EROSION CONTROL AND DRILLING FLUID GUIDELINES
EL SHERANA EXPLORATION PROGRAMME
PHASE 1

April 1989
1.0 INTRODUCTION

El Sherana is located in the South Alligator Valley approximately 110km by road east of Pine Creek in the Northern Territory. The Coronation Hill Joint Venture (CHJV) considers that its leases at El Sherana (and the South Alligator Conservation Zone generally) are highly prospective for gold, silver, platinum and/or palladium mineralisation, based on gold assays from almost 3,000 drill holes drilled over the period 1954 - 1964.

The objective of the CHJV El Sherana Exploration Programme is to continue investigations of the mineralisation already indicated on the El Sherana leases, and to explore the remainder of the lease area for similar mineralisation with a view to confirming economic mineral deposits.

The first phase in the exploration programme involves drilling five holes to check on gold values reported from previous drill core and to determine the extent of platinum and palladium mineralisation.

A Public Environment Report (PER) has been prepared in accordance with the requirements of the Minister for the Arts, Sport, the Environment, Tourism and Territories. Based on the PER, CHJV have been given permission to proceed with further exploration.

This report, which is based on inspection of the El Sherana area on 17 January 1989, sets out guidelines for erosion control during Phase I of the exploration programme and describes CHJV proposed management of drilling fluids on site.

2.0 PROPOSED WORKS

During Phase I of the exploration programme it is proposed that five diamond drill holes of 75mm diameter would be drilled between the El Sherana and El Sherana West open cuts (Figure 1). The depth of drilling for these five drill holes would vary from 75m to approximately 175m and they would be sited to confirm high gold values noted in old records.

Figure 1 shows the location of the proposed drill holes all of which are located immediately adjacent to existing tracks and benches. Only minor
earthworks will be required for temporary drilling platform and sumps. No new
tracks are proposed.

It is proposed to carry out this drilling programme during the dry season when
there is only a remote chance of rainfall from isolated thunderstorms. There
is, therefore, unlikely to be any erosion during the drilling programme.
Measures will, however, have to be taken to ensure that erosion is controlled
during the subsequent wet season after the drilling has been completed.
Erosion from the exploration area will be minimised by means of erosion
control works and appropriate management of the vehicles and equipment used
in the exploration.

3.0 EROSION REGIME AT EL SHERANA

El Sherana is subject to a monsoonal tropical climate in which the majority
of rainfall occurs during a wet season lasting from November to April. During
this period high intensity short duration storms occur frequently and rainfall
intensities of 100mm/hr for half an hour can be expected annually. The
average annual rainfall erosivity has been estimated to be 500 t.m/ha/cm x
km/hr (which compares with 100-200 t.m/ha/cm x km/hr in most of the wheat
lands of Southern Australia).

The absence of any significant rainfall during the dry season leads to
desiccation of the vegetation and extremely sparse ground cover at the end of
the dry season. The first intense rainfall of the wet season, therefore, has
the opportunity to cause significant erosion.

The soils of the exploration area on El Sherana comprise stony upland soils.
Generally, the soil depths are very shallow (<0.3m). The profile contains
more than 70% stones and gravel and the remainder has a silty loam texture.
The soils are highly erodible because of the absence of any cohesive material.
Rainfall runoff is high due to the steep slopes, and the large soil particle
size indicates that these soils are well drained. These soils are generally
protected from erosion by surface boulders, stones and gravel. However, if
the surface is disturbed, the soil is susceptible to erosion and will
generally erode until a new cover is developed. Previous exploration
activities have caused extensive disturbance in the past but colonisation of the area by natural vegetation has stabilised the hillside.

The exploration area is located on a northwesterly facing hillslope which has slopes which are typically 50% or steeper. The landscape has the potential for high rates of erosion because of the combined effects of:

- high rainfall intensities
- relatively sparse vegetation cover
- naturally erodible soils which are more susceptible to erosion after disturbance
- steep slopes.

4.0 EROSION CONTROL WORKS

The erosion control works proposed for the drilling programme at El Sherana have the primary objective of controlling the sediment transported off the lease area. Because of the limited extent of the disturbance which will be caused in this instance, the overall objective can be best achieved by controlling erosion at each site where disturbance will occur.

The drilling programme proposed for Phase I of the Exploration Programme at El Sherana will take place during the dry season. For the months of May to August the estimated average monthly rainfall is only 4mm (CHJv 1988). This rainfall occurs as thunderstorms which occur very irregularly. In most years the monthly dry season rainfall is zero. There is, therefore, only a remote chance that rainfall will occur during this drilling programme. Any such thunderstorm during the dry season would generate minimal runoff because the dry soil conditions would lead to a high initial loss.

The main threat of erosion from the drilling areas will occur early in the following wet season before any vegetation has colonised the disturbed areas.

In order to accommodate the erosion control requirements for both dry and wet season it is proposed that the earthworks involved in the drilling programme should concentrate on the following features:
minimise the area disturbed
install runoff control works which will minimise erosion from wet season rainfall.

4.1 DRILL PADS

The main features of an idealised arrangement for a drill pad are shown in Figure 2. The important feature of this arrangement are:

1. A diversion bank or ditch should be constructed to protect the exposed area of drill pad from runon from upslope.

2. The area disturbed should be kept to the minimum required for safe working.

3. Where there is a choice the location of the drill pad should be on the crest of a ridge where runoff will tend to be shed away from the pad and where the upslope area draining onto the pad is minimised.

4. The pad should be constructed with a slight outward slope leading into a diversion bank. Runoff should be prevented from discharging down the access track.

5. Each diversion bank should lead out a short distance on the contour onto undisturbed areas.

6. Discharge from each diversion bank should be by means of a level still controlled by a timber sill crest set exactly level to distribute the runoff over a width of slope of 3 - 5m.

7. The discharge areas for the two diversion drains should be arranged so that discharge from each remains separate.

8. Construction of the drill pads should commence with the stockpiling of any available topsoil at one side of the area of the drill pad.
9. After drilling has been completed the immediate areas of the pad should be returned as far as possible to the original landform without disturbing the two diversion channels which should be left in place. The stockpiled topsoil should be spread uniformly over the disturbed area and seeded with local vegetation species.

4.2 ACCESS TRACKS

No new access tracks are proposed for Phase I of the Exploration Programme. Some routine maintenance works will, however, be required. Where earthworks are required these will be carried out in accordance with the following principles.

1. Cross drains (illustrated in Figure 3a) should be provided at approximately 20m spacing on slopes up to 50%. Care should be exercised to ensure that runoff diverted from the road is spread uniformly across the ground at the discharge point.

2. Turnout drains at the side of the track (illustrated in Figure 3b) should be provided at about 20m spacing where cross drainage is not provided. Spreading of the water at the outlet point is required to ensure that concentrated flow does not initiate gullying.

4.3 MANAGEMENT AND MAINTENANCE

An important aspect of any erosion control programme in an environment such as that at El Sherana is to ensure that erosion control works are maintained adequately until natural vegetation has re-established to provide erosion control. The high intensity rainfall, steep slopes and erodible soils will lead to erosion occurring on any disturbed area. A programme of routine inspection and repair will be necessary for the first wet season after drilling has occurred.
5.0 MANAGEMENT OF DRILLING FLUID

The environmental conditions attached to the El Sherana Exploration Authority require under Section 5, that:

- Bunded fluids will be recycled back to the drill rig and eventually collected at the completion of drilling activities for disposal in an appropriate manner outside the Conservation Zone.

The following procedure will be used for management of drilling fluids on site.

At the cessation of drilling, drilling fluids consist mainly of water with miscible mineral oil, and emulsifying agents with drill cuttings in suspension. On the completion of each hole, sump contents will be allowed to settle and/or flocculated to remove solid material from suspension and physically separate emulsified oil from water. Fluids remaining in the sumps will either be:

- recycled to the next hole or
- allowed to settle and the drilling oils collected for disposal outside the Conservation Zone.

Where water/drilling fluids are of suitable quality, they will be collected and transferred to the next drill site to be re-used in subsequent drilling. All due care will be taken during collection to prevent spillage.

Material to be disposed of will be collected in 250 litre drums, stored at El Sherana and ultimately transported out of the Conservation Zone.

In addition to the earthworks proposed under erosion control, sumps to hold and handle the drilling fluid will be dug on the drill pad, in line with the procedure developed at Coronation Hill. At the completion of drilling, sumps along with settled cuttings will be backfilled.
FIGURE 2a: PREFERRED LOCATION OF DRILL PAD FOR EROSION CONTROL

FIGURE 2b: GENERAL ARRANGEMENT OF DRILL PAD FOR EROSION CONTROL

FIGURE 2c: SCHEMATIC CROSS SECTION THROUGH DRILL PAD

FIGURE 2d: DETAIL OF LEVEL SILL OUTLET
SPACING OF DRAINS IS CRITICAL. EXCESSIVE VELOCITIES AND QUANTITIES OF WATER IN SIDE DRAINS AND AT DISPOSAL POINTS TO BE AVOIDED.

EARTH WINDROW

WATER SPREAD OVER VEGETATED AREA

DIVERSION BANK AND LEVEL SPREADER

CROSS DRAIN

BLOCK IN TABLE DRAIN

TURNOUT DRAIN TO BE LEVEL AT OUTLET ONTO NATURAL SURFACE

TURNOUT DRAIN

CORONATION HILL JOINT VENTURE
EL SHERANA EXPLORATION
PHASE 1. EROSION CONTROL GUIDELINES

EROSION CONTROL OPTIONS FOR ACCESS TRACKS

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FIGURE 3