

In-situ Impact

Submission to :

Environmental Impact Assessment Honeymoon Uranium Mine Project

Dept. of Planning SA

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Executive Summary

This submission is prepared by Friends of the Earth, Australia (FoEA) in response to the Environment Impact Statement for the proposed Honeymoon Uranium Project in north-east South Australia. The proponent Southern Cross Resources plan to commercially mine uranium using the controversial acid In-situ Leach (ISL) process. Southern Cross Resources is predominantly made up of Canadian financiers with a 28% retaining interest by Sedimentary Holdings (Aust.).

Nuclear Cycle

It must be clearly noted that the Honeymoon uranium mine would become part of the broader nuclear industry. The effects of radiation, weapons proliferation and long lived radioactive wastes have impacts far beyond the regional environment. Whether or not the proponent or government assessment bodies acknowledge this, there remains a significant moral and political dimension to uranium mining.

The Guidelines for Assessment prepared under the Environment Assessment (Impact of Proposals) EPIP Act 1974¹ ignore aspects relating to the nuclear fuel cycle. FoEA contends that these issues are fundamental to responsible independent assessment. Assessment of projects in the national interest should involve community concern and 'whole of impact' methodology. The Friends of the Earth submission includes a presentation on these issues along with a critique of the project in accordance with the Guidelines for Assessment.

The Honeymoon Project

The Honeymoon project was stopped in 1983 due to community opposition to uranium mining and the nuclear industry. The reason the Honeymoon Project has been re-initiated is due solely to political and singular economic interests. It is not due to improved mining techniques or increased demand from a proven and socially acceptable industry. During the 18 years the project lay dormant the nuclear industry has continued to adversely impact environment and health across the world. This industry continues to fail to operate safely, prevent weapons proliferation or deal with the high volumes of radioactive waste generated.

In-situ Leach Mining

ISL presents significant site impacts due to the inherent properties of the ore and the technique used. ISL mining involves the circulation of solutions (sulfuric acid) through an orebody to dissolve uranium from where it is pumped to the surface and recovered in a processing plant. The use of sulfuric acid leachate for uranium has never been practiced at a commercial scale in OECD countries. In the former Eastern Europe and Soviet Republics it has led to large scale and intractable groundwater contamination.

What are the problems?

While mining companies attempt to control flows underground to ensure an economic uranium recovery rate the complexity and uncertainty of underground water systems presents real risks of wider contamination. With radionuclides and heavy metals dissolved into the groundwater and under heavy pressure through pumping they become significantly more mobile.

The Honeymoon project plans to discharge remaining waste solutions from processing back into the groundwater. From being inert and immobile in the ore body, these wastes would in future remain bioavailable and mobile in the aquifer.

Rehabilitation?

When rehabilitation is attempted, further chemicals are injected into the aquifer to precipitate out these unwanted wastes to immobilise their transport through the groundwater. However even rigorous pumping and chemical treatment does not guarantee successful restoration – many elements such as radium and selenium, remain mobile under the chemical conditions created. It is extremely difficult to obtain a chemical balance between all contaminants – some will inevitably remain dissolved and able to migrate away from the former mining zone to a potential user of the groundwater.

Southern Cross Resources has no intention to rehabilitate. Given the above the company seeks to avoid the costs of rehabilitation arguing that the groundwater is already contaminated and unwanted. The privilege of exploiting natural resources for private profit must be balanced with a responsibility at each stage to reduce impacts.

¹ The EPIP Act is superseded from July 16th 2000 by the controversial Environment Protection and Biodiversity Conservation (EPBC) Act 1999 which will slightly affect the process for future developments.

The proponent has failed to acknowledge that the ISL process significantly increases the mobility of these materials through dissolving and pumping which threatens neighboring and connected groundwater. They would not be allowed to do this in the USA or in Canada, ISL uranium mining standards in the USA require rehabilitation of groundwater to its original quality, SCR seek to compromise environmental standards and to avoid the responsibilities and costs of rehabilitation. This is a dangerous precedent for mining standards in Australia, and may allow otherwise uneconomic mine

Approvals, Assessment Process

This will be the second ISL uranium project using sulfuric acid to be assessed in the OECD. The first, Beverley project also in South Australia has yet to commence commercial production. There remains significant scientific uncertainty as to the long term impacts of these projects. This is significantly new territory for both the proponent and the assessing body.

Friends of the Earth remains critical that the assessment process applied to ISL projects has been limited hence compromising environmental protection. There remains no ability to independently monitor the operation of ISL projects

Combined with this is insufficient regulatory framework to adequately and appropriately assess the further expansion that both the Beverley and Honeymoon projects propose. Southern Cross Resources is attempting to use this EIA process to gain approvals for a series of separate projects. The company has proposed “amendments” to the EIS to extend approvals rather than submitting a separate EIS for each of further uranium mine proposals. This would significantly compromise credible assessment and deny public involvement in decision making.

Conclusions and Recommendations

In conclusion, Friends of the Earth is opposed to the Honeymoon Project for the following:

1. Site specific impacts
2. Technical aspects of the ISL mining process
3. The broader impacts of uranium mining and the nuclear industry.

Friends of the Earth believes that based on each of these factors the Honeymoon project should not be given approval under the EPIP Act.

Were the mine to gain approval[#], the following requirements should at a minimum be placed on the proponent:

- Surface evaporation of all liquid wastes, no discharge of wastes into the aquifer;
- Uranium contained in the middle and upper aquifers should not be mined;
- Restoration of reducing geochemical conditions in all affected aquifers after mining (to try and reduce the heavy metal load to pre-mining conditions);
- Demonstrate financial security and have these arrangements made public;
- All field leach trial data from 1982 and 1998-2000 should be released as part of the Supplementary EIS and before commercial operations proceed.

Further to this:

- Further deposits near Honeymoon/East Kalkaroo must be assessed at the PER level as a minimum, preferably the EIS level;
- Goulds Dam/Billeroo should be assessed as a separate EIS and mining project;
- Funding of a long term groundwater monitoring regime to ensure the protection of groundwater for pastoral and other possible future uses;
- An independent committee involving Federal Government, expert, indigenous and environment group representation is established to oversee ISL operations as previously proposed by Environment Australia

FoEA contends this would be a political rather than scientific decision

TABLE OF CONTENTS:

INTRODUCTION	5
FACTORS FOR ASSESSMENT	6
1. INTRODUCTION	6
2. BACKGROUND	6
3. NEED FOR THE PROPOSAL.....	6
4. PROJECT DESCRIPTION.....	7
5. PROJECT ALTERNATIVES	8
6. THE EXISTING PHYSICAL ENVIRONMENT	9
7. EXISTING BIOLOGICAL ENVIRONMENT.....	11
8. EXISTING SOCIO-ECONOMIC ENVIRONMENT	11
9. EXISTING CULTURAL ENVIRONMENT.....	11
10. RADIOLOGICAL ENVIRONMENT	11
11. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION	12
12. ENVIRONMNETAL MONITORING AND MANAGEMENT PLAN	12
13. REHABILITATION AND DECOMMISSIONING	12
14.....	12
15. CONCLUSION	12
16. RECOMMENDATIONS	13

Introduction

The nuclear industry is broadly agreed to be in a terminal state of decline. The nuclear electricity industry has attempted for 30 years to transcend its fundamental beginning as a by-product of the nuclear weapons race. The 'peaceful atom' has failed even the most modest claims of its promoters to produce safe, clean and cheap electricity for a peaceful and prosperous world. The original promoters through North America and Europe are disengaging from an industry unable to support or defend the spiraling costs, radioactive waste or emissions the industry imposes. Without the finance and protection that the cold war provided, the nuclear industry is now exposed to the market place and democratic regulation.

These shifts leave an industry in decline attempting its last gasp. Desperate to masquerade as "clean and green" the industry is aggressively lobbying international debate over greenhouse issues. The industry is further targeting developing economies through Asia to adopt that which has failed in the West. Both avenues further expose the industry's credibility and it is widely believed that reason will prevail.

The Honeymoon project, a uranium mine that would contribute to this industry, cannot be assessed in isolation to this reality. To preclude this fails to protect both the Australian and international environment and communities aspirations for a clean, peaceful and sustainable future. Aside from socio-environmental impacts, investment in uranium by private companies and the subsequent support from State and Federal governments is bad economics.

The Honeymoon project like the US owned Beverley ISL project also in South Australia attempts to defy the market by passing further costs onto the environment. The In-situ leach technique is a cheap and nasty mining method. It is employed to exploit ore bodies of marginal grade without the requirement of expensive capital associated with conventional open-cut and underground techniques.

The proposed ISL use in Australia goes a step further and exploits weak environmental regulation and the transient political climate. The company (as with the Beverley project) is planning the use of acid leachate and direct discharge of waste with no requirement to rehabilitate. This form of mining has not been used commercially anywhere in the OECD, with severe contamination where it has been used through Eastern Europe.

The following comment from Friends of the Earth is broken into 2 sections:

- a. General Comments – an overview of the project and the issues of approval and regulation
- b. Factors For Assessment – comments made in accordance with the 'Guidelines for Assessment' and annotated with reference to the EIS prepared by the proponent.

General Comments

The assessing body would be aware that uranium mining has been one of the most contentious issues in Australian politics. The fundamental issues of whether Australia should export uranium has not been assessed since the Fox Inquiry was established 1974. Community opposition to uranium mining remains, it is purely the change of political power that has led to the present series of uranium projects.

The structure of Environment Impact Assessment (EIA) under the EPIP and upcoming EPBC is unable adequately assess radioactive or nuclear facilities. This is due in part to the site specific assessment approach taken, contradicted by the unique mobility of radioactivity. This is further due to the impact minimisation combined with project facilitation taken rather than a clear mechanism to veto inappropriate developments. Hence this leaves the broader issues subject to the winds of politics, devoid of established information and developed public policy.

This form of commercial ISL uranium mining using sulfuric acid and direct disposal of wastes does not occur anywhere else in the OECD. The proponent may submit that this is due to geology, however this is fundamentally an issue of environmental regulation. This project would be unacceptable in North America where both ISL proponents are based. Requirements in this region to rehabilitate groundwater would prevent the use of acid based leachate.

It cannot be stressed enough that the intention and acceptance of this form of mining in Australia degrades our environmental standards. Approvals set precedents for further exploitation of uranium reserves taking advantage of the low cost framework being provided. Clearly, beyond the arguments around uranium, if the less polluting alkaline leachate cannot be used and rehabilitation can not be

achieved then the project should not proceed. The value judgement of whether an aquifer has future use for other purposes is one that should not be made by a proponent.

No groundwater system can ever be reasonably considered to be “isolated”, since water must have traveled from somewhere to be in the aquifer in the first place. There has been significant controversy surrounding the Beverley ISL approvals over this issue. It was formally and independently established that it remained *uncertain* whether the Beverley aquifer to be mined was connected. Unfortunately the precautionary approach was not adopted due to political pressure as opposed to scientific judgement. In this case the Honeymoon aquifer is clearly connected, an admission made by the proponent.

There is significant concern that the project is marginally financial at best. As the market price for uranium continues to fall, contract security and project viability will come into question. While the project’s financial viability may be directly outside the bounds of Environment Impact Assessment, it does have import on the ability of the proponent to rehabilitate and rectify extra-ordinary incidents.

Factors for Assessment

In accordance with the EIS Layout

1. Introduction

It is noted that the original EIS for the Honeymoon Project in 1980-81 included a pilot scale mine to be operated before a commercial mine. To not release the results from the field leach trial undertaken in 1982 seriously compromises the project. In the USA, the public and regulatory assessment of the results from a field trial or pilot plant form the basis of the permitting and approval of commercial mines. The Draft EIS is very poor in data from the 1982 and recent (and ongoing) 1998-2000 trials.

The Billeroo leases and uranium project should be removed from this EIS, since it is an entirely separate deposit, geological system and therefore mining project.

2. Background

Discussion of project and the assessment approach taken under EPIP etc

The history (Section 2.1.1) fails to acknowledge that the push-pull tests conducted at Honeymoon in 1977 and 1979 were with alkaline and acid reagents, respectively. Also, the ‘rapid advances in ISL technology’ in the USA were with the use of alkaline reagents and NOT ACID.

Section 2.4.1 fails to state that the 1979 push-pull tests were with acid, compared to those in 1977 being with alkaline chemistry. The pattern E drilled in 1982, which failed to intersect uranium mineralisation and encountered low permeability proves the high variability of the sedimentary geology. This fundamental problem in the application of ISL is ignored, dismissed or wrongly interpreted by the proponent.

It is noted that the original project was halted in 1983 due to community opposition. The substance of the project remains the same as does the community sentiment.

3. Need for the Proposal

Overall the market predictions are based on information that suggests marginal demand with this information 2-3 years old. The real market situation for uranium continues to fall.

3.2.1 Demand

The proponent clearly misunderstands the world uranium market. The demand for uranium is not increasing rapidly, with most western countries in the process of phasing out nuclear power or stagnating new projects. Even in Asia, Japan has recently announced a slowdown in new reactors, as has China and several other countries. The figures used are based on market information from 1998

Significant Points:

Uranium Commodity Price : US\$8 / pound (July 2000)

3.2.2 Supply

The source of military and FSU uranium will continue to keep downward pressure on the uranium price for many years, especially given the recent Non Proliferation Treaty which reached agreement for the disposal of yet more HEU and excess military Plutonium.

The recent spot price for uranium has fallen to around US\$8/lb. Most producers expect these prices to stay for the next few years, although some display apparently biblical faith in possible price rises (eg. ERA in their recent June quarterly report). It is quite doubtful that the long term price for uranium will ever rise beyond US\$15/lb, meaning Honeymoon will have to be one of the most efficient producers in existence to survive without going bankrupt. Many ISL mines in the USA are closing down (eg. Kingsville Domw & Rosita in Texas), while new projects have failed to come on stream (eg. Crownpoint, New Mexico).

The vertical scale in Figure 3.1 is WRONG.

The figure, taken from the industry group the Uranium Information Centre, should be about 70,000 t U/year. It is laughable that a graph copied directly from a website could make such a mistake.

3.3.1 Economic Benefits

The overall revenues, given the lower than expected prices, would barely give the proponent a profit for shareholders and repay debts.

4. Project Description

4.1.2 Project Description

Poor quality of yellowcake product (80% U_3O_8) is significantly lower than Ranger and Olympic Dam, which are in the order of 98%. This means that the marketability of Honeymoon uranium will be more difficult, therefore impacting on the economics of the project.

Table 4.1 - The units of "G.T." and "S.G" are not explained adequately enough anywhere in the text or glossary.

The low GT values for East Kalkaroo and Billeroo prove that the costs of extraction for these deposits will be high and therefore mining marginal.

The proponents fail to mention restoration of heavily polluted groundwater after mining, a major cost and regulatory requirement in the USA. The belief of the proponents to 'discover' additional uranium reserves amenable to ISL is misplaced, since any further uranium is likely to be low grade and thin and uneconomic to recover in the prevailing world uranium market over the coming decade, such as Yarramba, Oban and/or Berber. The use of solvent extraction technology in the proposed process plant will also increase costs and reduce the possibility of mining further deposits, since remote sites require the use of ion exchange columns, such as those used heavily in Texas and Wyoming and likely to be used at Beverley.

4.4.1 ISL Wellfield

Figure 4.6 fails to address issues of where the monitoring wells will be situated in the hydrogeologic sequence, such as the Upper, Middle or Basal Sands.

The mechanical integrity of ALL wells should be tested at intervals of not more than 1 year, compared to the 5 years proposed. The nature of highly acidic solutions will attack the grouting and cements used in the wells, and give a higher probability of failure compared to normal groundwater bores. A basis for the use of 660 kPa pressure should be provided, since this would appear to be a low pressure for testing purposes.

Monitoring wells must not be screened over large intervals, since this tends to dilute possible excursions and groundwater contamination. This also means that a high number of monitoring wells must be used, across the several aquifer sands in order to provide an acceptable degree of confidence in the ability of the proponent to detect (and therefore rectify) any excursion or contamination problems.

The basal groundwater, if a need is found for pretreatment, should be treated and injection of upper sand groundwater banned. The basal groundwater should be treated, preferably with soda ash. The resulting calcite will contain a significant proportion of radium and would constitute a radioactive waste that needs long term management.

The spelling of sulphate is wrong - the latest consensus in the international chemistry community is for SULFATE.

The use of ferric sulfate as an oxidising agent should be banned, due to the potential for jarosite precipitation. This Draft EIS is the first public acknowledgement by the various companies who have been attempting to mine Honeymoon that jarosite did in fact occur at the 1982 field leach trial. Previous papers have denied this, proving the proponent cannot be entrusted to be truthful and scientifically accurate in their reporting of Honeymoon's performance.

Curiously, the data in Table 4.1 fails to include potassium (K). Since jarosite is a $KFeSO_4$ mineral (formula approximate only), this prevents any proper geochemical analysis of the claim that jarosite has not been formed during the current trials. The table should also include analysis of As, Ni, Cr, Cd and Pb.

5. Project Alternatives

Failure to provide a credible 'No Project' option as required under the Guidelines of Assessment.

5.2.1 Project Development

World Uranium Supply - It is incorrect, indeed arrogant, to assert that Honeymoon uranium will be produced under more stringent safeguards than elsewhere. This admits the likely possibility of nuclear terrorism or links to nefarious nuclear weapons programs - both excellent grounds alone to reject Honeymoon specifically and the nuclear industry more broadly!!

Greenhouse Gas Emissions - Another arrogant claim to be rejected. Many eminent scholars, such as Amory Lovins, reject and clearly document the myth of greenhouse gas 'efficiency' of nuclear power. Given that the government allows the EIS to ignore analysis of the nuclear fuel cycle in this EIS, they should be banned from making false and misleading statements about alternatives to nuclear power. Otherwise, they should justify their case for nuclear power in their Supplemental EIS.

5.2.2 Project Deferral or Abandonment

It is clearly wrong to state that impacts have been 'negligible' to date from the demonstration plant. Later in the EIS (page 10-6), it states that gamma radiation levels at the trial site from 1981-82 have been increased nearly 3-fold, to levels higher than average background for the area. For pastoralists and indigenous peoples who use this land in the long term, these impacts are of great concern (by comparison, the Nabarlek mine also had similar problem gamma increases after rehabilitation; see Martin, 2000).

The proponent fails to acknowledge that the abandonment of the project would also prevent the destruction of the groundwater quality in the Yarramba palaeochannel, and stop excessive gamma radiation problems at the surface and radon burdens. This means the EIS fails its regulatory obligations and should be expanded and resubmitted.

5.3 Recovery Method

It is agreed that the application of underground or open pit mining is unacceptable in terms of environmental impacts. The proponent clearly dismisses and fails to understand the significance of the destruction of groundwater quality by ISL.

5.4 Ground Water Pretreatment

The proponent should not be allowed to replace Basal groundwater with Upper sands groundwater, since this will lead to water level differences which will exacerbate the potential for excursions and impacts on the stock quality Upper sands groundwater.

5.5 Leaching Method

The high calcium concentrations in the groundwater of the Yarramba palaeochannel should preclude the use of both acid and alkaline, due to the potential for the formation of gypsum and calcite, respectively. Both, when precipitated (and it is a matter of when, not if), will act to block screens and reduce aquifer permeability, critical for economic and environmental operation.

Figure 5.2 fails to include critical details of column size, oxidising agents, acid (sulfuric ?), alkaline reagents (which carbonate ?), sample preparation etc.

5.6 Uranium Recovery Process

The use of solvent extraction in ISL mines is ancient technology, with ISL mines in Texas and Wyoming using ion exchange technology almost exclusively. Given the higher radon emission rates for solvent technology, the project should be abandoned if it can't be feasible with ion exchange.

5.7 Process Reject Solution Management

The best environmental option for management of liquid wastes is surface evaporation. Re-injection leads to highly acidic and soluble heavy metals and radionuclides polluting groundwater - being much higher than that existing prior to mining.

The Draft EIS misrepresents the deep well disposal practices of ISL mines in the USA - virtually all use deep well re-injection as their primary means of liquid waste disposal, not just 'a number'.

It is wrong to state that there are no deep groundwater formations at Honeymoon which would be suitable for deep well disposal. It is simply that the deep geology is undrilled and not studied. For example, the Mutooroo pilot scale In Situ Leach copper mine, operating for over 1 year at the old Mutooroo copper mine about 80 km south of Honeymoon, was situated in fractured rock of the Willyama Formation (see Canterford *et al.*, 1983). Given that the Willyama rocks underlie the Yarramba palaeochannel, deep well disposal may be technically feasible, although it is certainly not preferable from an environmental point of view.

5.8 Process Solids Management

All radioactive solids produced by the Honeymoon project should be managed on site, in dry storage above ground in an engineered repository and monitored by the proponent in perpetuity. Clearly, the best alternative is not to produce the wastes in the first place.

GENERAL COMMENT - NO ADVANTAGES/DISADVANTAGES LISTED completely and honestly for all options discussed throughout the Draft EIS.

6. The Existing Physical Environment

6.2 Geological Environment

The geological cross-sections presented in Figures 6.4 to 6.5 and 6.10 are INCORRECT. The sections presented in Brunt (1978), as shown below, define clear gaps in the clay confining layers between the basal, middle and upper sands. Given that the latest drilling at Honeymoon has not been extensive, the proponents are merely 're-interpreting' and redefining the sections to try and hide the fact that the sands are hydraulically connected (due to these gaps in the clay). It should also be noted that, despite the work of Brunt being available for the 1980 Draft EIS, they were not included to hide this clear hydrogeologic fact. The proponents therefore cannot be trusted to be representing the channel stratigraphy and hydrogeology correctly.

Reference to the Billeroo palaeochannel should be removed, since this is not part of the Draft EIS and is an uneconomic part of the Honeymoon project (due to the low grade and thin sections of the Goulds Dam deposit).

Reference to the Yarramba resource should be removed for the same reasons above for the Billeroo/Goulds Dam resource.

It is important to note that the underlying rocks for the Yarramba palaeochannel comprise fractured rock basement, with less confinement than that offered by a thick (>20 m) clay layer. Given the source of the uranium as granitic (leached over time from these underlying rocks), the channel cannot be considered to be confined vertically to an acceptable degree.

The methodology used to derive the uranium resource estimates has not been presented. This is critically important for a number of reasons:

1. Estimates based on Gamma counts (eg. Effective U_3O_8 or 'e U_3O_8 ') significantly over or under estimate the contained chemical quantity of uranium ($\%U_3O_8$) due to disequilibrium in the radioactive decay series for uranium.
2. Such comparisons of e U_3O_8 vs. $\%U_3O_8$ also provide evidence of the strength of the reducing conditions in the aquifer or orezone.

This data should be released by the proponent in the supplement EIS.

6.2.3 Regional Seismicity

Uranium tailings dams are required to be structurally sound for 1,000 years, yet the proponent assumes that PVC pipes and testing after an earthquake will be enough to prevent possible impacts. Earthquakes are poorly understood and characterised in Australia, mainly due to the different mechanisms causing them (intraplate rather than interplate) and their lower frequency (which acts to skew seismic statistics). The proponent should present evidence that the proposed PVC piping will be structurally sound for the 1,000 year period their conventional uranium mining counterparts are legally (and morally) required to demonstrate and engineer for.

6.4 Hydrogeology

An isopach of the Upper Clay should be provided. The isopach of the Middle and Upper Clays should also include an overlay of the Honeymoon and East Kalkaroo deposits, to allow exact interpretation of the threat of hundreds of bores further breaching the clay layers.

Although acknowledged since the original proposed development of Honeymoon in the 1980s, the proponents still try to obfuscate the FACT that the leaky palaeochannel system is exactly that – it LEAKS!!! For example, page 6-27 :

'... possibly resulting in the establishment of direct hydraulic connection between aquifers at some locations ...'

Combine this with the puncturing effect of hundreds of bores and the thin average clay at 3 m, there is VIRTUAL SCIENTIFIC CERTAINTY that the aquifers at Honeymoon/East Kalkaroo will leak and make it difficult for the proponent to maintain adequate injection control to meet modern community and environmental standards.

The thin clay lenses in Figure 6.16 also prove the above point - LEAKY AQUIFERS!!!!

The presence of uranium mineralisation in all three Eyre Formation aquifers demonstrates that despite the uranium being leached/sourced from the underlying fractured rocks and granites, they have migrated over geologic time to all sands/aquifers. This proves direct hydraulic connections and a LEAKY AQUIFER SYSTEM.

The piezometric data in Figure 6.18 is not stated whether this data is density corrected. The figure is based on a pitiful number of groundwater bores, which is not clearly stated which bores monitor which aquifer. At least 25 bores should be used to more accurately determine the water levels/piezometric surfaces for each aquifer.

The water quality in Table 6.8 fails to include Radon and Thorium. See comments on Table 4.1. A proper table, as should have been presented in the Draft EIS, is given on the next page. This shows the high radon disequilibrium factors and the clear detriment from heavy metals and radionuclides. The proponent should have included the extra analyses presented in Bush (1999).

The proponent exaggerates the quality of the groundwater at Honeymoon - deliberately to pollute it, it seems. Dozens of gold and nickel mines use groundwater with salinity levels up to 300,000 mg/L. Kangaroo Island residents use potable water derived from the reverse osmosis treatment of seawater - worse quality than Honeymoon! Many saline seepage/springs in WA also have higher than average radium activities. Thus Honeymoon have failed to present a convincing argument for their detrimental impacts on the Yarramba palaeochannel.

7. Existing Biological Environment

No comment submitted

8. Existing Socio-economic Environment

No comment submitted

9. Existing Cultural Environment

No comment submitted

10. Radiological Environment

10.3 Existing Radiation Environment

The large diurnal variations in radon mean that daily monitoring should be undertaken over several weeks for each season of the year, capturing all climatic conditions and variations. The small monitoring data to date cannot claim to assess possible conditions where atmospheric inversions will lead to high accumulated radon and radon progeny exposures to workers and the public. Especially since the mine will significantly increase the radon burden during its life - the surrounding Lake Frome plains are very low in ambient radon.

The units in section 10.3.2 Soil, are confused, with values given in $\mu\text{Sv/h}$ or $\mu\text{Gy/h}$. The Draft EIS should explain the conversion or present consistent units, as all peer reviewed scientific analysis should. This problem also exists in Table 10.3.

The 3-fold increase in gamma activity at the site of the 1980s trials at Honeymoon, like the 'radioactive anomaly' at Beverley from pump tests, prove that the surface environment will almost definitely be more radioactive than that prior to mining.

The various soil, biota and surveyed radioactivity levels prove the low radioactivity environment of the Honeymoon/Lake Frome region. To bring more radioactive materials into this environment presents a long term threat that will only serve to increase the levels of radioactivity.

Table 10.4 : Radionuclide Analysis

No date of tests, number of samples, variability etc. provided. This information should be included in the supplement EIS. Given the increase in Gamma levels at the old test site, new tests should have been conducted, especially to assess bioconcentration.

References ODO (1982) , ODO (1997) missing

10.4.2 Operational Releases

Page 10-10 Under the subsection *Drilling Activities* Radon in airlifted water is stated as 19,100 Bq/L – Radon Data figure should have been included in Tables 4.2 & 6.8. Under the subsection *Plant Solution* Radon in the pregnant solution is stated as 12,700 Bq/L. The proponent should provide data and evidence to explain these differences and the radioactive disequilibrium processes. It would be reasonable to assume that Radon levels in the pregnant solution would be higher than natural groundwater (airlifted water). The estimates as presented could be a significant underestimation of Radon release – a critical issue.

Under the subsection *Storage Ponds* Radium is stated as 2,220 Bq/L in the barren solution. The proponent should explain why this value is significantly higher than the figure presented in Table 4.2. The Radium levels of the solids should be stated in Bq/kg to be consistent with other data presented in the EIS eg. The 101 Bq/g of salt precipitates in the storage pond is 101,000 Bq/kg – tens of thousands of times higher than local vegetation and also higher than Ranger ore (~ 30,000 Bq/kg).

10.4.3 Airborne Dispersion Modelling

The Draft EIS uses a version of MILDOS that is nearly 20 years out of date. The latest version of MILDOS has a specific capability for application for ISL mine. A copy can be obtained from the USDoE or through www.antenna.nl/~wise/uranium/

As such, there can be no confidence placed in the modelling presented in this Draft EIS for Radon and Radon progeny dispersion.

The use of *Kvasnicka and Auty 1994*, should be removed since this was for the Ranger uranium mine and is of no relevance what so ever to the proposed ISL project.

11. Potential Environmental Impacts and Mitigation

11.2.8 Hydrological Effects

Exploration Bores - Experience all around the world proves that unsealed exploration bores LEAK (eg. Marlowe, 1984; Mudd, 1998, 2000a&b). Simply relying on formation properties is clearly insufficient, especially in an aquifer system that is already known to LEAK.

11.2.9 Liquid Disposal

Figures 11.5 , 11.6 No units for Concentration Distribution given. It should be explicit what units are being used for comparison to pre-mining concentrations.

Page 11-18 Subsection *Upper Aquifers* Paragraph starting 'Detailed analysis.....
.....these holes'.

Page 11-19 Continued
'Potential hydraulic connection caused.....thickness and extent'

THIS IS CLEAR ADMISSION BY THE PROPONENT THAT THE AQUIFERS AT HONEYMOON LEAK.

Therefor liquid wastes should NOT be re-injected into the aquifer system. There appears to be no thickness of clay in the palaeochannel sequence which would provide a high enough degree of confinement during mining and liquid waste re-injection.

The 1981 Honeymoon EIS was the final EIS not the Draft EIS as stated.

The Bampton 1998a reference appears incorrect, since it refers to Goulds Dam not Honeymoon / East Kalkaroo (should be 1998c ?). The proponent should not be allowed to mine uranium in the middle and upper aquifers near the Honeymoon site.

12. Environmental Monitoring and Management Plan

No comment submitted

13. Rehabilitation and Decommissioning

Refer to previous sections, specifically groundwater restoration requirements

Conclusion

It has been stated previously that the assessment of the Honeymoon uranium project has excluded the

broader issues of the nuclear industry. However those who decide must acknowledge this will take place in a void of information and public will. This decision while legally and procedurally defensible fails in a broader sense to serve the public interest. This decision is servicing assumed rights of a private enterprise within a window of political opportunity. The question of whether we should mine uranium remains unanswered.

Recommendations

In conclusion, Friends of the Earth is opposed to the Honeymoon Project for the following:

1. Site specific impacts
2. Technical aspects of the ISL mining process
3. The broader impacts of uranium mining and the nuclear industry.

Friends of the Earth believes that based on each of these factors the Honeymoon project should not be given approval under the EPIP Act.

Were the mine to gain approval[#], the following requirements should at a minimum be placed on the proponent:

- Surface evaporation of all liquid wastes, no discharge of wastes into the aquifer;
- Uranium contained in the middle and upper aquifers should not be mined;
- Restoration of reducing geochemical conditions in all affected aquifers after mining (to try and reduce the heavy metal load to pre-mining conditions);
- Demonstrate financial security and have these arrangements made public;
- All field leach trial data from 1982 and 1998-2000 should be released as part of the Supplementary EIS and before commercial operations proceed.

Further to this:

- Further deposits near Honeymoon/East Kalkaroo must be assessed at the PER level as a minimum, preferably the EIS level;
- Goulds Dam/Billeroo should be assessed as a separate EIS and mining project;
- Funding of a long term groundwater monitoring regime to ensure the protection of groundwater for pastoral and other possible future uses;
- An independent committee involving Federal Government, expert, indigenous and environment group representation is established to oversee ISL operations as previously proposed by Environment Australia

FoEA contends this would be a political rather than scientific decision

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