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REHABILITATION SURVEYS

HEAZELWOOD (EL 21/85)

MICROFILMED
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BY

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ENVIRONMENTAL REHABILITATION

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CONTENTS

| | Page. |
|--|--|
| SUMMARY AND CONCLUSIONS | 1 |
| RECOMMENDATIONS | 2 |
| INTRODUCTION | 3 |
| LAND TENURE STATUS | 5 |
| LOCATION AND ACCESS | 5 |
| HISTORY OF REMEDIAL WORKS | 6 |
| WORK CONDUCTED CONDUCTED BY CONTRACTOR | 7 |
| | |
| FIGURE 1. | LOCALITY DIAGRAM. |
| FIGURE 2. | LOCATION OF REMEDIAL WORK BRASSEY. |
| FIGURE 3. | LOCATION OF REMEDIAL WORK FENTONS PROSPECT. |

SUMMARY AND CONCLUSIONS

Phil Jones and Associates were contracted to carry out rehabilitation surveys on the Heazelwood Prospects worked previously by Metals Exploration Ltd (EL 21/85).

Moderate revegetation has occurred over the past 5 - 7 years however, additional seeding of poorer areas as well as fertilizing was thought necessary to improve on the natural regeneration. A site specific seed mix was prepared, bulked with sawdust to allow for easy broadcasting. Organic based fertilizers (Rehabilitation and Establishment mix and Fish and Chips) were used instead of propriety inorganic mixes as the nutrients in the organic fertilizers are not susceptible to leaching - as evidenced from recent trials by Tas Crays Pty Ltd.

The two main prospects, Brassey and Fentons, were both rehabilitated with some 4.5 kilometres of costeans and tracks seeded and fertilized and a further 3.5 kilometres of track also fertilized. Some additional Tea Tree slash was applied to appropriate road cuttings to augment the programme. Some tracks required minor earthworks to alter drainage in order to lessen erosion. Significantly, some two loads of rubbish had to be removed from the Brassey site, being mostly discarded material around drillsites, and deposited at the Waratah Municipal Tip.

Follow up fertilizing in spring would significantly augment the recently completed programme allowing the colonized areas to thrive, thus lessing any chance of setback due to man made or natural disasters.

To maintain the integrity of the rehabilitation programme some effort should be expended to advise people of the works completed and to state that vehicular access will only set back that work.

- 2 -

RECOMMENDATIONS

Follow up fertilizing in the coming Spring period (September - October) would significantly augment the recently completed seeding and fertilizing programmes at Heazelwood. This second nutrient boost would greatly aid the development of natural vegetation found occurring along most of the disturbed areas and also help the establishment of the recently seeded areas. Such a procedure should allow the revegetation to be well enough established to survive any further natural or man made setbacks.

Signs stating that rehabilitation surveys have been completed should be erected at the Brassey mine and near the Fentons turnoff in an attempt to dissuade four wheel drive movements past these points. Grips and barricades constructed will otherwise undoubtedly be bypassed or traversed thus negating their effectiveness and allowing for the onslaught of erosion.

A locked gate should be erected over the entrance to the Brassey Mine adit to control unauthorised entry.

INTRODUCTION

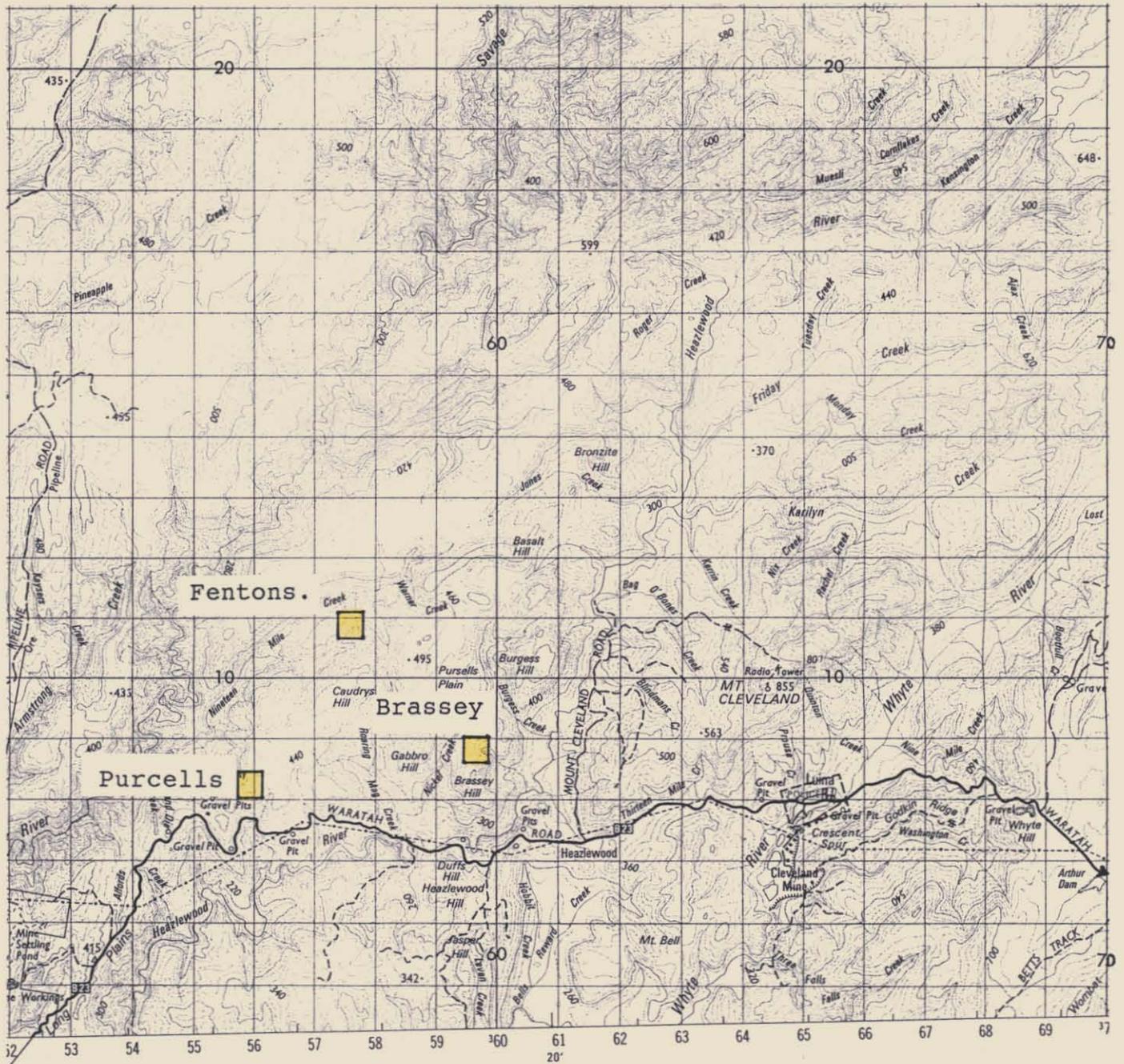
A field visit was made to the Heazelwood Area (formerly EL 21/85) on the first and second of February 1994, in company with the Tasmanian Department of Resources (TDR) Environmental Field Officer, D. Gatehouse, who showed me over the following areas requiring rehabilitation (Figure 1.):

1. Jaspers Prospect
2. Fentons Prospect
3. Purcells Prospect
4. Brassey Mine Area
5. Burgess Prospect.

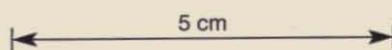
After viewing these prospects it was apparent that due to public activity in those easily accessed areas, including the new Brassey Fossicking area; both the Brassey and Fentons prospects would require the more immediate rehabilitation. Time and product permitting the other prospects including Purcells, Burgess and Jaspers would also be rehabilitated.

Following this site inspection Phil Jones and Associates submitted an expression of interest to the TDR and was successful in being awarded the rehabilitation contract on the 16 February 1994. The rehabilitation proposal was assessed by a panel from TDR, Department of Environment and Land Management and discussed with staff from the Forestry Commission.

FIGURE 1 - LOCALITY DIAGRAM



SCALE 1:100 000



The sealed Waratah Road gives good access to the main prospect areas and gravel four wheel drive tracks give direct access to the rehabilitation sites. The start of the track into Fentons is only negotiable by four wheel drive, after a period of dry weather due to its slippery and rutted clay base.

A four wheel drive motor bike was also used to access costeans and dozer tracks in order to transport seed and fertilizer. The use of this vehicle minimized damage to the natural regeneration and greatly improved productivity.

HISTORY OF REMEDIAL WORKS

Metals Exploration Ltd conducted detailed exploration surveys over all the prospects previously mentioned whilst holders of Exploration Licence 21/85. Surveys included the excavating of approximately 10 kilometres of trenches and the siting of some 30 drill pads.

Upon completion of these programmes Metals Exploration carried out remedial works including the backfilling of trenches, cleaning up of drill sites and removal or burying of plastic sample bags holding percussion drill samples. It was hoped that natural vegetation would quickly colonize the bare expanses given the high rainfall for the area. It should be noted here however, that little effort was made to allow for this significant runoff on already disturbed soils. Nor was there any serious attempt to keep what could only be described

- 7 -

as extremely thin (less than 100mm) ferruginous soils, on top of the rehabilitated costeans. In spite of this there has been surprisingly good natural revegetation; principally those primary colonizers - Bauera, Tea Tree, Hakea, Banksia, Heath, Lomatia and Peppermint Eucalypts, over the last 5 to 7 years. The seedlings vary in height from last seasons germination 1 - 2 cm up to 40 - 50 cms.

WORK CONDUCTED BY CONTRACTOR _____

The long term rehabilitation objective for the exploration sites was to produce natural and stable landforms of a type not dissimilar to those in the general area.

To achieve this a programme utilizing environmentally responsible rehabilitation techniques was implemented, including the use of a low ground pressure four wheel drive bike to transport seed and fertilizer and the use of organic (OR-90 fish/bark compost) based fertilizers to give greater site retention of nutrients. Field trials of OR-90 and proprietary inorganic fertilizers by Tas Crays Pty Ltd have shown nil down slope movement of nutrients due to rainfall for the organic product, and strong solubility and movement of the inorganic product.

Tas Crays Pty Ltd's Rehabilitation and Establishment mix with NPK ratio 6:5:5 + Mg (equivalent to an EZ proprietry mix) was used as the primary fertilizer at a rate of 2 - 3 handfuls per 4m². Approximately 1.8 tonnes of fertilizer was applied at this rate covering roughly 4 hectares in area. Fish and Chips, a fertilizing mulch was also used at Heazelwood particularly in the rehabilitation of the percussion drill sites. Rows of cuttings from the drill sites were initially recontoured by hand and a layer of mulch to a depth of 5 to 10 mm applied to act as a humic rich seed bed. Some 800 kgs of fertilizing mulch was used for this purpose as none of the sites showed any sign of natural revegetation due the impoverished nature of the 'fresh' bedrock chips.

The majority of mulched drill sites were later seeded with a mix of compatible natives as were the majority of costeans and tracks at Brassey and some of the costeans and tracks at Fentons. The make up of the seed mix was based on field observation of native species made during the initial visit with some 4.8 kgs (Table 1) of mixed seed was bulked approximately ten fold with sawdust thus giving a more even spread of seed. A second 4.8kg (Table 2) batch of seed was made up when it became apparent that the initial mix, spread at the rate of 4 gm / m² would be insufficient to cover the remedial areas at Brassey and Fentons.

TABLE .1.

| | |
|---------------------------------|------------|
| <i>Eucalyptus nitida</i> | 0.80 kg |
| <i>Eucalyptus amygdalina</i> | 0.80 |
| <i>Allocasuarina littoralis</i> | 0.50 |
| <i>Acacia melanoxylon</i> | 0.80 |
| <i>Banksia marginata</i> | 1000 seeds |
| <i>Hakea lissosperma</i> | 0.20 |
| <i>Leptospermum lanigerum</i> | 0.40 |
| <i>Leptospermum glaucescens</i> | 0.30 |
| <i>Leptospermum nitidum</i> | 0.30 |
| <i>Gahnia grandis</i> | 0.20 |
| <i>Lomandra longifolia</i> | 0.20 |
| <i>Agastachys odorata</i> | 0.10 |
| TOTAL | 4.80 kgs |

The second batch is markedly different as it was designed to more closely mimic vegetation located at Fentons prospect which contains a higher proportion of eucalypts.

TABLE .2.

| | |
|---------------------------------|----------|
| <i>Eucalyptus nitida</i> | 1.30 kg |
| <i>Eucalyptus amygdalina</i> | 1.50 |
| <i>Allocasuarina littoralis</i> | 0.50 |
| <i>Acacia melanoxylon</i> | 0.50 |
| <i>Leptospermum lanigerum</i> | 0.50 |
| <i>Leptospermum glaucescens</i> | 0.50 |
| TOTAL | 4.80 kgs |

- 10 -

It should be noted here that half the acacia seed was heat treated to aid selective germination and that the Gahnia seed was also specially treated to enhance its germination. The seed mix eventually covered approximately 2.5 Ha of costean, drill site and drill track with tracks and costeans averaging approximately 5 metres in width.

Some Tea Tree / Hakea and She Oak slash was used on certain drill sites, road cuttings and spoil heaps and fertilizer applied liberally to these areas. Furthermore a number of large roadside disturbed areas were also treated with slash up to 1 - 2 metres width on both sides of the road in an attempt to produce a vegetative screen. Both the screened and remaining disturbed areas were thoroughly fertilized.

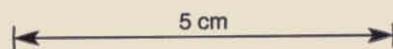
BRASSEY MINE AREA (FIGURE 2)

Some 3200 metres of drill track and costean were seeded and fertilized at this site. A further 20 drill sites were seeded and mulched and 2 sites just seeded. In addition two grips were cut across the main track leading down in to the central gully to stop further substantial erosion along it. A rock barricade was also constructed on the Brassey Hill track approximately 20 metres from its junction with the main track. Both of these access ways were fertilized and seeded and any vehicular traffic will only damage any potential revegetation.

FIGURE 2 - LOCATION OF REMEDIAL WORK : BRASSEY



SCALE 1:1400



- Seeded / Fertilized
- Fertilized
- Tea Tree slash / fertilized.
- Grips
- Track
- Drill sites
- Coastline

Most of the tracks at this prospect were bulldozed to hard base leaving little fines for any possible revegetation, however some of the hardier species have still managed to colonize and spread , albeit slowly. Species such as Baeura, Tea Tree and Sprengelia would appear to be the major colonizers.

The costeans had moderate to good revegetation coverage with only small patchy areas of nil to minor colonization. The rough, pock marked nature of the remedial work has aided the growth and germination of the majority of species.

Despite the previous attempts by the previous licence holder to clean up the site some two ute loads of drill site rubbish, cable, drums and plastic bags and ploy pipe had to be removed from the site and disposed of at the Waratah Municipal Refuse Site.

A large borrow pit approximately half way into the Brassey Prospect (See Fig. 2) was also assessed for rehabilitation purposes. The most cost effective method of achieving satisfactory results at this site was to place fertilized Tea Tree / Hakea and Allocasuarina slash adjacent to the access road and up to 2 metres distant from it along the length of the disturbed area. This should create a selective vegetative screen in due course, whilst the remaining heavily fertilized disturbed areas have time to regenerate more slowly.

FENTONS PROSPECT (FIGURE 3)

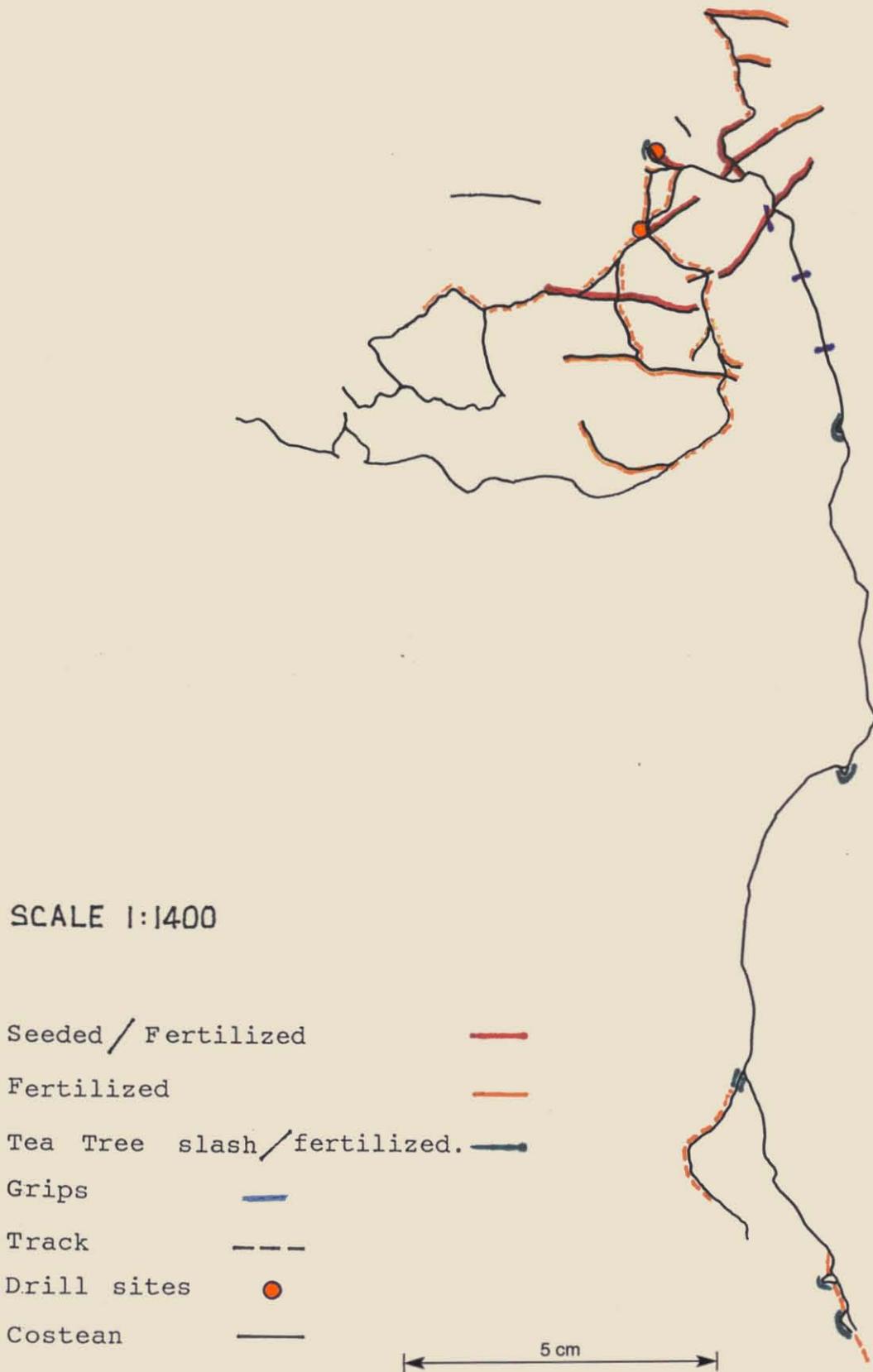
Approximately 4720 metres of tracks and costeans were fertilized of which some 1210 metres were also seeded. In addition 3 drill sites were fertilized with the largest one also being partially seeded and covered with thinly spread Tea Tree / Allocasuarina / Callistemon and Eucalypt slash in an attempt to assess their regenerative powers.

Soils at Fentons were some what thinner than at Brassey and many of the costeans had little fines for seed to do well in. Where the tracks made by Metals Exploration followed the peat lined gullies severe erosion has occurred with gutters to 0.4 to 0.5 metres deep being evident.

Not all of the tracks and costeans at Fentons were readily accessible for rehabilitation purposes hence the southern most and remotest disturbed areas remain untouched. This may allow for some sort of subjective comparison between the rehabilitated zones and those colonized by natural regeneration.

Two grips were also constructed along the main access track near its end in order to divert water off the track thus minimizing erosion. Similarly one grip was cut accross a costean to divert water into thick scrub and away from the readily erodeable soils within the costean.

FIGURE 3 - LOCATION OF REMEDIAL WORK : FENTONS PROSPECT



- 15 -

A moderate amount of Tea Tree slash rehabilitation was completed from the Fentons divide dozer cutting south to the slippery yellow clay zone near the turnoff to Brassey. All these areas were fertilized with the R & E mix and covered as thickly as possible with slash from local Tea Tree / Allocasuarina / Hakea and Callistemon. The secondary 'tramway' track was also fertilized for roughly 250 metres back from its junction with the main track and the junction was heavily covered in slash in an attempt to create a vegetative screen. This adds approximately 500 extra metres of fertilized roadside to the total mentioned previously.

PURCELLS PROSPECT

Some five 24 kg bags of R & E mix remained to be utilized after the completion of the programmes at Brassey and Fentons.

These were duly used at Purcells to cover 2 drill sites, a large costean area and some of the tracks in the near vicinity. Phytopthera Cinamomii is notably present at Purcells as it was at Brassey and to a lesser degree at Fentons. It would appear to have come in on the tracked vehicles, used to either dig the costeans or carry out the drilling programme.