Stockpile and reported to the Corridor Creek wetland filter system. Further, some of the weathered material was entrained in particulate form in water flowing off the Grade 2 Stockpile, particularly its western batter, and also reported to the Corridor Creek wetland filter system. As a result, ERA measured a uranium concentration of 2287 parts per billion and a turbidity of 2000 NTU on 20 and 26 February respectively in water samples taken some 200m upstream of the entrance to the new wetland filter constructed in the headwaters of Corridor Creek wetland filter system. Figure 2 shows the half pipes which take runoff from the Southern Stockpile area, including the Grade 2 Stockpile and directs it into a drain. Figure 3 shows the input point to the Corridor Creek wetland filter system approximately 200m downstream from the half pipes shown in figure 2.

Figure 1 Incorrectly dumped material on top of the Grade 2 Stockpile (Photo: Alex Zapantis 27/2/02)

Figure 2 Half pipes receiving runoff from the southern stockpile area (Photo: Alex Zapantis 27/2/02)

Figure 3 Input point to the Corridor Creek wetland filter system (Photo: Alex Zapantis 27/2/02)

The locations shown in figures 2 and 3 are where samples of water containing high uranium concentrations were collected. These locations are marked on the map of the Ranger Project Area shown in figure 4.

Water leaving the Southern Stockpile area, which includes the Grade 2 Stockpile, flows through up to four wetland filters constructed in Corridor Creek which have the function of improving water quality by a combination of processes including dilution and the removal of contaminants, particularly uranium, from the water column.

Routine environmental monitoring at the statutory monitoring point downstream of the Ranger mine, GS8210009, demonstrates that the Corridor Creek wetland filter system performed as would be expected. Uranium concentrations exceeding 2000 parts per billion entered the wetland filtration system, and the highest concentration of uranium measured at GS8210009, which is within the Ranger Project Area upstream of where Magela Creek enters Kakadu National Park, was less than 0.3 parts per billion. This concentration does not pose any risk to the environment or to human health. For comparison, the limit for environmental protection purposes derived according to the procedure recommended in the Australia New Zealand Water Quality Guidelines using the most restrictive category of ecosystem (i.e. one of high conservation value) is 5.8 parts per billion. The drinking water standard for human health protection is 20 parts per billion. Figure 5 shows the concentration of uranium measured in the Supervising Scientist's routine environmental monitoring program at GS8210009 for the 2001/02 Wet season. These results demonstrate that, at all times, uranium concentrations were lower than the ecological and human health limits by more than a factor of twenty.

In addition to chemical water quality monitoring, the Supervising Scientist undertakes biological monitoring. Biological monitoring is carried out with creek-side toxicity tests on key indicator species at two stations on Magela Creek - one upstream from the mine and the other downstream. Data has been collected from these stations since 1992. Creek water is pumped continuously to test chambers in small field laboratories on the creek bank. Two tests are conducted in these chambers. The first test measures any change in the rate of egg-laying by snails. The second assesses the survival of larval Black-striped Rainbowfish.

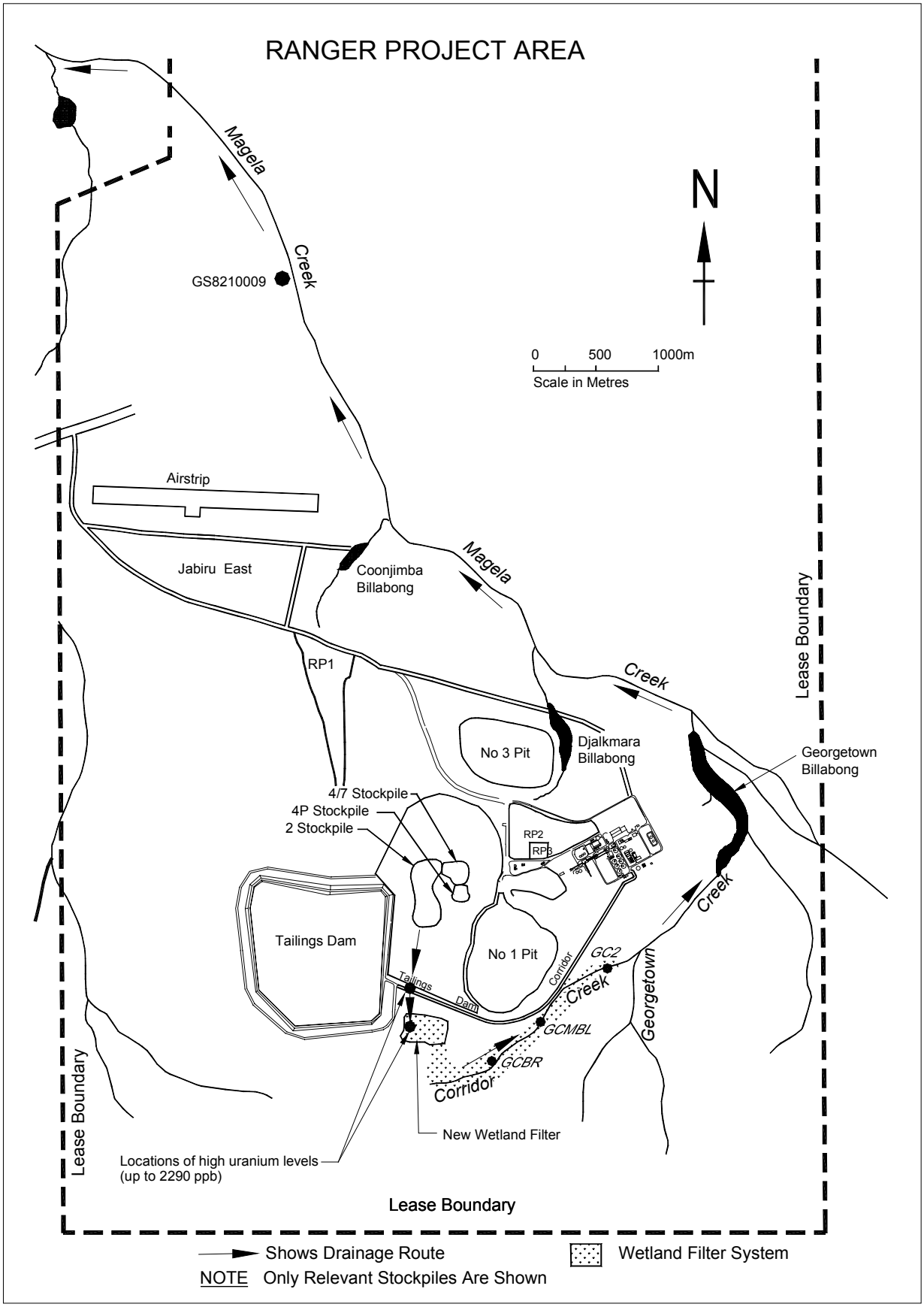

Figure 4 Map of the Ranger project area

For both tests, any impact from the mine is identified by comparing the results from upstream of the mine with those from the downstream station. If there is no impact from the mine, the difference between the two sites should not differ greatly from the long term mean. The data for these tests, including the 2002 data, are shown in figure 6; these "difference data" are shown by the dashed line. These graphs show that for both tests the difference between upstream and downstream stations fluctuates around this mean. There was no large shift in response to the incident at Ranger over January and February 2002.

Thus, both the chemical and biological monitoring programs conducted by the Supervising Scientist demonstrate that this incident did not cause any harm to the environment or to human health.

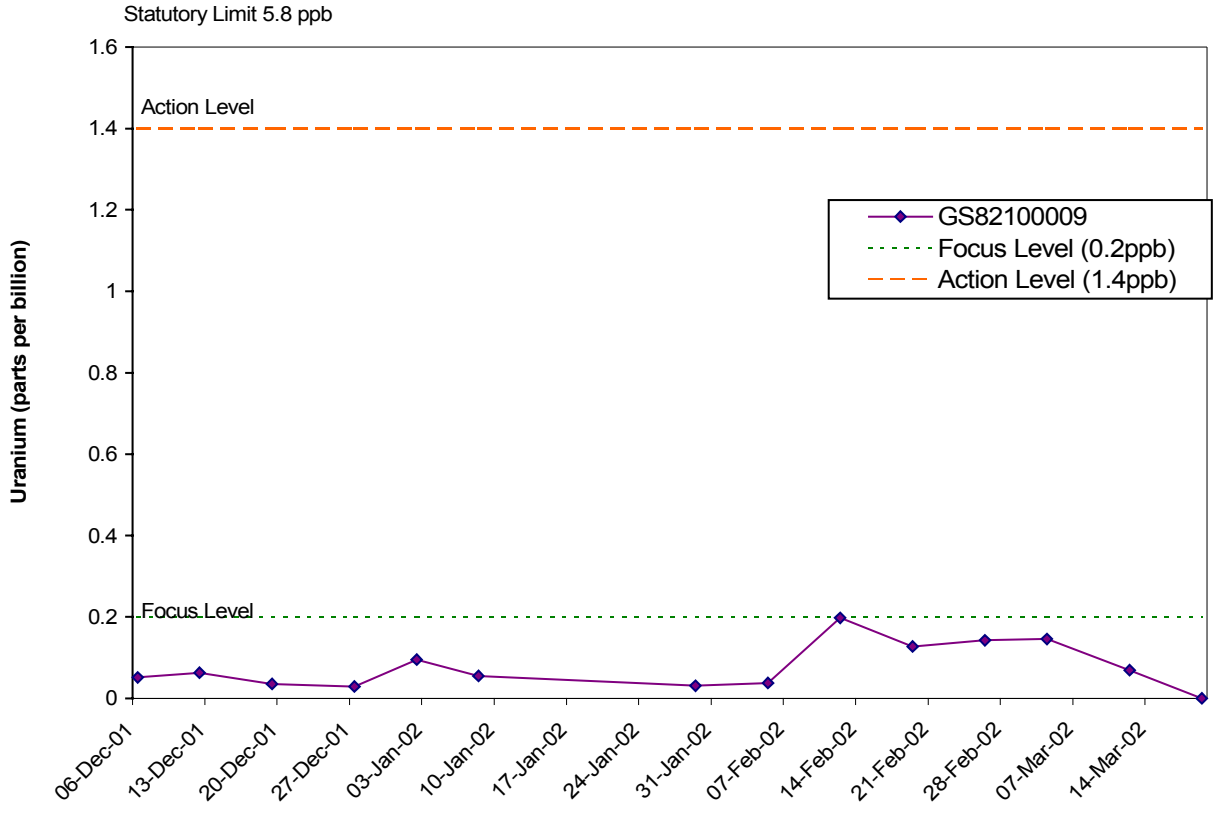

Figure 5. Supervising Scientist data: concentration of uranium at GS8210009

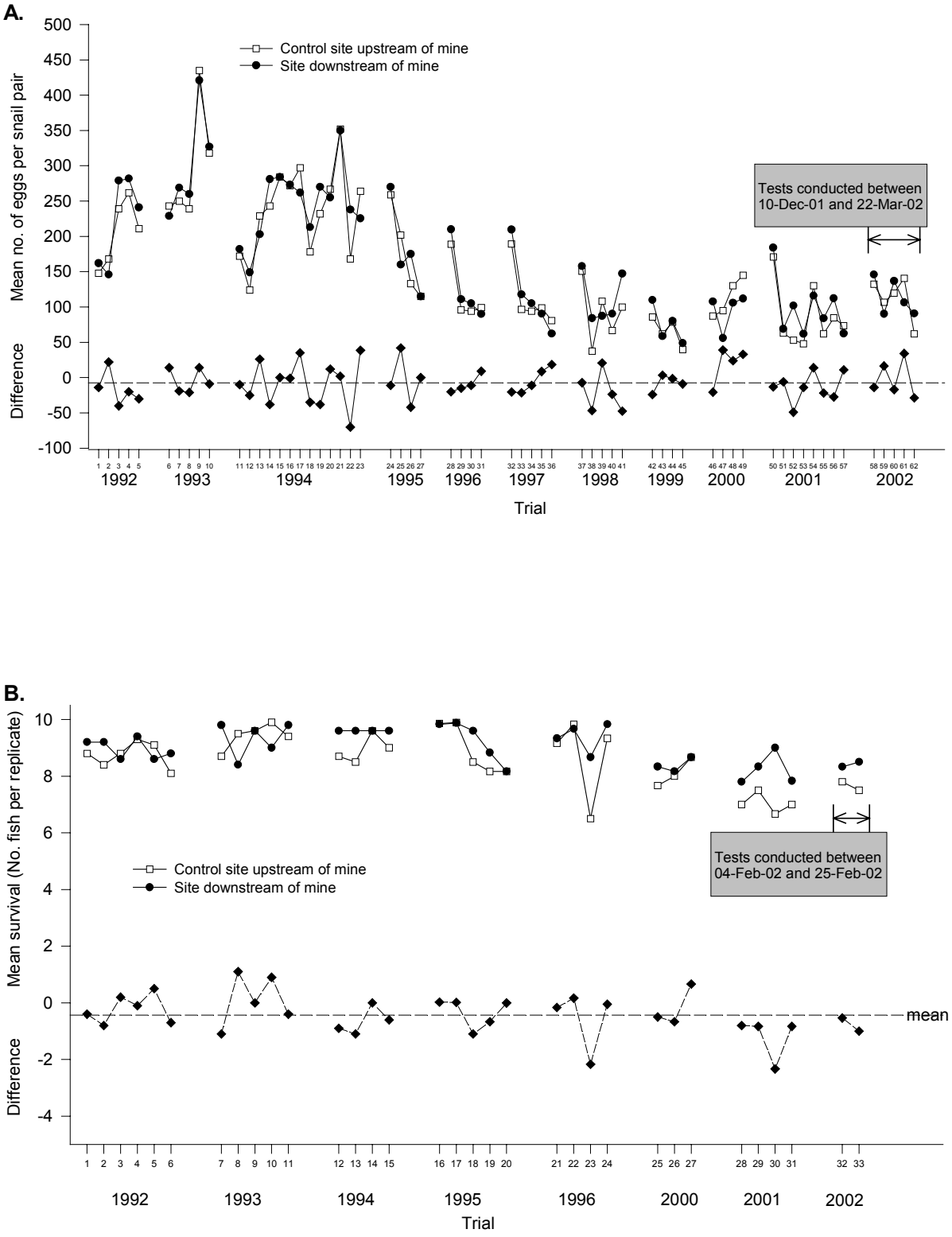

Figure 6 Biological monitoring of Magela Creek (a) egg-laying by snails, (b) survival of Black-striped Rainbowfish

2.5 Discussion of issues arising from the incident

Whilst it has been agreed by all stakeholders, including the Gundjehmi Aboriginal Corporation, that this incident has not posed any risk to the environment or to the health of people living downstream of Ranger, there are four issues which warrant discussion. These are:

- Interpretation of uranium concentration data
- Contravention of the stockpile management plan
- The delay in recognising the contravention of the plan
- Maintenance of drainage works around the ore stockpiles.

Interpretation of uranium concentration data

The uranium concentrations measured at the input point to the Corridor Creek wetland filter system in January and February 2002 were higher than expected for normal operation of the stockpiles. ERA's investigative report states that these high uranium concentrations were initially ascribed to local earthwork disturbances and low flow conditions in a newly constructed drain.

Without reference to hindsight, this is a plausible interpretation of the data. Indeed, when stakeholders were first notified of the incident on 26 February 2002, DBIRD staff immediately stated that DBIRD had interpreted the data in this manner. Straightforward estimates of the likely increase in the concentration of uranium in the waters of Kakadu National Park, based on available dilution, led DBIRD to correctly conclude that there was no risk to people or the downstream environment. Further, the concentration of uranium at the statutory downstream monitoring point, GS8210009, never approached the action level of 1.4 parts per billion which would have triggered an investigation.

However, it was evident when the ERA Environment Manager advised stakeholders of the incident on 26 February that he had not been made aware of these data until that day. This was confirmed in subsequent discussions with ERA. The lack of reporting to the Environment Manager of the occurrence of higher than expected uranium concentrations in water entering the wetland filter system is considered to be of greater significance than the misinterpretation of origin of the high concentrations. It is indicative of deficiencies in ERA's internal reporting and communication systems.

Contravention of the stockpile management plan

The dumping of material on the Grade 2 Stockpile, giving rise to runoff and seepage from this uncompacted material towards the Corridor Creek wetland system, is in contravention of written plans for the management of the Grade 2 Stockpile. Prior to the 2001/02 Wet season, the RMTC carefully determined how the Grade 2 Stockpile should be managed based upon the application submitted by ERA. After approval and prior to the commencement of the Wet season, the stockpile was carefully prepared in accordance with the approval.

However, on 14 January 2002, the Ranger Mine Department decided that the Grade 2 Stockpile should be used to receive additional material from Pit 3. From the ERA Investigative Report and detailed discussions with ERA staff, it is clear that this decision was based on the following rationale:

- The amount of grade 2 material excavated from Pit 3 was considerably greater than expected for the current stage of development of Pit 3

- The Western stockpile, which was receiving this material, had reached its design capacity for the current stage of development of Pit 3
- The Grade 2 Stockpile had considerable capacity to accept further material prior to reaching its design capacity
- Hence, the 2 stockpile should receive the additional material.

The above reasoning is perfectly sound when only mining needs are considered. On a mining scale, the amount of additional material dumped on the Grade 2 Stockpile is extremely small. However, the decision was made without reference to the ERA Environment Department and does not take into account the environmental protection aspects of the management of the Grade 2 stockpile for the 2001/02 Wet season. It is clear that the Mine Department was either unaware of the approved plan for management of the Grade 2 Stockpile or staff of the Mine Department did not understand the environmental protection attributes that were so carefully incorporated in the plan. It is also evident that there was no effective communication process between the ERA Environment Department and the Ranger Mine Department. In addition to being symptomatic of deficiencies in internal reporting and communication systems, the action of Mine Department staff also indicates a lack of appropriate environmental awareness amongst some ERA employees.

Delay in recognising the contravention of the stockpile management plan

The significance of the dumping of the material on the Grade 2 Stockpile was not recognised until 6 weeks after it commenced. It is reasonable to expect that the ERA Environment Department would have a simple system to verify that the environmental management plans that it steers through the approval process are implemented on site. It is also reasonable to expect that ERA would have a general environmental inspection regime which covers all areas of the site, even those where no environmental issue is expected to be identified. This incident has exposed an obvious flaw in those internal monitoring systems. In focussing on the more complex issues such as the correct construction of wetland filters, the ERA Environment Department overlooked the most basic potential failure, the possibility that fresh material would be incorrectly dumped on the Grade 2 stockpile during the wet season. This is indicative of deficiencies in ERA's internal environmental inspection and verification processes.

The OSS, accompanied by DBIRD and the NLC, undertakes Routine Periodic Inspections (RPI) of the Ranger site (and Jabiluka site) each month. With reference to this incident, these inspections were completed on 10 December 2001 (prior to the incorrect dumping commencing), 17 January 2002 (3 days after the incorrect dumping commenced) and 28 February 2002 (after ERA had informed authorities of the incorrect dumping). RPIs usually have a focus issue and inspect areas where an environmental issue has been identified or that have been subject to an environmental approval which was required to be implemented since the last RPI.

During both the December 2001 and the January 2002 Ranger RPIs, the new Corridor Creek wetland filter, the drainage channel leading to the filter and the drainage works leading from the Grade 2 Stockpile were inspected. These were the aspects of the Grade 2 Stockpile which were considered to pose the greatest risk to its successful management in accordance with the approval. During a previous visit to Ranger by the OSS, the compaction of the surface of the 2 stockpile had been observed. At the January RPI, ERA staff advised the inspection team that the Grade 2 Stockpile was inactive and the inspection team did not drive to the top of the stockpile.

Maintenance of drainage works around the ore stockpiles

On 27 March 2002, the Assistant Secretary of the OSS and the Supervising Scientist conducted a detailed inspection of the relevant ore stockpiles at Ranger. The inspection was to clarify aspects of the ERA Investigation Report which was received on 22 March. One aspect, in particular, was the management of any seepage that may express at the base of the Grade 2 stockpile.

As noted previously, seepage from the Grade 2 stockpile is not permitted to report to the Corridor Creek wetland filter system. Appropriate seepage control structures were observed to be in need of maintenance on the south eastern side of the Grade 2 Stockpile and were not present on the western side of the stockpile. Any seepage which could potentially have reported to the Corridor Creek wetland filter system due to the observed deficiencies in seepage control structures would be a very minor proportion of the total seepage from the stockpile. This is a matter than requires attention prior to the 2002/03 Wet season. The potential for some of the runoff from the 4/7 stockpile to have reported to the Corridor Creek wetland filter system is also due to poor housekeeping. These are relatively minor matters in themselves, but they are further evidence of significant room for improvement in ERA's inspection and maintenance systems.

3 Delayed reporting at Jabiluka

3.1 Exceedence of action levels in Swift Creek

To assist in the interpretation of data collected and ensure that clear guidelines exist for the reporting of unusual events, a data classification system has been applied to data collected at the principal monitoring sites downstream from Ranger and Jabiluka. This system establishes focus levels, action levels and limits for a number of important water quality variables, consistent with the Australia New Zealand Water Quality Guidelines.

The focus and action levels are merely early warning indicators are based upon statistical considerations of the water quality characteristics of each catchment. Since the focus and action levels are set at values that occur in the natural distribution, they will be exceeded occasionally each wet season. They are designed to ensure that ERA takes appropriate actions, where required, well before any limit is approached.

When a focus level is exceeded, ERA is required to initiate a watching brief. This essentially means taking particular note of the next sample to determine if there is a trend.

When an action level is exceeded, ERA is required to immediately inform the major stakeholders, initiate an investigation and take corrective action if required. The nature of the required investigation and action will be specific to the circumstances. For example, concentrations of some constituents occasionally reach naturally high values. These will show up as high concentrations both upstream and downstream from the mine. In this case, the exceedence of an action level would be reported but it would be noted that it was a natural occurrence and no further action would be necessary. If, however, an action level were exceeded and not accompanied by a high upstream concentration, in addition to notifying the authorities, ERA would take additional actions such as the analysis of duplicate samples and collecting additional samples for analysis.

In January 2002, ERA data recorded the exceedence of action levels for uranium, magnesium, and electrical conductivity. Some of these exceedences are explained by first flush and so were not required to be reported immediately. However, some could not be explained in this

way and, hence, ERA was required to immediately inform OSS, DBIRD and NLC and initiate an investigation.

Of particular concern to stakeholders were exceedences of the action level for uranium. For Swift Creek downstream of Jabiluka, the focus level for uranium is 0.02 parts per billion, the action level is 0.03 parts per billion and the limit is 5.8 parts per billion. On 2 January, 8 January and 22 January 2002 concentrations of uranium downstream from Jabiluka equaled or exceeded the action level (0.03, 0.05 and 0.06 parts per billion respectively). These occurrences were not reported to stakeholders until 15 February 2002, a delay which is not consistent with ERA's reporting requirements. Similarly ERA did not take appropriate action internally following exceedence of the action levels.

The data for 2 and 8 January show that similar uranium concentrations occurred at the upstream site. Thus, if a proper investigation had been carried out it would immediately have concluded that the exceedence of the action value had been a natural occurrence and no further action would have been required.

The upstream and downstream results recorded by ERA on 22 January were 0.01 and 0.06 parts per billion respectively. The concentration measured downstream exceeded the action level for uranium. Also, these data indicated that the Jabiluka mine site was the source of uranium due to the significantly higher concentration downstream compared to upstream. According to the commercial laboratory which undertakes the analysis of water samples collected by ERA, these data was reported to ERA on 25 January 2002. ERA should have reported this to OSS, DBIRD and NLC immediately and commenced an investigation. However, stakeholders were not notified until 15 February 2002 (appendix 3), in clear contravention of ERA's reporting commitments.

Supervising Scientist data for 22 January 2002 recorded effectively the same uranium concentration upstream and downstream of Jabiluka. Figure 6 shows Supervising Scientist data for the concentration of uranium upstream and downstream of Jabiluka during the early part of 2001/02 Wet season. When duplicates of the downstream sample collected by ERA on 22 January 2002 were analysed, as suggested by OSS, the result was not 0.06 parts per billion but 0.014 parts per billion. This result is below the action and focus level and agrees with the Supervising Scientist data. The commercial analytical laboratory used by ERA advised the Jabiluka Minesite Technical Committee on 12 March 2002 that the incorrect result was most probably due to contamination of the sample at its laboratory. Had ERA immediately reported the exceedence of the action level and commenced an investigation as required, the erroneous result would have been identified within a few days at most, and the unnecessary public concern would have been avoided.

3.2 Environmental significance

Taking into account the error in the analysis of uranium in the ERA Swift Creek sample for 22 January 2002, the maximum uranium concentration measured downstream from Jabiluka in January and February 2002 was 0.05 parts per billion (note that this is an ERA result, the highest concentration measured by the Supervising Scientist was 0.024 parts per billion at first flush). This concentration is lower than the ecological and human health limits by more than a factor of 100. Thus, there was no harm to people or ecosystems downstream from Jabiluka arising from these events.

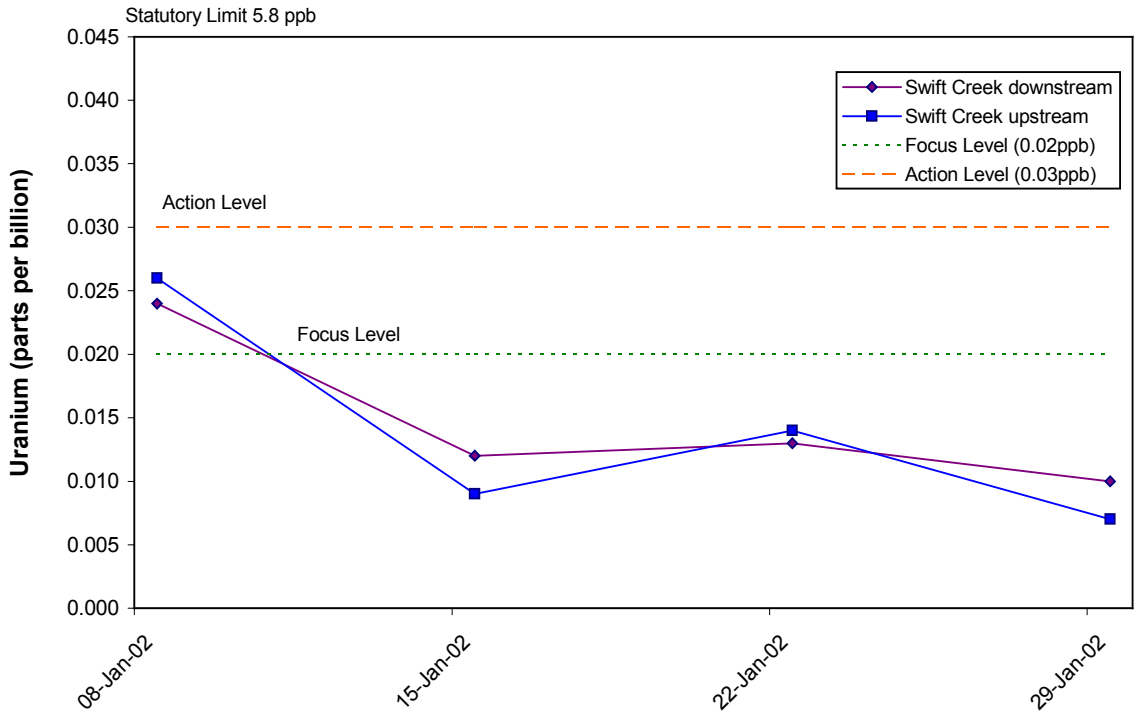

Figure 6 Supervising Scientist data: concentration of uranium in Swift Creek down stream of Jabiluka

3.3 Conclusions regarding the delay in reporting at Jabiluka

The conclusions to be drawn from the above discussion on Jabiluka monitoring data are:

- ERA did not adhere to the reporting requirements related to action levels in Swift Creek in January 2002.
- Had proper procedures been followed, it would rapidly have been established that there was no cause for concern and that the environment was not threatened. No further action would have been required.
- There are clear deficiencies in ERA's internal procedures in the Environment Department to ensure that monitoring data are properly assessed and action taken where appropriate.
- No harm occurred to people or ecosystems arising from these incidents.

4 Discussion

4.1 Environment protection

From the above assessments, it is clear that neither the stockpiling incident at Ranger or the delay in reporting the exceedence of action levels at Jabiluka caused any harm to the environment or to the health of people living downstream of Ranger. These conclusions have been reached on the basis of the chemical monitoring data collected by ERA and both the chemical and biological monitoring data collected independently by the Supervising Scientist.

This conclusion is supported by the Northern Territory Government, the Northern Land Council and the Traditional Owners.

4.2 ERA environmental management procedures

Significant deficiencies in ERA's environmental management systems have been identified in this report, have been acknowledged by ERA and need to be addressed. In summary, those deficiencies are:

- Inadequate internal communication between the ERA Environment Department and the Ranger Mining Department.
- Inadequate awareness in the Mine Department of the environmental objectives of mine plans.
- Inadequate internal communication, reporting and review of environmental data within the ERA Environment Department.
- Inadequate environmental surveillance and ongoing confirmation of the appropriate implementation of approved environmental management plans and protocols, including general inspection and maintenance procedures and documentation.

These deficiencies resulted in ERA not implementing plans or requirements which had been considered and agreed by the Minesite Technical Committee. The plans or requirements are sound; it is the failure by ERA to implement them effectively which has caused these incidents.

ERA has, in its Investigation Report and in subsequent discussions with the Supervising Scientist and other stakeholders, agreed to take a number of specific actions, including the following, to overcome these deficiencies:

- Commission a new system (LIMS) for the management of environmental data. This system has the capability of alerting managers, including the General Manager, automatically when any focus, action or limiting value has been exceeded.
- Appoint a new Environment Manager to replace the previous manager who was dismissed following the incidents discussed in this report.
- Focus the mine-site environmental staff on on-site issues of environmental protection rather than strategic issues; the strategic issues will be handled by the ERA General Manager – Strategy and by EWL Sciences.
- An external specialist consultant will review environmental tasks and duties and determine the staffing capabilities required to carry these out; the Environment Department will be restructured to meet these requirements.
- Specialist tasks, evaluation and reporting will be contracted to EWL Sciences.
- The General Manager – Operations will attend meetings of the Minesite Technical Committee; this will raise the profile of ERA's commitment to the environment and will ensure that ERA will carry out commitments made at the MTC.
- A senior member of the Environment Department will attend weekly mine planning meetings; this will raise awareness of environmental issues within the Mine Department and improve internal communications on environmental matters.

To address the main deficiency identified in this report, inadequate systems to ensure the implementation of management plans and the proper interpretation and use of monitoring data, ERA also made a commitment to contract an external specialist to review existing

environmental management and communication systems within the Ranger operations and to design and implement more effective process management systems. While this was welcomed by the stakeholders, it was considered that it is now necessary for ERA to proceed towards full compliance with and certification against the international standard on Environmental Management Systems, ISO 14001. ERA has now agreed to this action and announced its commitment to upgrade its environmental management systems at Ranger and Jabiluka such that they are compliant with ISO14001 by July 2003 and certified against ISO14001 by July 2005.

The ISO14000 series of standards, which are also Australian/New Zealand Standards, establishes an internationally recognised framework for environmental management based upon an environmental management system model with the following components; Environmental Policy, Planning, Implementation and Operation, Checking and Corrective Action, and Management Review. Certification against ISO14001 would ensure that the deficiencies in management systems identified in this report, and any other deficiencies that have not been identified, were adequately addressed. Certification to ISO14001 is a very significant process with an equivalently significant cost and can not be achieved in a short time frame for an industrial site at the scale of Ranger mine.

4.3 Compliance with statutory requirements

There are two sets of statutory requirements relevant to the Grade 2 Stockpile incident. The first is the Northern Territory *Mining Management Act 2001* (MMA), which is the principle legislation administered by DBIRD to regulate environmental aspects of the Ranger uranium mine.

The Northern Territory Minister for Resource Development approved ERA's proposal to divert rainfall runoff from the Grade 2 Stockpile to the Corridor Creek wetland filtration system. That proposal described how the Grade 2 stockpile was to be managed in order to separate poorer quality seepage, which was to report to the Low Grade Ore Sump, from better quality surface runoff, which was to report to the Corridor Creek wetland filter system. There is no doubt that the dumping of additional material on the Grade 2 stockpile by ERA in January and February 2002 was inconsistent with that proposal and, therefore, contrary to the approval issued by the Minister under the MMA.

Whether or not the actions of ERA legally constitute a breach of the MMA is most appropriately judged by DBIRD, which administers the legislation and would be responsible for undertaking any prosecution under the Act. In discussion with the Supervising Scientist, DBIRD has indicated that the primary test is, in its view, whether or not any prosecution would be likely to succeed. It is the view of DBIRD that, since the actions of ERA did not give rise to any environmental impact outside the Ranger Project Area, a prosecution would very probably fail. Further, DBIRD advised that the issue of "what is reasonable" must be considered. The incident did not result in any change which has any environmental significance downstream of Ranger, so it would not be reasonable for the regulator to interpret ERA's actions as breaching NT legislative requirements. Hence, it does not interpret this incident as a breach of Northern Territory legislative requirements.

The second set of statutory requirements are the Commonwealth's Environmental Requirements for Ranger (ERs). These requirements are attached to the Authority issued by the Commonwealth Minister for Resources under section 41 of the Commonwealth *Atomic Energy Act 1953*. The provisions of the ERs that need to be considered in relation to the Grade 2 stockpiling incident and potential environmental impacts are reproduced below:

1.1 The company must ensure that operations at Ranger are undertaken in such a way as to be consistent with the following primary environmental objectives:

(a) maintain the attributes for which Kakadu National Park was inscribed on the World Heritage list;

(b) maintain the ecosystem health of the wetlands listed under the Ramsar Convention on Wetlands (i.e. the wetlands within Stages I and II of Kakadu National Park);

(c) protect the health of Aboriginals and other members of the regional community; and

(d) maintain the natural biological diversity of aquatic and terrestrial ecosystems of the Alligator Rivers Region, including ecological processes.

1.2 In particular, the company must ensure that operations at Ranger do not result in:

(a) damage to the attributes for which Kakadu National Park was inscribed on the World Heritage list;

(b) damage to the ecosystem health of the wetlands listed under the Ramsar Convention on Wetlands (i.e. the wetlands within Stages I and II of Kakadu National Park);

c) an adverse effect on the health of Aboriginals and other members of the regional community by ensuring that exposure to radiation and chemical pollutants is as low as reasonably achievable and conforms with relevant Australian law, and in particular, in relation to radiological exposure, complies with the most recently published and relevant Australian standards, codes of practice, and guidelines;

(d) change to biodiversity, or impairment of ecosystem health, outside of the Ranger Project Area. Such change is to be different and detrimental from that expected from natural biophysical or biological processes operating in the Alligator Rivers Region; and

(e) environmental impacts within the Ranger Project Area which are not as low as reasonably achievable, during mining excavation, mineral processing, and subsequently during and after rehabilitation.

7.1 All excavated material must be managed such that there is no detrimental environmental impact outside of the Ranger Project Area, and that environmental impacts within the Ranger Project Area are as low as reasonably achievable.

As there was no detrimental environmental impact to Kakadu National Park or harm to human health resulting from this incident, the key phrase in these provisions relates to ensuring that environmental impacts within the Ranger Project Area are as low as reasonably achievable. Whilst it is true that, as a direct result of the incorrect dumping of material on the Grade 2 stockpile, the load of contaminants that entered the Corridor Creek wetland filter system on the Ranger Project Area was increased, it is not correct to equate this with an increase in environmental impact on the Ranger Project Area. The Corridor Creek wetland filter system is designed and intended to absorb contaminants. It is not reasonable to interpret the successful performance of its designated function as an environmental impact. In fact, by successfully performing its intended function, the Corridor Creek Wetland filter system removed the potential for significant environmental impact in Georgetown Billabong on the

Ranger Project Area, which is not part of the constructed wetland filter system. Thus, in the opinion of the Supervising Scientist, ERs 1.1, 1.2 and 7.1 have not been breached.

Another provision of the ERs that should be examined relates to interpretation of monitoring data, viz;

> 13.2 The company must ensure proper analysis of monitoring results to the satisfaction of the Supervising Authority or the Minister with the advice of the Supervising Scientist

As noted previously, the way in which ERA interpreted the high uranium concentrations measured at the entry point to the Corridor Creek wetland filter system is plausible. Although it was subsequently shown to be incorrect, it is not reasonable to conclude, on the evidence available, that the data were not properly analysed. Where there is more than one possible explanation for data, a proper analysis of the data can result in a conclusion which is later shown to be incorrect by the provision of additional information. The known performance of the Corridor Creek wetland filter system, and other environmental monitoring data available at the same time, demonstrated that there was no risk to the environment or human health. The action level for the concentration of uranium measured at GS8210009 downstream of Ranger, which if exceeded would have required an investigation, was never approached. So the decision by ERA not to initiate further analyses of these data, or initiate further investigations more rapidly, is considered to have been reasonable. Thus, in the opinion of the Supervising Scientist, ER 13.2 has not been breached.

It also needs to be questioned whether or not ERA acted in accordance with its reporting requirements under ER16.1 (c).

> 16.1 The company must directly and immediately notify the Supervising Authority, the Supervising Scientist, the Minister and the Northern Land Council of all breaches of any of these Environmental Requirements and any mine-related event which:
>
> (a) results in significant risk to ecosystem health; or
>
> (b) which has the potential to cause harm to people living or working in the area; or
>
> (c) which is of or could cause concern to Aboriginals or the broader public.

This was an issue specifically raised with the Supervising Scientist by the Gundjehmi Aboriginal Corporation.

With respect to the Grade 2 Stockpile incident, it is clear that individual staff of ERA were aware of the higher than expected uranium concentrations at the monitoring site at the entrance to the wetland filter system in January and early February 2002. However, they did not interpret these observations as indicating incorrect dumping of material on the Grade 2 Stockpile. The latter interpretation only occurred in the period 23-26 February. The first occasion on which ERA management became aware of the incorrect dumping was 26 February and the ERA Environment Manager notified the NT DBIRD, the Supervising Scientist and the NLC on that day. The NLC advised GAC on 27 February. It is, therefore, the view of the Supervising Scientist that there was no delay in reporting the incident to the authorities.

With respect to the failure by ERA to immediately notify authorities of the exceedence of action levels in Swift Creek, Ranger ER16.1 does not apply. The Ranger Environmental Requirements were revised in 2000 however the original Jabiluka Environmental

Requirements remain in force, and these ERs do not have a provision equivalent to Ranger ER16. The relevant Jabiluka Environmental Requirement is ER36.

36. The lessees shall ensure proper analysis of monitoring results and shall make data and reports available to the Supervising Authority at times and in a form prescribed by the Supervising Authority.

The analysis of the data by ERA was proper. It correctly interpreted its data, identifying data which was due to natural processes and data which indicated that the Jabiluka site may be the source of slightly elevated concentrations of chemical constituents. So the issue is whether the delay in reporting breaches the requirement that data be made available to the Supervising Authority at times prescribed by the Supervising Authority. The Supervising Authority is NT DBIRD.

ERA has committed itself, through agreeing to proposals discussed at the Jabiluka Minesite Technical Committee, to reporting exceedences of action levels downstream of Jabiluka to the NLC, OSS and NT DBIRD immediately. However, this commitment is not prescribed by the Supervising Authority under Northern Territory statute. Consequently, Jabiluka ER36 has not been breached.

For these reasons, it is the Supervising Scientist's view that ERA has not been in breach of the Environmental Requirements by its actions related to the Grade 2 Stockpile incident or its delay in reporting the exceedence of action levels in Swift Creek downstream of Jabiluka.

It should be noted that whilst the Jabiluka Environmental Requirements have not been revised, and there is no ER equivalent to Ranger ER16.1, ERA and the stakeholders are working to Ranger ER16.1 at Jabiluka as well as Ranger in order to ensure that the principle of transparency is equally applied to both sites.

4.4 Respective responsibilities of ERA and the supervising authorities

In the public discussion on the Grade 2 Stockpile incident, it has been suggested that this incident demonstrates that the authorities, DBIRD and the OSS, are not sufficiently active on the Ranger mine-site. A brief discussion is, therefore, warranted on the respective roles of mine operators and regulatory authorities.

The Northern Territory Department of Business, Industry and Resource Development is responsible for administering and enforcing relevant Northern Territory legislation at Ranger and Jabiluka. That is, DBIRD is the regulator. The OSS is responsible for supervising the environmental aspects of uranium mining at Ranger and Jabiluka on behalf of the Commonwealth. DBIRD and OSS undertake their respective functions through monitoring, auditing, inspection, and review processes. The output of these processes are requirements which ERA, the operator, must meet. ERA is responsible for meeting any requirements placed upon it by its regulators including the overarching requirement that the environment be protected.

In any regulator/operator scenario, the regulator needs to be vigilant to ensure that it does not take on, and is not perceived to take on, the responsibilities of the operator. This may occur if the regulator becomes closely involved in devising the strategies by which the operator will comply with its responsibilities, or reviewing and interpreting information and advising the operator how it should react, or defining very detailed and comprehensive requirements for the operator to meet. If this occurs, there is a tendency for the operator to become less diligent in meeting its responsibilities because it perceives that the regulator has taken over

responsibility. The result will inevitably be diminished performance. No regulator has the detailed knowledge or the resources to effectively run the operations which it is regulating.

Since the Supervising Scientist Report on the Investigation of the Process Water Leak at the Ranger Uranium Mine was released in June 2000, there has been a tendency towards increasing the involvement of OSS in on-site issues. For example, ERA on-site monitoring data are now provided to OSS, DBIRD and NLC on a regular basis whereas two years ago, provision of on-site monitoring data to stakeholders was the exception rather than the rule. This was a sound development because it increased transparency and provided the authorities with the opportunity, as appropriate, to develop a clearer understanding of on-site processes. However, the provision of data to the authorities does not alter the primary responsibility of ERA for examining and interpreting its on-site data and for taking action if necessary

Similarly, it has been our perception over the past two years that ERA has been relying more heavily on OSS, DBIRD and the NLC to contribute towards development of its management plans or applications. In some cases, the OSS has been uncomfortable with the extent to which it (and DBIRD and NLC) have been involved in their formulation. Where this level of engagement has been necessary to ensure sound environmental outcomes, the probable cause has been that ERA has not utilised all the expertise available to it through its subsidiary company EWL Sciences, and did not have all the required expertise on site at Ranger or Jabiluka. This was an issue which was raised in the Leak Report (Supervising Scientist 2000). As a result, ERA made changes to its staff structure. However, there have since been further changes in staffing at ERA and it is appropriate that ERA should, particularly in the light of the conclusions of this report, conduct a full review of the Environment Department staffing needs.

ERA has, during the conduct of this review, made commitments (see previous section) both to conduct a full review of the staffing needs of the Environment Department at Ranger and to make greater use of the expertise available to it in EWL Sciences.

The key conclusion of this discussion is that a clear division of responsibilities should be maintained at all times between ERA and OSS, DBIRD and NLC. An appropriate response to these incidents, which have caused no harm to the environment or to people, is to take steps to ensure that ERA has the systems and skills to enable it to meet all of its responsibilities rather than transfer these responsibilities to the regulators.

5 Conclusions

This report has resulted from an investigation by the Supervising Scientist of two incidents that occurred at Ranger and Jabiluka during January and February 2002. These were:

- the incorrect management of the Grade 2 Stockpile at Ranger
- the failure by ERA to immediately notify authorities of the exceedence of action levels in Swift Creek downstream from Jabiluka.

An important conclusion regarding these incidents has been that neither resulted in any harm to the environment of Kakadu National Park or to the health of people living in the region. This conclusion is supported by all stakeholders including the Traditional Owners of the Ranger and Jabiluka sites.

It has also been concluded that neither of the above incidents constitutes a breach of either the Northern Territory or the Commonwealth's statutory requirements of ERA.

We have concluded that it is the failure to have adequate systems in place to ensure the implementation of environmental management plans and the examination and interpretation of data obtained in monitoring programs that has given rise to these incidents, rather than any failure to have such plans and programs in place.

In the course of this review, ERA has made a number of commitments to address this failure. Many of these commitments are detailed measures designed to improve ERA's environmental performance and these are supported by the Northern Territory Government, the Northern Land Council and the Supervising Scientist. Of greatest significance has been ERA's commitment, following detailed discussions with the principal stakeholders, to obtaining compliance with, and certification against, the International Standard ISO 14001. Had ERA not agreed to this action, it would have been a recommendation of this report that it be required to do so. The reason we place such emphasis on the adoption of ISO 14001 is that compliance with this standard will, in the opinion of the Supervising Scientist and the other principal stakeholders, adequately address the deficiencies identified in this report.

A Johnston
Supervising Scientist
12 April 2002

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