DEPARTMENT OF MINES AND ENERGY

SOUTH AUSTRALIA

REPORT BOOK 96/30

PUREBA/NUNNYAH REHABILITATION PROJECT

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Pureba/Nunnyah Rehabilitation Project

J F PARKER and
T J WILSON

The Department of Mines and Energy, South Australia undertook a rehabilitation project to ameliorate the impact of a 15 year old mineral exploration program in Pureba Conservation Park and Nunnyah Conservation Reserve in the Far West of South Australia. Access tracks and drill holes created in the early 1980s were actively rehabilitated during March and April 1996. Access tracks were ripped to 600mm using a Komatsu D85A with a three tine ripper. Drillholes were backfilled manually using volunteer labour supplied by the Australian Trust for Conservation Volunteers. Forty four vegetation regeneration monitoring points were established. The project achieved the major objectives of discouraging third party access, making safe drillholes and encouraging vegetation regeneration and provides a useful model for future rehabilitation projects.

INTRODUCTION

In the late 1970 s and early 1980s exploration was undertaken for uranium in the Narlaby Palaeochannel, 90 kilometres east of Ceduna, South Australia (Figure 1). The Licensee undertook an extensive exploration programme preparing approximately 500 kilometres of access tracks and drilling over 1 000 holes to an average depth of 100 m.

A Declaration of Environmental Factors (DEF) was prepared for the programmes. The Licensee committed to ripping the main access tracks or placing gates across them in order to discourage tourist use. They assumed that the tracks would be completely regrown within seven years providing they were not used. All rubbish and litter was to be cleared from drill sites and all plant and buildings removed from the camp site.

The exploration programme was also subject to the standard interdepartmental assessment process between MESA and the then Department of Environment and Planning (now Department of Environment and Natural Resources). As a result of this assessment process it was concluded that the exploration programme would not have a significant impact and that vegetation would naturally regenerate along the access tracks without the need for active rehabilitation.

At the time of exploration, the programme was within Unelated Crown Land. Subsequently, the land was proclaimed as Nunnyah Conservation Reserve and Pureba Conservation Park in 1986 and 1990 respectively. The location of the two parks is shown in (Figure 1). Nunnyah Conservation Reserve is a reserve under the Crown Lands Act. Pureba Conservation Park is a park under the National Parks and Wildlife Act. It was proclaimed with a conditional dedication which permitted the acquisition of exploration and mining rights. Under the Crown Lands Act,

mining and exploration are also permitted within Nunnyah.

In June 1995, the office of the Far West Region of the Department of Environment and Natural Resources (DENR) wrote to MESA requesting MESA's assistance in the rehabilitation of access tracks and drillholes in Nunnyah Conservation Reserve and Pureba Conservation Park . In response to the request for assistance, an inspection of abandoned drillholes and access tracks in the Reserve and Park was undertaken by T Wilson from the Environment Branch (MESA) and C Welbourne (Park Assistant, DENR, Ceduna) on the 27th July 1995. From the inspection it was apparent that the tracks and drill holes impacted on the conservation values of the Park and Reserve.

In most cases the rehabilitation of tracks was not satisfactory. The access tracks had been created using a D7 bulldozer. Little effort had been taken to avoid standing vegetation and both the above ground portion as well as the rootstock was removed. Topsoil was displaced to the edges of the track forming windrows (Plate 1).

The reason for the tracks not regenerating sufficiently is due to the severe compaction of the soil on the tracks and the removal of rootstock and topsoil. Compaction was primarily the result of exploration related traffic and to a lesser extent third party vehicle use since the programme.

The majority of drillholes had not been filled and rubbish associated with drilling and campsites was still evident. It was concluded that active rehabilitation was necessary to improve the condition of the tracks, drillholes and campsite and decrease their impact on the conservation value of the parks.

MESA Executive agreed with the inspection results and directed the Environment Branch to prepare a rehabilitation proposal and costing. There was no legal requirement for MESA to undertake the project, nor was there any requirement on the then Licencee. The impacts were a legacy of an activity undertaken fifteen years ago, at a time when none of the land was within the Reserve System. When the land became part of the Reserve System it was acknowledged by then National Parks and Wildlife Service and Department of Lands (now both part of DENR) that there were exploration tracks in the area. In 1987 the Department of Lands considered that the tracks were a significant impact on the parks and recommended that rehabilitation trials be undertaken prior to a full scale rehabilitation programme (Department of Lands, 1987). This recommendation was never acted upon.

MESA agreed to take on the responsibility of funding and running the project on behalf of DENR. MESA recognised that the project had a number of benefits including obtaining logistic and scientific data on rehabilitation of exploration tracks, and ameliorating a significant impact caused by exploration. It was also hoped that it would strengthen the relationship between MESA and DENR.

Project Trial

In order to compile a fully costed rehabilitation proposal, T Wilson, J Parker and I Dobrzinski of MESA's Environment Branch undertook a field trip to the area, from the 7th to the 10th of November, 1995, to obtain logistic and technical data for the project. Both a ripping trial and a track condition assessment trial were undertaken.

Ripping Trial

A ripping trial was undertaken to assess the efficiency and effectiveness of different ripping techniques and earthmoving plant. Two different types of plant were trialled. A grader with a variable ripper capable of being altered to two, three, four and seven tine set up and a D85A bulldozer with a three tine ripper set up. The grader cost $60.00 per hour to hire and the and the bulldozer $105.00.

During the trial it was discovered that there was a layer of calcrete approximately 300 mm below the surface of the soil. The grader was not capable of ripping through the calcrete layer and therefore could not reach the required depth of 600 mm. The D85A bulldozer was capable of ripping through the calcrete, in places bringing to the surface large boulders of calcrete (Plate 2). In comparison to the grader, ripping

with the bulldozer created a surface that discouraged third party access, created an excellent seed trap and allowed moisture penetration, but did appear to result in greater disturbance to any existing track vegetation and cause a greater aesthetic impact (after project completion neither the damage to existing regrowth nor the aesthetic impact were considered to be an issue).

The relative costs of the machine hire proved to be an irrelevant factor as only the D85A was capable of doing the work to a level which would achieve the required outcomes. The need to rip through the calcrete layer ruled out the possibility of using a grader or a smaller bulldozer.

Line Assessment

Fifteen tracks in Nunyah Conservation Reserve were assessed to determine whether they required rehabilitation. The qualitative assessment was based on whether the vegetation on the track looked similar in composition and density to that off-track.

Of the fifteen tracks it was conclusively considered that only five would require ripping. Where there was some doubt as to whether ripping would be beneficial it was considered prudent to err on the side of caution and leave the line. This would reduce the cost of the project, but would not prevent future rehabilitation should the results of the proposed project suggest that it would be beneficial to actively rehabilitate all lines. This was particularly a problem where there had been patchy regeneration of vegetation, such that it would be necessary to drive over vegetation in order to access those areas that require ripping.
DENR were unable to undertake the assessment at the same time, however following their own site visit agreed with the MESA assessment. Based on the results of the two independent assessments a common assessment methodology was developed by MESA.

A project costing was compiled based on the results of the trial. The total cost of the project was estimated to be $65 000. The majority of the funds used for the project were provided by MESA. DENR were unable to contribute money towards the project however the Far West Region of DENR provided logistic support, making available field and office equipment and staff. $15 000 was provided for the project by the mining industry.

The cost of the project within MESA was shared between Environment Branch and Mineral Resources. Environment Branch put in the majority of the funding ($50 000). Mineral Resources contributed almost $17 000 in order to undertake a soil and calcrete geochemical sampling project concurrent with the ripping, thus taking advantage of the human and physical resources already on site.

The project was designed to achieve the objectives of:

- regeneration of native vegetation
- discouraging third party access
- making safe open drill holes
- improving the aesthetic environment.
- obtaining scientific, logistic and technical data on rehabilitation
- demonstrating to other parties that MESA is serious about environmental management
- strengthening the relationship between MESA and DENR
- removing an example of poor exploration practice (which although not representative of current practices, could be used as an argument against future access
- assist in achieving a common view (with DENR) about what is satisfactory rehabilitation.

The time frame for the project was short. Having obtained approval to undertake the project at the end of February 1996 it was important to complete the ripping before the anticipated break in season in May. This would maximise the possibility of germination in the first year and also avoid delays due to wet weather.

STUDY AREA

The project area is within the Yellabinna Environmental Association (Laut *et al.* 1977). This is characterised by low east-west trending dunes and interdunes. The interdunes are covered with open scrub dominated by

Eucalyptus socialis and E. gracilis with patches of *Allocasuarina cristata* open woodland with an understorey of saltbush, bluebush, daisybush and dryland teatree. The dunes are dominated by *E. socialis* with an understorey of *Triodia irritans*.

The soils vary between dune and interdune. Interdunes are characterised by red calcareous earths with a calcrete layer commonly occurring approximately 20-30 cm below the surface. The dunes are characterised by reddish siliceous sands. Nodular calcrete rarely occurs on dunes. The rainfall for the area is approximately 300 mm.

METHODS

There were three major phases to the rehabilitation project:

- assessment of the rehabilitation requirements of the tracks
- filling of open drill holes and the removal of rubbish
- ripping access tracks that required active rehabilitation

Throughout the project, the Far West District Office of DENR were consulted to ensure that agreement was reached on the nature and extent of the rehabilitation activities and that the project was consistent with their requirements.

Assessment

Before the ripping started it was necessary to determine which tracks were to be rehabilitated which were to be left open for future access and which did not require rehabilitation. Consultation with DENR, the Pureba Dog Fence Board and local landholders was undertaken to decide which tracks would be left open for their various access requirements.

The entire length of each track was inspected to make an accurate assessment of the rehabilitation requirements. The tracks were assessed in terms of the amount of revegetation on the track and its consistency with surrounding vegetation, the visibility of entrances, the extent of erosion and compaction on the tracks and the existence of any major excavations (eg borrow pits) that needed rehabilitating. The number of open drill holes was also recorded. An example of the assessment form used is attached in Appendix A.

Motorcycles were used to gain access to the tracks to reduce the impact of driving. This was most important as until a track had been inspected it was not possible to determine whether it required ripping. Use of motorcycles meant that the assessment had negligible impact on the tracks.

Where it was determined that ripping was not required on a track it was important to assess the visibility of the track entrance. Where entrances were visible, the start of the track was to be ripped to discourage any third party access.

Drillholes And Rubbish Removal

The Australian Trust for Conservation Volunteers (ATCV) were contracted for a four week period to fill in all open drill holes in the park and remove the rubbish. The ATCV is a national, non-profit, independent organisation which provides assistance to landholders with practical conservation projects.

For the cost of the wages for two supervisors ($6 000.00), the ATCV provided a team of six people (including the supervisors) and their own equipment. MESA also funded the ATCV accommodation and the cost of hiring two vehicles.

The volunteers formed two teams of three people and used MESA vehicles to drive down the lines and backfill the holes prior to the tracks being ripped. Even the drillholes on the tracks were filled as ripping would not ensure that they were made safe. The drillholes on tracks which did not require ripping were not backfilled by the ATCV as this would do more damage than good.

It was originally anticipated that the holes would be plugged approximately one metre under the ground using octaplugs and then filled with dirt. This method was found to be ineffective as the holes were too large in diameter for the plugs to be stable. Instead drill cuttings, still evident from drilling, were used to fill the holes. Dirt

was mounded on top of the hole to counter any subsidence.

Ideally it would have been best to employ local people to achieve the work in the park but unfortunately due to a tight budget and the short time frame this was not possible.

Ripping

To relieve the compaction and induce revegetation, ripping through the calcrete and compacted soil to a depth of 600 mm was considered to be best practice (pers comm Neville Bonney, Greening Australia). Mr Andy Bates, PISA Landcare Officer of Port Lincoln (pers comm 1996) advised that the best time of year for ripping is March while the ground is still dry but before the first rain. The earlier that the ripping could occur the better as this would allow more seed to be trapped before the first rains. Ripping also reduces the competition from surrounding vegetation by breaking any roots which could compete with emerging juveniles for nutrients and moisture (Barron, Bishop and Dalton, 1996).

An invitation to submit tenders for the ripping was advertised in the Advertiser on the 11th of March. The closing date for tenders was the 18th of March. In order to ensure that the objectives of the rehabilitation were achieved a number of requirements were included in the tender (Appendix B). These requirements were:

- the need to rip to 600 mm
- the need to rip through the calcrete layer
- the need to minimise removal of on-track vegetation by lifting blades and rippers whenever practicable
- the quotation should include ripping versus non-ripping (walking) travel costs
- not driving off track
- the plant should be thoroughly cleaned to avoid transporting weeds into the area; and
- project completion by mid May

Only tracks and borrow pits created during the exploration program were ripped or assessed. None of the tracks or excavations which predated the exploration were included in the assessment.

RESULTS AND DISCUSSION

Assessment

The assessment of the tracks commenced on 11th March 1996 and was completed 9th April 1996. In total 535 km of track were assessed; 333 km of line were ripped and 123 km of line were left to regenerate without active rehabilitation (Appendix C). The total length of tracks left open for access was 79 kilometres, of which 51 km was for park management and 28 for vermin control (Figure 2).

Two people were used to do the assessment work. The primary reasons for this were safety and scientific accuracy. In particular, the use of motorcycles potentially presents a major safety issue and has implications for future projects. A motorcycle user protocol was developed for the project (Appendix D). The protocol addressed the major safety issues, in particular the requirement for two people to travel together at all times at safe speed.

The motorcycles proved to be of benefit for the assessment of lines as they had very little impact on the tracks and it was considered a good method of transport for this type of work. The additional major issues, which became apparent after the project, related to the nature of the work. Track assessment is a repetitive exercise and motorcycle riding is tiring work, both physically and mentally. The combination of the two could lead to errors in scientific and technical (riding) judgement. The latter is obviously an important personnel safety issue and highlights the need to travel slowly and wear the correct protective equipment. Moreso there is a need to plan assessment work so that personnel do not spend extended periods riding. A four to five hour riding day is the maximum that is considered safe and effective. Furthermore a riding day should be broken up so that riders remain alert. Combined with an average speed of between 20 and 40 kms per hour, this has obvious implications for the amount of assessment that can be done in a day (forty kilometres per hour is only safe in open country on good tracks).

The duration of assessment trips should be no longer than two weeks in total and consideration

should be given to not riding on five consecutive days as this too can lead to decreased concentration. If assessment is needed to run for more than two consecutive weeks then consideration should be given to additional assessment teams being assigned to the job. This has implications for the length of time and number of people required to undertake the project.

Drillholes And Rubbish

The teams filled in a total of about 400 drillholes. The exact number is greater than this however it is not known because there is no record of the additional holes which the ATCV reported filling in each day. Notably these drillholes were not recorded on the maps provided with the EL report. Drillholes took a maximum of twenty minutes for three people to fill.

At all drillsites the mounds of cuttings were still obvious and had not disappeared in the last fifteen years. Although individually none is a significant impact they are nevertheless an unnecessary impact easily avoided by digging a sump and burying the cuttings, or ideally placing the cuttings back down the hole.

A large amount of rubbish associated with the exploration programme was removed by the ATCV. Drilling rods and drill bits, forty-four gallon drums and a large number (hundreds) of jarrah stakes, many still in good condition, were removed from the park. The condition of the jarrah stakes is interesting as it is often considered unnecessary to remove stakes as they decompose quickly. This is obviously not the case and stakes should be removed after all programs.

The ATCV teams did not drive along tracks that have been left to regenerate naturally. Due to the length of the tracks it was not possible for the ATCV to get to the remaining 37 drill holes on foot. These holes backfilled by MESA personnel using motorcycle transport.

At the end of the project half a day was spent removing flagging tape which had been used by MESA to identify the entrances to all tracks.

Ripping

Only four tenders were received for the project. The price range varied from $95 000 to approximately $20 000. The successful tender was a local contractor, PH and DK Meier, whose bid was based on a Komatsu D85A priced at $85 per hour for walking and $105 per hour for ripping. These prices included floating plant to and from the site and all plant maintenance.

The restrictions imposed by timeframe, terrain and track width (approx four metres) meant that a D85A dozer was the ideal machine in this case (Plates 3 and 4). A wider (greater horsepower) machine, although quicker and more powerful, would have resulted in damage to vegetation on either side of the track. A smaller machine would have been incapable of ripping through the calcrete and would have been comparably slower in other areas and would have had trouble pulling three tines at a depth of 600 mm through areas without calcrete.

The ripping commenced on the 12th of April and was completed on the 4th of May. The operator generally worked 10-12 hour days and, other than downtime and two days working on a related project, worked every day. A total of 49.25 hours of walking and 116.25 hours of ripping was required to complete the project.

Of the 333 km of track which required ripping the dozer walked 174km along tracks which required ripping but as they were not ‘through tracks’ the dozer was required to walk in and rip out.

The sequence in which the tracks were to be ripped was decided in advance in order to minimise the amount of walking between tracks (hence wasted time and money). The dozer walked only 66 kilometres. The location of the four gates on the dog fence were the major determinant of the sequence.
Ripping to a depth of 600 mm was possible in most areas, however where the calcrete was present in massive or sheet form it was often not possible to rip to 600 mm. This occurred infrequently and will not have a significant impact on the overall success of the rehabilitation. It was notable that in those areas where sheet calcrete occurred vegetation was

very sparse, ripping through the calcrete layer would have lead to increased growth in an otherwise sparsely vegetated area. A number of the more obvious borrowpits were also rehabilitated by replacing the topsoil and ripping the floor of the pit (Plates 5 and 6).

Even on those tracks which required ripping there were places where the existing vegetation was in good condition and did not warrant ripping. In such instances, the dozer was either manoeuvred around the vegetation or walked over it with the rippers and blade raised (Plate 7).

It was originally intended to oversee the dozer work on a continuous basis. This proved both impractical and unnecessary. It was impractical because it was necessary to be in front of the dozer at all times in order to be able to traverse the track and undertake the soil and calcrete sampling. It was unnecessary because the operator understood exactly what we required and did not require constant attention.

It was originally intended to follow behind the dozer on a motorbike, riding just off track. This was never attempted because it was impractical; the weight of samples would make it more difficult to steer the bike, and there was also the safety issue of a single person on a bike. The amount of equipment that the supervisor needed with her for a days work was also not physically possible to carry on a bike. Consequently, the supervisor drove ahead of the dozer in a 4WD vehicle on unripped track, stopping every 500 metres to take geochemical samples from a ripped portion of the track behind the dozer.

It was still necessary to supervise the project on a daily basis. Invariably there were decisions to be made about which tracks to rip next and the dozer operator required transport to and from the dozer at various times. In the early stages supervision was also required until both parties had sufficient confidence in the requirements and abilities of the other. Once confident, it was only necessary to have random checks to maintain assurance that the job was done as required.

Without the need to closely supervise the ripping the supervisor had sufficient time to undertake the geochemical sampling project simultaneously. This allowed frequent contact with the operator. If the dozer had required constant supervision then it would not have been possible for one person to do the geochemical sampling at the same time. This is the benefit of having a good operator.

If the geochemical sampling programme had not been required then alternative projects such as vegetation sampling would have been possible. Given the limited requirement for supervision the supervisor should have additional tasks to undertake to make the best use of time and resources.

The project was undertaken by MESA on behalf of the DENR and respective staff worked closely on the project. In particular, there were several occasions when DENR's opinion was critical. These occasions were:

- choice of the rehabilitation technique
- selection of which lines to leave open for park management purposes
- choice of assessment methodology
- writing the tender brief,
- selection of the successful tender
- signing off on the project.

The project was important for both Departments in terms of initiating a close degree of cooperation on a project of mutual interest. Hopefully the trust and cooperation that has been built up through this project can be maintained. It is important for both exploration and conservation that the two Departments work together.

The total cost of the project was $61 573.25 (Appendix E). This was marginally cheaper than the predicted cost due mainly to savings in wages and purchase cost of the motorbikes. The supervisor's wages were funded from the Environment Branch budget for most of the project because of an unfilled vacancy within the Branch. The project cost does not account for the time of the project manager (0.6 PSO-2 for six months) and project officer (0.5 PSO-1 for three months).

The cost of backfilling the drillholes and removal of rubbish was $14 834.00, assessment

costs were $10 526.24 and cost of ripping access tracks were $26 463.35. The remaining project costs were spent on purchase of motorcycles, miscellaneous expenditures and general project costs not attributable to any one stage.

These costs provide an indication of what similar projects would require in terms of physical, human and financial resources. The benefits of being able to undertake a geological or botanical project at the same time should not be overlooked as it can contribute a significant proportion of the project funding.

Monitoring Points

In order to determine whether the ripping has achieved the project outcome of regenerating native vegetation, photo monitoring points were set up at 44 locations (Figure 2). The monitoring points provide sufficient replicates of each vegetation and soil type. Photopoints have also been set up along the tracks which have not been ripped to provide a yardstick with which to measure the success of the ripping. The details of the photopoints are in Appendix F.

Few pre-ripping photographs were possible and no measurements of pre ripping vegetation were taken. This was not considered necessary as the monitoring is designed to examine the progress of regeneration after ripping. At the time of ripping no vegetation exists on track.

CONCLUSION

The impact of mineral exploration access tracks drillholes, rubbish and the campsite was a legacy of past exploration. The removal of topsoil and rootstock and the severe compaction caused by exploration vehicles prevented the regeneration of native vegetation on the access tracks. This impact was not predicted at the time. The poor completion of drillholes and the rubbish (drilling rods, jarrah stakes, fuel drums) however was not acceptable practice and reflected poorly on the Industry.

Ripping the tracks and campsite to relieve soil compaction and reduce root competition proved to be a reasonably cheap method of encouraging regeneration and where necessary should be employed by companies at the end of exploration campaigns. Ripping is not appropriate or necessary in all situations and the rehabilitation technique to be used will depend on the site conditions and the type of impact.

Although this exercise was cost effective as a project in its own right, it would be better and more cost effective if explorers planned to undertake rehabilitation as part of their exploration program.

The Mineral Industry's financial involvement in the project is to be commended. It was not obliged to undertake this work but did so accepting that in this case it had a social responsibility as a land user.

The success of this project demonstrates amongst other things that there are opportunities for the Industry, MESA and DENR and possibly the conservation movement to work on projects of mutual interest for the benefit of both mining and conservation.

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Figure 1

LOCALITY PLAN

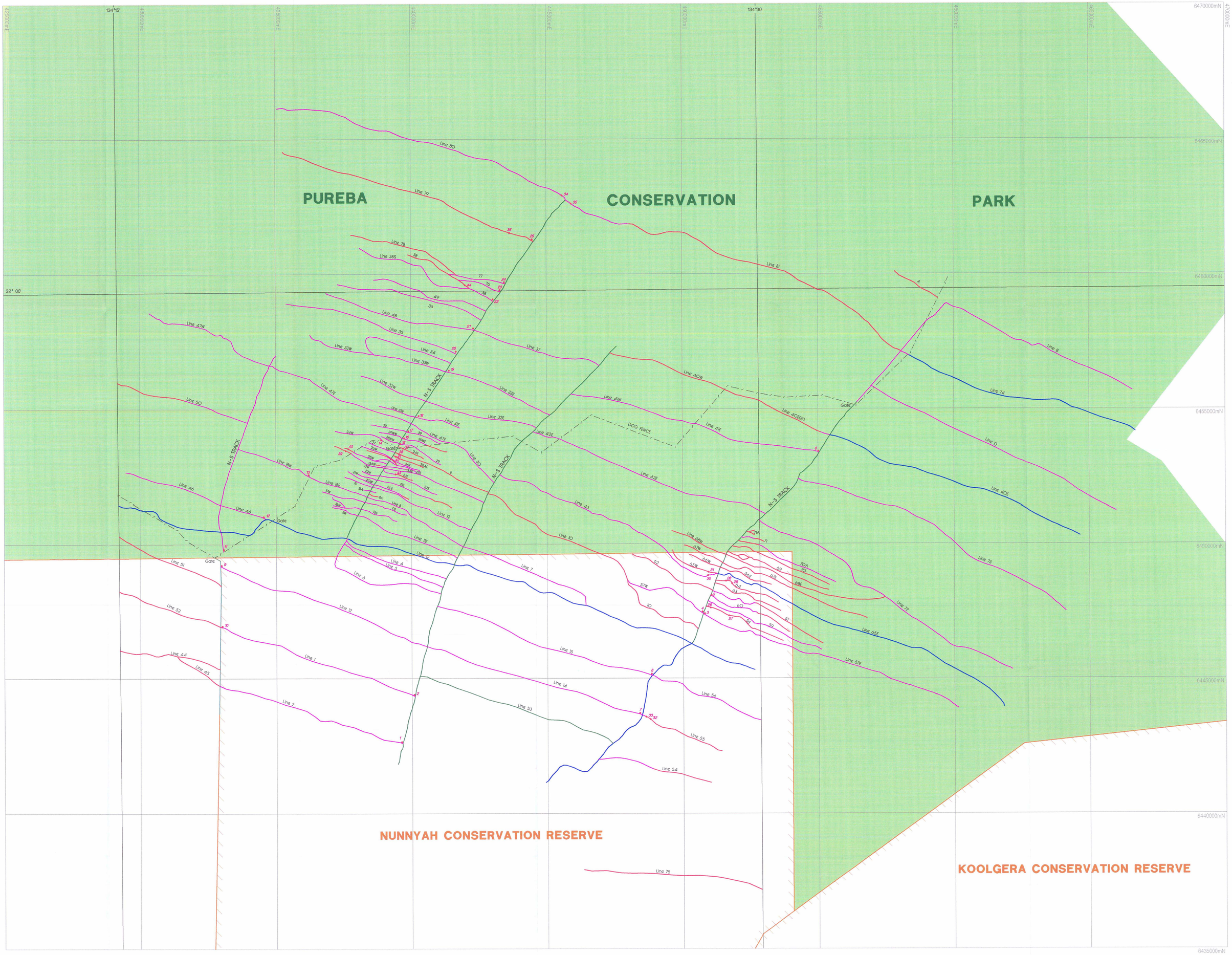

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Figure 2

Pureba / Nunnyah Rehabilitation Project

TRACK REHABILITATION AND PHOTOPOINTS

96-0148 MESA

APPENDIX A

Pureba/Nunnyah Rehab Project - Assessment Sheet

Track number..... Assessor.....

Track entrance

entrance visible - may attract third parties.....yes .....no

Revegetation

no vegetation..... (.....% of track)

isolated stands of vegetation..... (.....% of track)

mix of species similar to that off line . (.....% of track)

Erosion

evidence of erosion (past or active) .....yes .....no

comment .....

Compaction

compaction..... (.....% of track)

Track Width

track to narrow to rip (<2.4m) .....

track ~ 2.4m.....

track >2.4m (two passes).....

Drillholes

Number of open drill holes.....total.....

Number of closed drill holes .....total.....

Borrow pits and other excavations

number, description, location .....

.....

.....

.....

.....

Brief Explanation

Visibility of track entrance
- applicable to tracks that do not require ripping
- the revegetation on the track may be OK but may have a better chance if entrance is less visible to prevent third party use

Revegetation
- the amount of revegetation on the track will be the main factor in determining whether the track needs ripping or not
- revegetation is likely to vary along the line

Compaction
- compaction inhibits seed germination etc - it would be difficult for revegetation on severely compacted tracks to progress further
- it is expected that compacted tracks will have poor reveg - useful to note

Erosion
- if erosion is encountered on any of the lines then we may have to rethink the whole rehab process ie. ripping may not be appropriate

Track Width
- track may be too narrow to rip or may require two passes with the dozer

Drill holes
- record the number of open drillholes in order to know how many need to be filled

Borrow pits and other excavations
- record anything that needs fixing

APPENDIX B

Tender Document

1. SUMMARY

The Department of Mines and Energy, South Australia intends to carry out a rehabilitation program on mineral exploration tracks in Pureba Conservation Park and Nunnyah Conservation Reserve. The project area is located 70km east of Ceduna and is easily accessible by road (Map 1.).

The original exploration program was undertaken in the early 1980s and consists of a network of access tracks throughout the two parks. The tracks have not successfully rehabilitated in the last fifteen years and it is now planned to rip the tracks to relieve compaction and induce revegetation.

2. PROGRAM AIMS AND OBJECTIVES

The primary objectives of this rehabilitation program are:

- to encourage rapid regrowth of vegetation
- to relieve areas of compaction
- to disguise tracks at entry points and discourage third party use

The best results from the ripping will be deep, open furrows for trapping water and seeds.

3. PROGRAM DESCRIPTION

A total of 500km of access track have been cleared in the two parks and it is estimated that at least 350km of the tracks will need to be rehabilitated. Rehabilitation will be in the form of ripping.

A bulldozer will be required to rip the ground to a depth of at least 600mm along the tracks. Calcrete is located around 300mm below the ground surface and the ripper must be capable of ripping through the calcrete. The driver will be required to lift the ripping tines and blade over any existing vegetation on the tracks as directed by MESA field supervisor. It is therefore estimated that of the 350km which will have to be travelled, the ripper will only be used for approximately 280km. Quotations should be for ripping 80% of the 350km of track.

Map 2 shows the network of tracks in the park. While a good proportion of the tracks can be accessed from both ends, some of the tracks are only accessible from one end so the dozer will need to be first backed down the track before ripping out again. The tracks running North-South in the park will be left open for fire access and will not need to be ripped.

On some of the tracks that do not require active rehabilitation, it may be necessary to rip the first 200m of each end in order to prevent third party access on to the track.

The vegetation in the parks is low mallee and the threat of overhanging branches on the tracks is minimal. The bulldozer will not at any time drive off the access tracks and the driver will make every effort to avoid damaging vegetation off track and minimise damage on track. MESA and National Parks officers will give the driver instruction as to what constitutes an acceptable level of damage to vegetation on the tracks before commencing and as necessary during the project.

4. EARTHMOVING PLANT

The preferred machine to be used for the rehabilitation is a bulldozer with hydraulically operated ripping tines located at the rear of the dozer, Alternative machinery will be considered provided sufficient evidence of its ability to do the job is presented. The ripping tines should be as wide as the plant in order to rip the entire width of the track. Plant must be thoroughly cleaned, to the satisfaction of National Parks and MESA,prior to commencing the program in order to minimise the risk of transporting weeds into the area.

5. MESA PROVISIONS

MESA will provide all base maps required to perform the rehabilitation as specified.

Further, MESA will provide supervision at all times to instruct/inspect the operation to ensure satisfactory progress and completion.

6. GENERAL REQUIREMENTS

Acceptance of successful quotation will be notified in writing within 7 days of close of "invitation to quote" (Monday 18th March 1996). The work programme will then be subject to a signed Agreement prepared by the Minister before commencement of the work.

This project will be managed by Mr T Wilson, Environmental Officer. All enquires can be directed to him by telephone (08) 274 7652 or by facsimile (08) 272 3503.

7. DELIVERABLES

The successful candidate is to supply full management and equipment to successfully carry out this programme as well as be responsible for the performance any subcontractor engaged in any facet of this programme.

Tenders should include:

- evidence of technical expertise particularly with regard to ripping through calcrete
- evidence of sufficient indemnity insurance
- list of resources available, specifications and dimensions of plant to be used
- evidence of ability to perform work within timeframe specified
- business references

8. SCHEDULE

The following schedule is proposed:

Close of invitation to quote March 18th

Commencement of Programme April 9th

Completion May 3rd

The program will be conducted on a strict time frame and the applicant must be capable of commencing and completing the project on the dates indicated.

9. COSTING

Potential contractors shall supply a cost estimate for the proposed work. The costing shall be considered fixed for the period of the project.

A series of progress payments to be paid on satisfactory completion of mutually agreed stages may be considered.

Additional project costs incurred due to equipment or personnel down time will be the responsibilities of the contractor. such costs would include but would not be limited to accommodation, living expenses and wages for all project personnel. Consequently the contractor should have sufficient and appropriate insurance to cover such an eventuality.

10. TERMS OF TENDER

10.1. Delivery of tenders

All tenders shall be received in a sealed envelope marked "Tender for rehabilitation of access tracks in Pureba Conservation Park and Nunnyah Conservation Reserve" not later than 5:00pm Monday 18th March 1996 and addressed in the following manner:

The Supply Manager
Mines and Energy
PO Box 151
EASTWOOD SA 5063

10.2. Submission by Facsimile

Tenders may be submitted by the due date by facsimile transmission, but the original tender must be received by the Department no later than four working days after the closing date. The facsimile transmission number is (08)272 7597.

10.3. Service of Acceptance

All tenders shall specify an address and, where possible , a facsimile number for the service of an acceptance of tender.

10.4. Tenders to Comply

Tenders must indicate any contract terms sought in addition to those contained in the Project Specification, or variations sought to the indicated conditions. Acceptance of any variation of terms or options will be by mutual agreement.

10.5. Execution of Tenders

Tenders shall be executed in one of the following forms:

- in the case of a tenderer being a company, under its common seal affixed in the manner specified in its memorandum or articles of association;
- in the case of tenderer being a partnership, by the signature of each partner in the presence of a witness;
- in the case of a tenderer being a natural person, by the signature of that person in the presence of a witness.

10.6. Late Tenders

Late tenders will only be accepted at the absolute and unfettered discretion of the Director-General.

10.7. Acceptance of Tenders

MESA shall not be bound to accept the lowest or any tender.

Acceptance of a tender (if any) shall be subject to contract, and the successful tenderer shall be required to enter a formal contract on the terms and conditions set out in the Project Specification subject only to such amendments as may be agreed.

10.8. Right to Negotiate

MESA reserves the right to communicate with any tenderer in seeking further particulars of a tender either without in any way being construed to have counter offered to that tenderer, or without creating any obligation, contractual or otherwise, with that tenderer.

10.9. Evidence of Competency

Each tender shall present to MESA satisfactory evidence that the tenderer is competent to provide the services to the satisfaction of MESA.

References to any relevant works should be supplied and copies of same may be required for viewing.

10.10. Disclosure of Interests

The tenderer shall disclose to MESA any actual or potential conflict of interest which may arise between the tenderer, a director or other officer of the tenderer or proprietors as a consequence of the acceptance of the tender.

10.11. Compliance with Legislation

The tenderer shall comply with all relevant State and Commonwealth legislation and regulations, and the successful tenderer may be required to provide documentary evidence of such compliance.

11. FURTHER INFORMATION

Additional information on the project can be obtained from Tim Wilson: phone (08) 274 7652, fax (08) 272 3503.

APPENDIX C ASSESSMENT RESULTS					
Track and drillhole rehabilitation requirements					
Track No.	**km to leave**	**km to rip**	**km to walk**	**total km**	**drillholes**
1		8.0		8.0	4
2		7.0		7.0	2
3		8.3		8.3	2
4		4.0		4.0	5
5		4.0		4.0	9
6		4.5		4.5	5
7		5.2		5.2	4
8		4.2		4.2	8
8A	0.9			0.9	6
9	4.0			4.0	15
10	7.0	3.0		10	5
11E		4.0		4.0	0
11W		1.0	1.0	1.0	4
12		4.1		4.1	5
13E		4.1		4.1	6
13W		1.4		1.4	4
13AE	0.3	0.8	0.8	1.1	20
13AW	0.35	0.15	0.15	0.5	2
14		8.8		8.8	1
15		9.0		9.0	2
16E		1.5	1.5	1.5	4
16W		1.8	1.8	1.8	3
17E		1.6	1.6	1.6	5
17W		1.6	1.6	1.6	5
18E		2.4	2.4	2.4	1
18W		2.9		2.9	4
18A		1.2	1.2	1.2	4
19		1.1	1.1	1.1	4
20E	0.3	1.1	1.1	1.4	6
20W		1.3	1.3	1.3	7
21E	1.0	2.0	2.0	3.0	6
21W		0.8	0.8	0.8	2
22E		2.5	2.5	2.5	11
22W		0.6	0.6	0.6	0
23	0.9	0.1	0.1	1.0	0
24W		2.6	2.6	2.6	3
24E	1.0			1.0	6

Track and drillhole rehabilitation requirements					
Track No.	**km to leave**	**km to rip**	**km to walk**	**total km**	**drillholes**
25E	1.1			1.1	3
25W	1.4			1.4	2
26W		1.1	1.1	1.1	13
26AE	0.9			0.9	6
26E	0.9	0.9	0.9	1.8	13
27		1.1		1.1	6
28		1.3	1.3	1.3	12
28W(E)		2.0		2.0	1
28W(W)		0.7	0.7	0.7	0
29	1.1			1.1	0
29W(E)		1.8		1.8	4
29W(W)		0.9	0.9	0.9	10
30		2.4		2.4	3
31W		1.5		1.5	0
31E		1.6	1.6	1.6	2
32E		4.2		4.2	6
32W		2.6	2.6	2.6	7
33E		4.1		4.1	3
33W		5.6	5.6	5.6	11
34		4.2	4.2	4.2	6
35		7	7	7	6
36		5.7	5.7	5.7	1
37		5.2		5.2	4
38	2.8	1.0	1.0	3.8	10
38S		2.9		2.9	10
39		2.6	1.3	2.6	7
40E	10.9		6.5	10.9	13
40E(W)	4.1	0.2	0.2	4.3	4
40W	4.6			4.6	2
41W		5.0		5.0	2
41E		4.9		4.9	3
42		8.5		8.5	6
42W		1.0		1.0	1
43		9.1		9.1	4
44	4.0			4.0	0
45	4.0			4.0	0
46		5.0		5.0	1.0
47E		6.1	6.1	6.1	5
47W		5.0		5.0	4

Track and drillhole rehabilitation requirements					
Track No.	**km to leave**	**km to rip**	**km to walk**	**total km**	**drillholes**
48		5.8	5.8	5.8	8
49		4.7	4.7	4.7	9
50	3.0	3.0	3.0	6.0	2
51	6.3			6.3	2
52	4.7			4.7	3
53	7.5			7.5	0
54	7.3	2.0	2.0	4.3	1
55	3.0	0.4	0.4	3.4	1
56		3.4	3.4	3.4	6
57W		3.0		3.0	4
57E		8.0	8.0	8.0	1
58	4.7			4.7	0
59		6.0		6.0	1
60	2.8	3.0	3.0	5.8	2
61	3.8	2	2	5.8	0
62	4.0			4.0	0
63	3.9	0.3	0.3	4.2	2
64	2.2			2.2	0
65W	2.0			2.0	0
65E	7.6			7.6	7
66E	4.9	0.5	0.5	5.4	0
66W	1.8			1.8	0
67E	5.7			5.7	0
67W	1.7			1.7	0
68W	2.3			2.3	1
68E	6.2			6.2	20
69	5.5			5.5	0
70	5.5			5.5	0
70A		5.0	5.0	5.0	0
71	4.0	0.2		4.2	0
71A	4.0			4.0	0
72		11.7		11.7	2
73		12	5	12	6
74	9.5		9.5	9.5	6
75	7.0			7.0	0
76		1.2	1.2	1.2	0
77		2.0		2.0	9
78	6.3			6.3	9
79	10.2			10.2	14

Track and drillhole rehabilitation requirements					
Track No.	**km to leave**	**km to rip**	**km to walk**	**total km**	**drillholes**
80		11.0	11.5	11.5	14
81	12.3	3	12.3	15.3	8
A	5.4			5.4	3
B		8.5	8.5	8.5	6
D		13.8	13.8	13.8	11
N-S tracks		10.5		10.5	1
other walking			66		
TOTAL	**201.65**	**333.35**	**236.35**	**535**	**530**

APPENDIX D

Mesa Motorcycle Rider Protocol

1. Riders will only use the motorcycles for the purposes of undertaking Departmental field work
2. Conventional transport will be used in preference to motorcycles. Motorcycles will only be used when it can be demonstrated that they are the better method of transport.
3. Riders will not use motorcycles for recreational purposes
4. Riders will only use the motorcycles on government roads when it is absolutely necessary, either due to an emergency, or for logistic reasons. A motor vehicle is the is the preferred form of transport in both cases. If for logistic reasons, then the rider should advise the Manager prior to undertaking fieldwork that it will be necessary to use public roads.
5. Riders will at all times demonstrate due environmental care in riding off-road to minimise the environmental impact and present an appropriately responsible image to the public.
6. Should riders damage the bike or injure themselves the Department may prohibit them from using motorcycles in future
7. Riders will at all times wear appropriate clothing: at least long trousers and long sleeved shirts (jackets are optional), footwear which protects the ankles, and eye and head protection equipment.
8. Riders will at all times travel at a speed and in a manner which is safe and practicable for the terrain their physical and mental condition and riding ability.
9. Riders should always work in pairs. Only when it is absolutely necessary such as for medical or mechanical emergency reasons should riders ride alone. When riding alone riders should exercise due care recognising the danger of riding alone. Lower vehicle speeds than would normally considered necessary should be adopted.
10. Riders should be aware of the availability of motorcycle training courses to improve riding ability and are encouraged to undertake these courses.
11. Riders should be legally permitted to ride motorcycles and have the necessary skills to ride a bike in the proposed working environment.
12. Riders shall carry walkie-talkies, or similar comunication devices, at all times .

APPENDIX E	PROJECT COSTS		
Rehabilitation costs			
	Projected	**Actual**	**Difference**
Labour			
Craig Welbourne	3000	2348.92	651.08
Jacqui Parker	4217	738.56	3478.44
ATCV	6000	6000	0
Equipment			
Motorcycles	9000	7710	1290
Bike accessories	700	777	-77
Registration	274	274	0
Airfares			
Tim Wilson (5)	1164	1498.5	-334.5
Jacqui Parker (2)	388	722	-334
Bulldozer	11819	10000	1819
Accommodation			
Jacqui Parker	1100	853	247
Tim Wilson	392	37	355
ATCV	2340	1748	592
Food/expenses			
Jacqui Parker	1328	1190.8	137.2
Tim Wilson	0	717	-717
ATCV	0	95	-95
Vehicles			
J Parker	2500	3118.54	-618.54
ATCV	5000	6215.63	-1215.63
Motorcycle fuel	200	93.15	106.85
Service	0	119.2	-119.2
Miscellaneous			
Maps	0	66	-66
Octaplugs	0	7	-7
GPS battery	0	114	-114
Photocopying	0	22.5	-22.5
Strainer post	0	10.9	-10.9
Kitchenware	0	33.9	-33.9
Taxi fares	0	95	-95
Shinguards	0	20	-20
Lamination	0	42	-42
Hardware	0	17	-17
Innertubes	0	50.3	-50.3
Droppers	0	95	-95
Tyre repairs	0	10	-10
Freight	0	0	0
Aerial	0	150	-150
TOTAL	49422	44989.9	4432.1

Geochemical sampling costs			
	Projected	**Actual**	**Difference**
Labour			
Jacqui Parker	3124	2954.25	169.75
Airfares			
Tim Wilson	388	388	388
Jacqui Parker	0	0	0
Vehicles	2500	3550	-1050
Bulldozer	6961	6962.5	-1.5
Accommodation			
Jacqui Parker	1100	985	115
Food/expenses			
Jacqui Parker	1328	1303.6	24.4
TOTAL	15401	16143.4	-354.35

APPENDIX F

Photopoint Descriptions

The majority of photos were taken over the long point of the dropper.
All droppers are located on the eastern side of the track.
Vegetation association descriptions are in order of frequency of species present

Date: 8/7/96 - 11/7/96
Camera Pentax SLR
Lens: 50mm.
Film Kodak ASA 400.

PHOTOPOINT DESCRIPTIONS

Site No: 1 **Time:** 3.15pm
Line No: 2 **Photo No:** 043921
Direction: West **Status:** ripped
Distance from main track: ~
Soil Type: clay/sand over calcrete
Landform: Interdunal swale
Vegetation Description: Tall open eucalyptus very little understorey, some scattered santalum and acacia.

Site No: 2 **Time:** 3.00pm
Line No: 1 **Photo No:** 043920
Direction: West **Status:** ripped
Distance from main track: ~80m
Soil Type: C/S over calcrete
Landform: Interdunal swale
Vegetation Description: Eucalyptus, melaleuca, triodia.

Site No: 3 **Time:** 1.50pm
Line No: 57E **Photo No:** 043908
Direction: East **Status:** ripped
Distance from main track: ~200m (dropper on RHS)
Soil Type: S/C
Landform: Interdunal swale on base of dune
Vegetation Description: Eucalyptus, melaleuca, triodia.. Callitris, hakea and santalum towards dune crest.

Site No: 4 **Time:** 1.40pm
Line No: 57W **Photo No:** 043907
Direction: East **Status:** ripped
Distance from main track: ~200m
Soil Type: Loam/C/S
Landform: Interdunal swale
Vegetation Description Eucalyptus, melaleuca, triodia

Site No: 5 **Time:** 2.15pm
Line No: 60 **Photo No:** 043725
Direction: east **Status:** ripped
Distance from main track: ~20m
Soil Type: S/C
Landform: Interdunal swale
Vegetation Description: Eucalyptus, triodia

Site No: 6 **Time:** 2.00pm
Line No: 15 **Photo No:** 043916
Direction: West **Status:** ripped
Distance from main track: ~20m
Soil Type: S/C
Landform: Interdunal swale
Vegetation Description: Eucalyptus, senna, triodia

Site No: 7 **Time:** 2.15pm
Line No: 14 **Photo No:** 043917
Direction: west **Status:** ripped
Distance from main track: ~20m
Soil Type: C/S over calcrete
Landform: Interdunal swale
Vegetation Description: Eucalyptus, melaleuca, triodia fairly open understorey

Site No: 8 **Time:** 2.30pm
Line No: 41E **Photo No:** 043909
Direction: East **Status:** ripped
Distance from main track: ~300m
Soil Type: C/S over calcrete
Landform: Interdunal swale
Vegetation Description: Eucalyptus, maireana, open understorey

Site No: 9 **Time:** 9.50am
Line No: 3 **Photo No:** 043940
Direction: East **Status:** ripped
Distance from main track: ~180m
Soil Type: C/S/L
Landform: Interdunal swale
Vegetation Description: Eucalyptus, melaleuca, triodia

Site No: 10 **Time:** 10.30am
Line No: 1 **Photo No:** 043941
Direction: East **Status:** ripped
Distance from main track: ~60m
Soil Type: C/S/L over calcrete
Landform: Interdunal swale
Vegetation Description: Eucalyptus, melaleuca, scattered triodia

Site No: 11 **Time:** 11.00am
Line No: **Photo No:** 043942
Direction: East **Status:** ripped
Distance from main track: ~80m from dog fence
Soil Type: S
Landform: dune
Vegetation Description: Eucalyptus, melaleuca, triodia, hakea

Site No: 12 **Time:** 11.15am
Line No: 46 **Photo No:** 043943
Direction: North **Status:** ripped
Distance from main track: ~50m
Soil Type: S/C over calcrete
Landform: swale
Vegetation Description: Eucalyptus, melaleuca, atriplex

Site No: 13 **Time:** 11.30am
Line No: 18W **Photo No:** 043944
Direction: North **Status:** ripped
Distance from main track: ~50m
Soil Type: C/S over calcrete
Landform: dune
Vegetation Description: Eucalyptus, senna, melaleuca, atriplex

Site No: 14 **Time:** 4.00pm
Line No: 24W **Photo No:** 043939
Direction: East **Status:** ripped
Distance from main track: ~100m (of edge of dog fence)
Soil Type: S/C
Landform: Interdunal swale
Vegetation Description: Eucalyptus, triodia (fairly open)

Site No: 15 **Time:** 3.30pm
Line No: 28WE **Photo No:** 043936
Direction: East **Status:** ripped
Distance from main track: ~100m
Soil Type: S/C/L
Landform: Interdunal swale
Vegetation Description: Eucalyptus, triodia, melaleuca, senna

Site No: 16 **Time:** 3.15pm
Line No: 29WE **Photo No:** 043935
Direction: East **Status:** ripped
Distance from main track: ~100m
Soil Type: Light C/S
Landform: Interdunal swale
Vegetation Description: Eucalyptus, triodia, melaleuca

Site No: 17 **Time:** 3.00pm
Line No: 39 **Photo No:** 043934
Direction: East **Status:** ripped
Distance from main track: ~30m
Soil Type: L/S
Landform: Interdunal swale
Vegetation Description: Eucalyptus, saltbush, melaleuca, maireana (open understorey)

Site No: 18 **Time:** 2.45pm
Line No: 31E **Photo No:** 043933
Direction: East **Status:** ripped
Distance from main track: ~10 m
Soil Type: S/C over calcrete
Landform: Interdunal swale
Vegetation Description: very open shrubland, atriplex, maireana and senna

Site No: 19 **Time:** 2.30pm
Line No: 33E **Photo No:** 043932
Direction: East **Status:** ripped
Distance from main track: ~150m
Soil Type: S/L over calcrete
Landform: Interdunal swale
Vegetation Description: Eucalyptus, acacia (fairly open understorey)

Site No: 20 **Time:** 2.15pm
Line No: 38 **Photo No:** 043931
Direction: East **Status:** ripped
Distance from main track: ~150m
Soil Type: C/S
Landform: Interdunal swale
Vegetation Description: Eucalyptus, melaleuca, triodia

Site No: 21 **Time:** 2.00pm
Line No: 48 **Photo No:** 043930
Direction: East **Status:** ripped
Distance from main track: ~150m
Soil Type: C/S
Landform: Interdunal swale
Vegetation Description: Eucalyptus, dodonea, triodia

Site No: 22 **Time:** 1.30pm
Line No: 38 **Photo No:** 043928
Direction: East **Status:** ripped
Distance from main track: ~150m
Soil Type: C/L (low lying)
Landform: Interdunal swale
Vegetation Description: Senna, acacia, eucalyptus, atriplex, (very open low shrubland)

Site No: 23 **Time:** 1.15pm
Line No: 1 **Photo No:** 043927
Direction: East **Status:** ripped
Distance from main track: ~200m
Soil Type: S/C over calcrete
Landform: Interdunal swale
Vegetation Description: Eucalyptus, triodia, melaleuca, senna

Site No: 24 **Time:** 1.00pm
Line No: 77 **Photo No:** 043926
Direction: East **Status:** ripped
Distance from main track: ~175m
Soil Type: Deep S
Landform: Interdunal swale
Vegetation Description: Eucalyptus, melaleuca, triodia

Site No: 25 **Time:** 2.30pm
Line No: 79 **Photo No:** 043925
Direction: East **Status:** unripped
Distance from main track: ~270m
Soil Type: C/S
Landform: Interdunal swale
Vegetation Description: Eucalyptus, maireana, atriplex, acacia

Site No: 26 **Time:** 10am
Line No: 58 **Photo No:** 043910
Direction: East **Status:** unripped
Distance from main track: ~250m
Soil Type: S/C
Landform: Interdunal swale
Vegetation Description: Eucalyptus, triodia, melaleuca

Site No: 27 **Time:** 10.15am
Line No: 58 **Photo No:** 043911
Direction: East **Status:** unripped
Distance from main track: ~430m
Soil Type: light S/C
Landform: Interdunal swale
Vegetation Description: Eucalyptus, triodia, melaleuca

Site No: 28 **Time:** 11.00am
Line No: 64 **Photo No:** 043913
Direction: East **Status:** unripped
Distance from main track: ~160m
Soil Type: S/C
Landform: Interdunal swale
Vegetation Description: Eucalyptus, myoporum, eremophila, maireana

Site No: 29 **Time:** 10.50am
Line No: 64 **Photo No:** 043912
Direction: East **Status:** unripped
Distance from main track: ~360m
Soil Type: S/C
Landform: Interdunal swale
Vegetation Description: Eucalyptus, myoporum, eremophila, maireana

Site No: 30 **Time:** 11.30am
Line No: between 62 & 65W **Photo No:** 043914
Direction: East **Status:** ripped
Distance from main track: ~200m
Soil Type: Light S/C
Landform: Interdunal swale
Vegetation Description: Eucalyptus, maireana, santalum

Site No: 31 **Time:** 11.45am
Line No: 65W **Photo No:** 043915
Direction: East **Status:** unripped
Distance from main track: ~220m
Soil Type: light S/C
Landform: Interdunal swale
Vegetation Description: Eucalyptus, maireana, santalum

Site No: 32 **Time:** 2.30pm
Line No: 55 **Photo No:** 043918
Direction: East **Status:** unripped
Distance from main track: ~300m
Soil Type: S/C
Landform: Interdunal swale
Vegetation Description: Eucalyptus, senna, eremophila, melaleuca, triodia (fairly open).

Site No: 33 **Time:** 2.30pm
Line No: 55 **Photo No:** 043919
Direction: East **Status:** unripped
Distance from main track: ~150m
Soil Type: C/S over calcrete
Landform: Interdunal swale
Vegetation Description: Eucalyptus, very open, some melaleuca and scattered triodia. (Looked like it had a burn through it 2-3 years ago)

Site No: 34 **Time:** 10.00 am
Line No: 80 **Photo No:** 043922
Direction: East **Status:** ripped
Distance from main track: ~200m
Soil Type: S/C
Landform: Interdunal swale
Vegetation Description: Eucalyptus, triodia, melaleuca

Site No: 35 **Time:** 11.15am
Line No: 81 **Photo No:** 043923
Direction: East **Status:** ripped
Distance from main track: ~150m
Soil Type: S
Landform: dune crest
Vegetation Description: Eucalyptus, triodia, melaleuca, hakea

Site No: 36 **Time:** 12.30pm
Line No: 79 **Photo No:** 043924
Direction: East **Status:** unripped
Distance from main track: ~540m
Soil Type: C/S
Landform: Interdunal swale
Vegetation Description: Eucalyptus, triodia, melaleuca

Site No: 37 **Time:** 3.45pm
Line No: 24E **Photo No:** 043938
Direction: East **Status:** unripped
Distance from main track: ~100m
Soil Type: S/C
Landform: Interdunal swale
Vegetation Description: Eucalyptus, melaleuca, triodia

Site No: 38 **Time:** 3.45pm
Line No: 9 **Photo No:** 043937
Direction: East **Status:** unripped
Distance from main track: ~100m
Soil Type: sandy/clay
Landform: Interdunal swale
Vegetation Description: Eucalyptus, melaleuca, triodia (fairly dense)

Site No: 39 **Time:** 11.45am
Line No: 13W **Photo No:** 043945
Direction: S/east **Status:** unripped
Distance from main track: ~50m
Soil Type: S/C over calcrete
Landform: swale
Vegetation Description: Eucalyptus, triodia, some melaleuca

Site No: 40 **Time:** 12.00pm
Line No: 25W **Photo No:** 043946
Direction: North **Status:** unripped
Distance from main track: ~150m
Soil Type: clay/sand
Landform: swale
Vegetation Description: Eucalyptus, melaleuca, triodia

Site No:	41	**Time:**	12.15am
Line No:	26AE	**Photo No:**	043947
Direction:	East	**Status:**	unripped
Distance from main track:		~20m	
Soil Type:	S		
Landform:	dune		
Vegetation Description:		Eucalyptus, melaleuca, triodia	

Site No:	42	**Time:**	12.30 pm
Line No:	track between 25E and 26E	**Photo No:**	043948
Direction:	East	**Status:**	unripped
Distance from main track:		~200m	
Soil Type:	S		
Landform:	dune		
Vegetation Description:		Eucalyptus, melaleuca, triodia	

Site No:	43	**Time:**	12.30 pm
Line No:	line 23	**Photo No:**	043949
Direction:	East	**Status:**	unripped
Distance from main track:		~140m	
Soil Type:	S/C		
Landform:	swale		
Vegetation Description:		Eucalyptus, melaleuca, triodia (dense undergrowth)	

Site No:	44	**Time:**	1.45pm
Line No:	ext. of line 38	**Photo No:**	043929
Direction:	East	**Status:**	unripped
Distance from main track:		~150m of line 38	
Soil Type:	S/C over calcrete		
Landform:	Interdunal swale		
Vegetation Description:		Eucalyptus, melaleuca, triodia	

Plate 1. Abandoned mineral exploration access track. (Photo 43723)

Plate 3. Komatsu D85A front view. (Photo 43705)

Plate 2. Result of ripping trial using D85A. (Photo 43715)

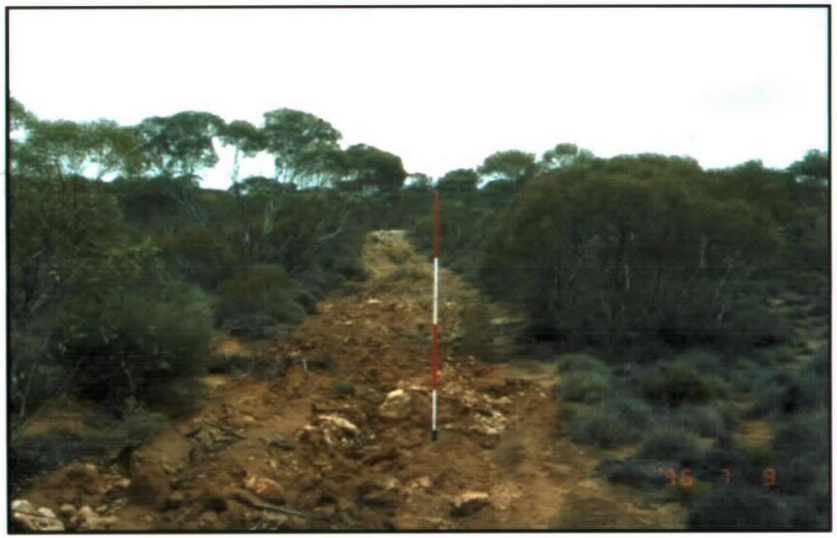
Plate 4. Komatsu D85A rear view. (Photo 43706)

Plate 5. Borrow pit prior to ripping. (Photo 43717)

Plate 6. Borrow pit after ripping. (Photo 43718)

Plate 7. Minimal impact caused by 'walking'. (Photo 43712)

Photopoint 1, 1996. (Photo 43921)



Photopoint 2, 1996. (Photo 43920)

Photopoint 3, 1996. (Photo 43908)

Photopoint 4, 1996. (Photo 43907)

Photopoint 5, 1996. *(Photo 43725)*

Photopoint 6, 1996. *(Photo 43916)*

Photopoint 7, 1996. *(Photo 43917)*

Photopoint 8, 1996. *(Photo 43909)*

Photopoint 9, 1996. (Photo 43940)

Photopoint 10, 1996. (Photo 43941)

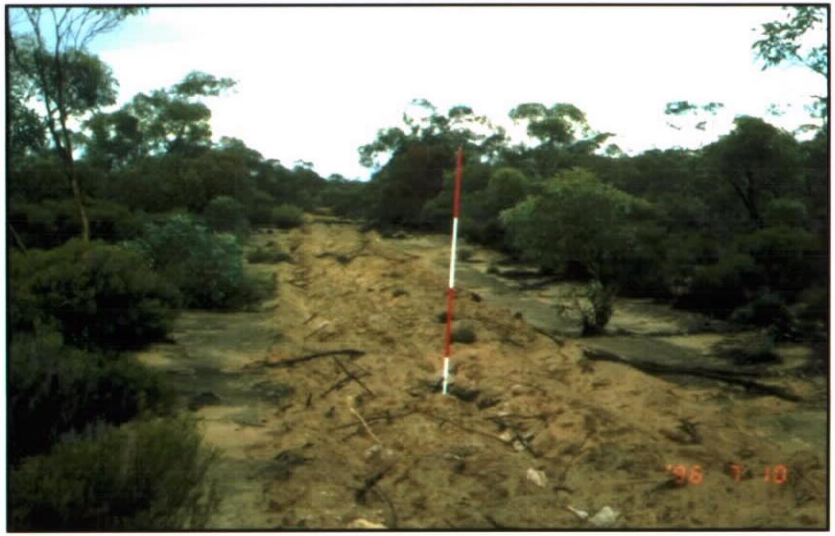
Photopoint 11, 1996. (Photo 43942)

Photopoint 12, 1996. (Photo 43943)

Photopoint 13, 1996. (Photo 43944)

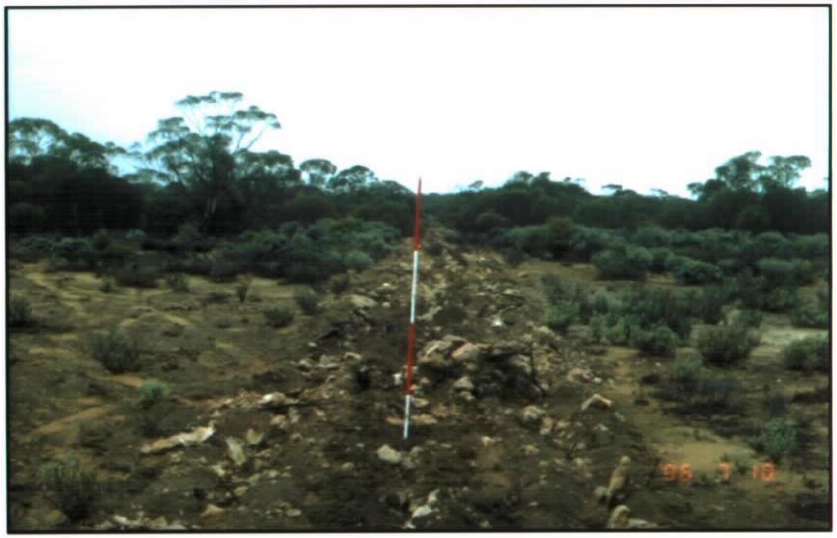
Photopoint 14, 1996. (Photo 43939)

Photopoint 15, 1996. (Photo 43936)



Photopoint 16, 1996. (Photo 43935)

Photopoint 17, 1996. (Photo 43934)



Photopoint 18, 1996. (Photo 43933)

Photopoint 19, 1996. (Photo 43932)

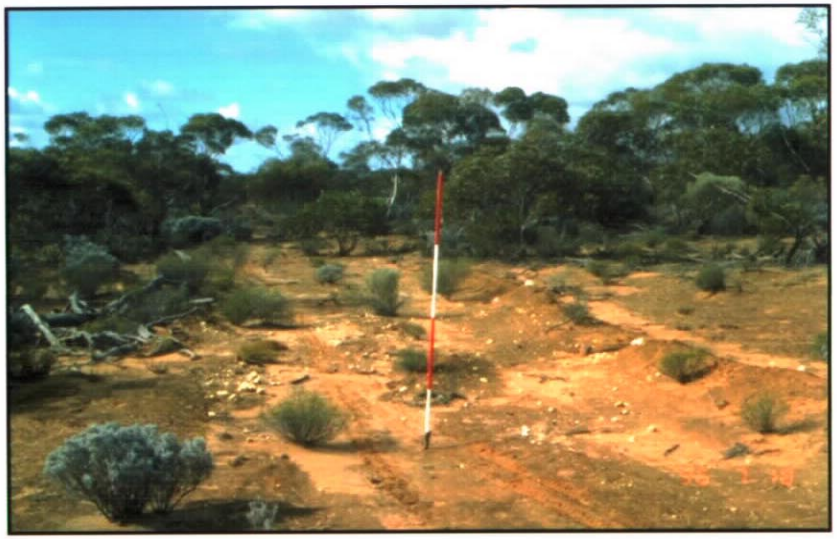
Photopoint 20, 1996. (Photo 43931)

Photopoint 21, 1996. *(Photo 43930)*

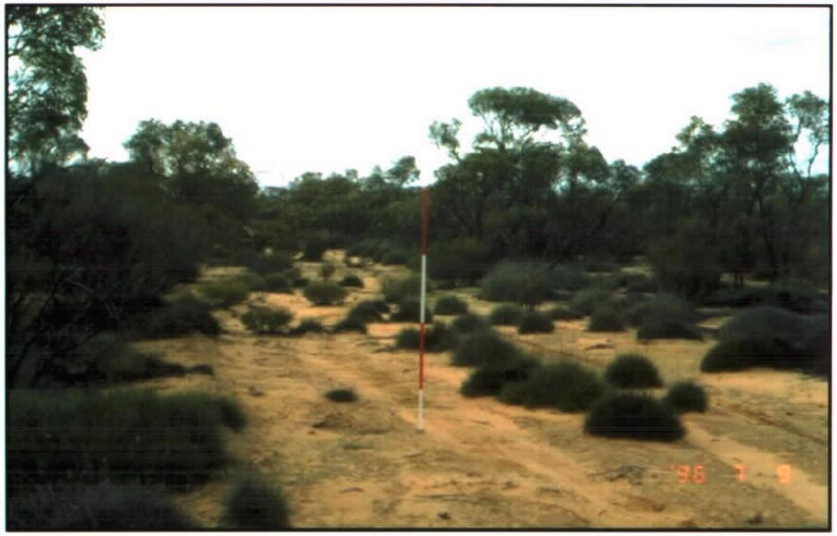
Photopoint 22, 1996. *(Photo 43928)*

Photopoint 23, 1996. *(Photo 43927)*

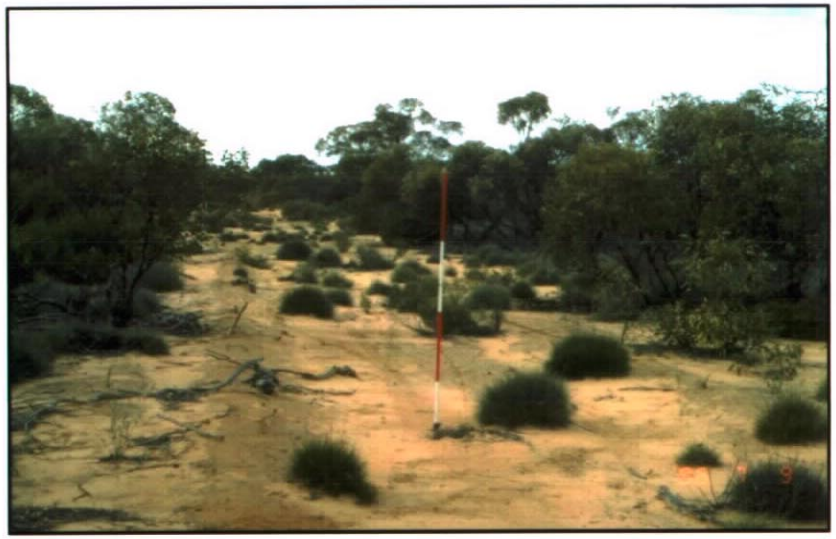
Photopoint 24, 1996. *(Photo 43926)*



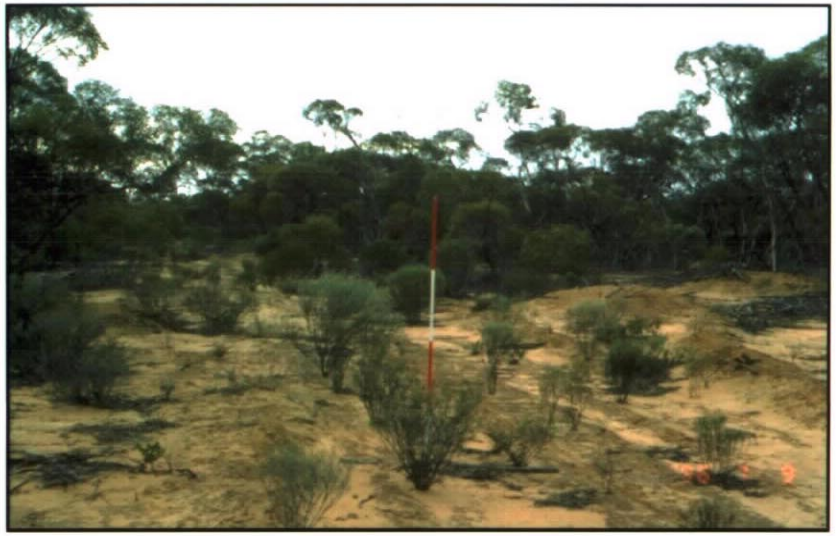
Photopoint 25, 1996. *(Photo 43925)*



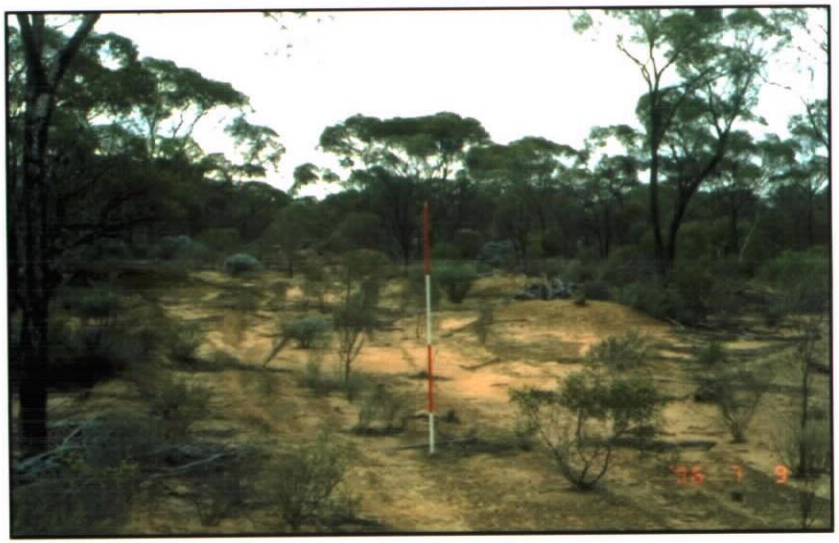
Photopoint 26, 1996. *(Photo 43910)*



Photopoint 27, 1996. *(Photo 43911)*

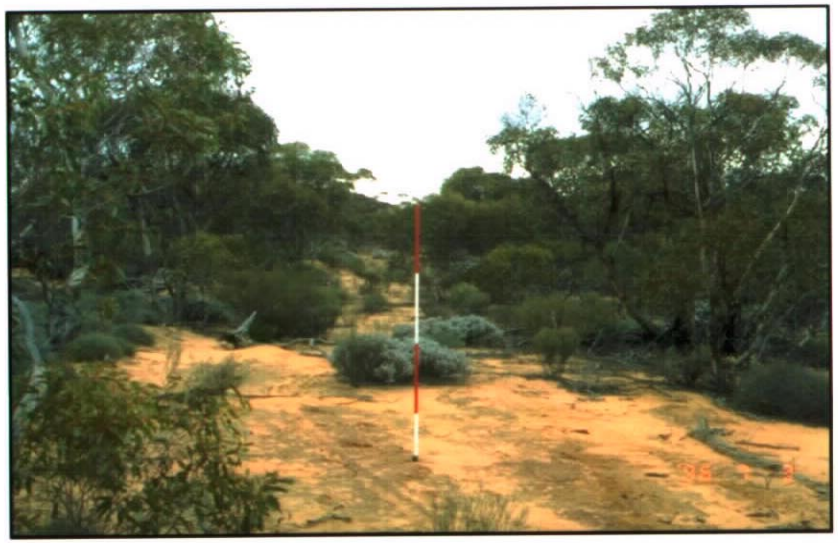


Photopoint 28, 1996. *(Photo 43913)*



Photopoint 29, 1996. (Photo 43912)

Photopoint 30, 1996. (Photo 43914)



Photopoint 31, 1996. (Photo 43915)

Photopoint 32, 1996. (Photo 43918)

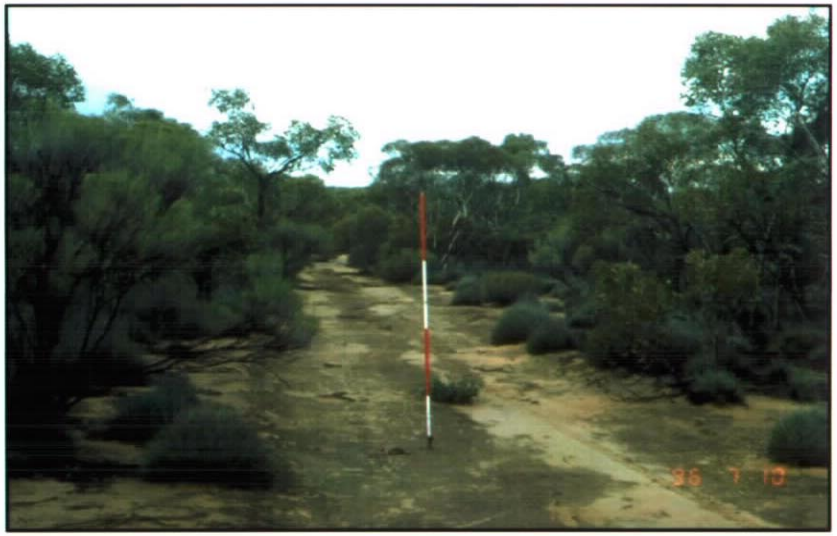
Photopoint 33, 1996. *(Photo 43919)*

Photopoint 34, 1996. *(Photo 43922)*

Photopoint 35, 1996. *(Photo 43923)*

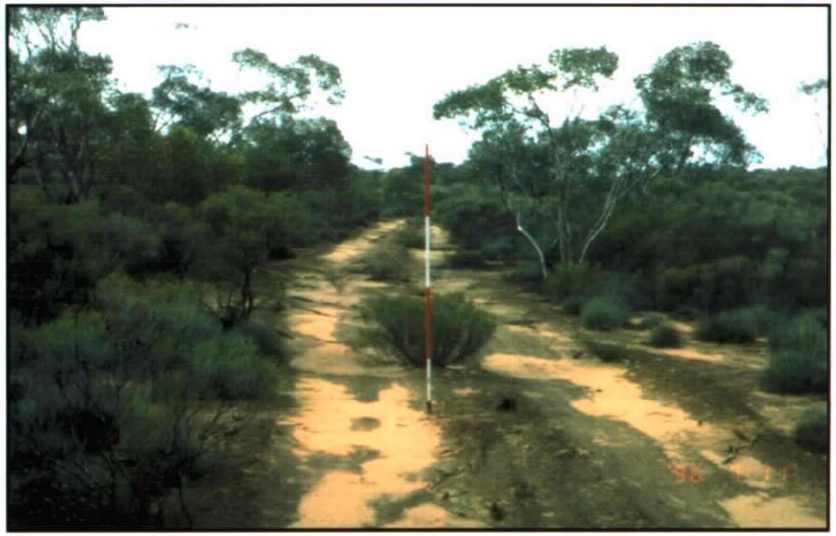
Photopoint 36, 1996. *(Photo 43924)*

Photopoint 37, 1996. (Photo 43938)



Photopoint 38, 1996. (Photo 43937)

Photopoint 39, 1996. (Photo 43945)



Photopoint 40, 1996. (Photo 43946)