



Response Document - Beverley Four Mile Project PER and Mining Lease Proposal

Mine owner	Quasar Resources Pty Ltd and Alliance Craton Explorer Pty Ltd Joint Venture as joint venturers in the Beverley Four Mile Project
Proposed Mine operator	Heathgate Resources Pty Ltd
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Tenement details	EL 3666
Name of mining operation	Beverley Mine Four Mile Project
Commodity to be mined	Uranium
MLA application date	16th May 2008

Prepared for
Heathgate Resources Pty Ltd (as proposed mine operator)

Level 4, 25 Grenfell Street, Adelaide 5000

19 March 2009

42657105.05002



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Executive Summary

This Response Document follows release by Heathgate Resources Pty Ltd (Heathgate) in its capacity as mine operator on 8 January 2009 of a Public Environment Report (PER) (formally a Draft PER) and Mining Lease Proposal (hereafter called the PER / Proposal), for construction and operation of the Beverley Four Mile Project.

The purpose of the Response Document and the PER / Proposal is to satisfy the requirements of the South Australian Government for a Mining Lease Proposal to support an application for a Mining Lease under the *SA Mining Act 1971*, and the Commonwealth Government's requirements for a PER under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The State and Commonwealth requirements for construction and operation of the Beverley Four Mile Project are set out in Guidelines dated 17 September 2008 prepared by the South Australian Department of Primary Industries and Resources SA (PIRSA) and the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) (DEWHA, PIRSA 2008).

The Four Mile deposits lie within the boundaries of the Exploration Lease EL 3666. A Mining Lease application covering part of EL 3666 was lodged on 16 May 2008. This MLA is the Project Area for this PER / Proposal.

The Beverley Four Mile Project entails construction of a satellite facility close to the Four Mile deposits, and construction of in-situ recovery (ISR) wellfields of the same design as currently used on the Beverley mining lease. This satellite facility would remove the uranium from the ISR liquor by ion exchange, producing uranium bearing resin, which would be trucked to the Beverley processing plant. The resin would then be stripped of uranium, and trucked back to the satellite facility.

Minor modifications would be required at the Beverley processing plant to accept the uranium-bearing resin, however there would be no net increase in uranium processing capacity. The uranium stripped from the resin would be processed at Beverley, and the small quantity of liquid waste arising would be disposed of at Beverley.

There would be no change to the existing Beverley camps, airstrip and supply bores. An unsealed access road would be constructed between the Beverley processing plant and the Four Mile satellite facility. A separate groundwater water supply may be installed at Four Mile. Some additional internal roads would be necessary within the Four Mile lease to access the wellfields. There would also be some additional fencing along the western boundary of the Four Mile deposits for security purposes, and a minor change to the alignment of the 4WD track from Paralana Springs to Hidden Valley, which runs near this boundary, to divert around the Four Mile West deposit.

Read in conjunction with the PER / Proposal, this Response forms the Final PER under the *EPBC Act*, and supports the conclusion of the PER / Proposal that the construction and operation of the Beverley Four Mile Project can be undertaken to meet applicable South Australian and Commonwealth requirements and with no significant impact on the environment.

No comments were received during the public exposure period that required any further evaluation, documentation, figures or tables. A table of the comments received and Heathgate's responses is provided in Section 1. Errata are listed in Section 2.

Comments and Responses

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The PER / Proposal for the Proposed Beverley Four Mile mine was published on 8 January 2008 in order to allow the public to participate in the approval process. Public comments were collated by the South Australian Government and passed on to Heathgate for response, along with a summary of the issues raised that are within the scope of the assessment process.

Table 1-1 below captures all comments received under headings derived from the issues listed in the summary, and provides Heathgate's responses. Some additional issues raised by the public are also addressed. Some comments that were out of scope (as determined by the regulators) have been omitted.

No comments were received that required further evaluation, documentation, figures or tables.

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Table 1-1 Responses to Comments

Public Comment	Response
<p>1 South Australian Department for Environment and Heritage</p> <p>Diversion of Paralana Springs - Hidden Valley 4WD track, and associated impacts</p> <p>Diversion of the Paralana Springs–Hidden Valley 4WD track is proposed. Has the landform and environment of this area been considered in any of the studies/reports? The impacts on flora, fauna, soils and hydrology relevant to this area are not detailed.</p> <p>It is unclear where resin returned to the Four Mile site from Beverley will be placed and how it will be dealt with.</p> <p>S3.2 states that there will be no impacts to tourism as the operation will be the same as at Beverley. This does not recognise that the project area for Four Mile West overlaps Arkaroola Sanctuary and that proposed road changes, fencing and scenic impacts closer to the ranges are expected.</p>	<p>The diversion of the Paralana Springs–Hidden Valley 4WD track will not be required at the beginning of construction and operations. The landform is Paralana High Plains which has been considered in the flora, fauna and other environmental reports. The track would be relocated closer to the foothills of the Flinders Ranges but still on the High Plains. Details will be confirmed with the owners and managers of Arkaroola Wilderness Sanctuary ahead of its requirement. The area of habitat affected by relocation of this track is very small in the context of the mining plan, and the previous alignment would be rehabilitated when mining finishes, or reinstated and the new alignment rehabilitated depending on the wishes of Arkaroola Wilderness Sanctuary and other stakeholders.</p> <p>Refer Section 4.5.3 – resin will be taken to a truck loading / unloading bay and returned to one of the five ion exchange vessels.</p> <p>The Arkaroola boundary extends eastwards from the Flinders Ranges into the plains area where Four Mile West is located (Figure 2-1). However as noted in Section 3.2, the proposed ISR operations on the plains area of Four Mile West would not affect the wildlife sanctuary and tourism activities at the Arkaroola Wilderness Sanctuary, which are focussed on the Finders Ranges. It is noted also that the Paralana Springs are outside the proposed Mining Lease area.</p>

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<p>Impacts from the proposed operations on tourism (particularly tourism associated with Arkaroola)</p> <p>Tourism: sample photographs showing current views from track within Arkaroola over the project area would provide better documentation of the impacts.</p> <p>S3.6: The plain is not featureless as stated here but dissected by numerous creeklines.</p> <p>S3.8: 'Geohazards' examines earthquake potential along faults in the area but the risks of fault movement in terms of the proposal are never assessed e.g. in Table 7-6 (risk assessment).</p> <p>There is an opportunity here to develop a strategic plan for the environmental management of the broader project including the cumulative impacts which will result when the Paralana area is exploited.</p> <p>S3.17.1: The first sentence should be deleted: it is obvious that radiation predates humans.</p> <p>Visibility of operations from Paralana Hot Springs</p> <p>Paralana Hot Springs: how far are the springs from proposed fences, road and wells and how visible will infrastructure be to tourists visiting the springs?</p> <p>Location of free flowing bores on the claim area</p> <p>Page 5-2 states that flowing bores will be closed off at Four Mile as has been done at Beverley. Are any such bores known at Four Mile?</p>	<p>Additional information and photographs will be given in the MARP.</p> <p>This comment is accepted; the text states 'almost featureless'.</p> <p>The specialist report provides earthquake ground motion parameters for use in the design of the Four Mile. The detailed design will use these to ensure the appropriate standards are met to resist earthquakes at the site.</p> <p>The Paralana Springs are outside the proposed Mining Lease area, and the Paralana area will not be 'exploited'.</p> <p>Opening comments of this nature are included in a discussion of radioactivity based on previous experience in explaining the phenomenon to non-technical audiences. Not all readers may have a scientific background.</p> <p>The Paralana Hot Springs are partly inside the gorge of the Paralana Creek where it exits the Flinders Ranges. No infrastructure will be visible from the springs.</p> <p>There are no flowing bores in the vicinity of Four Mile. The nearest flowing bores are water supply bores associated with the Beverley Mine. Flows from these more distant bores are controlled.</p>

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<p>Categories in the Risk Assessment matrix</p> <p>Tables 7-2 and 7-4 have different terms for the middle category of consequence, namely moderate and intermediate.</p> <p>Table 7-6, risk assessment matrix:</p> <ul style="list-style-type: none"> • 2.1: consequence should probably be moderate. • 2.2: likelihood of loss of local vegetation will remain almost certain after mitigation measures but the consequence may be kept minor through planning, operating procedures and SEB offsets. • There is no section in this table on flora as opposed to vegetation, specifically the risk of loss of species initially present on site and threats to scheduled species. These risks need to be addressed. • 3.1 (surface water): why is watercourse contamination considered to be minor in consequence? It should perhaps be considered moderate. • 4.3: is groundwater contamination really minor in consequence? • 5. Fauna: no specific mention of threatened species yet assessments have concluded that at least two threatened species occur in the immediate area. 	<p>It is agreed that in the consequence listing of Table 7-2, 'Moderate' should read 'Intermediate'. This is noted in the Errata.</p> <p>The risks assigned were discussed with various stakeholders before publication, and will be reconsidered during the preparation of the MARP taking into account comments made during the PER / Proposal public review process.</p> <p>Noted.</p> <p>For the purposes of the risk assessment vegetation and flora have been considered to represent the same aspect. No scheduled plant species are involved.</p> <p>The assessment of the risks for both surface and groundwater is based on experience at Beverley mine, where the effects on watercourses and non-mined aquifers has been extremely low or zero and the opportunity for any consequences greater than 'minor' is minimal. These will be reconsidered during the preparation of the MARP.</p> <p>The nationally vulnerable Dusky Hopping-mouse <i>Notomys fuscus</i> was only detected at the neighbouring Beverley mining lease in 2007 and this is considered an extension of the known range of the species, in marginal habitat, perhaps due to relatively unusually good conditions in its normal habitat to the north east (Waudby & How 2008). The proposed development is not considered a threat to this species. The Common Bandy-bandy (<i>Vermicilla annulata</i>), listed as State Rare, was only known from a single dried specimen found by environmental staff and has not been found in fauna surveys. Although</p>

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<ul style="list-style-type: none"> 5. Safety of available watering points is not mentioned. 6. Is radon gas release minor in consequence? 	<p>uncommon to rare this snake is widespread throughout Australia and the clearing of a relatively small proportion of a very widespread landform is not considered a treat to this species.</p> <p>These are either standard pastoral watering points (dams and troughs), natural springs such as Paralana Hot Springs or standard stock troughs filled by Heathgate with potable water away from the main areas of disturbance.</p> <p>Radon gas release is minor in consequence as confirmed by discussion with the EPA Radiation Protection Branch.</p>
<p>Methodology and timing of fauna and flora surveys</p> <p>Table 7-8: 4 x 1 ha weed abundance quadrats are mentioned. The quadrat area is adequate but the coverage across the site may not be with only four quadrats. Where are these quadrats located? The opportunistic component of monitoring mentioned here is commended if implemented correctly but details are lacking.</p> <p>Figure 7-1 should map the quadrat sites over disturbance areas to enable better assessment of their utility. There appears to be no sites within the Four Mile West deposit area or covering the proposed access road.</p>	<p>Weeds are checked in all vegetation quadrats. At the time of the survey, four quadrats had weeds observed. The more recent survey report (Beverley Uranium Mine Vegetation Monitoring Observations September 2008 – to be attached to the 2008 Beverley MARP Compliance Report) states “Alien species were recorded at four monitoring sites during the 2008 survey. All records were from sites along the Four Mile Creek and involved only two species. <i>Brassica tournefortii</i> (Wild Turnip) was recorded at a single site (BU12A) at a cover value of 0.3%; <i>Schismus barbatus</i> (Arabian Grass) was recorded at four sites (BU12A, BE02, BE03, BE05). These species were all recorded at low cover values, ranging from 0.7% to 2.3% (see Appendix A [of the report given as Appendix E of the PER/Proposal]). The occurrence of <i>Brassica tournefortii</i> was a new record for the Beverley Mine Lease, although it is somewhat surprising that it had not been recorded earlier”.</p> <p>The orebody outlines where mining (and therefore disturbance) is planned are shown elsewhere, e.g. Figure 1-4 and others. A figure including the orebody outlines and the quadrat sites will be included in the MARP. Early monitoring effort is concentrated around the Four Mile East deposit, which is planned for first development. Additional flora monitoring sites will be established at or near Four</p>

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<p>Weed inspections will need to be more intense in disturbed areas especially where vehicles move in and out to pick up new introductions or outbreaks and some quadrats will need to be placed in areas where infestations may occur.</p> <p>Pages 7-30 and 7-31: The utility of plant cover and biomass data is questioned ("noisy" data) but there is no reference or justification given for this conclusion.</p> <p>The surveys were conducted in drought conditions with very few ephemeral species recorded. <i>Swainsona oligophylla</i> has been recorded at Beverley only after significant rainfall. It follows that the presence of this NPWA Rare species has not been ruled out for Four Mile.</p> <p>The SEB ratio should be 8:1, not 4:1 according to the guidelines and common sense. The area may be grazed but it has the potential to return to ungrazed community structure.</p>	<p>Mile West if required ahead of mining there.</p> <p>Comment on where weed inspections are most needed is noted and agreed. This is done on an ongoing basis by environmental staff and does not rely solely on the annual vegetation surveys. Quadrats may be moved or additional ones added to the program if specific areas of new weed outbreaks are detected.</p> <p>This comment is based on advice from the specialist arid zone botanist who has examined the historic data at Beverley.</p> <p>Agreed, although it should be noted that Heathgate environmental staff often collect additional plant specimens between formal surveys after rain events, the identity of which is confirmed by the specialist arid zone botanist if the plant is possibly an addition to the formal records for the area. The clearing of a relatively small proportion of a very widespread landform is not considered a threat to <i>Swainsona oligophylla</i>.</p> <p>The SEB ratio has been previously discussed at length with the regulating authorities and the value of 4:1 has been agreed as appropriate.</p>
<p>The design of the baseline and monitoring surveys may not be appropriate. At the least, it is poorly explained and justified in the document.</p> <p>The baseline survey was conducted in 1 ha/10,000 m² quadrats considered necessary for the climate and vegetation.</p>	<p>The design of the baseline survey is based directly on DEH methodology for investigation and classifying vegetation in new areas. Annual monitoring is the same as that used at Beverley since the start of operations and is identical to that used at Olympic Dam since that mine started up. Both were designed and implemented by Dr Tim Fatchen of Fatchen Environment and are based on methods initially devised by SANPWS, and have been accepted by the regulating authorities since before operations commenced.</p> <p>This survey used the standard DEH survey methodology for arid zone areas. This is referenced in the report, even if this is not explained in explicit detail. Any</p>

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<p>The annual flora monitoring quadrats appear to have been designed to cover 100 m² (i.e. 1%) of each 1 ha baseline quadrat divided into ten 5 m x 2 m cells.</p> <p>What is the purpose of a baseline quantitative vegetation survey if the subsequent monitoring uses a different set of quadrats at a different scale?</p>	<p>DEH reviewer should be well aware of the methods. The only difference to those set out in full by Heard and Channon (1997) is the use of 100 m x 100 m quadrats instead of the 30 m x 30 m quadrats used in agricultural areas. This is the accepted quadrat size for pastoral areas.</p> <p>The annual vegetation monitoring (it is the vegetation that is being monitored as a whole, the individual flora species are a component of this). The quadrats used are each 5 m x 2 m and there is one per quadrat. This equals 10 m², not 100 m². The individual flora elements could be reported on from year to year, all the data are present in the specialist's reports. The current approach is considered acceptable and has been approved by the regulating authorities.</p> <p>This is explained in the Four Mile Baseline report. The 1 ha quadrats are used by DEH and Heathgate's specialist arid zone botanist to determine vegetation associations, or the relationship between different sites. These are of too coarse a scale to detect differences at individual sites between years. Conversely, the 10 m² quadrats are useless in detecting the changes from year to year. The latter is demonstrated in Badman (2006)¹. (Figure 4 on Page 22 of that report). This shows a scatter plot of data from all annual monitoring at Beverley and shows only a big cluster of sites with two tails; one of all site data from the wettest year, and the other of all sites in the driest year. The large quadrats are DEH's design and are used for the same purpose that they use them for. The small quadrats have been used at Beverley since monitoring began and were designed by Tim Fatchen. This same method has been used at Olympic Dam since monitoring began there and has been accepted by the regulators for both mine sites.</p>

¹ Badman, FJ 2006. Southern EL 3251 Flora Survey. Supporting Report D of the Beverley MARP and Draft PER/Mining Proposal

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<p>How is it possible that 10 m2 quadrats (grouped in to 100 m2 blocks) are adequate for monitoring when 10,000 m2 quadrats were required for the baseline survey to account for the environment?</p> <p>It is dubious that the proposed monitoring quadrats are sufficient to gain a picture of vegetation dynamics at the sites. Populations are too spread out in this environment and sampling of a larger area is probably required.</p> <p>The baseline and annual monitoring surveys reported for 2007 appear to both be baseline surveys using different methodologies.</p> <p>Page 12 of the 2007 annual flora report states that some monitoring sites were set up on the edge of creeks and these generally miss tall trees and larger shrubs. Reasons are given for these sites not being located within the 1 ha 'baseline' sites. The quadrat layout appears to be inappropriate and reflects the inadequacy of the quadrat size for the environment in that it would be sensible for the design to capture the community structure and dominant species present on that landform, other wise it may be difficult to assess and interpret changes to the community.</p>	<p>There are no 100 m² blocks. The two different quadrat types measure two different things as explained above. Neither can fulfil the alternative purpose.</p> <p>The number of monitoring quadrats is considered to be sufficient. There is a clear understanding of the vegetation dynamics of the area from the baseline surveys of both the Four Mile and the Beverley Extension Leases (Badman 2006). The sampling of 1 ha quadrats is done using a scoring system (a rating of each plant's abundance rather than a strict numerical value for the cover of each species as is done in the smaller quadrats) that is necessarily too inaccurate to detect small changes between annual monitoring events. For instance, a score of 1 includes plants with cover values from "plentiful but less than 5 cover" to 5% cover. A score of 2 includes "5% - 25%" cover. When looking at a 1 ha quadrat one cannot differentiate between 5 and 6% cover. This is why this size quadrat cannot be used to detect small changes between monitoring events. This can be done much more accurately in the 5 m x 2 m quadrats, where cover values are estimated for 10 cells each 1 m² and then averaged over the whole quadrat.</p> <p>The Baseline survey used 1 ha quadrats in order to determine the number of different vegetation types through the widely accepted methods of ordination and classification; the annual survey use the smaller quadrats so there will be data for use in comparison with the following year's data, i.e. the purpose is different, hence also the methodology.</p> <p>Sites were set up on the edge of creeks in order to comply with what was done during the original Fatchen surveys at Beverley. Small quadrats cannot easily be set up in these rocky creeks because: 1) marker pegs are swept away each time there is a flood; 2) the creek bed is usually too rocky to drive in pegs; 3) the creek bed is often bare of short-lived vegetation because it is regularly swept away by floods; 4) the Melaleucas in particular would often cover the whole quadrat and make access to it almost impossible. Creek trees are covered by</p>

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<p>The fauna report identified major drainage lines as important sites of bird diversity and it follows that vegetation monitoring of these creeks should be designed to include riparian trees and shrubs by using appropriate scales.</p> <p>The monitoring program has been set up to be conducted annually in spring. There is no justification given for the choice of season. BOM data for Arkaroola (which are closely comparable in pattern to the data given for Beverley but slightly higher rainfall received during rain events) suggest that almost all significant rainfall events in the area occur in summer months with occasional significant events in March or April. Spring survey would normally be used in areas receiving maximum rainfall during winter months. If the justification for spring survey is the dominant flowering period expected for the majority of species in the area, this should be explained. If this is the case, explanation of why the 'baseline' survey was conducted during April should be given.</p> <p>Monitoring and survey should be flexible to allow for follow-up surveys, at least opportunistic searches for additional species (e.g. <i>Swainsona oligophylla</i>), to be conducted at suitable times following rainfall, otherwise it is conceivable that a series of monitoring surveys conducted in September may never pick up some ephemeral species which would grow after summer rains and be dead by spring.</p>	<p>the quarterly photographs taken by site environmental staff and any changes are or will in future be reported in the annual report (Mining and Rehabilitation Compliance Report).</p> <p>The baseline fauna survey for the Four Mile project was undertaken in spring along with the monitoring for the Beverley Mine fauna sites. Spring bird surveys are undertaken so that fauna survey work is undertaken at the same time as the remaining fauna surveys. Undertaking autumn fauna surveys generally will give a lower diversity of reptiles and often lower capture rates of mammals, therefore spring is more productive.</p> <p>The monitoring program is not designed to pick up every single species, but designed to detect long term change as a direct result of the mining operations. It is noted that <i>Swainsona oligophylla</i> was picked up at two locations near Beverley in the spring of 2005, following good winter rainfall. Most of the herbarium records (95 collections) are from the cooler months, with very few from summer. Beverley is also very close to the southern limit of this species known range in SA. Species such as this occur only in good seasons, when they are hidden amongst other common herbs. Heathgate environmental staff may collect additional plant specimens between formal surveys after rain events, the identity of which are confirmed, if necessary, by the specialist arid zone botanist if the plant is possibly an addition to the formal records for the area or of conservation significance.</p>

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<p>Baseline flora survey report, threatened species section: there is no explanation of survey methods used across the site (not just within quadrats) to identify threatened species, especially at areas proposed to be cleared or disturbed. Areas of heavy impact should have a complete species list compiled with intensive searches for threatened species. The quadrats designed to characterise the vegetation of the area and establish monitoring sites are not adequate for this purpose.</p> <p>Page 12 mentions searches for threatened species in 1 ha quadrats. A survey of a quadrat should implicitly involve intensive searches for all species within the quadrat.</p> <p>Opportunistic observations in other likely areas of occurrence of threatened species are briefly mentioned but this does not provide the necessary detail in terms of survey intensity and extent to assess the likelihood of presence of further taxa at the site.</p> <p>Management measures to protect threatened species</p> <ul style="list-style-type: none"> Page 7-47: establishing clean water sources as an alternative does not ensure that fauna will not utilise process water and ponds if these are also accessible. <p>The fauna report recommends that lights are turned off at night to avoid impacts to animal behaviour (such as avoidance) but this is not mentioned or discussed in the ML proposal.</p> <ul style="list-style-type: none"> The EPBCA Vulnerable Dusky Hopping Mouse is known in the area but management measures are not included in the ML proposal. 	<p>It is not possible to survey the whole of the mine lease and surrounding area for any species every year, especially the small herbaceous ones. Thorough searches are made for all species at all monitoring sites and opportunistic searches at other likely places during each annual survey. As noted above, other collections of possible threatened species are made by Heathgate environmental staff on behalf of the specialist arid zone botanist and under his collection permit, who arranges identification. This typically occurs after significant rainfall events.</p> <p>These intensive searches are undertaken – see note above.</p> <p>Opportunistic searches are made by Heathgate environmental staff with the support of the specialist arid zone botanist – see notes above. For example, two native species of <i>Tribulus</i> (Caltrop) and the native dodder <i>Cuscuta victoriana</i> were identified in this manner in 2007/08 after rain events.</p> <p>Process water ponds are fenced to exclude larger fauna, and few birds are observed on the ponds. Paralana Hot Springs and North Mulga Dam are permanent or near-permanent water sources in the area as well as the water troughs maintained for stock and wildlife by the pastoralist and Heathgate respectively.</p> <p>This is not practicable as human safety precautions at a 24 hour operation require good localised artificial lighting.</p> <p>After lengthy discussions with experts, Peter Copley (Senior Ecologist, Threatened Species, DEH) and Dr Cath Kemper (Curator of Mammals, SA</p>

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<ul style="list-style-type: none"> The assumptions made in the fauna report that the population must be transient as it is expected to prefer sand dune country are unsubstantiated. It may be that the habitat breadth of this species is poorly understood. Even if the species migrates locally according to rainfall, the Beverley Four Mile area may represent significant habitat. The identified population may well be outlying but the assumptions about its significance are dubious as it may be that dispersal is a critical process for maintenance of the species. This is clearly not known. At the time of the survey, the details of the proposal were not known, therefore it appears that no specific searches for significant species nor habitat assessments have been made for proposed areas of clearing and disturbance, which is unfortunate and needs to be addressed. This also impacts the design of the monitoring program, for example, monitoring and searches for feral animals may need to be more intense around structures and in disturbed areas such as buildings and roads. <p>The impacts to fauna of fencing the project area to the west are not addressed.</p>	<p>Museum) and reviewing known information on this species, it was concluded this species is specific in its habitat requirements (sand dune habitat) with <i>Notomys cervinus</i> occupying the gibber plains habitat, with no overlap being recorded between the two species. Therefore, it is considered that species is transient, and to say its preference for sand dune country is unsubstantiated is false and it is suggested that the reviewers should check with the Departmental experts on this species. Please also refer to the refereed paper by Waudby and How (2008).</p> <p>The assumption in relation to the importance of this outlier was based on discussions with Peter Copley. Heathgate's consulting fauna specialist maintains that the Four Mile area is actually different to the Beverley sites. It has been recorded in that the Four Mile Creek has less sand, is structurally different with less large red gums and thicker smaller gums and more surface river stone.</p> <p>The habitats available for fauna within the major land forms vary slightly across the project area, however, sampling gibber sites across the project area will have given a very good picture of fauna use of gibber sites to be impacted, as this habitat type is very similar across the project area. Targeting specific areas to be impacted will not necessarily provide more data or more specific data as the habitat features are similar. Also, the baseline survey would be utilized to direct locations of plant and infrastructure - in this respect it is undesirable to survey after the design phase, as by then it is too late to make any design alterations should any significant populations be found.</p> <p>Feral cat trapping is undertaken at Beverley and will be extended to Four Mile. Several cats are caught and euthanised each year. Wild dog baiting is also undertaken and mice are trapped in buildings. Elliot traps are used in case native animals are captured, although by far the majority are house mice.</p> <p>Much of the fencing in the west already exists. When Four Mile West is mined in</p>

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<p>S5 of the fauna report recommends implementation of weed and pest control as required. There should be a more targeted program for recognised threats such as feral cats.</p> <p>Biological monitoring</p> <ul style="list-style-type: none"> The rationale and methodology for the design of the monitoring programs needs to be explained, for example as to the selection of sites for vegetation monitoring quadrats. <p>Cumulative impacts from proposed operations</p> <p>Overall there appears to have been a missed opportunity to coordinate the biological monitoring programs in some way so that flora and fauna dynamics could be better compared and correlated over time. Such coordination could be considered for future developments at Beverley.</p> <p>Details of pro-active methods for rehabilitation (soil and vegetation sections)</p>	<p>the future, any affected fencing would be relocated. It is noted that the fencing would be stock grade fencing which is used extensively through the region.</p> <p>As noted above, feral cat trapping is undertaken at Beverley and will be extended to Four Mile. Weed and pest control is also undertaken as necessary and will be extended to Four Mile.</p> <p>In relation to fauna, the site selection is based on a spread of sites across the project area within the different major land forms (habitat types) present within that project area. Monitoring sites need to be located in areas where they will not be disturbed directly by the project (e.g. where a road is going to go) as if this occurs it will impact on the analysis of results. The micro-siting of fauna sites is based on accessibility (trying not to create new tracks that increases the level of impact), habitat features present within the area (e.g. cracking clay in the gibber), the quality of the area and the locations of planned disturbance. This is solely designed to put sites in areas which will capture / observe the highest diversity of fauna species for that habitat type whilst taking into account the disturbance areas. Long-term changes to abundance and species diversity can then be monitored over time.</p> <p>Surveying for fauna earlier in the season is likely to detect lower fauna species diversity and abundance. The warmer weather is needed to generate activity, particularly in reptiles. This may not be the same for flora species. Thus a compromise is necessary, otherwise monitoring would occur continually with a huge number of sites. This is unrealistic and whilst it could add a lot of data, it would not add commensurate of value.</p>

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<ul style="list-style-type: none"> • The soil and vegetation section does not mention any pro-active methods for rehabilitation, only continuing monitoring. • Is any rehabilitation required or planned (e.g. earth works, seeding, planting, weed control)? • Table 8-1 mentions 'revegetation' and 'soil and seed sources', which suggests that revegetation will occur as opposed to monitoring of natural regeneration. • Even if the specifics of revegetation are not described within this document, there should at least be mention of appropriate strategies to be implemented such as provenance of propagules and restoring the vegetation community to a state comparable with baseline data. <p>The EFA method described to assess rehabilitation success appears to be based on plant cover and functional characteristics of soil. Community structure, diversity and composition should also be included.</p>	<p>Progressive rehabilitation will be undertaken as is currently the practice at Beverley mine. Drill pits are rehabilitated soon after drilling, often within a month. When mining is completed in a wellfield, the wellhouse and much of the surface-laid piping and electrical services are relocated to another wellfield and reused. When a final decision is made to rehabilitate a wellfield (after secondary and sometimes tertiary recovery has been undertaken), those wells not required for ongoing monitoring are decommissioned.</p> <p>Heathgate undertakes ongoing weed control. Revegetation is by a combination of natural recolonisation for small areas where fresh topsoil is respread (e.g. drill pits) supplemented by seeding from locally sourced native vegetation seeds for larger areas that may be rehabilitated some years after the original clearing.</p> <p>Although techniques will be refined, Ecosystem Function Analysis (which includes vegetation monitoring and species presence and richness as well as cover) is proposed to assess the return of the ecosystem function. Refinements that may include additional consideration of plant community structure, diversity and composition will be considered as the rehabilitation plan is refined in the light of rehabilitation progress at Beverley and later Four Mile.</p>
<p>2 Jill Robinson</p>	
<p>Consultation</p> <p>I feel that this PER, while containing very similar information, is not subjected to the same rigor of public comment and thus is not giving the Australian people the opportunity to have input. This is further demonstrated in section 6 where consultation was on a local level only. No notification was placed in state or national papers and no state or national public meetings were held. The lack of success of this consultation is shown in table 6.1 where a very small number of people attended meetings. In section 6.1, identification of stakeholders, I do not believe that “the regulators” can be put down as the only people representing the whole community. The South Australian public and Australian public are clearly stakeholders in the mining of uranium.</p>	<p>In addition to direct consultation with Adnyamathanha representatives and Commonwealth and SA regulators, notifications of public consultation sessions (held at Pt Augusta, Hawker and Arkaroola) were published as follows:</p> <ul style="list-style-type: none"> • The Recorder, Port Pirie (20/11/08) • The Transcontinental, Port Augusta (22/11/08) • The Flinders News, (21/11/08) • Arkaroola (notices placed in public places) • Vulkathunha/Gammon Ranges National Park HQ (notice sent by email)

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	<ul style="list-style-type: none"> • Southern Flinders Ranges Development Board (notice sent by email) • Pt Augusta City Council (notice sent by email) <p>Notices for the PER / Proposal were published in:</p> <ul style="list-style-type: none"> • The Advertiser (Adelaide) • The Australian (National) • The Recorder (Port Pirie), and • The Transcontinental (Port Augusta). <p>There was thus ample opportunity for all interested parties to be informed and to provide feedback.</p>
<p>Vertical confinement of Eyre Formation and Fractured Rock aquifer</p> <p>Specific comments on areas requiring further information are provided in the following dot points:</p> <ul style="list-style-type: none"> • Mining is occurring in an entirely different aquifer, and while an assessment of the hydrogeology has been undertaken I feel that this has not been performed to the level required for ISR mining. 	<p>The assessment of the hydrogeology has been undertaken to a great level of detail, including a significant program of field work and aquifer testing. This included the installation of over 25 test wells specifically into the Four Mile embayment aquifer system as well as analysis of data from over 100 aquifer monitoring points regionally and analysis of over 800 geological data points within the Four Mile East deposit and regionally.</p> <p>The assessment was planned and implemented in consultation with State and Commonwealth regulators, and a panel of hydrogeologists, with over 65 years of combined professional experience in groundwater management.</p> <p>Heathgate as proposed operator is confident that the current level of detail and understanding of the aquifer system will allow the deposit to be mined efficiently and without unacceptable environmental impacts.</p> <p>Heathgate as proposed operator will apply an adaptive management approach to mining of this deposit, where, as mining progresses and the understanding of the</p>

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<ul style="list-style-type: none"> I have concerns that the hydrogeological assessment has not demonstrated that the aquifer is vertically confined. The discussions of vertical confinement between the Eyre and Fractured Rock deal only with natural pressures and have not considered those that will be present during mining. <p>Details of aquifer "frac" pressure</p> <ul style="list-style-type: none"> There is no indication of what the aquifers "frac" pressure will be and therefore a limit on what mining pressures will be restricted to. 	<p>system is continually improved, management of the mining system will be adapted to ensure continued efficient mining without unacceptable environmental impacts. This adaptive management approach is undertaken within the strict constraints required by State and Commonwealth Regulators to ensure that environmental impacts are acceptable.</p> <p>Aquifer testing at the Four Mile East orebody indicated that the aquifer is confined vertically. Further, the measured difference in natural aquifer pressure between the Eyre Formation and Fractured Rock aquifers provides additional evidence that 1) there is a hydraulic barrier to flow between the formations; and 2) the potential for flow is from the fractured rock to the Eyre Formation. The natural pressure gradient will not be reversed during mining because mining is undertaken while maintaining bleed, where more water is extracted than injected thus maintaining a slight pressure gradient towards the mining zone.</p> <p>The calculation of fracture (frac) pressure, and its use in restricting injection pressure is not relevant at Four Mile East because the orebody is hosted in an open aquifer system. The application of a frac pressure constraint on injection pressure was relevant at the Beverley mine because this is a fully bounded system. At Beverley, uncontrolled over-injection would result in increasing aquifer pressure that could theoretically cause buoyancy and failure of the overlying aquitard. This is akin to over-inflating a closed vessel such as a bicycle tire until the rubber fails and the tyre bursts. Because the Four Mile East Orebody is hosted in a laterally unbounded, open, aquifer system (demonstrated by pumping tests and the measured natural hydraulic gradient), uncontrolled over-injection would result only in flow of water away from the mining zone, not an ongoing increase in aquifer pressure. The Four Mile scenario is akin to inflating a rubber hose which is open at both ends; it is not possible to over-</p>

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<p>Comment on the pastoral suitability of the Eyre Formation - in reference to fluoride and TDS levels</p> <ul style="list-style-type: none"> The water in the Eyre Formation is of much better TDS quality than the Namba Formation, they note that the class of use is unusable due to Fluoride levels, however in the lower range is not that much higher than the drinking water standards and may be useable for stock. Very little detail is provided in the report on the water quality and generally about the aquifer. There are references to the appendices, however this makes it very difficult to read and assess. <p>Options for prevention of migration of mining fluids</p> <ul style="list-style-type: none"> The aquifer is demonstrated as having a gradient. What options are the company going to use to prevent migration of mining fluids. <p>Disposal of liquid waste from mining operations</p> <ul style="list-style-type: none"> It is not completely clear on what liquid waste disposal options are. It is mentioned but not in enough detail. If liquid waste is not to be pumped into the Eyre, will this draw down the aquifer over time. If it is to be trucked to Beverley and disposed in the Namba formation then what is the sustainability of this option. I would also question if this mixing of waters between aquifers is allowed under the water resources act. 	<p>pressurise this hose because air will simply flow out of the open ends. However, as stated in the previous point above, mining will be operated with slight over-extraction (bleed) – hence over-pressurisation is practically impossible.</p> <p>Noted. Within the aquifer zone targeted for mining, natural radionuclide concentrations preclude all uses other than mining including stock watering.</p> <p>As noted above the great detail provided in the Hydrogeology section creates the need for appendices.</p> <p>The natural migration speed (~15 m per year) is less than one hundredth of the production fluid circulation speed, thus making control relatively easy by maintaining a slight over-extraction of mining solution (bleed) which acts to draw water towards the mining zone, preventing migration.</p> <p>An extensive monitoring network is planned which will demonstrate that control of mining solution is being achieved.</p> <p>Liquid waste will be managed as per the currently approved disposal procedure, i.e. at Beverley in approved ex-mining aquifer areas. The active mining aquifer at Four Mile will draw down slightly during mining but will recharge naturally with time.</p>

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<p>Metallurgy of the formation and recovery rates of uranium resource</p> <ul style="list-style-type: none"> There is very little information on the metallurgy of the formation and demonstrated tests on recovery. ISR mining is not the most efficient in the recovery of resources, especially if aquifer permeability is low or in any way heterogeneous or if it is difficult to leach. It is in the best interest of the Australian public to maximise recovery of our resources. I feel further information on this is essential. <p>Radon modelling of the satellite plant</p> <ul style="list-style-type: none"> There is no radon modelling of the satellite plant. There is a proposed PLP, therefore radon emanation from the aquifer will be maximised. No indication of the occupational or environmental levels are provided. <p>Mitigation of risks from locating infrastructure within flood plains</p> <ul style="list-style-type: none"> The mining areas and satellite plant are both located in the foothills and next to or on a large creek. Not enough information is provided on the impact this will have. The area is significantly different to that of the Beverley mine. I would question the risk ratings on allowing mining and operations within the 10 year flood plain areas. The justification of infrastructure only being located with these zones for less than a year may not be valid. It is clearly stated in the document that no wells at Beverley have been rehabilitated, therefore it must be assumed the wells at Four Mile will remain for several years. Even though flow in four mile and similar creeks in this area is rare, when it does occur the velocity is high and there is sand movements. What will the company do to mitigate the risk to damage of wells and pipework during these events. 	<p>ISR is a relatively efficient form of mining because more of the resource is available for mining. High development cost for underground and open-cut mining means that some sections of orebodies are too costly to mine. With ISR, sections as thin as 2 m can be mined even when 100 m or more below the surface.</p> <p>The PLP will be covered and radon will be exhausted through stacks. The PLP will be located such that radon from the pond will not be a significant hazard to workers or the environment.</p> <p>Neither the mining areas nor the satellite plant are located in the foothills. They are located near Four Mile Creek but that has been taken into account in the design of the facilities.</p> <p>The majority of the infrastructure in the wellfields is in place for 1.5 to 2 years, after which most is moved and re-used in new wellfield developments.</p> <p>This is addressed in the PER / Proposal (Table 7-6). Measures include: engineered creek crossings where high opportunity for flood damage is present; ponds, wellhouses and processing plant located on high ground above 1-in-100 year Annual Rainfall Index (ARI) flood level; use of 1-in-100 year ARI flood level map in design of pipe routes and flood protection to minimise creek crossings; minimise production well installation in flood-prone areas; and visual assessment of infrastructure as part of routine maintenance and following all major rainfall events of greater than 1-in-10 year ARI.</p>

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<p>Other Issues</p> <ul style="list-style-type: none"> The impact from increased traffic on the roads across Four Mile Creek has not been adequately addressed. This should also include the impact during flood or flow events. What does the company intend to do to mitigate sediment transport from wellfields into Four Mile Creek. 	<p>The traffic density across Four Mile Creek will be very low (about eight trucks per day, plus service vehicles) and would cease during flow events.</p> <p>As noted in the PER / Proposal, some silt control measures would be employed on roads, particularly creek crossings, as is presently done at Beverley.</p>
<p>3 South Australian Environment Protection Authority Radiation Protection Division</p>	
<p>Miscellaneous comments</p> <p>1.5, Para 1 (and elsewhere) - A minor point; ion exchange is based on a chemical process not physical (such as gravity, magnetic, electrostatic or optical) separation techniques.</p> <p>3.17.1 - The NOHSC National Standard for Limiting Occupational Exposure to Ionising Radiation (NOHSC: 1013 (1995)) has been superseded by Radiation Protection Series No.1. In any case, annual radiation dose limits are set in regulations under the Radiation Protection and Control Act 1982.</p> <p>4.1.4(2) - Suggest - A licence under the Radiation Protection and Control Act 1982 (SA) to Mine or Mill Radioactive Ores, referred to generally as a Radiation Licence. Note: the EPA intends the 4-Mile licence to be a separate licence under the RPC Act.</p> <p>(2) Commonwealth Codes –</p> <ul style="list-style-type: none"> Note: the ‘Mining Code’ is not used as a reference by the EPA, rather it will be a binding condition of the Beverley 4-Mile licence issued under the RPC Act. Note: Comment above about the NOHSC standard. <p>4.2.4, Para 2 - The Plans are to satisfy requirements under RPC Act Licence conditions.</p>	<p>Noted. A text change is noted in the Errata.</p> <p>Noted and accepted; the same dose limit of 20 mSv/yr averaged over a five-year period applies under the newer arrangements. Future documentation will refer to the current arrangements.</p> <p>Noted.</p> <p>The appropriate licence for Four Mile will be applied for ahead of construction and operation.</p> <p>Noted and accepted; future documentation will refer to the current arrangements.</p> <p>Noted and accepted; future documentation will refer to the current arrangements.</p> <p>Noted and accepted.</p>

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<p>4.6.2, Para 4 - The disposal of liquid radioactive waste is authorised via the RWMP.</p> <p>Satellite plant detailed diagrams Figure 4-4 - More detailed diagrams of the satellite plant will be required to obtain a licence under the RPC Act.</p> <p>7, ID 4.1 Event: Groundwater (including radiological) contamination. Operational Management Measure(s) – also Refer to RWMP.</p> <p>Leakage between pond liners - management of leaked liquids Page 7-38 - Note: Leakage (below TALR) detected between pond liners must be returned to the pond - not left to seep to underlying soil.</p> <p>Frequency of groundwater compliance monitoring, and rationale for determining ECI parameters Page 7-45, Table 7-12 Compliance Monitoring - The proposed operational monitoring frequencies and ECL's do not match the text. For example, the 'Underlying Well' text states Fortnightly monitoring will be conducted, but the Table indicates Monthly.</p> <p>Should clearly explain here:</p> <ul style="list-style-type: none"> • Why the Lateral monitoring frequencies are not initially the same as for the existing Beverley operation. • That the Lateral frequencies will be increased in the future as mining and the calculated Eyre Formation flow drives the mining fluid closer to the monitoring well ring. 	<p>Noted and accepted; the role of the RWMP in authorising liquid waste disposal is discussed elsewhere in the PER / Proposal.</p> <p>Accepted, more detailed diagrams will be provided when the licence is applied for.</p> <p>Noted and accepted; future documentation (notably the MARP) will include this clarification.</p> <p>Accepted. This is the practice at Beverley and will also be done at Four Mile. Future documentation (notably the MARP) will make this clear.</p> <p>Monthly monitoring of overlying and underlying wells is planned. This will be reflected in the MARP which must be approved by the regulating authorities before operations commence. We propose that this frequency be reviewed when sufficient operational experience is available as a less frequent frequency is expected to be appropriate. The initial monitoring frequency is set higher until the behaviour of the aquifers under operational conditions has been assessed.</p> <p>Due to the extensive nature of the orebody, lateral monitoring wells at the boundary of the mining zone are some distance from the initial mining zone (> 250m). As a result, mining solution cannot reach the observation wells within 3 months hence more frequent monitoring would be redundant.</p> <p>Monitoring frequencies will be reviewed annually in order to maintain sound risk management strategies.</p>

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<ul style="list-style-type: none"> Why the particular ECL parameters were chosen. 	<p>The proposed ECL parameters of pH and SO₄, EC (Lateral Wells) and pH, SO₄ and Uranium (Overlying and underlying wells) are selected because these parameters will exhibit the greatest contrast between native groundwater and mining solution, whilst being readily and reliably measured.</p> <p>Actual trigger levels will be determined as more data is available in the MARP.</p>
<p>4 South Australian Environment Protection Authority Regulation & Compliance Division</p>	
<p>Details of bunding of harmful liquids</p> <p>4.5.3 Types of Equipment</p> <p>“A bunded processing area, including a truck loading/unloading bay”</p> <p>All areas that contain liquids that have the potential to harm the environment should be bunded in accordance with the EPA guidelines “Bunding and Spill Management”.</p> <p>Details regarding the type and location of bunding will be required prior to EPA approval. Therefore this level of detail may be provided during the development of the MARP.</p> <p>EPA authorisation of Beverley landfill</p> <p>4.6.4 Industrial and Domestic Waste</p> <p>“All wastes that are deemed to have no further use are disposed of in an approved landfill facility at the Beverley ML 6321 site”</p> <p>The Beverley landfill is not yet authorised under the EP Act, this is currently being actioned. It is therefore yet to be determined whether the Beverley putrescible landfill will be approved to receive listed waste (such as oil and chemicals). If the landfill is not authorised for the receipt of listed waste it may be necessary to transfer this waste to an approved facility off site.</p> <p>Details of sewage management at the satellite plant</p>	<p>Noted.</p> <p>Noted. Information would be provided in the licence application to EPA (as required under the Environment Protection Act 1993).</p> <p>Noted.</p>

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<p>4.7 Supporting Surface Infrastructure Include details for sewage management from the satellite plant Management of brine from the Four Mile RO plant 4.8.3 Water Sources "The Four Mile plant will contain a reverse osmosis unit to treat GAB water" Please outline the management and disposal of RO brine. Errata Table 7.1 Legislation The Environment Protection (Industrial Noise) Policy 1994 and the Environment Protection (Machine Noise) Policy 1994 have been replaced with The Environment Protection (Noise) Policy 2007. The Draft Environment Protection (Site Contamination) Amendment Bill 2005 has been gazetted and is now the Environment Protection (Site Contamination) Amendment Act 2007. Please correct the names of this legislation. Details of which ponds will be clay lined 7.4.3 Control and Management Strategies – Soil "Ponds lined with plastic or clay" Please identify which ponds will be lined with clay. For a pond depth of up to 2 m, the compacted clay liner should have a minimum thickness of 300 mm and should be constructed to achieve a coefficient permeability of less than $1 \times 10^{-9} \text{ ms}^{-1}$, anything deeper than this needs to be designed by an appropriately qualified specialist. Please note that ponds with only clay liners will not be approved to hold processing liquids or liquid processing wastes.</p>	<p>An application will be made to the Department of Health when design information on the sewage management system is available. Information would also be included in the licence application to EPA.</p> <p>RO brine will preferentially be utilised for dust suppression on roads, as is the practice at Beverley. However, in event of any surplus, the excess would be added to the wellfield balance bleed stream, which is returned to the process at Beverley.</p> <p>Noted. These changes are listed in the Errata.</p> <p>Detail on the pond design would be provided in the necessary EPA licence applications. It is anticipated that the design would be similar to that approved for Ponds 5 and 6 at Beverley.</p>

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<p>Please clarify the type and thickness of the plastic to be used as pond liners.</p> <p>Management of liquids resulting from leakage from ponds</p> <p>7.7.7 Discussion – Leakage from ponds</p> <p>Following previous discussions regarding the use of TALR at Beverley, the EPA was of the understanding that fluid resulting from minor leaks below the TALR would be pumped from the sump below the pond or between the liners and returned to the pond. The description on page 7-46 infers that this fluid will not be managed particularly in regards to ‘It is noted that the thick unsaturated zone beneath the ponds to the Willawortina aquifer some 50m beneath provides an effective additional barrier against potential impacts of leaks below the TALR’. Please confirm whether fluid resulting from minor leaks will be managed.</p>	<p>It is confirmed that any collected leakage would be returned to the pond, as is the current practice at Beverley.</p>
<p>5 Anggumathanha Law Adnyamathanha Elders</p>	
<p>Description of land use (in particular indigenous land use)</p> <p>We refer to Guidelines developed for the preparation of the PER for Four Mile according to State and Commonwealth regulations stipulate that proponent must ‘Describe the land use (historical, current and potential) for the lease ...’ (pg 16, Guidelines for Preparation of PER Four Mile, Sept 2008).</p> <p>The Beverley Four Mile Project PER and Mining Lease Proposal (hereafter referred to as ‘the PER’) does not include any description of Adnyamathanha land use and other non-commercial forms of land use such as recreational use (see Section 1.7 Proposed Post Mine Land Use, and Section 3.2 Land Use). ‘Land use’ is confined in the PER to commercial use such as mining and pastoralism. This denies our existence as Indigenous peoples and the values that make this area a resourceful part of the Flinders Ranges for all Australians. This region is worthy of protection for its natural, cultural and social assets, and these should be the top priority of governments.</p>	<p>Adnyamathanha land uses are protected under the Native Title Act and the Heritage Act. Much of the information on the spiritual meaning and use of the land is private/secret for Adnyamathanha People and is not for publication. The work area clearance procedure ensures that Heathgate can operate without specific knowledge of the sites and without impacting on sites.</p>

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<p>Rehabilitation of wastewater disposed to aquifers</p> <p>PER must include description (incl. maps) of any creeks, springs, drainage areas, surface and underground waters. PER does not describe uses and cultural meanings of water for Adnyamathanha. We know from our own Anggumathanha Law that water is a precious commodity and must not be wasted or polluted. We know the underground spring water is connected to the above ground creeks and springs, and we are very concerned that the PER says that polluted waste water and solids as a result of mining and exploration can be buried in shallow pits or put back into the underground water system. We feel this is totally unacceptable; all waste water must be fully rehabilitated, and solid waste must be disposed of carefully. As TOs we deserve to see a plan of how waste can be disposed of safely and for the long term. Government needs to be more responsible in looking after our environment so that future generations do not suffer. We are all entitled to good, clean water.</p> <p>Level of stakeholder consultation undertaken</p> <p>We strongly disagree with the claims made by proponent in the PER that Adnyamathanha are satisfied with the environmental performance. How can we be satisfied when our land is being wrecked? The Native Title process is being used to buy off some people in the community, but we know that deep down many Adnyamathanha feel very uneasy about uranium mining. We know from our traditional knowledge that this stuff is poisonous and should not be interfered with.</p> <p>We believe the ATLA Committee and the Native Title Named Applicants do not hold the authority to speak on behalf of all Adnyamathanha, especially Anggumathanha Law Elders. We are the people that were raised in Camps, and we know our traditional Adnyamathanha law. The role of ATLA is limited to the right to negotiate compensation for damage caused by developers to our country, under White Law, not Anggumathanha Law. This law only gives Native Title consultants the right to agree as part of the Work Area Clearance procedures, or else they don't get paid money by the mining company. Anggumathanha Elders are very concerned that our voices are not</p>	<p>The water in the areas of actual and proposed mining operations at Beverley and Four Mile respectively is unsuitable for human and stock use because it is too radioactive and, in the case of Heathgate's operations at Beverley, too saline. There are other water sources in the region that are easier to tap into and of better water quality. The Beverley Four Mile Project will have no impact on these better water sources.</p> <p>As noted in the FoE Australia response (Submission 6), remediating the contents of the liquid waste disposal site would be akin to remediating the contents of a council landfill and is thus not proposed.</p> <p>Heathgate has hosted quarterly consultative meetings with representatives of the Adnyamathanha community since the beginning of the project. The minutes of these meetings indicate that no assertions of poor performance have ever been made. Furthermore, in October 2007, the community voted to support the extension of the Beverley Mining Lease.</p> <p>Heathgate and Quasar have consulted extensively over the past 3 years with representatives of the Adnyamathanha People, who were selected by the Adnyamathanha People. Neither Heathgate nor the mine owners have ever received a request from the Anggumathanha Law Adnyamathanha Elders for further consultation.</p>

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<p>being properly heard by the mining proponent or the government, and that Native Title is misrepresenting our authority as Traditional Owners.</p> <p>Level of detail in the section relating to Aboriginal heritage sites</p> <p>Cultural and archaeological sites, objects or remains according to the Aboriginal Heritage Act (SA), 1988 are not fully canvassed in the PER; limited to discussion on tangible (physical) evidence of cultural significance and does not include intangible (spiritual, social) evidence. It was noted by Heathgate Resources that 'No sites were identified as requiring entry on the South Australian Register of Aboriginal Sites' (pg 3-65, PER and Mining Lease Proposal, Jan 2009). These surveys date back over 10 years ago and were done when Adnyamathanha were under pressure to sign off on a Native Title Agreement. We feel there should have been another survey done with a female anthropologist, and Anggumathanha Elders should be included. The Site Register should not be seen as a complete record of Aboriginal sites, and many people feel it is better NOT to register sites in order to protect the whereabouts of sites. We feel that the government should be funding Site Register surveys and helping communities put together guidelines on how they want to be consulted with. Our experience tell us that government are not helping; whenever we ask for support we get no reply, or are told there's no money available. We know that funding is available; we just need help to make use of it.</p> <p>Social impacts to the community caused by mining operations and royalty payments</p> <p>As women in the community we are constantly dealing with the community violence and frustration associated with more mining on our country. We see our families torn apart by royalty money, by some members choosing to support the mine and work there and others opposing this, by some people secretly supporting the mining companies such as Heathgate for personal gain. Mining companies are not being honest with the whole community, and they are using vulnerable people to divide us up. Women are suffering because the damage to our country is a family issue, and we are the leaders when it comes to dealing with family problems. We break up the fights, we try and bring our family back together again, we try to stop the arguing over royalty</p>	<p>As noted above, much of this information is, quite rightly, not provided to Heathgate or the mine owners. The work area clearance procedure ensures that sites are protected.</p> <p>The Beverley mining operations are not visible or audible from any community location. The total area of the Beverley Lease and Four Mile Lease application represents a tiny fraction of the Adnyamathanha Native Title claim area, and access for the Beverley and Four Mile operations is restricted (for safety reasons) in a tiny fraction of the lease areas. As Beverley provides jobs and economic activity in an area with few other opportunities, Heathgate believes that it is having a positive impact on the community and it is considered that the Beverley Four Mile Project will, for similar reasons, continue to have a positive</p>

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<p>money and how it should be shared to benefit everyone. We know that very few women will ever work at this mine site; there is a track record that proves this. So women will not benefit from jobs created by these mines such as Beverley. Women are the ones who take the children out bush to visit places and get bush foods, not the men. But our sites around the Beverley area are just too contaminated now, we are scared to go anywhere near there and pick fruit, drink water and eat kangaroo meat from there. It's poisoned now and all fenced off by mining, so we have lost access to this special part of our country.</p> <p>Representation of Aboriginal women in Work Area Clearance roles</p> <p>When women go out to do Work Area Clearance we get treated like dirt. The mining company people are always mostly men, and they only listen to what the men have to say, never the women.</p> <p>Mining companies only ever employ men anthropologists; women have been asking for proper representation and a woman anthropologist but it never happens. We get abused, sometimes violently especially when we have to stay at hotels out in remote parts of the country and the men (including anthropologist and mining people) sit around and drink at the end of the day. Women are always the ones that have to be the peacemakers.</p> <p>And we know from experiences that Work Area Clearances done in the lead up to the Four Mile proposal will not guarantee protection of our sites. Some of us have taken part in this work, and when we have raised our concerns we get ignored or abused, and the destruction of our sites continues. Women are subjected to foul language, ridicule and sometimes threatened with violence by men and if we do not go along with what the men are saying we are treated as outsiders. There has never been a female anthropologist appointed to accompany women despite many requests, and we feel this should be a necessary part of the Work Area Clearance procedure.</p>	<p>effect on the local community.</p> <p>Even within the areas fenced for safety reasons, the bush food has no possibility of being contaminated. There is no permanent or semi-permanent natural surface water in the immediate region (other than Paralana Hot Springs which has no possibility of impact).</p> <p>Women's views are both recorded and considered and great effort is spent trying to ensure that all views are accommodated where ever possible.</p> <p>No instances of abuse have ever been reported regarding Work Area Clearances on Heathgate or Quasar tenements.</p> <p>The selection of the work area clearance team is entirely with the Adnyamathanha Traditional Lands Association, as is the selection of the anthropologists. Neither Heathgate nor the project owners have any role in these selections and works with whatever team is selected.</p>

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<p>6 Friends of the Earth Australia</p>	<p>Note: FoEA references are listed at the bottom of this table.</p>
<p>Alternatives to disposal of untreated liquid waste and disposal fluids into Namba formation aquifer on Beverley Mine lease</p> <p>In-situ leach (ISL) uranium mining involves pumping an acid solution (or an alkaline solution in some cases) into an aquifer. This dissolves the uranium ore and other heavy metals and the solution is then pumped back to the surface. The small amount of uranium is separated at the surface. The liquid radioactive waste - containing radioactive particles, heavy metals and acid - is simply dumped in groundwater. For Beverley Four Mile, the proponents propose dumping liquid waste within the Beverley lease area rather than the Beverley Four Mile lease area.</p> <p>The 2004 CSIRO report states: <i>"As stated in the Beverley Assessment Report, the bleed solutions, waste solutions from uranium recovery, plant washdown waters and bleed streams from the reverse osmosis plants are collected prior to disposal into the Namba aquifer via disposal wells. These liquid wastes are combined and concentrated in holding/evaporation ponds, with excess injected into selected locations within the mined aquifer. The injected liquid is acidic (pH 1.8 to 2.8) and contains heavy metals and radionuclides originating from the orebody."</i> (Taylor, G.; Farrington, V.; Woods, P.; Ring, R.; Molloy, R. (2004): Review of Environmental Impacts of the Acid In-Situ Leach Uranium Mining Process. CSIRO Land and Water Client Report.)</p> <p>From being inert and immobile in the ore body, the radionuclides and heavy metals are now bioavailable and mobile in the aquifer.</p> <p>The volume of liquid waste is discussed in the 7/1/09 Beverley Four Mile Project Public Environment - Report and Mining Lease Proposal document: <i>"With the inclusion of maximised recycling of water, approximately 2.5 L/s (averaged over a year) of liquid waste will be generated once the Beverley extraction circuits are decommissioned. This will be disposed of at Beverley ML 6321 in the hydraulically isolated formerly mined Beverley Sands aquifers in the North, Central and South wellfields."</i></p>	<p>Liquid waste disposal will be in accordance with the Commonwealth and SA regulator approved procedure.</p> <p>The approved disposal area is within an old mining zone in a static system that is sealed by several tens of metres of clay. It is thus immobile and not bioavailable outside the disposal site, as suggested.</p>

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<p><i>"It is noted that initially the Beverley Four Mile resin elution circuit and Beverley ML 6321 capture and elution circuits will operate in parallel. During this time the combined volume of liquid waste will remain within an annualised average rate of 5 L/s.</i></p> <p><i>"At the indicated rate there is enough disposal volume in those three wellfields to accommodate up to 16 years of liquid waste. Additional volume exists in Beverley North East, East and Deep South wellfields. Any extension of liquid waste disposal in these areas would be subject to a successful application to the regulatory authorities using the Beverley Mine Procedure for Management of Liquid Waste Disposal (Appendix C of the MARP, Heathgate 2008c) or its approved successor.</i></p>	
<p>The Beverley Four Mile proponents have no plans to remediate the polluted aquifer as they say the pollution will 'attenuate' - that the aquifer will return to its pre-mining state over time. This claim has been queried by the scientific community as being highly speculative with no firm science behind it.</p> <p>The 2004 CSIRO report endorsed the dumping of liquid waste in ground-water yet the information and arguments it used in support of that conclusion were tenuous. The CSIRO report notes that attenuation is "not yet proven" and the timeframe of "several years to decades" could hardly be more vague. The 2004 CSIRO report states in its Executive Summary:</p> <p><i>"The use of acid rather than alkaline leaching and disposal of liquid wastes by re-injection into the aquifer is contentious. Available data indicate that both the leach solution and liquid waste have greater concentrations of soluble ions than does the pre-mining groundwater. However as this groundwater has no apparent beneficial use other than by the mining industry, this method of disposal is preferable to surface disposal. Although not yet proven, it is widely believed and accepted that natural attenuation will result in the contaminated water chemistry returning to pre-mining conditions within a timeframe of over several years to decades."</i></p> <p>Elsewhere the 2004 CSIRO report notes uncertainties associated with attenuation:</p> <p><i>"The EIA for Beverley and Honeymoon suggest that natural attenuation will occur, however, exact timeframes are not given. The issue of predicting attenuation is made</i></p>	<p>Remediating the contents of the liquid waste disposal site would be akin to remediating the contents of a council landfill. It should be noted, however, that after 12 or more months of acid being consumed during production, there is clear evidence of the presence of residual acid-consuming substances in the aquifer, and thus support for the view that it will continue to attenuate.</p>

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<p><i>more complex by not fully understanding the microbiological or the mineralogy of the surrounding ore bodies, before and after mining, and how these natural conditions will react with the altered water quality introduced by the injection of leachate, and re-injection of wastewaters. Following general practice, geochemical modelling was undertaken with a series of assumptions where data were not available. Although these assumptions are considered reasonable by the review team, some technical experts have a differing opinion. In any case the results must be considered approximate.</i></p> <p>The monitoring results from Beverley are limited by the short duration of mining and operation, and there are currently no completely mined-out areas for which the water chemistry can be followed after mining to verify the extent of the expected natural attenuation. However, pH results for an area that was trial-mined in 1998 and then left until full-scale mining of the same area was due are shown in Figure 13.</p> <p>Note that whilst other data are available for these wells there are not consistent trends in other analytes. There has been little recovery of groundwater chemistry towards background in the test-production wells other than a favourable change for pH. There are presently no equivalent monitoring data for the northern area, which is presently being mined. "Even if full attenuation does occur over time, it is unlikely to occur in the timeframe of post-mine-closure monitoring proposed by the mining proponent. The 7/1/09 Beverley Four Mile Project Public Environment - Report and Mining Lease Proposal document states:</p> <p><i>"Heathgate proposes an initial period of five years from the conclusion of commercial operations to complete the decommissioning of facilities. A monitoring and maintenance program is proposed to run for a further two years, for a total of seven years from the final conclusion of mining activities. The total monitoring period will be reviewed with the regulatory authorities and may be extended.</i></p> <p><i>"Facilities will therefore be fully decommissioned within seven years from the conclusion of the commercial operation. This period includes a post-completion monitoring period for vegetation maintenance, groundwater sampling, drainage repairs and other activities to ensure the long-term permanent rehabilitation of the site.</i></p>	

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<p>The 2004 CSIRO report states: <i>"Natural attenuation is preferred to adjusting the chemistry of the wastewater prior to re-injection as the latter would result in the need for additional chemicals on-site, generation of contaminated neutralisation sludges which would have to be disposed of, risk of potential clogging of pore spaces in the aquifer and associated higher costs.</i></p> <p>Those are not insurmountable problems. Moreover there are alternatives to adjusting the chemistry of waste-water then reinjecting it into the aquifer, such as evaporation followed by management of solid wastes. As the CSIRO report notes: <i>"10.6 Alternatives to Liquid Waste Re-Injection</i></p> <p><i>"Suggestions made during the community consultation process included not re-injecting the liquid wastes into the aquifer, and neutralisation of waste before re-injection.</i></p> <p><i>"Not re-injecting the waste into the aquifer would require either sophisticated water treatment and/or the installation of much larger evaporation ponds. Both would generate solid wastes to be disposed of in a solid waste repository. When the wastes dried out they would become a possible dust source, which could increase the potential radiation exposure of workers, in particular in relation to dust inhalation, but also from radon inhalation and gamma exposure. Environmental radiation levels at the surface would also increase. These are presently negligible issues associated with the existing ISL practices.</i></p> <p><i>"Neutralisation of the waste liquid prior to re-injection would precipitate out some metal salts, which would need to be filtered before re-injection, and be disposed of in a solid waste repository.</i></p> <p><i>"Also following re-injection it is likely that the re-injection bores would rapidly clog owing to precipitation around the bores, as the injected water and existing acidic water in the aquifer interact. Clogging of re-injection wellfields and associated problems with pipelines and pumps may increase the risk of spills due to operational problems with equipment and increased maintenance."</i></p> <p>None of the issues raised by the CSIRO amount to compelling reasons to support</p>	

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<p>dumping liquid waste in ground-water. Some of the reasons cited are absurd and cast serious doubt over the credibility of the CSIRO review - for example dust suppression is simple and inexpensive.</p> <p>The SA government should:</p> <ul style="list-style-type: none"> • conduct or commission a thorough comparative assessment of the options for managing liquid waste. • insist that the proponents rehabilitate the aquifer to pre-mining conditions and insist on monitoring/remediation until pre-mining conditions are achieved. 	<p>The Chief Scientist, on request from the Commonwealth Minister for the Environment, conducted a review of the proposed liquid waste management system in 2008. Operations are in accordance with the recommendations of the Chief Scientist.</p> <p>Heathgate is required to ensure that the appropriate environmental values are not diminished, and will rehabilitate and monitor to the extent necessary to achieve this goal.</p>
<p>Potential for chemical treatment of disposal fluids to assist/hasten natural attenuation The 2004 CSIRO report states:</p> <p><i>"For the Beverley operation, groundwater monitoring is required to be conducted for seven years after mining to demonstrate that their expectations in regard to natural attenuation are being borne out.</i></p> <p><i>Research into the use of and ability of chemical amendments to assist with or speed up the processes of natural attenuation processes may be beneficial, especially where the latter may be slow and/or incomplete. This approach may also be of benefit in the case of plant or equipment failure with resultant contamination of soil or shallow aquifers."</i></p> <p>Has any follow-up work been done to investigate the potential to assist or hasten attenuation?</p> <p>The 2003 Senate References and Legislation Committee report into the regulation of uranium mining in Australia reported "a pattern of under-performance and non-compliance", it identified "many gaps in knowledge and found an absence of reliable data on which to measure the extent of contamination or its impact on the</p>	<p>Now that mining and waste disposal activities in the first region mined at Beverley have ceased, attenuation studies can commence.</p> <p>Beverley has operated successfully for over 9 years with no impact on the environmental values identified for the region.</p>

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<p>environment", and it concluded that changes were necessary "in order to protect the environment and its inhabitants from serious or irreversible damage". On ISL mining, the 2003 Senate report stated:</p> <ul style="list-style-type: none"> • <i>"The Committee is concerned that the ISL process, which is still in its experimental state and introduced in the face of considerable public opposition, was permitted prior to conclusive evidence being available on its safety and environmental impacts."</i> • <i>"The Committee recommends that, owing to the experimental nature and the level of public opposition, the ISL mining technique should not be permitted until more conclusive evidence can be presented on its safety and environmental impacts."</i> • <i>"Failing that, the Committee recommends that at the very least, mines utilising the ISL technique should be subject to strict regulation, including prohibition of discharge of radioactive liquid mine waste to groundwater, and ongoing, regular independent monitoring to ensure environmental impacts are minimised."</i> <p>In relation to the Beverley mine, Dr. Gavin Mudd, a hydrogeologist based at Monash University, notes: "The critical data which could answer scientific questions concerning contaminant mobility in groundwater has never been released by General Atomics. This is especially important since GA no longer maintain the mine is 'isolated' from surrounding groundwater, with desires to expand the mine raising legitimate concerns over the groundwater contamination legacy left at Beverley."</p>	
<p>Dr Mudd states (in a short statement posted at www.foe.org.au/anti-nuclear/issues/u/oz):</p> <ul style="list-style-type: none"> • The mining technique of in situ leaching (ISL), often referred to as solution mining, is becoming an increasingly favoured method for the extraction of uranium across 	<p>Beverley has operated successfully for over 9 years with no impact on the</p>

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<p>the world. This is primarily due to its low capital and operating costs compared to conventional mining. Little is known about the environmental impact of this method, and mining companies have been able to exploit this to promote the method as "environmentally benign".</p> <ul style="list-style-type: none"> • The ISL process involves drilling ground water bores or wells into a uranium deposit, injecting corrosive chemicals to dissolve the uranium within the ore zone, then pumping back the uranium-laden solution. • The method can be applied only to uranium deposits located within a ground water system or confined aquifer, commonly in palaeochannel deposits (old buried river beds). • Although ISL is presented in simplified diagrams by the nuclear industry, the reality is that geological systems are inherently complex and not predictable. • There are a range of options for the chemistry of the mining solutions. Either acidic or alkaline chemical agents can be used in conjunction with an oxidising agent to dissolve the uranium. • Typical oxidising agents include oxygen or hydrogen peroxide, while alkaline agents include ammonia or sodium-bicarbonate or carbon dioxide. The most common acidic chemical used is sulphuric acid, although nitric acid has been tried at select sites and in laboratory tests. • The chemicals can have potentially serious environmental impacts and cause long-term changes to ground water quality. <p>The use of acidic solutions mobilises high levels of heavy metals, such as cadmium, strontium, lead and chromium. Alkaline solutions tend to mobilise only a few heavy metals such as selenium and molybdenum. The ability to restore the ground water to</p>	<p>environmental values identified for the region. Monitoring provides excellent information on potential environmental impacts.²</p> <p>No response required</p> <p>ISR can also be applied where fluids can be constrained sufficiently to orebody regions.</p> <p>Geological systems can be inherently complex but operating experience at Beverley shows that operations are predictable.</p> <p>No response required</p> <p>No response required</p> <p>The dilute sulphuric acid and hydrogen peroxide to be used at Beverley Four Mile will be managed to ensure that the identified environmental values are protected.</p> <p>The nature of the orebody determines whether acid or alkaline solutions are used.</p>

² See <http://www.heathgateresources.com.au/custom/files/2007531124687/annualenvironmentreport2006.pdf>

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<p>its pre-mining quality is, arguably, easier at sites that have used alkaline solution chemistry.</p> <ul style="list-style-type: none"> • A review of the available literature on ISL mines across the world can easily counter the myths promulgated about ISL uranium mining. Whether one examines the USA, Germany, Russia and associated states, Bulgaria, the Czech Republic, Australia or new ISL projects across Asia, the truth remains the same – the ISL technique merely treats ground water as a sacrifice zone and the problem remains "out of sight, out of mind". • ISL uranium mining is not controllable, is inherently unsafe and is unlikely to meet "strict environmental controls". It is not an environmentally benign method of uranium mining. • The use of sulphuric acid solutions at ISL mines across Eastern Europe, as well as a callous disregard for sensible environmental management, has led to many seriously contaminated sites. • Perhaps the most severe example is Straz pod Ralskem in the Czech Republic, where up to 200 billion litres of ground water is contaminated. Restoration of the site is expected to take several decades or even centuries. • Solution escapes and difficult restorations have been documented at ISL sites in Texas and Wyoming. • Australia has encountered the same difficulties, especially at the controversial Honeymoon deposit in South Australia during pilot studies in the early 1980s and at Manyingee in Western Australia until 1985. • The Honeymoon pilot project used sulphuric acid in conjunction with ferric sulphate as the oxidising agent. The wells and aquifer experienced significant blockages due to the minerals jarosite and gypsum precipitating, lowering the efficiency of the leaching process and leading to increased excursions. The aquifers in the vicinity of Honeymoon are known to be connected to aquifers used by local pastoralists to water stock. 	<p>All forms of mining treat their orebodies as sacrifice zones. It is simply not possible with today's technology to extract a mineral and enjoy its benefits, without disturbing the orebody. The great advantage of ISR mining is that to the greatest extent possible, the disturbance is limited to just vicinity of the orebody.</p> <p>Beverley has operated successfully for over 9 years with no impact on the environmental values identified for the region. Beverley has met the strict environmental conditions imposed as a result of the environmental assessment process.</p> <p>Not relevant to the Beverley Four Mile project.</p> <p>Not relevant to the Beverley Four Mile project.</p> <p>Not relevant to the Beverley Four Mile project</p> <p>Not relevant to the Beverley Four Mile project.</p> <p>Not relevant to the Beverley Four Mile project.</p>

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<p>Journal articles, conferences papers etc. on ISL mining (and other issues) by Dr. Mudd are posted at: <http://civil.eng.monash.edu.au/about/staff/muddpersonal>.</p> <p>The 2004 CSIRO report states in its Executive Summary:</p> <p><i>"While ISL technology has environmental and safety advantages when projects are well planned and operated (Underhill 1998), there are several acid ISL operations that have been developed and operated with little or no consideration for the environment. The conditions at these sites are a direct consequence of the Soviet-era operation of uranium mines without effective management of environmental aspects of production, without restoration of contaminated areas, much less planning and design for reclamation and long-term containment of wastes. Similar operating conditions without effective pollution control and closure concepts were apparent at uranium sites in other centrally planned economies such as East Germany, Czechoslovakia and Hungary prior to 1990."</i></p> <p><i>"... The environmental consequences from acid ISL operations under the Soviet-era are significant and a component of the many environmental problems from this era, the majority of which were from mine water/groundwater/tailings/waste rock arising from underground and open cut mines. It is noted that as many of the environmental problems were related to the governance and institutional arrangements of the era, direct comparison with practices in Australia cannot be made."</i></p> <p>However a number of the criticisms made of Soviet-era management apply to uranium mining in SA:</p> <ul style="list-style-type: none"> • Captured bureaucracies. • Slack regulation. • Political interference (e.g. Rann pre-empting assessment by describing Beverley Four Mile as a "world class" project). • Orwellian doublespeak (e.g. Garrett describing ISL as "world's best practice"). 	<p>No specific environmental issue is raised that is within the scope of the assessment process.</p>
<p>Risk Assessment</p> <p>The 7/1/09 Beverley Four Mile Project Public Environment - Report and Mining Lease</p>	<p>The risk assessment was conservative. Procedures are in place to manage</p>

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<p>Proposal document states that there is a 'Moderate' risk of contamination preventing a return to pastoral use. The SA government should insist on a more comprehensive risk assessment including quantitative risk assessment.</p>	<p>spills so that the pastoral values of the region will not be reduced by the activities at Beverley.</p>
<p>Level of consultation with indigenous communities</p> <p>It goes without saying that FoEA does not speak on behalf of Adnyamathanha Traditional Owners. Nevertheless the following issues need further consideration.</p> <p>Consultation with Adnyamathanha Traditional Owners continues to be inadequate and selective. In part this is because of the limitations of Native Title legislation and processes. Heathgate and other proponents of Beverley Four Mile could consult more widely but choose not to do so.</p> <p>Consultation - Heathgate style - was discussed by Adnyamathanha custodian Jillian Marsh:</p> <ul style="list-style-type: none"> • “Initial negotiation was misrepresentative, ill-informed, and designed to divide and disempower the Adnyamathanha community.” • “[T]he resulting meeting was held under appalling conditions. The company (Heathgate Resources) censored the entire meeting with the assistance of Graham Gunn (local member of Parliament) and the State Police. One Adnyamathanha man that stood up and asked for an independent facilitator from the floor to be elected was immediately escorted by two armed Police holding him on either side (by his arms) to the outside of the building.” (Submission to 2002-03 Senate Inquiry.) 	<p>Heathgate and Quasar have consulted extensively with representatives of the Adnyamathanha People, who were selected by the Adnyamathanha People, over the past three years. These claims do not relate to the current proposal.</p>
<p>The 'Referral of proposed action' document states:</p> <p>"There is an ongoing stakeholder consultation process established for Beverley, involving different mechanisms for consultation with various stakeholder groups, and this has been extended to include consultation about the Four Mile project.</p> <p>In particular, Heathgate and Quasar have developed an effective working protocol with the local Adnyamathanha People. There is general agreement that the Adnyamathanha People want the Beverley operations to continue, they want the</p>	

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<p>benefits to be fairly distributed, and they want more employment and business opportunities.</p> <p>Consistent with this, the Four Mile project has been discussed briefly at the Beverley Advisory Committee (made up of Adnyamathanha representatives and Heathgate and Quasar personnel)."</p> <p>The consultation process is certainly convenient for Heathgate and other Beverley Four Mile proponents - but it is not inclusive, representative or adequate. FoEA understands that PIRSA will be receiving a submission from an Adnyamathanha Elders group - Anggumathanha Law Elders - on this issue.</p> <p>The 7/1/09 Beverley Four Mile Project Public Environment - Report and Mining Lease Proposal document states:</p> <p>"It is recognised that different mechanisms are required for effective consultation with various stakeholder groups, and that the level and type of consultation varies between these groups."</p> <p>The Beverley Four Mile proponents ought to be required to negotiate with the Adnyamathanha Elders group in addition to current consultative mechanisms. There ought to be genuine negotiation including a right of veto for Traditional Owners rather than tokenistic consultation requirements.</p> <p>The 7/1/09 Beverley Four Mile Project Public Environment - Report and Mining Lease Proposal document states:</p> <p>"The Work Area Clearance methodology adopted by the company in association with the Native Title applicants, has been developed to minimise any potential deleterious impact upon Aboriginal cultural values at all stages of exploration and development within the area. The survey team is selected by representatives of the Adnyamathanha community and consists of up to 8 members. The team is assisted by up to two anthropologists and usually about 5 Heathgate personnel."</p> <p>The Anggumathanha Law Elders have a radically different view of the adequacy of</p>	<p>Heathgate and Quasar have consulted extensively with representatives of the Adnyamathanha People, who were selected by the Adnyamathanha People, over the past three years. In a 200 strong community, a diversity of views should be expected, but there is general agreement that the Beverley mine is beneficial to the Adnyamathanha People, and it is hoped that the Adnyamathanha People will agree with the Beverley Four Mile mine.</p> <p>Neither Heathgate nor the mine owners have ever been requested to consult with any Aboriginal group other than the elected representatives of the Adnyamathanha People.</p>

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work area clearance processes than that provided by the Beverley Four Mile proponents.	See the response above re the Anggumathanha Law Elders submission.
7 Friends of the Earth, Adelaide	
<p>Consideration of cumulative impacts from other potential mining operations in the area</p> <ul style="list-style-type: none"> 8.5 Potential Impact/events - In particular the need to 'consider the cumulative effects of the event being repeated many times, possibly by other industries or operators in the area and the potential for some impacts to be unknown, unpredictable or irreversible' have not been addressed. This is a serious and unacceptable deficit given the number of known and predicted deposits in the Frome Embayment and greater Lake Eyre Formation. <p>Alternative remediation strategy in the event of failure of natural attenuation</p> <ul style="list-style-type: none"> 9.3 Completion risk assessment - There is not alternative remediation strategy put forward in the case of a failure of natural attenuation, or a failure to achieve consensus or a situation of adequate confidence with regard to this process. 	<p>As Heathgate or Quasar hold majority stakes in all the Exploration Licences between the Ranges and Lake Frome, there is no possibility of other uranium companies operating in the region. The risk assessment process is very thorough and risks assessed as immaterial were not documented. This is a standard practice in risk assessments as it aids in keeping the focus on material risks.</p> <p>Further studies will be done after mining has been completed in the first wellfields to determine if remediation is necessary. If necessary, there are several options available (see response in this submission on page 39 below).</p>
<p>Consideration of Aboriginal values in the description of environment</p> <p>A comprehensive consideration of Aboriginal values is absent from these sections (see submission to this PER by Ms Marsh).</p> <p>7 Stakeholder consultation</p> <p>8.5 Potential Impact/events</p> <p>Evidence provided on natural attenuation and suitability of attenuation modelling undertaken</p> <p>As this project uses the insitu-leach (ISL) mining method, some specific requirements were made. In particular the proponent has not fully considered the environmental value of the groundwater which will be affected. Additionally, the evidence provided for</p>	<p>Aboriginal values are protected through work area clearances and comprehensive heritage clearance procedures. By request of the Adnyamathanha People, the contents of work area clearance reports are confidential.</p> <p>No specific issue is raised.</p> <p>The groundwater in question is too saline and radioactive to be used for human drinking water or for stock. This has been fully considered in the risk</p>

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<p>natural attenuation is lab based, loses significant applicability when scaled up to mimic an aquifer system and significantly does not consider the inherent complexity of the aquifer system. This lack of consideration introduces a significant element of risk which is not addressed in the PER.</p> <p>Program of emergency actions</p> <p>8.6 Control and management strategies - Strategies for controlling and avoiding the manifestation of particular risks are included; however there is not a clear and comprehensive program of emergency actions articulated for when a particular event occurs. For example, if a significant excursion of leachate solution occurs, what is the course of action? It is inappropriate to simply refer to 'that which occurs at Beverley'. In the very least reference to the relevant section could be made, however the PER is a stand alone document and Four Mile is a new project, and therefore the information provided must be comprehensive in this respect.</p>	<p>assessment.</p> <p>In regard to natural attenuation, Heathgate have undertaken significant research using world's best practice modelling methodologies to assess the efficacy of natural attenuation in the aquifer. While it is correct that all modelling carries some inherent uncertainty, the modelling methodology employed by Heathgate has addressed this uncertainty using robust methods including:</p> <ol style="list-style-type: none"> 1) Exhaustive sensitivity analysis of model calibration to parameter assumptions (PER / Proposal Section 2.6 Appendix M); and 2) The implementation of very conservative model parameters – hence uncertainty in model predictions will <i>under</i> predict natural attenuation rather than over predict. <p>The proposed adaptive management approach to mining at Beverley Four Mile will entail ongoing validation of the natural attenuation modelling and adaptation of mine closure planning to reflect the continually evolving understanding of the aquifer geochemistry (PER / Proposal Section 3.10.4 pp 3-55),</p> <p>Early warning monitoring will be installed as per Beverley so that potential excursion of mining solutions are detected early and remedied via flow adjustments within the wellfield. This management technique has resulted in no excursions at Beverley in over 9 years of operation.</p> <p>Any detected excursion of leachate would be controlled by targeted groundwater pumping to draw groundwater containing lixiviant back into the mining zone.</p>
<p>Level and method of stakeholder consultation, particularly with relevant Aboriginal groups</p> <p>It would appear that a comprehensive process of stakeholder consultation has not</p>	<p>Neither the Adnyamathanha Traditional Lands Association (the official peak</p>

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<p>occurred. This process would likely have highlighted and avoided some of the key issues identified in the sections above. The submission to this inquiry by Ms Marsh of the Anggumathanha Elders Group draws attention to a number of key groups who were not consulted including the Anggumathanha Elders Group, Adnyamathanha Traditional Lands Association and a number of groups holding heritage information. The submission by Ms Marsh highlights a number of key concerns such as the cultural significance of water resources, and anecdotal accounts of environmental damage arising from the current Beverley operation, yet these issues are not considered in the PER.</p> <p>The PER recognises that different stakeholder groups may require different consultative processes. Given the low attendance of all public meetings held by the proponent, we put forward that additional methods of information sharing and consultation with community must occur. Rather than a 'come to us' approach with formal meetings, a 'we'll come to you approach' is required. This must also be undertaken with a necessary program of education for all relevant stakeholders such that they understand the process and what they need to be considering. High quality consultation with facilitation and capacity building is required.</p>	<p>organisation of Adnyamathanha People) nor Anggumathanha Elders requested further consultation with the Anggumathanha Elders.</p> <p>With the exception of several Beverley Advisory Committee meetings, all consultation occurred on country in the Adnyamathanha claim area.</p>
<p>Risk assessment process</p> <p>9.3 Completion risk assessment - Here in particular we find inadequate evidence to support the ability of the natural attenuation process to <i>'demonstrate with confidence that this attenuation will occur in this aquifer, and demonstrate that the attenuation will occur in an appropriate timeframe.</i> Additionally, there is not alternative remediation strategy put forward however is required <i>'Where attenuation cannot be demonstrated... a contingency rehabilitation plan will need to be provided to achieve the outcome, should the research not provide confidence in natural attenuation'</i>. We provide further comment on the attenuation research and the ISL method below.</p>	<p>See responses to comments above regarding natural attenuation modelling.</p> <p>There is a well established range of methodologies (employed in the US and elsewhere) available for rehabilitation of the aquifer if natural attenuation is found to be less effective than predicted. These methodologies include:</p> <ul style="list-style-type: none"> • Groundwater Sweep – where lixiviant is pumped out of the aquifer without re-injection. This draws clean native groundwater into the mining zone. • Pump and Treat – where lixiviant is drawn out of the aquifer and treated before re-injection into the aquifer • Addition of Remediation agents – these can be reductants such as hydrogen sulphide to return the aquifer to reducing conditions or other materials which

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<p><u>Unsatisfactory risk assessment process</u></p> <p>A core component of standard risk assessment is a comprehensive stakeholder consultation and participation process in not just the identification of risks, but also the management, mitigation and determination of outcomes/criteria. As stated above, the stakeholder consultation was limited and not participatory in nature, therefore key considerations such as the social and cultural implications of the proposed project have not been addressed.</p> <p>Similarly, risk assessment requires the elucidation of a clear decision pathway at every point in the process. This is not evident in the PER. The determination of certain risks including both the magnitude of the potential impact and the likelihood of it occurring appear to be largely discretionary decisions made by the proponent. If this is not the case, what consultative process was engaged to reach these decisions? Why has this information not been included with the PER? Understanding the process and decision pathway would give greater confidence in the risk assessment.</p> <p>Risk assessment involves a clear understanding of where information is inadequate, that in itself being a key risk. In particular we find that the unknown information regarding the potential future impacts to groundwater resources as a result of the operation of the mine and the injection of waste materials into and within a complex aquifer system pose significant risk to environment and cultural values of the region to our and future generations. The absence of such a fundamental consideration in the risk assessment is potentially dangerous.</p> <p>The AS/NZ 4360 is internationally recognised as an outstanding risk assessment standard, with participatory consultation and transparency essential to its operation. We do not find that the PER has achieved the benchmark set by this standard.</p>	<p>can act to attenuate lixiviant.</p> <p>Heathgate is currently working with CSIRO to research potential aquifer remediation agents.</p> <p>Heathgate disagrees with these comments. The documentation provided in the PER / Proposal was in accordance with the issued guidelines.</p> <p>Extensive studies and a comprehensive risk assessment were undertaken.</p> <p>Comprehensive consultation was also undertaken.</p> <p>Please refer to responses to similar comments made by FoE Australia (Submission 6).</p>

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<p>ISL mining is a notorious activity, both within Australia and internationally. Significant public and scientific debate is ongoing regarding the appropriateness of this activity in Australia, and indeed any other country.</p> <p>A core requirement of a leachable uranium deposit is that it is isolated, usually bounded above and below by impermeable clay layers or <i>aquitards</i>. This allows the injected solution to be locally constrained to that aquifer, without contaminating surrounding, underlying or overlying aquifers and subsurface environments, at least while operation maintains the appropriate hydraulic gradient. Assumptions of 'closed systems' and 'isolated aquifers' have proved erroneous both internationally and within Australia for both the Honeymoon and Beverley projects, where despite nine years of operation aquifer relationships and vertical connectivity have proven more complex than first anticipated and are yet unresolved (HR 1998; SC 2000). Additionally, evidence exists that through geological time, even an isolated aquifer is not actually isolated (Hendry & Wassenaar 2004; Ranville et al. 2007; Timms & Hendry 2007 and relevant references therein). Natural systems contain anomalies; indeed modelling and diagrammatic representation of subsurface conditions will always be simplifications of the true state, where minor irregularities can have serious implications and guarantees of no risk cannot honestly be given (Mudd 1998).</p> <p>The effectiveness of this process of <i>natural attenuation</i> in neutralising all contaminants within the disposal solution is unresolved even by proponents of the process such as Solodov (1998). Indeed it may not be possible for the major element and heavy metal chemistry to return to uncontaminated levels (Mudd 1998) and has not yet been demonstrated for either the operational Honeymoon and Beverley mines (Mudd 2001a). In the United States, all projects using acid-leaching methods have had substantial problems with groundwater contamination and reduction in quality even after multiple attempts to restore the waters to near original conditions (summarised in Mudd 2001a,b). Much of the ground water in the Lake Eyre Basin is of unsuitable quality for humans, and in many cases stock, which has been used as an argument against remediation. This is faulty logic, a developed environmental responsibility in the very least must attempt to return an ecological system to the natural state in which</p>	<p>Please refer to responses to similar comments made by FoE Australia (Submission 6) and Jill Robinson (Submission 2).</p>

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<p>it was found.</p> <p>The laboratory testing and modelling undertaken for the PER remains unfinished as per the admittance of the proponent. On this basis we put forward that inadequate evidence has been generated to guarantee the efficacy of natural attenuation. However, in addition to this we find that the modelling involving the upscaling of the laboratory data to an aquifer scale, with the addition of various components such as general flow pathways and speeds, is too simplistic for such a potentially hazardous issue. Aquifers are complex systems, and the palaeochannel system underlying the Frome Embayment is no exception, as illustrated in real life examples from both the Beverley and Honeymoon projects. It is highly likely that no modelling regime could fully account for all the potential pathways and dynamics of these systems. Given the magnitude of the potential repercussions we must question whether the risk is too great (a comprehensive risk assessment would have done this). Despite the unfinished and simplified nature of the research that is put forward, we still see a residual effect of the waste material in the aquifer after the cessation of mining activity, for example up to 800 years for pH (Appendix M, Fig. 4.8). With even low risk of this occurring an impact on this scale is unacceptable.</p>	
<p>8 Department of Water, Land and Biodiversity Conservation, Native Vegetation Group</p>	
<p>Rehabilitation Section 1.8 – Mine closure and rehabilitation - Rehabilitation of temporary access tracks is proposed. It would be beneficial for the environment for access tracks created during the exploratory phase of the project to be rehabilitated as well.</p> <p>Visual screening Section 4.7.4 – Visual screening and site security - Under Visual Screening, it is stated that part of the Paralana Springs to Hidden Valley 4WD track will be realigned around the edge of the wellfield. In the event that the new track is proposed to be greater than 5 metres in width, the approval of the Native Vegetation Council will be required for</p>	<p>Heathgate has a policy of utilising existing tracks as much as possible during exploration. It is noted that there are many tracks in the area, which have arisen from pastoral activity, tourism and kangaroo shooters. Heathgate can accept no responsibility for tracks resulting from these activities.</p> <p>See comments above. The diversion of the Paralana Springs-Hidden Valley 4WD track will not be required at the beginning of construction and operations. The track would be relocated closer to the foothills of the Flinders Ranges but still on the High Plains. Details will be confirmed with the owners and managers</p>

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<p>any vegetation removal. Clearance will be assessed in accordance with Native Vegetation Regulation 5(1)(d) – Infrastructure.</p> <p>Positioning of fencing of western boundary Any proposed fencing around the western boundary of the Four Mile deposits should be located to avoid sensitive areas such as significant vegetation (including large trees) and watercourses that are subject to erosion. Where crossing a watercourse would be unavoidable, the shortest distance across should be chosen.</p> <p>Note: these issues are also referred to under Section 1.5 – Summary of proposed operations</p> <p>Aerial photography investigations to monitor changes in vegetation cover changes Section 7.5.3 Control and management strategies – vegetation - Under Management Measures, aerial photography is suggested as a way of comparing vegetation cover changes over time. Further detail is required as to who will be responsible for acquiring the imagery, how often images will be taken, what resolution the images will be, and what year of imagery will be used as the baseline. It is most likely that aerial imagery will be useful as a tool for detecting the overall area of surface disturbance, from which vegetation clearance will need to be extrapolated. Given the small size of the vegetation species present in much of the plains area (<i>Sclerolaena</i> spp., tussock grasses etc), it is unlikely that aerial photography would be of sufficiently high resolution to detect individual plants. It would be useful for picking up loss of larger vegetation, such as trees and shrubs in drainage lines.</p>	<p>of Arkaroola Wilderness Sanctuary ahead of its requirement. The area of habitat affected by relocation of this track is very small in the context of the mining plan, and the previous alignment would be rehabilitated when mining finishes, or reinstated and the new alignment rehabilitated depending on the wishes of Arkaroola Wilderness Sanctuary and other stakeholders. As the diversion is part of the mine plan, clearing will be accounted for in the mine’s Significant Environmental Benefit arrangements. The track will not exceed 5 m width.</p> <p>Noted and agreed.</p> <p>Aerial photography complements the annual vegetation monitoring, as noted in the Mining Proposal/Public Environment Report. Specialist companies are engaged to undertake the aerial photography, which is undertaken every two years in accordance with the existing Beverley MARP. The next flyover is scheduled to be undertaken shortly. The resolution is 1:20,000 scale equivalent. It is proposed that year 2007 would be taken as the baseline.</p>

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FoEA References:

- Hendry, M. J. & Wassenaar, L. I. (2004) Transport and geochemical controls on the distribution of solutes and stable isotopes in a thick clay-rich till aquitard, Canada. *Isotopes in Environmental and Health Studies* **40**(1): 3-19.
- HR (1998) *Beverly Uranium Mine: Environmental Impact Statement*. Heathgate Resources, Adelaide, South Australia.
- Mudd, G. M. (2001a) Critical review of acid in situ leach uranium mining: 1. USA and Australia. *Environmental Geology* **41**: 390-403.
- Mudd, G. M. (2001b) Critical review of acid in situ leach uranium mining: 2. Soviet Block and Asia. *Environmental Geology* **41**: 404-416.
- Ranville, J. F., Hendry, M. J., Reszat, T. N., Xie, Q. L. & Honeyman, B. D. (2007) Quantifying uranium complexation by groundwater dissolved organic carbon using asymmetrical flow fieldflow fractionation. *Journal of Contaminant Hydrology* **91**(3-4): 233-246.
- SC (2000) *Honeymoon Uranium Project: Environmental Impact Statement*. Southern Cross Resources Australia Pty Ltd, Queensland.
- Solodov, I. (1998) The retardation of liquid radioactive wastes due to the geochemical properties of the zone of injection. In: *Groundwater contaminants and their migration.*, eds. J. Mather, D. Banks, S. Dumbleton & M. Fermor, pp. 265-280. Geological Society, London, Special Publications.
- Timms, W. A. & Hendry, M. J. (2007) Quantifying the impact of cation exchange on long-term solute transport in a clay-rich aquitard. *Journal of Hydrology* **332**(1-2): 110-122.

Acronyms and Abbreviations (in Contents pages) – add the following:

BFME Beverley Four Mile East

Executive Summary, fifth paragraph, second sentence is amended to the following:

Quasar, as Manager, plans to appoint Heathgate Resources Pty Ltd (Heathgate) as the mining operator for the project.

Executive Summary, sixth paragraph, is corrected as follows (in regard to the first sentence, it is noted that the proposed location of the satellite plant is shown in Figure 1-4):

The Beverley Four Mile Project entails construction of a satellite facility close to the Four Mile deposits, and construction of in-situ recovery (ISR) wellfields of the same design as currently used on the Beverley mining lease. This satellite facility would remove the uranium from the ISR liquor by ion exchange, producing uranium bearing resin, which would be trucked to the Beverley processing plant. The resin would then be stripped of uranium, regenerated, and trucked back to the satellite facility.

Section 1.1, fourth paragraph, second sentence is amended to the following:

Quasar proposes to appoint Heathgate as the mining operator for the project.

Section 1.4, first paragraph – the second sentence is deleted. The paragraph now reads:

The Beverley Uranium Mine is capable of producing about 1,500 t/a uranium as uranium oxide concentrate (UOC) by the ISR method, although the current production is approximately 800 t/a. The export licence is for 1,500 t/a (as U₃O₈) and it is possible that the production may be increased to that in the future.

Section 1.4, second paragraph – the word 'are' is missing in the first line. The text should read '...ore-bodies that are present in aquifers.....'

Section 1.5, first paragraph, second sentence, and also Section 4.1.1, first paragraph, second sentence, are amended to the following:

The Four Mile satellite facility would remove the uranium from the ISR liquor by ion exchange, producing uranium bearing resin, which would be trucked to the Beverley processing plant.

Section 2.5, second paragraph, is amended to the following:

Quasar, as Manager, proposes to appoint Heathgate as the operator of the Beverley Four Mile Project. Notwithstanding Heathgate's proposed appointment as the operator, Quasar and Alliance will retain ownership of all facilities installed on EL 3666 in proportion to their participating interests (from time to time) in the Beverley Four Mile Joint Venture Project.

Section 2

Errata

Figure 3-2 was missing from the final electronic (pdf) version of the document. It is presented below:

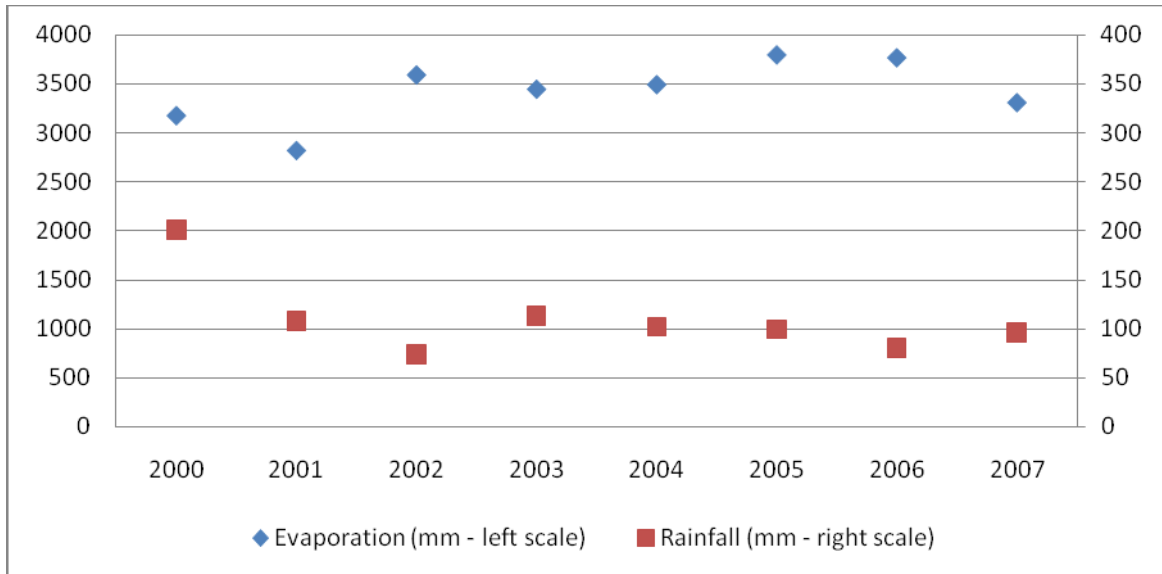


Figure 3-2 Annual Pan Evaporation and Rainfall, Beverley

Section 3.9.1 – delete first sentence.

Page 3-25, second paragraph from bottom – BFME (Beverley Four Mile East) should have been defined here.

Figures 3-17 and 3-22 – the geological drill hole pattern shown in Figure 3-17 is about a year out of date.

Figure 3-22 shows the drill hole pattern correct as at December 2008.

Table 7-1 is amended as follows:

Under the heading ‘SA State Codes of Practice’:

Delete reference to the Environment Protection (Industrial Noise) Policy 1994 and the Environment Protection (Machine Noise) Policy 1994. These have been replaced by the Environment Protection (Noise) Policy 2007.

Delete reference to the Draft Environment Protection (Site Contamination) Amendment Bill 2005. This has been gazetted and is now the Environment Protection (Site Contamination) Amendment Act 2007.

In the consequence listing column of Table 7-2, ‘Moderate’ should read ‘Intermediate’.

Badman FJ. 2006. *Beverley Uranium Mine Additional Mineral Leases - Flora Survey*. Prepared for Heathgate Resources Pty Ltd.

DEWHA/PIRSA 2008. Australian Government Department of the Environment, Water, Heritage and the Arts / Government of South Australia Primary Industries and Resources SA 2008. *Guidelines for Preparation of a Public Environment Report (PER) under the Australian Government Environment Protection and Biodiversity Conservation Act 1999 and a Lease Proposal and Mining and Rehabilitation Program (MARP) under the South Australian Mining Act 1971. Four Mile Uranium Mine EPBC 2008/4252. 17 September 2008.*

Heard, L. and Channon, B. (1997). *Guide to a Native Vegetation Survey (Agricultural Region) Using the Biological Survey of South Australia Methodology*. Geographic Analysis and Research Unit, Information and Data Analysis Branch, Department of Housing and Urban Development, Adelaide.

Heathgate Resources Pty Ltd 2008. *Beverley Four Mile Project Public Environment Report and Mining Lease Proposal*. Prepared for Heathgate Resources Pty Ltd by URS Australia Pty Ltd, 8 January 2009.

Waudby, HP and Howe, T 2008. *An additional record of the dusky hopping mouse Notomys fuscus in South Australia*. Australian Mammalogy 30: 30: 47-49.

Section 4

Limitations

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Heathgate Resources Pty Ltd in its capacity as contractor for the Quasar Resources Pty Ltd and Alliance Craton Explorer Pty Ltd Joint Venture. Only Heathgate Resources Pty Ltd and the South Australian and Commonwealth government departments or authorities to whom this report is to be submitted may rely on this report. No other third party may rely on this report unless the third party has been authorised in writing by URS to rely on the report.

This report is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal dated 31 October 2008, and subsequent documentation.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared between February and March 2009 and is based on the information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.