Appendix G
Peer Reviews

PEER REVIEW OF DRAFT REHABILITATION PLAN
COBURN MINERAL SAND PROJECT

As requested I have reviewed the above draft rehabilitation plan for the Coburn Mineral Sand Project proposed by Gunson Resources Limited. My involvement in the preparation of the plan was solely as reviewer of early drafts and the final draft.

I have based my review of the plan on the following experience:

(1) Over 30 years personal experience describing rangeland systems and assessing condition of vegetation and soils in most pastoral areas of Western Australia. Senior author or co-author of seven major rangeland survey reports.
(2) Sound knowledge of the project area having personally field sampled and prepared landform, vegetation and soil (land system) descriptions for the area as part of the Carnarvon Basin Rangeland Survey (Payne, Curry and Spencer 1987).[1]
(3) Over 40 yrs personal experience with rehabilitation programs on degraded rangelands in the Kimberley, Pilbara and southern rangelands. Author of various reports and articles.
(4) Personal experience with recent field sampling and evaluation at 10 disturbed site Case Studies in the local area – information on these sites is presented separately as an appendix to the PER.
(5) Personal experience in monitoring trends in vegetation condition and soil surface characteristics in rangelands e.g. the Western Australian Range Monitoring System (WARMS).

My comments on the plan are provided below:

The rehabilitation methods in the plan represent best-known practice and the sequence and timing of procedures is laid out in a logical and appropriate manner.

I endorse the plan's intention that access to any made water points will be denied to mammalian fauna to minimise grazing and trampling impacts on recently treated areas. Similarly I endorse the banning of vehicle access to all recently rehabilitated areas in order to prevent damage to soil surface crusts and vegetation.

I agree that research and field studies conducted to date suggest that the methods outlined in the plan will be sufficient to provide effective rehabilitation. At the same time I commend the intention to undertake research and development work to further investigate and refine techniques.

I consider that the completion criteria as outlined are adequate, realistic and achievable and that the intended monitoring program will enable adequate reporting and environmental auditing.

[1] Payne, A.L., Curry, P.J. and Spencer, G.F. (1987). An inventory and condition survey of the Carnarvon Basin, Western Australia. Western Australian Department of Agriculture, Technical Bulletin No. 73. 478pp.

In summary I am satisfied that the rehabilitation plan is a professionally competent document that addresses all the relevant environmental issues and, barring wildly extreme climatic events, will achieve its objectives in the time frames indicated.

I trust that these comments are adequate for your requirements and will be pleased to provide further detail if necessary.

Yours sincerely,

Alan Payne
Environmental Consultant, Rangelands

REVIEW OF THE GUNSON RESOURCES LIMITED REHABILITATION PLAN
prepared by
URS Australia Pty Ltd

D. C. Blandford
[H.D.A., B.A. (Geol), Litt. B. (Geomorph), Post Grad. Dip. Env. Imp. Ass.]

Gunson Resources Limited propose developing its Coburn Mineral Sand Project in the Shark Bay region of Western Australia. The project, which is located approximately 85 km south-east of the town of Denham and immediately south of Hamelin Pool lies within the Australian Semi-arid Zone.

The ore body will be mined using open cut techniques with overburden and sand tail being returned to the mined out void. Processing will be in-pit and will advance with mining. The ore body, known as the Amy Zone, is approximately 35 km long, up to 3 km wide, and has a thickness ranging from 10 to 40 m. The product will be transported from site.

The Rehabilitation Plan, prepared by URS, presents a sound framework for addressing rehabilitation issues at the Coburn site. The very location of the project presents challenges in that the climate is semi-arid, rainfall is extremely variable, and the soils present are naturally both physically and chemically infertile. These issues make this site no different from any other mine located within the Australian Arid and Semi-arid climatic zones in terms of rehabilitation design, implementation, and success. In all instances, any rehabilitation plan developed for mining ventures should always be open ended. As monitoring data become available and the results of Research and Development Programmes become available, these will be integrated into the rehabilitation plan resulting in continual upgrading and modification of implementation and operational procedures.

It is noted that Gunson's strategy is to return disturbed areas to a pastoral land use. It is not appropriate to define an 'end-use' or final land use and then try to achieve this objective. The objective of the rehabilitation plan should be to develop a stable land surface to allow the establishment of habitats commensurate with the location and then, ultimately, the development of a self-sustaining ecosystem. The reason that it is not appropriate is that final land use will be dictated by land capability. Put in very simple terms, if land is used beyond its capability, then degradation will occur. If at some time in the future, grazing does occur, then this should only be after the lease has been relinquished by Gunson, and successfully rehabilitated to the satisfaction of the appropriate authorities.

It is probable that the environment will have a greater impact on the project than the project will have on the environment. Rainfall will be critical to the success or failure of the rehabilitation programme. The one issue that is certain regarding rainfall is that it is highly variable. Poor winter rains and then no cyclones for a few years suggests that the infiltration of rainfall is critical to rehabilitation success. Having surface soils with high infiltration rates will be essential for both maximising the effective use of rainfall and minimising surface runoff. There is very limited evidence of surface runoff in the pre-mining landscape and the return of the red sand sub-soil over sand tail suggests this trend can be continued in the post-mining landscape. The use of this sub-soil resource in the rehabilitation programme is a bonus, generally not enjoyed by those responsible for the success of such programmes.

What must be remembered is that an artificial system is being created, to best emulate the physical system that existed prior to disturbance. In this instance the vegetation/soil system should be treated with respect.

The reconstructed soil profile should:

- minimise surface runoff;
- maximise rainfall infiltration;
- provide a medium for plant growth;
- must be part of a landform system where the geometry is consistent with long-term stability; and
- must be deep enough to be internally draining and to allow lateral through-profile drainage to occur.

The detail provided in the Rehabilitation Plan suggests that the reconstructed profile can satisfy these criteria. Once the shape of the land has been defined and the profile reconstructed, then vegetation establishment becomes important. The aim should be the successful development of bushland habitat to the point where it is not seasonally dependent but self-sustaining.

Rehabilitation methods outlined in the plan appear to address, adequately, the strategies proposed. The detail can be filled in at a later date when implementation commences. However, landform reconstruction will play an important role towards achieving the stated aims of the plan. There is no discussion on understanding the fabric of contemporary surface morphology. The orientation of the final surface form may be critical in terms of wind erosion. At the present time, dune orientation, at least in the southern half of the project area, appears to be east-west. As stated in the Plan, summer winds are southerly. It is recommended that some careful planning be carried out as to the orientation of the reconstructed dunefield. Dunes oriented normal to long wind runs will suffer extensive crestal blow-outs. This earth-surface process should be avoided as it will add to the rehabilitation effort. Long wind runs should be parallel to the long axis of dunes. However, there may be trade-offs between the costs of dune construction and rehabilitation risk. Such issues can be addressed in the planning stage of the project.

Further to dune orientation, it will be important to define slope geometry prior to landform reconstruction. Slope length and slope angle should be aimed at maximising infiltration and minimising surface runoff. This aspect of rehabilitation has not been set out in the plan but I assume that it will also be addressed at the planning stage. This is an important component of the rehabilitation programme as it will dictate the type of machinery required. In many cases, the type of earth moving equipment available dictates what and how things are built. This aspect needs to be addressed very early in the planning stage of the project.

As mentioned above, the reconstruction of the soil profile is of paramount concern in the overall rehabilitation process. Contouring the sand tail prior to placing the red sand sub-soil will result in some compactive effort being applied. This is seen as advantageous as reduced pore space/size will potentially improve the water holding capacity through a reduction in permeability. The same comments apply to the sub-soil. However, it is important to understand that the retrieval, stockpiling, return, and final spreading of the topsoil has the potential to destroy what little structure is present in this material. If seeding is carried out by a contractor using rubber-tyred machinery, then further compactive effort will result. The resultant final density of the topsoil

will vary from that in undisturbed topsoil. Understanding the dry density ratio between placed and undisturbed topsoil is important for long-term success and it has been demonstrated that surface runoff can be generated in topsoils compacted by seeding operations using rubber-tyred machinery.

It is noted that the water contained in the sand tail will be slightly brackish. Under the proposed materials placement scenario, this is seen as being advantageous as the saline electrolyte of the pore water will discourage dispersion of any sodic material that finds its way to the deeper sub-soil. Further, clay contents are of such a low order that dispersion is not seen as a major issue. However, a waste characterisation programme and periodic monitoring of profile elements is strongly recommended. The potential for capillary rise of salts must also be considered. However, the particle size distribution of the overlying sandy sub-soil suggests that the material is not fine enough to effectively induce capillarity. It is strongly recommended that these potential changes be included in initial monitoring programmes.

The Research and Development Programme should look, at the outset, at fundamentals.

Accordingly, issues such as:

- changes to topsoil in post and pre-placement situations;
- compaction of surface topsoil using DDR's;
- differences in moisture content between analogue and reconstructed profiles;
- differences in infiltration rates between analogue and reconstructed profiles;
- changes in aggregate stability; and
- changes in profile salinity.

need to be included, and indeed, should form the basis of both the monitoring and research programmes.

The same types of fundamental issues should be addressed for vegetation. Once these aspects have been addressed, and understood, then techniques such as landscape function analysis can be applied.

Rehabilitation should be an open book, and will be a moving feast of successes and failures. The first objective is to rebuild the landform from materials available, the second objective is to get something to grow, the third objective is to develop surface stability, the fourth objective is to allow the system to develop within the constraints of the local environment, and with a little help from R&D and monitoring data.

The rehabilitation plan put forward by URS is sound in its broad-scale approach and legitimate in its understanding of constraints to rehabilitation success.

D. C. Blandford.

Department of
Industry and Resources

Your ref: 42905540
Our ref: MC:MC E0081/200401
Enquiries: Mark Cannon - Ph 9222 3263 Fax 9222 3860
Email: mark.cannon@doir.wa.gov.au

Mineral House
100 Plain Street, East Perth
Western Australia 6004
ABN 69 410 335 356

Telephone +618 9222 3333
Facsimile +618 9222 3862
www.doir.wa.gov.au

Blair Hardman
URS
Level 3 The Hyatt centre
20 Terrace Road
EAST PERTH WA 6004

Dear Blair,

DRAFT REHABILITATION PLAN - COBURN MINERAL SAND PROJECT

I refer to the above stated document dated 19 May 2005 submitted to me for peer review comments.

I previously reviewed a draft of this document dated 12 May 2005 and provided feedback to URS on 13 May 2005.

I understand that URS has prepared this document for Gunson Resources Ltd (the Company) for their Coburn Mineral Sand Project Amy Zone Operations. This project is located in the Shark Bay region of Western Australia approximately 250 kilometres north of Geraldton. The company proposes to mine 620 million tonnes of ore over a 20 year period, and produce heavy mineral concentrate (HMC) on site. The HMC will be transported offsite to Geraldton and so does not factor in the rehabilitation process.

The location of this project in the semi-arid region of Western Australia poses certain constraints in terms of time to achieve rehabilitation outcomes. Probably the most significant of those constraints is the uncertainty of local rainfall. Stability and permeability of the reconstructed soil profile are other potential constraints to successful and timely rehabilitation outcomes.

The procedure for rehabilitation has been addressed in the document and is a standard approach for rehabilitation by the mineral sands industry. This Department concurs with this procedure.

The company has committed to progressive rehabilitation, and after the initial start-up phase, to keeping all disturbances within the disturbance area required for access to and processing of the ore. This Department concurs with this approach.

The constraints to rehabilitation and revegetation success have been detailed and actions to address them identified including assessment, monitoring and reporting. A significant aspect of the proposed achievement of outcomes is the review and improvement process. This process requires commitment at the

highest level within the company. The commitment to research and development is noted also as a significant part of progressing rehabilitation and revegetation outcomes in a reasonable timeframe.

The company has provided a set of completion criteria. The time frames indicated are considered by this Department to be only indicative at this stage and hopefully shorter time frames will be achieved in practice.

One aspect that the industry generally needs to continue to apply resources to is determining the indicators that demonstrate that the required outcomes for rehabilitation and revegetation will be achieved in acceptable timeframes.

Regardless of the constraints presently before this project and the uncertainties, many of which apply across the State, this Department has no objection to this Rehabilitation Plan.

Yours sincerely

Mark Cannon
Environmental Inspector
MINERAL ENVIRONMENT - PERTH

30 June 2005