Mineral Exploration Code of Practice — Exploration work standards

The following pages outline the standard requirements for exploration work.

INDUCTION AND REGISTER

- Following receipt of written approval the person responsible (site supervisor) for the on-ground works must conduct an orientation (site familiarisation) and induction (documentation and sign off) for all workers (employees and contractors) who will be involved in the approved program.
- A register must be kept which clearly documents (signed off by the site supervisor and worker) that all workers have been made aware of the approval conditions and are familiar with the sections of the *Mineral Exploration Code of Practice* that apply to that program.
- In situations where site-specific conditions refer to particular flora the register must contain signed-off proof that the workers can recognise those plants or trees.
- The site supervisor must ensure that works comply with the *Mineral Exploration Code of Practice* and site-specific approval conditions, and the register must be available during site inspections for examination by any person nominated by the Director of Mines.

GRID LINES

ESTABLISHING CUT LINES

- Cut lines must not exceed one metre in width.
- Access must be discreet.
- Cut lines are to be established using hand-held tools such as machete, fern hook, axe and chainsaw only.

CUTTING VEGETATION

- For safety reasons, vegetation should be cut as close as possible to ground level and overhanging branches should be trimmed.
- No trees of any species over 150 mm diameter should be felled unless they are unsafe.
- Track cutters should recognise and avoid cutting the following species:

Common Name	*Scientific Name*
King Billy Pine	*Athrotaxis selaginoides*
Huon Pine	*Lagarostrobos franklinii*
Celery Top Pine	*Phyllocladus aspleniifolius*
Cheshunt Pine	*Diselma archeri*
Creeping Pine	*Microcachrys tetragona*
Deciduous Beech	*Nothofagus gunnii*
Pandani	*Richea pandanifolia*

Where plants such as manferns (*Dicksonia antarctica*, *Cyathea* spp.) are encountered, individual specimens are not to be decapitated. Fronds may be shaved off one side of the plant.

USE OF PEGS AND TAPE

- Mineral Resources Tasmania must be consulted on what colour tape to use to avoid confusion, as Forestry Tasmania has well established colours to depict coup boundaries and areas to be left uncut.
- Small lengths of biodegradable tape should be used.
- Conspicuous markers such as pegs and tape should be removed wherever possible on completion of the program, especially from the beginning of grid lines.
- In alpine and highly visible areas cutting should be kept to a minimum and pegs and tape should be recovered on completion of the program.

Grid line showing width and removal of trip hazards

USE OF GRID

- Whilst cutting and later using a grid, all introduced debris (bottles, cans, paper) is to be removed.
- If changing oil in grid-based machines, waste oil is to be collected and taken to an appropriate disposal area.
- Remove all wires used in geophysical surveys.

FIRE PREVENTION

- Explorers are advised to be aware of their responsibilities and obligations under the Tasmanian *Fire Service Act 1979* and the Tasmanian *Fire Service Regulations 2007*.
- On all work sites where petrol-driven machinery is used provision must be made to enable the suppression of accidental fires. Fire fighting equipment is to be kept on hand.
- Unless following prescriptions in an approved fire management plan, all machinery based activities (including chainsaws) are to cease on declared Total Fire Ban days.
- When using a portable generator for geophysical surveys ensure the exhaust area is clear of leaves and twigs. On Total Fire Ban days the above prescription applies.

ACCESS TRACKS

Properly made and carefully sited tracks will remain visually obscure and environmentally acceptable. A well planned track will cost less than one which is badly placed and requires frequent maintenance. When planning a track, the maintenance, rehabilitation and flora, fauna and heritage surveys must be considered, and included in the cost estimates. It is recommended that a suitably qualified track planner be employed to ensure that the best environmental and cost outcomes are achieved. Explorers are advised to familiarise themselves with the requirements for track work outlined in the *Tasmanian Reserve Management Code of Practice* and in the *Forest Practices Code* (see *More Information*).

COST–BENEFIT ANALYSIS

Helicopters

It is recommended that a cost-benefit analysis comparing helicopter access versus ground access is completed by the explorer prior to seeking approval for the works. Experience has shown that where access is through steep, heavily-timbered country, or where a long access track is being contemplated, the use of a helicopter is usually cheaper and certainly more environmentally responsible in the initial phase of exploration.

All Terrain Vehicles (quad bikes)

The use of all terrain vehicles may be advantageous in some situations where a narrow track is required. Operators must be trained in the safe use of these vehicles.

PUBLIC AND OTHER PRE-EXISTING ROADS

- Always use an existing road or track in preference to constructing a new one.
- When advised by MRT seek permission from the responsible authority (e.g. from the Hydro-Electric Corporation, Forestry Tasmania or from private landholder) before use.
- Do not accelerate deterioration by excessive speed, use of oversize or overloaded vehicles, or use in extreme weather conditions.
- Do not use tracked vehicles on unsuitable surfaces (such as bitumen).
- Drainage and any other damage on existing roads must be repaired.

PLANNING

The following points should be considered to establish the standard of track required:

- The volume of traffic, and type of traffic to use the track?
- For what period is the access required?
- Will it only be used in summer?
- How will potential future developments affect the track use?
- How will public access be stopped?

Once the planner has determined the standard to which the track must be constructed, some estimate should be made of costs. A costing must include:

- Planning and approval including flora, fauna and heritage survey costs.
- Allowance for proper drainage.
- Cost of pipes and culverts.
- Cost of maintenance.
- Cost of gates/access cut off.
- Cost of rehabilitation.
- Cost of increase in security deposit to cover increased rehabilitation requirements.

CLASS OF TRACK

Forestry Tasmania has designed a classification system for the construction of permanent roads, and this is reproduced below. Most exploration tracks will never be subject to the heavy use many forestry roads experience, and are highly unlikely to be of a higher grade than a Class 4 road. Most temporary exploration tracks required for limited use, such as drilling one hole, need not be constructed to this standard.

The *Tasmanian Reserve Management Code of Practice* has included a fifth type of road called an 'access track' which caters for temporary low-use exploration tracks:

Function	Temporary track
Pavement type	Unsurfaced dry weather only
Pavement width	3 to 3.7 m
Shoulder width	No shoulder required
Desired maximum grade	+15%, -15%

Road Design — Basic Approach

A guide to road design for permanent roads based on average tonnes per week carted (Forest Practices Code)

Characteristics	Road Class			
	Class 1 (Main)	**Class 2** (Semi-main)	**Class 3** (Spur)	**Class 4** (Track)
Function	Primary road in large network (two lane)	Significant feed road (slower two lane)	Terminal road (fast or slow single lane)	Special purpose access road, single lane — low cost
Log traffic volume	2500 t/week	1000–2500 t/week	<1000 t/week	very low
Pavement type	Heavy duty, all weather	Heavy duty, all weather	Can be all or summer only	Usually not metalled
Pavement width	5.5–6.0 m	5.5 m	3.7–4.0 m	3.7 m
Shoulder width	0.6–1.0 m	0.6 m	0.5–1.0 m	0.6 m
Desired maximum gradients	+5, -8%	+8, -10%	+12, -15%	+15, -15%

LOCATION

- Possible routes should be found using available maps and air photos, then by field inspection. Walk the whole length of the proposed track.
- An assessment should be made of the potential visible impact of different routes.
- Colour contrasts between soil and the underlying material can produce a high visual impact and must be taken into account in the planning.
- Learn to recognise and avoid rare or valued tree species.
- Consider routes which minimise tree clearing.
- Mark both sides of the track by tying a corridor of tapes along the proposed route.
- To assist in the location of the track, establish control points at creek crossings and saddles and then decide on the required gradient between the control points.
- Avoid poor or difficult ground such as rock outcrops, soaks and swamps. The best track locations will be found by following the contour, on ridge tops or on bottom slopes just above the valley floor.
- Minimise the number of stream crossings.
- Fit the track to the topography so that the disturbance will be kept to a minimum.
- Avoid sudden changes in gradient.
- Steep sections of tracks are prone to severe erosion and must have drainage grips or cross drains put in during construction.
- Avoid level tracks, as water will pool on the flat sections.
- Ideally tracks should be built to a grade of not less than 1% and preferably not more than 5%.
- When developing a new track off an existing roadway ensure the junction is discreet, but is also safe. Traffic management may be required.
- Where possible, the angle between track and road should be large and the track should include a dog leg close to the road, to reduce visibility.
- Tracks constructed parallel to a major watercourse should be some distance from the watercourse. Watercourses must be protected in a manner consistent with the guidelines provided in the *Forest Practices Code* as shown below:

Watercourse type	*Streamside reserve (total)*
Class 1. Rivers and lakes (as named on 1:100 000 scale topographic series)	80 m
Class 2. Creeks and streams (carrying permanent running water; catchment exceeds 100 ha)	60 m
Class 3. Permanent watercourses (catchment 50–100 ha)	40 m
Class 4. Semi-permanent or ephemeral streams carrying water intermittently	20 m

- Streamside reserves are recognised as necessary for the protection of water quality and no machinery should enter them except to cross the streams at defined points.
- Interference with the natural drainage should be kept to a minimum.
- Stream crossings should be at right angles to the stream.

CONSTRUCTION

- Excavators are the recommended machine for exploration earthworks.
- Pre-cut all logs and saplings greater than 150 mm in diameter before being placed aside by the excavator. The reason for pre-cutting is to avoid damage to peripheral vegetation from the uncontrolled falling of large trees.
- On some occasions, pushing over trees in line with the proposed track may be preferable to cutting. This technique is used in the construction of narrow tracks on

ATV track developed to access a drill site.

moderate slopes or short term drill tracks accessed by tracked vehicles.

- Trees may also be used as cording to cross boggy ground.
- Any commercial timber in State Forest must be set aside for salvage.
- Remove topsoil and vegetation and store in a secure windrow alongside the track.
- If a second cut is made subsoil must be stored in a second separate windrow alongside the track.
- When a demand for road building material is anticipated, locate a few good compact and inconspicuous borrow pits, and develop these systematically. Do not use subsoil which is required for later rehabilitation.
- It is recommended that a suitable geotextile is laid out on the prepared surface before gravel is spread.
- Do not needlessly remove vegetation from either side of the roadway.
- Gates/ditches/logs must be used to stop public access.

DRAINAGE

Install proper drainage as track construction progresses.

Grips (cross drains)

- All tracks require grips at frequent intervals.
- The lack of grips is the most common fault seen in track construction.
- They should be dish-shaped, approximately 0.6 m wide and 0.3 m deep.
- Grips should be at an angle across the track to best intercept and direct the water into a drain.
- Grips function most effectively in combination with a table drain.
- While the actual spacing of grips and table drains is largely determined on a site-specific basis, the following table (adapted from the *Forest Practices Code*) is a guide for grip spacings on a track which would be required for more than one season.

ERODIBILITY FACTOR

Grade of track	*Low–Medium*	*High*	*Very High*
1–5%	150 m	120 m	70 m
6–10%	120 m	90 m	40 m
11–15%	95 m	70 m	30 m
16–20%	50 m	35 m	30 m

The erodibility factor is governed by the soil type and/or parent rock over which the track is constructed. These are:

LOW: Dolerite or basalt rock/soils.

MEDIUM: Mathinna Beds and equivalents rock/soils; sandstone, mudstone; non-limestone soils overlying karst.

HIGH: Quartzite; coarse sandstone, thin residual soils derived from limestone and granite in wetter areas.

VERY HIGH: Granite rock/soil in dry areas; fine sandy soils.

Table drains and culverts

- Table drains should be dish-shaped, at least 0.3 m deep and at least 0.6 m wide.
- They should be dug on the uphill side of a track and should connect to a properly constructed grip.
- The dimensions of drains must be adequate to cope with the volume of runoff.
  - In easily eroded soils water velocity in these drains should not exceed 0.5 m/sec.
  - In more resistant soils, the velocity should not exceed 1.0 m/sec.
  - When constructing drains try and stick to the same gradients as used in track construction — between 1% and 5% slope wherever possible.
- Where drains cannot cope with the volume of water, they can be lined with rip rap (broken rock), half pipes or concrete interlocking channels.

Angled grip, approximately 0.6 m wide and 0.3 m deep.

Note rip rap in discharge area and good foundation.

Well constructed concrete pipe culvert.

- Where excessive silt loads are anticipated, or where water quality is an issue, large cross drains and culverts should be constructed in conjunction with a sediment trap.
- Sediment traps can be made out of geotextile rolled around a stake and placed across the water flow and pinned in place by steel stakes.
- Culverts and cross drains should be located where the run-off either filters through undisturbed forest soil or into natural drainage channels.
- Culvert pipes should be laid on a very slight grade. Rip rap should be placed in the discharge area to prevent erosion.
- Culvert pipes must be laid straight, on a good foundation, to prevent movement of pipes. Where pipes are joined, care must be taken to have them laid straight. Rubber ring joints or external bands can be used where movement is anticipated.
- The minimum recommended cover over pipes is 600 millimetres.
- Check drains and culverts frequently and unblock where necessary.

CREEK CROSSINGS

- Specialist advice must be sought where structures are to be placed in creeks that may have populations of platypus and freshwater crayfish or are used by spawning fish.
- Some creeks may be crossed by fording if a solid rock base or coarse gravel bottom exists and silt is not stirred up or washed into the creek by the access sections of track.
- Small crossings can be made by using logs. Logs are laid in the creek, parallel to each other, so that the water can flow between the logs. Gravel and fill are usually placed over the collection of logs to complete the road surface.
- Larger creeks will require something more substantial, such as a piped culvert or a log culvert.
- Anticipate winter and flood water flows and install culvert pipes which will cope with the maximum expected water flow.
- Log culverts are made by placing two abutment logs on each bank of the creek, parallel with the creek direction, then putting logs (stringers) across the creek, with their ends resting on the abutment logs. The logs are then covered with gravel or soil.
- During the last 50 metres before a track crosses a watercourse, drainage must be diverted into the surrounding vegetation or sediment traps, and not be allowed to continue to the stream unchecked.

DIFFICULT AREAS

Some terrains are more sensitive to the impacts of track construction:

- Buttongrass plains are poorly drained because of thick peat and a lack of gradient and usually have a quartz gravel base which produces a conspicuous colour contrast with the vegetation when exposed.
  - Skirt buttongrass plains wherever possible and cross at the narrowest point.
- Dunes are naturally mobile and therefore prone to erosion.
  - Tracks in dunes soon become the domain of unauthorised off-road vehicle users. Stabilisation of sand dunes is often dependent upon their precise shape and a fragile vegetation cover.
  - When working in dune country, the major requirement is to retain the full vegetation cover.
  - Tracks should not be made in dunes unless absolutely essential.
- Tracks are difficult to construct in alpine country and near impossible to restore. Helicopter-assisted drilling should be used in alpine areas wherever possible.

USE OF TRACKS

- The use of temporary tracks should be confined to the summer months.
- Carry a spade to unblock grips and culverts. Keeping water off the surface of tracks will greatly reduce the expenditure required for maintenance.
- Do not wait until tracks fail before doing any maintenance work. Cover boggy areas with tea tree cording or geotextile covered with gravel.
- Plan track use to minimise the number of journeys. Plan your time well, choose a suitable vehicle, and this will minimise both expense and environmental impact on the track.

RE-OPENING OF OLD TRACKS

- Overhanging vegetation should be cut, not pushed out of the way.
- Logs across the track must be cut, not simply pushed out of the way.
- Re-open old drainage and be sure to install additional drainage wherever necessary.

REHABILITATION OF TRACKS

Refer to the chapter on rehabilitation for timing, seeding rates and details on fertiliser types to be used in rehabilitation.

- Should ripping be required:
  - Rip along the contour;
  - Spacing of rip lines should be approximately equal to ripping depth;
  - Do not rip when soil conditions are too wet to allow the soil to shatter;
  - If ripping brings large amounts of rock to the surface, discontinue.
- Pull out culverts (pipes, logs etc.) and re-establish natural drainage pathways.
- Replace stockpiled topsoil over the track (after ripping if this was needed) to a depth of 0.3–0.4 metres.

Track construction through buttongrass on peat — coarse fill from local borrow pit.

Drill track in use.

Drill track soon after rehabilitation.

Drill track four years after rehabilitation.

Drill track ten years after rehabilitation.

DRILL SITES

ENVIRONMENTAL CONSIDERATIONS

- A drill site must be large enough to accommodate the drilling rig, compressor, pumps, drilling rods and sump and allow a safe working area.
- Allowance should be made in planning drill collar locations so that they can be moved to achieve better environmental outcomes.
- Large, dead trees should be avoided or the site must be made safe by cutting dangerous limbs or felling the tree.
- On completion most of the drill pad can be rehabilitated at the time the rig is moved, leaving vehicle access to the drill collar for later down-hole logging and abandonment works. This minimises the time soil is stockpiled and saves on rehabilitation costs.
- Drill sites must be supplied with a portable chemical toilet and the contents must be deposited in a recognised sewage disposal facility.

FIRE PREVENTION

- Explorers are advised to be aware of their responsibilities and obligations under the Tasmanian *Fire Service Act 1979* and the Tasmanian *Fire Service Regulations 2007*.
- No open or enclosed fires are allowed for any exploration related activity in Tasmania. The reason for this is that the danger of escaped fires and the damage of wood collecting to the environment are potentially highly detrimental to the low impact nature of exploration and the continued access to prospective ground.
- On all work sites where petrol-driven machinery is used provision must be made to enable the suppression of accidental fires. Fire fighting equipment is to be kept on hand.
- Unless following prescriptions in an approved fire management plan, all machinery based activities (including chainsaws) are to cease on declared Total Fire Ban days.

CONSTRUCTION

- Pre-cut any timber greater than 150 mm in diameter in the area to be cleared.
- Place topsoil and vegetation to one side of the drill site. If the drill site is to remain in place for a long time, and is on a slope, provide drainage along the top side of the pad. On a slope, topsoil should be stored on the uphill side of the drill pad.

USE OF A DRILL SITE

- Equipment must be in good condition to ensure that oil and hydraulic leaks do not contaminate the site.
- When drilling, place oil absorbent matting under and around the rig.
- Fuel, hydraulic fluids and oils must be stored in a fire safe bund which does not fill up with rainwater. Care should be taken when refuelling and fuel pumps, pouring spouts and funnels must always be used.
- Remove all rubbish and equipment from the drill site on completion of work. Rubbish bins must be used.
- If soil is contaminated by hydrocarbons it must be removed for disposal at a recognised site.
- On completion immediately cap or cover the drill hole. Do not leave an open hole in the ground. See *Abandonment of Drill Holes* below.
- Drill holes making water must be plugged and sealed off following the completion of any down-hole geophysics. See *Abandonment of Drill Holes* below.
- Drillers must be aware of the dangers of drilling new holes using high pressure air in close proximity to holes that have been sealed. The plugs from the old holes can be expelled forcefully. Explorers must ensure that staff and contractors are aware of this potential danger and must locate old holes and make them safe by removing the plugs or covering them with an appropriate protective mat.
- The site should be monitored periodically and any weed species must be eradicated.

WATER PUMPS

- Water pumps must be placed on oil-absorbent material and regularly checked for hydrocarbon leaks because of their close proximity to water courses.
- Fuel pumps, pouring spouts and funnels must always be used.
- Fuel tanks and lines must be sealed and secure and meet the engine manufacturers' specifications.

SUMPS

- Drill pads should be designed with the sump on the downhill side.
- Drains should be dug to direct any accidental spills into the sump.
- Sumps must always have oil absorbent booms floating in them.
- Booms must be replaced regularly.
- Cutting-rich water from the drill site must not directly enter any nearby watercourse.
- Pump water away from watercourses and allow to drain through vegetation where possible.
- Redirect excess water from the supply pump away from the sump.
- The following are circumstances where an above-ground sump system that recycles the water through a number of tanks should be adopted:
  - helicopter-supported drilling programs;
  - where an excavator is not required on programs utilising track-mounted rigs;
  - where no site preparation is required;
  - where an effective sump cannot be excavated due to difficult ground conditions;

Drill site preparation — note drainage on top side of the pad.

Drill site. Note oil absorbent matting under the rig.

Poor bunding (filling with water) and jury rigged fuel supply to pump.

Excellent fuel tank setup contained within the yellow drum which acts as the bund.

Roofed pump, fuel tank and bund.

Water spraying from pump and fuel tank with no bund — very poor practice.

Excellent example of remote area above ground sumps — note oil absorbent mat and sausage.

Remote area sumps that are working.

Flat remote area showing difficulty of draining drill water.

Creek contamination from drill water.

Dual excavated sump (above) and triple excavated sump (right).

- where the visual disturbance from earthworks is undesirable.

- To avoid the possibility of an unchecked spread of weed species, the practice of using straw bales should be avoided.
- In some cases, where it is not possible to establish a sump, drill hole return water must pass through an oil absorbent boom and then be pumped away from watercourses and allowed to filter through the vegetation. The position of the outlet must be moved on a regular basis to allow the undergrowth to absorb the water and to prevent cuttings from smothering any one area.

STORAGE OF FUELS

- All drums and other containers should be in a sound condition.
- Fuels and oil stored on site must be contained in a bund, away from any watercourses, that is fire proof and does not fill up with rainwater.
- A supply of oil absorbent material should be kept on hand to clean up any minor spills.

ACCIDENTAL SPILLS

- Spills of significant quantities of hydrocarbons (i.e. more than half a 200 litre drum) require notification to the Environment Protection Authority Pollution Control Officer (telephone 1800 005 171) and Mineral Resources Tasmania. Each large mine has a designated contact officer in liaison with the Environment Protection Authority, and notification may also be made using this network.
- Actions which may help clean up such spills include:
  - digging a trench (by hand) just below the spill and filling with oil-absorbent material, which must be replaced at frequent intervals.
  - construct a small dam in any affected watercourse; place a boom of oil absorbent material to trap the spill; replace the boom at regular intervals.

DRILLING ADDITIVES

- Drilling additives should be used sparingly and, where available, alternative biodegradable products should be used.
- Diesel must not be used as a down-hole lubricant.
- Used containers should be stored appropriately or taken off site.
- Material Safety Data Sheets on these products are available from the manufacturer and their recommendations on the safe handling and storage of these substances must be observed.

ABANDONMENT OF DRILL HOLES

- It is essential that all drill holes have secure collars that can be used to cap the holes or allow re-entry to extend the hole or seal holes that are making water.
- It is the explorer's responsibility to ensure that all flowing drill holes are permanently sealed to prevent surface discharge of groundwater. Publications by the Department of Primary Industries Victoria and the Western Australian Department of Mines and Petroleum (see *More Information* section) give detailed advice on the various procedures available to stop water flow. It is recommended that explorers consult with relevant MRT staff to discuss possible remedial action.
- All cored holes must be accurately surveyed and permanently marked.
- All holes, whether cored or otherwise, must be sealed so as to prevent collapse of the surrounding surface.
- Where any drill hole encounters natural or noxious gases, it must be plugged or sealed so as to prevent their escape.
- Where any drill hole encounters an artesian or sub-artesian flow the hole must be sealed discretely to prevent cross-contamination of aquifers.
- Most exploration holes in Tasmania are cored, and are usually left open after drilling for later access for geophysical logging. These holes must have temporary

Bunded hydrocarbon storage — but no tarp or roof cover.

caps. When a hole is no longer required, it must be backfilled or permanently capped.

- Holes with PVC collars must be cut off at least 400 mm below surface, sealed with a suitable conical plug, backfilled and mounded with a low permeability material and covered with topsoil. (Refer to the Western Australian Department of Mines and Petroleum document *Mineral Exploration/Rehabilitation Activities Guidelines* for detailed descriptions of techniques to seal PVC collared holes).
- Sample bags must be removed from the drill site on completion of the hole. If the sample is not toxic, acid forming or containing asbestos, it may be disposed of on site. Disposal options should first be discussed with MRT.
- A record must be kept of the abandonment procedure that documents the following:
  - Collar position in MGA94 Datum GDA94 co-ordinates;
  - Depth at which the hole is sealed;
  - Quantity and type of sealing materials;
  - Casing and/or collar details;
  - Photographs that illustrate the hole and site on abandonment.
- This record must be submitted as a report to Mineral Resources Tasmania on completion of the drilling program.
- No approvals for subsequent drilling programs will be considered until the report has been submitted.
- In situations where close-spaced drilling takes place a generalised illustrated report will be sufficient.

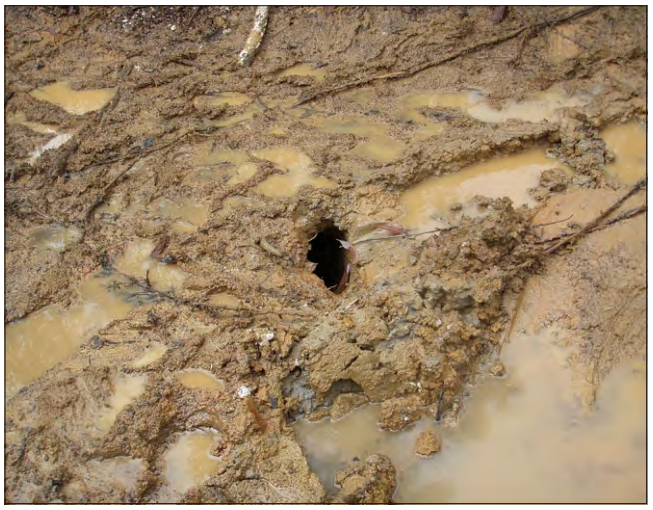
REHABILITATION

- If the ground has been compacted the drill pad should be ripped to loosen the soil.
- Stockpiled soil and vegetation should be spread over the site.
- If drainage works were put in around the perimeter of a drill site leave them intact. This will prevent erosion of the newly established vegetation.
- The site should be monitored periodically and further work carried out, if required, to ensure that the rehabilitation has been successful. Security deposits will only be returned when the site has successfully revegetated.

Refer to the chapter on *Rehabilitation and Revegetation* for timing, seeding rates and details on fertiliser types to be used in rehabilitation.

Open hole jammed with grease-soaked rags.

Open hole.



Open hole.

Open hole.

Steel collar — secure, sealed, but number will fade.

Steel collars — secure, sealed and permanent welded number.

Solid PVC collar and cap — no number.

(left) Solid PVC collar and cap.
Marked by treated pine pole, number will fade.

Broken PVC cap on steel collar.

Smashed unsealed PVC collar.

Drill hole making water.

Attempts to seal hole failed because of poor collar.

Three attempts to seal hole with eventual success at great cost. Note no solid secure collar.

Drill site rehabilitation adjacent to Jukes Road — July 2001

September 2001

November 2003

March 2004

February 2006

October 2010

Drill site rehabilitation at Lorinna — July 2007

October 2007

February 2008

July 2011

COSTEANS AND PITS

- Costeans (trenches) and pits should ideally be located to avoid large trees, but where this is not possible trees (greater than 150 mm diameter) should be pre-cut and moved to one side.
- Topsoil should be stored in a long, narrow pile, no more than 0.6 m high.
- Topsoil erodes easily and must be protected from needless loss by installing drainage if required.
- On a slope, a table drain uphill from the costean will be needed.
- Subsoil should be placed in a separate pile on the other side of the costean from the topsoil.
- With large costeans that will be left open for weeks or months, the topsoil should be stripped to make room for subsoil storage and the site must be made safe.
- With costeans that are left open escape ramps must be constructed to allow wildlife to enter and exit safely and the costean should be drained.
- Large costeans should be benched and made safe. There may not be room on one side for all the subsoil, in which case both soil and subsoil can be piled each side of the costean, but in separate piles.
- Fill in costeans as soon as possible after the program has finished. Replace subsoil and then spread out topsoil and vegetation.
- Refer to the chapter on *Rehabilitation and Revegetation* for timing, seeding rates and details on fertiliser types to be used in rehabilitation.

Costean at Stanley Reward showing topsoil to right and gravel to left.

Costean at Rushy Lagoon showing topsoil and gravel stockpiles.

REHABILITATION AND REVEGETATION

TIMING OF WORK

Earthworks should be done when the soil is dry enough to move. Under no circumstances should earthworks be attempted when the soil is wet and waterlogged.

Seeding and fertilising should be done after the replaced soil has been softened by rains. Autumn is the ideal time to seed and fertilise replaced soils.

Peat can be replaced at any time.

ESTABLISHING A VEGETATION COVER

Once topsoil has been respread a vegetation cover must be established. After 3 to 6 months stockpiled soil will have lost much of the regenerative material, and seeding may be needed.

Seeds must be collected from plant populations growing locally, to preserve the integrity of the local gene pool. Seeds, when hand sown, should be bulked with sand or sawdust for ease of sowing.

TEA TREE SLASH

The best, cheapest and easiest method of revegetation, which is appropriate for use in many parts of Tasmania, is tea tree slash. Branches of seed-bearing tea tree are selectively collected and laid over the newly spread topsoil. The seeds drop out of the tea tree, the leaves dry and fall off to form mulch, and the twigs act as sun, wind and grazing protection to the seedlings.

High leverage pruning shears have proven to be very effective in large rehabilitation projects as they allow selective choice of seed-rich branches and avoid the dangers of working with chainsaws in dense vegetation.

MULCHING

Mulching also aids revegetation on very exposed sites by providing protection from extremes of heat and cold and drying winds to the newly germinated seedlings. Mulches should be chosen carefully and must not contain any weed seeds.

Where erosion is a particular problem, such as on steep slopes, mulch can be held in place by using jute mesh held down with steel pins.

POTTED SEEDLINGS

Potted seedlings may be used where 'instant' growth is needed. Seedlings have to be bagged to prevent loss through grazing damage. Field trials have shown that sown seedlings overtake planted out seedlings after about two years. Potted seedlings are an expensive and relatively unsuccessful option in remote exploration areas.

Potted seedlings are very useful in areas where there may be fierce competition with opportunistic grasses, which prevent sown seedlings from making reasonable progress.

HYDROMULCHING

Hydromulching is most useful in covering large bare areas. This consists of spraying a mix of water, appropriate seeds, fertiliser and mulch, such as paper pulp mixed with indicator dye in a water and glue solution. The mix literally 'sticks' wherever sprayed, and the dye enables the sprayer to see what ground has been covered.

FERTILISERS

Field trials have shown that native plants respond well to small doses of fertilisers. There is field evidence that the Myrtaceae family do well with the addition of small amounts of fertiliser; the Proteaceae do not do so well, and may in fact be hindered. Insect damage has been noted in some trials to be more severe in fertilised plots, due to the increase in lush new growth which can sustain greater numbers of insects. Grazing damage can also be greater on fertilised plots than on similar, non-fertilised plots.

On the whole, the use of fertiliser, especially in small amounts, is preferred to non-use. Use a fertiliser such as the off-the-shelf 8:4:10 or 6:5:5 plus magnesium mix, at a rate of no more than 250 kg/ha. At a rate of 250 kg/ha, one kilogram of fertiliser will cover 40 m^2. One handful (approximately 100 g) will cover four square metres.

Spreading tea tree slash on drill access track.

Tea tree and eucalypt slash.

Track rehabilitation using stored topsoil and vegetation — July 2001.

Track rehabilitation — January 2003.

Track rehabilitation — February 2006.

Track rehabilitation — October 2010.

Balfour — Jute mesh site before spreading, 2002.

Balfour — Jute mesh site soon after spreading, 2004.

Balfour — Jute mesh site, 2005.

Balfour — Jute mesh site, October 2011.

HELICOPTERS AND HELIPADS

In most cases the most economical and environmentally responsible means of access in areas of inaccessible terrain is by helicopter.

The costs of helicopter services and the safety requirements, such as size of the helipad and the size and direction of the flight path corridor, will vary according to the type of aircraft used, the nature of the terrain, the weather and the loads which must be carried. The size of the helicopter landing pads will also vary according to the site and the work envisaged.

Explorers should ascertain from their helicopter contractors the exact requirements for each program.

Explorers must be aware of the principles of air access over and into CAR Reserves as outlined in the *Tasmanian Reserve Management Code of Practice*.

The approval process for helicopter access will examine the likelihood of disturbance to Wedge-tailed Eagles and White-bellied Sea Eagles and their nesting sites and a survey by ornithologists may be required to ensure that the *Threatened Species Protection Act 1995* is not transgressed.

AERIAL GEOPHYSICAL SURVEYS

In accordance with s.165 of the *Mineral Resources Development Act 1995* the Director's approval must be obtained to carry out an airborne geophysical survey. Explorers must seek this approval by submitting a work plan to Mineral Resources Tasmania (preferably by email to info@mrt.tas.gov.au) that clearly outlines the following:

- Geophysical method to be used;
- Type of helicopter or plane and contractor's contact details if known;
- Area to be covered;
- Line spacing and nominal flying height;
- Intended time of flying;
- Intended community and land manager notification.

Mineral Resources Tasmania will review the program and forward it onto the relevant land managers and the Mineral Exploration Working Group, if required, for comment. Issues that are likely to be covered in the approval may include:

- Protection of Wedge-tailed Eagles and White-bellied Sea Eagles;
- Community notification;
- Police and Emergency Service notification.

CAMPING

Large programs may be conducted from hutted camps, whilst smaller programs often involve tented camps for short periods. Camp sites must be removed and the area rehabilitated at the completion of a program or at the expiry of a tenement. Security deposits will need to be adjusted to reflect these potential liabilities.

FIRE PRECAUTIONS — ALL CAMPS

- Explorers are advised to be aware of their responsibilities and obligations under the Tasmanian *Fire Service Act 1979* and the Tasmanian *Fire Service Regulations 2007*.
- No open or enclosed fires are allowed for any exploration related activity in Tasmania. The reason for this is that the danger of escaped fires and the damage of wood collecting to the environment are potentially highly detrimental to the low impact nature of exploration and the continued access to prospective ground.
- Camps should have a fire response and readiness plan and all personnel should be informed and trained about fire hazard conditions and emergency response procedures.
- Generators must be well maintained. Leaves and debris should not be allowed to collect near the exhaust as this is a fire hazard.
- Where petrol-driven machinery or gas-fired cooking equipment is used provision must be made to enable the suppression of accidental fires. Fire fighting equipment is to be kept on hand.
- All hutted camps are to be fitted with serviceable fire extinguishers.
- Unless following prescriptions in an approved fire management plan, all machinery-based activities (including chainsaws) are to cease on declared Total Fire Ban days.

GENERAL GUIDELINES — ALL CAMPS

- All rubbish is to be removed from camp sites and disposed of at a recognised facility. It must not be burnt or buried.
- No littering to occur and food and food waste must be stored in a manner that does not attract local wildlife.
- Ensure washing (of people, dishes and clothes) is done at least 50 m from any watercourse or lake. Scatter soapy water into the ground, so some filtering is done before water percolates back to the nearest stream. Use biodegradable soaps and detergents.
- Pets must be left at home.
- Firearms are not to be used on any exploration licence by the explorers or contractors associated with the holder of the licence.

TENTED CAMPS

- Unless completely unavoidable, no vegetation should be cut to provide a camp site. Suitable camp sites can often be found without resorting to the cutting of standing vegetation. Use existing camp sites wherever possible.
- Camp at least 50 m away from watercourses of any size.
- Camps must be equipped with a chemical toilet. The contents of the latter must be removed for disposal at a recognised site.
- The construction of camp site 'furniture' using native vegetation is not acceptable.

HUTTED CAMPS

- Hutted camps must be equipped with a chemical toilet. The contents of the latter must be removed for disposal at a recognised site.
- The provision of cording or duck boarding around hut/s in boggy areas will be both more comfortable for camp users and environmentally responsible. Such materials should be ferried into the camp, not cut from local vegetation.

Hutted camp using converted rain water tanks as huts and a garden shed.

Garden sheds as individual bedrooms.

Chemical toilet.

Large capacity sewage storage.

PLANT DISEASES

Plant diseases and weed species can easily be transported by people and vehicles, and especially by heavy earth-moving machinery, if hygiene measures are not observed between jobs. Whilst mineral explorers are not the sole users of heavy machinery in isolated areas, or the sole users of many West Coast tracks, there remains an obligation on all users of all tracks to prevent the spread of weeds, and of pathological fungal diseases. One of the worst plant diseases in Tasmania is the fungus *Phytophthora cinnamomi*, and whilst this disease is incurable, strict hygiene measures will retard its spread.

PHYTOPHTHORA

Five species of *Phytophthora* (commonly known as 'water moulds') have been found in native vegetation in Tasmania (Rudman and Whinam, 1995).

Phytophthora cinnamomi (known as Cinnamon Fungus) is an introduced plant fungus which causes dieback and death in many of our native plant species. The fungus can be waterborne, and lives in soil. One of the prime methods by which this disease is spread is by the carriage of particles of soil from infected to uninfected zones.

The quantity of soil which must be moved to infect an area is small. The fungus is known to have been spread by the passage of walkers, while wombats and sulphur-crested cockatoos are also suspected vectors. The spread of this fungus by earth-moving machinery is common.

Studies (*Podger et al., 1990*) have shown that the fungus is already present over much of Tasmania, but it is unlikely to survive at altitudes above 700 mASL, where the mean annual temperature does not exceed 7.5°C, or the annual mean rainfall is less than 600 mm; i.e. the fungus will not live in cold, dry areas such as on parts of the Central Plateau.

Whilst strict hygiene measures must be observed in the *Phytophthora*-free zones, there are also good arguments for continuing some hygiene procedures in areas known to be already infected with the fungus. In an infected area, the species most susceptible to the fungus will brown off and die completely. Susceptible species include Blackboys (*Xanthorrhea australis*), Christmas Bells (*Blanfordia punicea*), Springelia (*Sprengelia incarnata*), white Waratah or whitey-wood (*Agastachys odorata*), Melaleuca (*Melaleuca squarrosa*), Pandani (*Richea pandanifolia*) and Mountain Berry (*Gaultheria hispida*). Most of the heath family (Epacridaceae), the pea family (Fabaceae), and the Proteaceae (Banksias, Hakeas and the like) are all very susceptible, while rainforest tree species and many eucalypts are also not immune from this disease.

Special care should be taken in coastal heathlands, buttongrass, sedgeland plains, and in dry eucalypt forest areas.

After an area becomes infected the more susceptible plants die, and these are replaced by other, more hardy types. Thus the core area of an infected zone may well seem to be of healthy vegetation but a number of key species will be missing. Out from this now-revegetated core will be a zone where the susceptible species will be dead and dying, then beyond this, healthy plants in the uninfected zone. Always clean boots and tools, and wash machinery and vehicles when moving from an infected to an uninfected area. Plan routes to avoid entering infected regions then passing into uninfected country. Visit infected areas last.

Explorers will be required to observe hygiene regulations before undertaking certain activities in areas known to be *Phytophthora*-free. Mineral Resources Tasmania, in consultation with other government agencies, will advise what precautions are required.

Detailed information on the disease, its spread, management and washdown procedures can be found at the Department of Primary Industries, Parks, Water and Environment website (see *More Information* section).

MYRTLE WILT

Myrtle wilt is a natural fungal disease which kills myrtles, especially where the tree has been damaged or disturbed. It is recommended that disturbance to myrtle roots and damage to limbs and trunks be minimised to stop the spread of myrtle wilt.

Phytophthora cinnamomi wash down station in the field.

WEEDS

- Weeds are opportunistic and can quickly cover a barren area from where they will spread into the surrounding native vegetation. For this reason steps should be taken to prevent weed seed being spread by people and machinery.
- Tasmanian weeds are classed into three categories:
  - Noxious;
  - Secondary;
  - Prohibited.
- All noxious and some secondary weeds are classed as 'prohibited'. This means that these plants may not be propagated, sold or transported within Tasmania.
- The Department of Primary Industries, Parks, Water and Environment has further information on how to recognise the listed weed species and control measures.

PREVENTION OF SPREAD

- Earthmoving machinery must be washed down to remove all soil, seeds and vegetation when moving from one location to another.
- Vehicles and boots must be cleaned between different localities.
- Any weeds found growing in newly revegetated zones or during track construction should be removed by digging, or poisoning with an appropriate herbicide.
- Seed pods, if present, should be removed from the area.
- Some exotic species which are not classified as a noxious weed are nevertheless environmentally undesirable plants. Always check that species to be used in revegetation projects are of local provenance and acceptable before planting.

FROG DISEASE — CHYTRID FUNGUS

WHAT IS CHYTRID FUNGUS?

Chytrid (pronounced kit-rid) fungus (*Batrachochytrium dendrobatidis*) causes the disease known as chytridiomycosis or chytrid infection which currently threatens Tasmania's native amphibians. The fungus infects the skin of frogs, destroying its structure and function, and can ultimately cause death. Sporadic deaths occur in some frog populations with 100 per cent mortality occurring in other populations.

Chytrid infection has been devastating to frog species, causing extinctions worldwide. The international trade of frogs probably brought the fungus to Australia from Africa. The disease has now been recorded in four regions in Australia — the east coast, southwest Western Australia, Adelaide, and more recently Tasmania. In mainland Australia chytrid has caused the extinction of one frog species and has been associated with the extinction of three other species. In addition, the threatened species status of others frogs has worsened through severe declines in numbers.

HOW IS IT SPREAD?

The movement of infected frogs, tadpoles and water are the known key agents of spread. The fungus (or infected frogs or tadpoles) can be spread by people in water and mud on boots, camping equipment and vehicle tyres, and in water used for drinking, or spraying on gravel roads or fighting fires.

WHERE IS CHYTRID IN TASMANIA?

In Tasmania, chytrid infection has spread widely in habitats associated with human disturbance and will continue to spread unless we act quickly. Once established, it is extremely difficult to eradicate chytrid fungus from the natural environment. Remote areas in Tasmania, particularly the Tasmanian Wilderness World Heritage Area, are still largely free of the disease and it is our challenge to keep it out.

WHAT YOU CAN DO TO STOP THE SPREAD OF CHYTRID

- Keep your gear clean — clean boots and camping equipment of soil and allow to dry completely before visiting remote areas.
- Plan to wash and dry vehicles (including tyres) and equipment before entering dirt roads within areas that are reserved or largely free of human disturbance.
- Think about water disposal — when disposing of small or large volumes of water within a natural environment ensure you are as far as possible from creeks, rivers, ponds and lakes. A dry stony disposal site is far preferable to a moist muddy one.
- Avoid transferring aquatic plants, water, soils and animals between frog habitats (for example, nursery plants, wetland fill and fish).
- Hygiene protocols for biologists and field workers visiting freshwater environments are outlined at the James Cook University web site on amphibian diseases.
- Education in relation to disease management is critical if we are to stop the spread of this important disease.

More information is available from Wildlife Enquiries at the Department of Primary Industries, Parks, Water and Environment in Hobart (telehone 03 6233 6556 or email wildlife.enq@dpipwe.tas.gov.au), or from the DPIPWE website.

PRIVATE PROPERTY

Explorers may enter upon private property to explore in most parts of Tasmania. A balance must be maintained between the interests of the landholders, who have surface rights, and the explorer who has rights to explore for minerals, which are usually the property of the Crown. The question of ownership of minerals can be complex in Tasmania and is addressed in the *Land Available for Exploration — Private Property* section of this Code.

A pamphlet entitled *Land Owner's Questions* is available from Mineral Resources Tasmania and this clearly outlines the rights of the landowner and responsibilities of the explorer. Distribution of these pamphlets to landowners, and a discussion of the proposed activities with them, is recommended.

Harmonious working relationships with landowners can be achieved by adherence to these principles:

- Select a field supervisor who has, if possible, some knowledge of farming and grazing practice.
- The field supervisor must be familiar with all aspects of the field program.
- The field supervisor should make direct contact with the landholder well in advance of entering the property, and discuss the exploration program and how any procedures may affect the land, stock or infrastructure.
- Give the landowner the names of the senior field staff, and leave a telephone number where the field supervisor can be contacted should any problems arise.
- Leave a location map showing the position of any proposed grids or drill holes with the landowner.
- Discuss with the landowner and be advised of any particular areas which require special care — such as buried water pipes, contour banks, windbreaks, erosion-prone land and the position of gates and fences.
- Make all contractors and subcontractors aware of company policy in the field and ensure that this is adhered to. Do not leave liaison with the landholder solely to the contractor. The holder of the exploration licence must bear the responsibility for establishing good working relationships with the landowner.
- Ensure that the operation of heavy machinery is supervised at all times and ensure that the contractor understands what is required.
- Where practicable the explorer should contact the landholder before each phase of the program. Keep the landowner informed of progress and discuss any changes to the program.
- Let the landowner know when machinery will be entering the property.
- No fishing, hunting or carrying of firearms without the express permission of the landowner.
- When ground is wet, limit or curtail entirely machine movements which would damage tracks and paddocks. If machinery must be moved, and damage occurs, then repair the damage as soon as possible, and to the satisfaction of the landowner.
- Keep the number of vehicles on a property to a minimum, and where possible keep to the same track.
- Use existing gates wherever possible.
- Leave gates as you found them. Do not shut an open gate, and do not leave open a gate which was shut.
- Ensure any tracks put in for exploration are properly made and drained, and will not degenerate into an erosion hazard.
- Prevent the spread of noxious weeds by frequently hosing down heavy machinery and vehicles.
- Enquiries should be made at the local Department of Primary Industries, Parks, Water and Environment office concerning stock health campaigns.
- As little timber should be cleared as possible. Try and remain flexible on the precise positioning of drill holes and grid lines, and be prepared to move (if possible) the proposed location.
- If timber is cleared be sure to do so in a manner acceptable to the landowner.
- Rehabilitation requirements should be discussed with the landowner on completion of the exploration work.
- When the project is finished invite the landowner to inspect the work area so any problems can be discussed and rectified promptly.
- Remove all rubbish from drill sites — including piles of cuttings if holes are chip drilled — unless you have agreed with the farmer that these can be left and spread over the drill site on completion of work. Make sure drill holes are either filled in completely, or capped and made safe for stock.