



DISTRICT COUNCIL OF COOPER PEDY

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Cooper Pedy Council
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Department of premier and Cabinet
Att Director of Engineering
GPO box320
Adelaide SA 5001

Dear Sir,

Re Fracking Proposal Arkaringa Basin

The Council have received two documents relating to a proposal by SAPEX to undertake further exploratory work in the Arkaringa Basin. These are the:

- Statement of environmental objectives
- Environment impact Report

Link Energy has been purchased by Tri Star and the application is to amend the current mining approvals attached to the previous drilling program has been made by SAPEX a subsidiary of Tristar. The council understands the proposal is to drill at a deeper level of strata than previously undertaken in what is thought to be Shale deposits holding Hydrocarbons which consist of gas and liquids east of the Oodnadatta road and East of the William creek Road. The exact extent of the drilling is yet to be determined. The proposal is however to undertake a Fracking program below the Great Artesian Basin (GAB) in relatively hard shale deposits below the Stuart Range formation (assumed to be relatively impervious) at a depth of 700m to 1700 m and within a zone the applicant considers is stable and will not influence the GAB. The fracking is anticipated to be 400m below the GAB.

Fracking is undertaken generally by drilling and casing and cement sealing to the zone of fracking. The trials will likely be a combination of Vertical Drilling combined with Horizontal Drilling. We understand the fracking trials are to be undertaken by water pressure injection with a detergent and sand injection to prop the cracking and provide a route for the trial extraction of hydrocarbons. The Drilling program is described in the documents as analogous to the Cooper Basin Gas fracking program and if successful would potentially be brought to full production in time. The key difference between this project and Cooper Basin is the drilling is close geologically to the natural springs of GAB and the current fault line penetration of the aquifers below and above the shales the UN known interconnectedness of the aquifers and the shales along the fault line is an issue discussed in this letter.

The council held a forum for discussion on the proposal on the 7th of March 2008 .Presentations were made the Department of Premier and Cabinet and the applicants for the licence extension.

It was abundantly clear that there is considerable opposition to the proposal although a number of members of the community expressed their views privately that they support the simulation trials.

The council understood from the presentation the department does not respond to the community concerns unless they relate to a technical issue relating to the application.

Therefor in considering the proposal the council has taken a precautionary approach to the proposed simulation. In particular the council believe the assessment should take into account the opportunities to become fully informed of the threats and opportunities the potential approvals may provide.

.Following receipt of a response to this letter the council intend to undertake another forum and hold a plebiscite of the community on this issue.

. The Council in considering the proposal have considered the following key issues of a technical nature and request a quick response to assist in informing the community. The following issues require answers to assist in their determination of the merits or otherwise of the proposal .

- The potential impact upon the Potentiometric levels (static Ground Water Levels) at the councils Oodnadatta track Drinking water supply. There is no detail on how this will be assessed.
- The potential impact on the Seismic Activity in the area posing a threat generally to the current fault line under the mound springs. Almost all fracking has had an effect upon the Seismic activity where it has been performed .How will this be assessed in this case prior to drilling and what modelling is proposed
- The potential impact upon the seismic stability of the basin hence the stability of the underground housing and accommodation at Coober Pedy .How is it proposed that the building Rules assessors adapt to a changed seismic profile .? What before and after information will be captured to assist the council in building rules assessments?
- How will the effect upon the cross strata natural fracture planes which will open up in the Stuart Range formation through the fracking process as part of the Shale zone fracking be monitored .This issue has not been articulated in the proposal .What conditions are going to apply to avoid fracture of the confining layers and the entry of the Borthanna aquifer into the fracking Zone.
- Additional to this information further information of a technical nature is required;

1. How is the effect of the perception by tourist's investors and interpretation of the rules surrounding underground buildings

relating to the safety of the accommodation to be assessed and compensated?

2. How is the industry brand effect on the state of tourism in particular to be addressed with the perception of unsafe underground accommodation.
3. How is the lending institutions attitude to lending for purchase of dugouts in the zone to be addressed ?Two institutions have already refused loan for dugouts in Coober Pedy another is now contemplating it .
4. How the interpretation of the Building rules in a higher risk seismic zone are to be addressed.
5. How are DENR concerns about aquifer interconnection effects and salinity mixing in the existing fault lines under a fracking regime close by to be addressed?
6. How is the potential for other tenements to be opened up in the Basin resulting in additional stress on the existing fault system and how that will compound the effects mentioned in this letter.
- 7 The fear for the physical health of the community and tourists
- 8 The acceleration of the declining population creating an increased burden on the remaining community and how that will be compensated.

Further information is required to address the following;

- How the unknown effects upon the aquifer below and above the fracking zone and its connectedness to the GAB within the fracture zones will be monitored and addressed. Ref DENR report .The current fault lines adjacent to the simulation zone transgress through the Great Artesian and Borthanna Basins.
- How the lack of knowledge of the aquifer integration as detailed in the DENR report can lead to a scientific assessment of the effects on the seismic activity and the aquifers.
- How the GAB and the Borthanna zones shear stress and any movement in shear stress levels may affect the springs and how it is assessed and how an increase in seismic activity is to be monitored...
- How the potential negative pore pressure during the suction phase will affect the spring mound potentiometric levels and how the government will address the serious environmental consequences if the springs dry up
- How can approval be granted when there is no indication in the application as to the proximity of the fracking to the springs therefor the technical impact cannot be modelled or assessed.
- How are the concerns of the AMYAC indigenous community to be addressed?

- To what extent are the observation wells proposed to enable the modelling of the static Ground Water Level before and after the Fracking Trial? This is information that appears to have been omitted from the proposal. This is an essential piece of information that is necessary before the proposal is considered appropriate

In the absence of this information council and the state government should refuse to support the proposal until independent modelling has been done and presented as part of the proposal.

If the proposal is approved the following should occur:

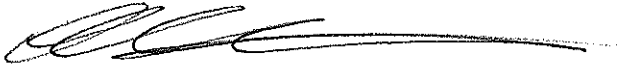
The state government should advise the council of the conditions that they propose for the SAPEX simulation trial to assure the Coober Pedy community that the government has considered the technical issues mentioned in this letter.

For Example a minimal set of conditions should include the following:

1. That the modelling of the hydrogeological effects is presented to the council prior to approval of the simulation to ensure sufficient information is obtained from the simulation to determine if there is a likelihood of an interaction with the GAB and the Boorhaman aquifer if so the application should be amended and re lodged to ensure a community view is submitted
2. That the state government ensure the simulated modelling is undertaken at a level of detail that will ensure that a check on the modelling can be undertaken after drilling and fracking.
3. That all simulated data on the effects on the GAB be made known to the council and the Coober Pedy Community before simulation or production approval is granted. If the effects are considered likely to be deleterious on the basin the simulation program not precedes.
4. The long-term effects of an extended program (stage 3 Approvals) in the event of the current simulation (trial) program being found to be economically successful should require modelling and a thorough analysis by the effected community. An opportunity to comment on the outcome should be provided to the community.

Your urgent assistance in addressing these issues is required.

Yours sincerely

A handwritten signature in black ink, consisting of several loops and a long horizontal stroke extending to the right.

Paul Athanasiadis
Acting Mayor
For and on behalf of the District Council of Coober Pedy

APPENDIX A

Notes to be addressed by the Department of Premier and Cabinet on the proposal for Simulation Fracking in the Akaringa Basin

EIR Proposal

1. The EIR suggests that the risk of the cross connection between aquifers is covered by the “proper Fracture Simulation Design “. Can the proponents give an adequate explanation of how human error will be addressed for a range of potential scenarios in the drilling process? A description of the instrumentation that will be used to detect a failure and the success of rectification is not provided for in the documents
2. The information provided in the EIR does not comply with Sec 10(3) in the following respects
 - There is no description in the document under S 85 (1) of what is a serious environmental damage or what triggers environmental harm in accordance with s111
 - There is no description in how monitoring of the potentiometric effects on the GAB may monitored or the effect on the residual shear stress may be effected along the existing fracture planes either within the formation or along the nearby fractures
 - There no description of the manner in which withdrawal from the simulation will occur if potentiometric effects are observed
 - There is no description of how the degrees of uncertainty of the effect upon the mound springs and the seismic state of the formation is to be addressed
 - The risk management section refers to cross aquifer damage or contamination. The document does not describe how this will be determined and or rectified.
 - The information has not been provided in a manner in which the lay person can understand it.

In conclusion we consider these issues provide for a medium level of impact and the community has a justifiable right to know how these issues are to be addressed and to be satisfied with it.

3. The provisions of 10(4) are not addressed as the competency of the reviewer and a declaration has not been provided.

4. The provisions of 11(1) (e) allow for information to be provided in respect to these comments and further reviewed by the community. We request this occur.
5. We request the applicant and the government will assess compliance as the current EIR does not refer to potentiometric monitoring as part of the project other than a suggestion the existing bores may be used , This fails on a scientific basis as the modelling check is not rigorous or accurate enough as a predictor . The EIR is fundamentally inadequate in this area and assumes that all geological observations will be done but there is no description of how and what will occur if certain circumstances that are common or unusual with this type of simulation are be addressed.
6. The assessment of the High or Low level operator has not been articulated by the department in respect to Sec 16 to 19. The council request an assessment what level they consider the application and why the level was chosen.
7. The size of the bond for rehabilitation should be disclosed and adequate for the work that may be required to rehabilitate a bore. The bond paid by the previous owner of the Tri Star tenement could not fund the rehabilitation in Queensland.

SAPEX Limited – PEL 122 & PEL 123 Fracture Stimulation Activities**Document:** Statement of Environmental Objectives

Version: Rev 0

Document Date: December 2017

General Comments

- The SEO relates to any fracture stimulation activities within the boundary of PEL's 122 and 123. There are numerous GAB springs within and near this boundary and recent studies have shown that there is potential for groundwater from aquifers, in addition to the GAB, to be supporting springs. These springs are also located within or near the extent of the Arckaringa Basin. No indication has been provided in either of the EIR/SEO documents as to likely locations of fracture stimulation activities and therefore are considered to be undertaken anywhere within the extent of PEL's 122 and 123. Fracking simulation activities within the Arckaringa Basin must account for potential impacts to the springs in the area. Has an EPBC referral been sought for fracture stimulation activities?
- If fracking simulation activities are likely to only occur within a sub-region of the PEL boundary, which can be defined, and is distant to any of the GAB springs then consideration should be to defining this boundary in both the EIR and SEO documents. Should fracking simulation activities be planned external to this boundary a subsequent review of the SEO and proposed activities would be required.
- There are a number of references to monitoring programs in the 'guide to how objectives can be achieved' section of the table. Where are these monitoring plans located? Are the monitoring plans to be prepared prior to the commencement of activities and if so when and how often are they to be reviewed? When and how are the results to be reported?
- This is a new area of SA in which fracture stimulation is to occur. And it is recommended that monitoring of aquifer pressures and water chemistry be undertaken at both private wells and springs both prior to (as baseline) and after fracture stimulation activities to provide confidence that activities have not affected GAB springs. The monitoring program is to be designed in consultation with DEM and DEW.
- The collection of all groundwater related data is to be provided to DPC-ERD in electronic format using data templates provided to DPC-ERD (attached to email).
- To note that DEWNR has been renamed and is now the Department for Environment and Water (DEW). Future versions of the documents are to reflect this.

Comment No	Science Comment (to identify relevant section / paragraph and consider required actions)	SAPEX Response	Addressed (Y/N)
	Section 1.1, pg. 2, editorial – when citing or referring to legislation it is preferable for the documents name to be in italics. P&GE act not completely italicised.		
	Section 1.2, 1 st paragraph, pg. 2 – editorial - reference to 'south eastern portion of the basin' to include the full basin name to		

Comment No	Science Comment (to identify relevant section / paragraph and consider required actions)	SAPEX Response	Addressed (Y/N)
	avoid mis-interpretation as the GAB also extends across the area. ('south eastern portion of the Arckaringa Basin')		
	<p>Table 1 – environmental objective 1:</p> <ul style="list-style-type: none"> • To consider adding the following items to the assessment criteria <ul style="list-style-type: none"> ○ Appropriate controls exist to protect separate aquifer systems and / or hydrocarbon reservoirs that are typically in natural hydraulic isolation from each other ○ There is no uncontrolled flow to surface (e.g. blow out) • To consider adding the following items to the 'Guide to..' section. <ul style="list-style-type: none"> ○ SAPEX to undertake baseline monitoring of aquifer pressure and water quality in areas where fracking activities are to occur both prior to and after fracking activities to show compliance. ○ Seismic measurement monitoring equipment to be installed near spring groups • 'Guide to..' section – 2nd item under Fracture stimulation - fracture design needs to ensure that fracture growth does not extend into either the overlying or underlying aquifers 		
	<p>Table 1 – environmental objective 2:</p> <ul style="list-style-type: none"> • 2nd assessment criteria to be modified: <ul style="list-style-type: none"> ○ No impact on groundwater dependent ecosystems resulting from extraction of groundwater or fracture stimulation activities. <p>The 'Guide to..' section will need to be modified to reflect this change. Possible items include:</p> <ul style="list-style-type: none"> ○ Seismic measurement monitoring equipment to be installed near spring groups ○ No fracture stimulation activities within X kilometres of a spring or fracture zone. 		

Comment No	Science Comment (to identify relevant section / paragraph and consider required actions)	SAPEX Response	Addressed (Y/N)
	<ul style="list-style-type: none"> ○ Proposed water supply wells reviewed to ensure that their use does not impact adversely on existing users of groundwater 		
	<p>Table 1, environmental objective 3:</p> <ul style="list-style-type: none"> • 2nd last item in 'Guide to' section – to correctly refer to the relevant NRM plan – SA Arid Lands Regional NRM Plan • Items in the 'Guide to' section regarding pond location, construction and leak detection also relate to environmental objective #1. Reference to these items is to be made in environmental objective #1. 		
	<p>Section 4, pg 17 –To consider extending the list of abbreviations by adding a glossary to the document to explain terminology used and avoid mis-interpretation. A glossary is provided in the EIR document, which could be filtered to relevant terminology for the SEO.</p>		



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EPA 05/13746

Mr Jarrod Spencer
Senior Environmental Officer,
Energy Resources Division
Department of the Premier and Cabinet
Level 6, 101 Grenfell Street
ADELAIDE SA 5000

Dear Jarrod

Thank you for the opportunity to provide comment on the following documents:

- SAPEX LIMITED PEL 122 & PEL 123 Fracture Stimulation Activities, Environmental Impact Report, December 2017; and
- SAPEX LIMITED PEL 122 & PEL 123 Fracture Stimulation Activities, Statement of Environmental Objectives, December 2017.

The Environment Protection Authority (EPA) has reviewed a previous draft version of both the Draft Environmental Impact Report (EIR) and Statement of Environmental Objectives (SEO) (Draft October 2017) as part of the Tri-Star Petroleum Company direct consultation with its stakeholders. These documents were provided to the EPA on 1 November 2017. The EPA notes the comments that were provided to the Tri-Star Petroleum Company on 1 December 2017 have now been considered and incorporated into the current EIR and SEO versions listed above.

Based on this (and no additional changes of environmental concern in the EIR and SEO documents) the EPA has no further comments.

For your information, the following comments were provided to Tri-Star Petroleum Company on 1 December 2017:

Draft Environmental Impact Report (EIR)

4.5 Hydrogeology (pg 33) & 4.6 Groundwater Use (pg 38)

Sapex Limited should consider and include new information from the Bioregional Assessment Program, particularly with regard to hydrogeological structure, aquifer connectivity and groundwater chemistry data. Reports are available here: <http://www.bioregionalassessments.gov.au/assessments/galilee-subregion/supporting-knowledge-projects>

5.4 Fracturing Fluids (pg 52)

The EPA supports the proposal to provide full detail of additives proposed for use in fracture stimulation operations to DPC-ERD as part of the activity approval process, along with a demonstration that the level of risk posed by these additives is consistent with this EIR.

It is noted that the level of risk posed by additives containing BTEX is described as relatively low and that it is not proposed to use additives where BTEX is present in significant quantities (but likely at trace levels). The EPA acknowledges the reasoning behind the proposed rating of 'relatively low' risk, but encourages the use of best practice technologies. It is understood that there are alternatives to BTEX additives. Sapex Limited should investigate and implement alternatives through a process of continuous improvement.

5.5 Fracture Height Growth and Fracture Monitoring (pg 54)

Fracture modelling is discussed in this section and includes the use of techniques such as micro seismic monitoring, surface tilt meters, proppant tracers, chemical tracers and sonic anisotropy logging. As the EIR does not limit the number of wells to be drilled and fracture stimulated, the EPA recommends that after 1-2 wells have been fracture stimulated and modelling has occurred, the results of this (and a report of outcomes) is received and reviewed by DPC-ERD prior to permitting Sapex Limited (via the Activity Notification Process) to conduct further fracture stimulation activities.

The EPA supports the implementation of diagnostic tools on a case by case basis with a more detailed program included in the submissions to DPC-ERD during the Activity Notification process.

Proppant Tracers (pg 56)

If Sapex Limited uses proppant tracers above the threshold level outlined in the *'Radiation Protection and Control (Ionising Radiation) Regulations 2015'*, then Sapex Limited (or the contractor carrying out the work) will require a radiation licence under the *Radiation Protection*

and Control Act 1982 and will need to apply to the EPA for approval to dispose of the proppant tracers.

5.8 Temporary Holding Ponds (pg 57)

This section outlines the ponds which are to be used to receive water for stimulation and recovered flow back fluids, which are to be lined and fenced. The EPA understands that the timeline for use of these ponds may vary, but all will be in use for approximately three to six months. This estimated timeframe will assist in understanding longer term well performance. Consequently, a water balance approach methodology to leak detection would be considered acceptable.

Considering aspects such as the provision for lining, the short term nature of storage, and the depth to groundwater, the risk of environmental harm is considered to be low. However the following should be carried out to ensure the likelihood of seepage is reduced:

- a) All ponds are to be lined with a suitable UV stabilised polyethylene material. All liners must be constructed to the manufacturers recommended installation method and be welded and checked for joint adherence and leak tested prior to being placed in operation, and
- b) Regular water balance calculations and visual inspections are made to ensure any loss of significant water volumes from the recovered fluid ponds is detected.

If the ponds are to be used for a period greater than one year, a more stringent leak detection method should be employed (e.g. monitoring bores).

A map of watercourses within the Arckaringa Basin has not been provided, however it is stated that ephemeral watercourses exist and that the temporary holding ponds will not be located near significant watercourses. The EPA considers any water course as significant and a contributor to the local (and wider) ecosystem. The location of the temporary holding ponds should be in accordance *EPA Guideline 509/14 Wastewater Lagoon Construction*. Whilst it is acknowledged that specific locations have not been determined, locations where flooding risk is high should be avoided and the ponds should not be located within 50m of any watercourse. This information should be included in the SEO, particularly under Objective 3.

6.0 Environmental Impact Assessment (pg 61)

The ability to assess potential environmental impact is dependent on the Bioregional Assessment Program (see EIR comments under 4.5 and 4.6). Robust data/discussion would be useful around:

- Hydraulic pressures in surrounding formations;
- Potential impact to existing users; and
- Environmental values of different hydrogeological units in accordance with the *Environment Protection (Water Quality) Policy 2015*.

Additional Comments

The remediation of contaminated soils from chemical and hydrocarbon spills is mentioned in a number of areas within the EIR (including 1. Summary and Table 10). Sapex Limited should describe the treatment and/or disposal path for any contaminated soil. The EPA considers that a spill remediation approach should be referenced based on volume, estimated horizontal and vertical impact.

The assessment for uncontained spills with a larger scale impact (potentially non trivial) should be undertaken in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure (1999) amended in 2013* & relevant SA EPA guidelines.

Draft Statement of Environmental Objectives (SEO)

The EPA comments that the twelve (12) environmental objectives for fracture stimulation operations as outlined under Section 2.1 are satisfactory.

It is expected that the measures suggested by the EPA regarding the Environmental Impact Report are incorporated into the corresponding category in "Table 1: Environmental Objectives and Assessment Criteria" contained within the Statement of Environmental Objectives where applicable.

Environmental Objective 11: Optimise waste avoidance, reduction, reuse, recycling, treatment and disposal (pg 12)

Assessment Criteria:

Putrescible waste from small camp sites should be buried at an appropriate location and depth in order to prevent exposure of waste by fauna or wind/water erosion. Once covered, the site should also be compacted to further minimise the risk of future exposure.

Should you require further information, please contact David Daminato via telephone 8204 2195 or via email david.daminato@sa.gov.au

Yours sincerely,



Greg Tyczenko

**MANAGER
MINING AND RADIATION BRANCH
ENVIRONMENT PROTECTION AUTHORITY**

Date: 9 FEBRUARY 2018