Project no: PS5720.03 17 June, 2005
Our ref: PS5720.03-AF wsfnoi Rev 0

PROJECT: **TRILOGY WATER STORAGE FACILITY**

CLIENT: **TECTONIC RESOURCES NL**

LOCATION: **NEAR RAVENSTHORPE**

SUBJECT: **NOTICE OF INTENT – SUMMARY**

Tectonic Resources NL proposes to construct a water storage facility/evaporation pond, the Trilogy Water Storage Facility (TWSF), as part of mining operations at the Trilogy deposit.

Nickel Ore is currently mined from the RAV 8 Pit and associated underground workings. Underground mining is expected to cease in late 2004. It is planned to develop and mine new gold and polymetallic ore deposits, at Kundip and Trilogy, 16 and 27 kms southeast of Ravensthorpe, respectively. The extraction of these ores will necessitate the construction of a new processing plant and as a by product the production of a tailings slurry that will require containment and storage. Separate Notice of Intent documents present details of the overall project and tailings storage facility.

Dewatering operations will be required in order to allow mining to proceed at Trilogy. Water from the dewatering operations will be pumped to a purpose built clay lined facility and the water disposed of by evaporation. Hydrogeology studies indicate a likely dewatering rate of 250m^3/day to 37m below ground level and a likely dewatering rate of 2,500m^3/day to lower the groundwater to 100m below ground level. At this stage mining will stop at a depth of 45m below ground level.

The design concept incorporates perimeter embankments constructed with sandy clay sourced from the surface of the Trilogy Pit or within the facility and a compacted clay liner on the 'floor' of the facility. Stage 1 of the facility will cover a maximum area of 10ha and the perimeter embankments will have a maximum height of 4m. The TWSF will be constructed in stages with cells added to cater for the expected increase in dewatering flows. If the entire resource at Trilogy is mined the TWSF could have an ultimate area of approximately 80ha.

The facility has been assigned a hazard rating of Low, Category 3, based on classification criteria outlined in Table 1 and Figure 1 of the Department of Industry and Resources (DoIR), (formerly the DME) (1999) document titled '*Guidelines on the Safe Design and Operating Standards for Tailings Storage'*.

A geotechnical investigation of the site indicates that it is suitable for construction of a water storage/evaporation pond. Sandy clay materials suitable for use in embankments and 'floor' liners are locally available.

Tectonic Resources NL make the following commitments in respect to the TWSF:

(i) The facility will be constructed in accordance with the drawings and specifications developed for this project. The construction will be monitored by a geotechnical specialist. Following completion of construction, a report will be compiled detailing the construction and the report will be submitted to the DoIR.

(ii) An adequate 'operational' freeboard of 0.7m will be maintained to store the design storm event, average recurrence interval (ARI) of a 1 in 100 year 72 hour duration, during the operation of the TWSF. This operational freeboard includes an allowance for wave action.

(iii) Monitoring bores adjacent to the facility will be utilised to monitor water levels and water quality. Base line water levels and samples will be taken prior to 'start up'. Routine water samples will be taken every three (3) months from monitoring bores for the facility to check water quality, with water levels in the monitoring bores read on a monthly basis.

(iv) Rehabilitation/decommissioning plans will be produced by Tectonic Resources NL and submitted to the DoIR near the end of the life of the facility.

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LOCATION: **NEAR RAVENSTHORPE**

SUBJECT: **NOTICE OF INTENT**

1.0 INTRODUCTION

This document presents the details required, by the Department of Industry and Resources, (DoIR) Western Australia, for a Notice of Intent (NOI) for the construction of a water storage facility/evaporation pond, the Trilogy Water Storage Facility (TWSF), as part of mining operations at the Trilogy deposit.

Nickel Ore is currently mined from the RAV 8 Pit and associated underground workings. Underground mining is expected to cease in late 2004. It is planned to develop and mine new gold and polymetallic ore deposits, at Kundip and Trilogy, 16 and 27 kms southeast of Ravensthorpe, respectively. The extraction of these ores will necessitate the construction of a new processing plant and as a by product the production of a tailings slurry that will require containment and storage. Separate Notice of Intent documents present details of the overall project and tailings storage facility.

Dewatering operations will be required in order to allow mining to proceed at Trilogy. Water from the dewatering operations will be pumped to a purpose built clay lined facility and the water disposed of by evaporation. Hydrogeology studies indicate a likely dewatering rate of 250m^3/day to 37m below ground level and a likely dewatering rate of 2,500m^3/day to lower the groundwater to 100m below ground level. At this stage mining will stop at a depth of 45m below ground level.

Details contained in this report were compiled in accordance with the requirements of the DoIR documents ,*'Guidelines on the Safe Design and Operating Standards for Tailings Storage'*, dated May 1999 and *'Guidelines to help you get Environmental Approval for Mining Projects in Western Australia'*, dated March 1998, as appropriate.

The facility has been assigned a hazard rating of Low, Category 3, based on the classification criteria outlined in Table 1 and Figure 1, of the above guidelines.

A storage data sheet and explanatory notes are attached as Plates 1 and 2. A Tenement Location Plan is attached as Plate 3.

1.1 Location

The TWSF will be located approximately 650m south west of the pit at Trilogy. The pit is located solely on Mining Lease M74/176. For the purposes of setting bonds the TWSF will have a surface area of 10ha (Stage 1) and an approximate ultimate surface area of 80ha.

The approximate centre of the Stage 1 TWSF is on GDA94 coordinates 6,261,000m north and 241,130m east.

1.2 Ownership

The Trilogy and Kundip Leases are 100% owned by the publicly listed company Tectonic Resources NL.

1.3 Existing Facilities

There are no existing structures at Trilogy. The present land use at the site is grazing/farmland.

2.0 SITE SELECTION

2.1 Background

The site selected was a gently sloping area close to the Trilogy Pit. A geotechnical investigation of the area was undertaken in order to confirm site suitability. This investigation revealed the surfacial soils at the site were sandy clay which are suitable for lining of the floor of the facility and construction of the perimeter embankments. The Geotechnical Investigation Report for the TWSF is presented in Attachment 1.

2.2 Climate

The following climatic data has been used in the design:

(i) Average annual rainfall is approximately 425 mm,
'Wettest' recorded annual rainfall is 734.5 mm (Ravensthorpe 1951).

(ii) According to Technical Report No.65, 2nd Edition March 1988 by the Department of Agriculture average annual evaporation in the Ravensthorpe area is estimated at 1,987 mm/year and net evaporation from dams in the same area is 1,644 mm/year.

(iii) Rainfall intensity estimation for Ravensthorpe for a 1 in 100 year ARI 72 hour storm event (180mm).

2.3 Landform and Soils

The natural terrain in the Trilogy Pit is relatively flat. The ground in the TWSF area slopes to the south at a grade of 1 in 100.

The subsoil conditions at the TWSF site generally comprise medium to high plasticity sandy clay.

2.4 Geology

The Trilogy deposit is located in an area of phyllitic schist and carbonaceous shale with minor quartzite. The mineralisation occurs within a silicified shale and minor sandstone that dips to the south east at approximately 40^{o}.

2.5 Hydrogeology

The siliceous mineralised zone forms the main aquifer. The permeability is associated with joints and fractures, which occur locally in the hanging wall and less commonly in the footwall.

Groundwater levels are about 34m below ground level. The groundwater salinity is approximately 18,000mg/L. The pH ranges from 8 to 3 in the mineralised zone. Due to the acidity and mineralised nature of the aquifer the groundwater has elevated levels of some metals (notably Fe 96mg/L, Zn 160mg/L and Pb 7.7 mg/L).

2.6 Hydrological Characteristics

2.6.1 Surface Water

Bunds will be constructed along the high side of the TWSF cells such that sheet runoff from upslope of the facility is diverted around the facility.

2.6.2 Design Floods

The TWSF will be formed by perimeter embankments on all four sides and thus any watershed into the storage area will be by incident rainfall only.

The storage will be operated such that an adequate 'operational' free board of 0.7m is provided to contain the design rainfall event of a 1 in 100 year ARI 72 hour storm event (2.5 mm/hour, 180mm), with allowance for wave action.

2.6.3 Hydraulic Analyses

The TWSF has been sized based on water balance assessments for both average and wettest record rainfall figures for Ravensthorpe. The water balance assessments adopted a net annual evaporation of 1,644 mm/year.

The facility has been sized such that during an average rainfall year there will be no net gain of water. During a 'wet' year there will be some water accumulation within the facility and therefore adequate storage capacity has been provided in order to provide for the expected water accumulation plus allowance for freeboard.

The printouts of the water balance analyses are presented in Attachment 2.

3.0 WATER STORAGE FACILITY STRUCTURE

Two construction options are presented with this Notice of Intent, namely:

(i) Option 1: The TWSF embankments constructed from sandy clay mine waste from the surface of the Trilogy Pit. This option has a single cell and the floor of the TWSF cell is formed by the natural ground surface which has a fall to the south of 1 in 100. In this option the area for evaporation will vary as the water level in the TWSF varies, given the natural fall of the ground surface.

(ii) Option 2: The TWSF embankments constructed from sandy clay material borrowed from within the facility. This option has 2 cells with a 'flat floor' in each cell and hence a constant area for evaporation.

Both options will incorporate a compacted clay liner on the 'floor' of the facility. The TWSF will be constructed in stages with cells added to cater for the expected increase in dewatering flows.

3.1 Drawings

The following drawings are provided in Attachment 3.

Trilogy Water Storage Facility-Option 1 General Arrangement and Section	Drawing No. 5720/03/02 Rev F
Trilogy Water Storage Facility-Option 2 General Arrangement and Sections	Drawing No. 5720/03/03 Rev D

3.2 Construction Method

A technical specification/scope of works document for construction of the embankment earthworks and compacted clay liner on the floor of the facility is presented in Attachment 4.

3.3 Area

The Stage 1 area, footprint, will be 10ha irrespective of the construction options selected.

3.4 Depth

The embankment height of the Stage 1, Option 1 embankment is 4m. The embankment height of the Stage 1, Option 2 embankment is 2.5m.

3.5 Capacity

The Stage 1, Option 1 has a storage capacity of 180,000m^3 and Stage 1, Option 2 has a capacity of approximately 90,000m^3, with due allowance for freeboard.

3.6 Wall Angles

The batter slopes adopted in the design are 1:2 (vertical:horizontal) upstream and 1:2.75 (vertical:horizontal) downstream. The slope geometry has been checked by conducting stability analyses of the embankment design concept (refer to Attachment 1).

3.7 Liners

A clay liner with a target permeability of 10^{-9} m/s will be constructed on the floor of the facility.

4.0 GEOTECHNICAL INVESTIGATIONS

The geotechnical investigation for the project involved a site reconnaissance, excavation of testpits and laboratory testwork. The geotechnical investigation report is presented as Attachment 1.

5.0 INSTRUMENTATION

4 new monitoring bores will be established around the facility and located by the Project Hydrogeologist in order to target geological structures/shears. Water samples will be taken every three (3) months from the monitoring bores located around the facility to check water quality. Water levels however will be read on a monthly basis.

6.0 REHABILITATION

The TWSF is a temporary facility. At rehabilitation/decommissioning the evaporites within the facility will be removed to the completed pit. The embankments will be removed at the end of operations (to the pit) or the facility used as water storage in association with another post operation land use.

Rehabilitation/decommissioning plans will be produced by Tectonic Resources NL and submitted to the DoIR near the end of the life of the facility.

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LIST OF PLATES AND APPENDICES (behind text)

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Project no: PS5720.03 17 June, 2005
Our ref: PS5720.03-AF wsfnoi Rev 0

Tectonic Resources N.L.
Suite 4, 100 Hay Street
SUBIACO WA 6902

Attention: Ms Kim Bennett

Dear Kim

RE: **TRILOGY WATER STORAGE FACILITY**
NOTICE OF INTENT DOCUMENTATION

Please find attached three (3) bound copies and six (6) unbound copies of the Notice of Intent (NOI) for the above project. It is understood that you will submit copies of the NOI documents to the various government departments for approval:

Please note that unbound copies of the Executive Summary only, have also been provided to you, for your distribution to the Local Shire and Local Pastoralist.

We trust this information meets your immediate requirements. Should you require clarification of any information, please do not hesitate to contact Soil and Rock Engineering for technical details of the design.

Yours faithfully
for and on behalf of SOIL & ROCK ENGINEERING

Christopher Lane
REGIONAL MANAGER

Distribution: Tectonic Resources NL - 9 Copies.

STORAGE DATA SHEET TRILOGY WSF			
Please answer all questions, with separate sheets for cells of different ages.	Job No.: PS5720.03 Ref No.: PS5720.03-AF WSFnoi Rev 0		
1. PROJECT DATA			
1.1 Project Name: Phillips River Project		1.2 Date: March 2005	
1.3 TSF name: TWSF	1.4 Commodity: Gold		
1.5 Name of data provider:* Kim Bennett		Phone:* 9388 3872	
1.6 TSF centre co-ordinates (GDA94): 6,261,000m North 241,130m East			
1.7 Lease numbers: M74/176			
2. TSF DATA			
2.1 TSF Status: Proposed ☒			
2.2 Type of TSF:[1] Paddock	2.2.1 Number of cells:[2] 1, Stage 1		
2.3 Hazard rating:[3] Low	2.4 TSF category:[4] 3		
2.5 Catchment area:[5] 8.6ha, Stage 1	2.6 Nearest watercourse: N/A		
2.7 Date deposition started (mm/yy): N/A	2.7.1 Date deposition completed (mm/yy): N/A		
2.8 Tailings discharge method:[6] NA	2.8.1 Water recovery method:[7] NA		
2.9 Bottom of facility sealed or lined? Yes	2.9.1 Type of seal or liner:[8] Compacted Clay		
2.10 Depth to original groundwater level: 34m	2.10.1 Original groundwater TDS: 18,000Mg/L		
2.11 Ore process:[9] NA	2.12 Material storage rate:[10] 250-2,500m^3/day		
2.13 Impoundment volume (present): 0 x $10^6 m^3$	2.13.1 Expected maximum: 180,000m^3		
2.14 Mass of solids stored (present): 0 x 10^6 t	2.14.1 Expected maximum: N/A		
3. ABOVE GROUND FACILITIES			
3.1 Foundation soils: Sandy clay	3.1.1 Foundation rocks: schists and shales		
3.2 Starter bund construction materials:[11] Sandy clay	3.2.1 Wall lifting by:[12] N/A		
3.3 Wall construction by: mechanically ☐ hydraulically ☐	3.3.1 Wall lifting material:[13] N/A.		
3.4 Present maximum wall height agl:[14] N/Am	3.4.1 Expected maximum: 4m		
3.5 Crest length (present): N/A	3.5.1 Expected maximum: 1,100m		
3.6 Impoundment area (present): N/Aha	3.6.1 Expected maximum: 8.6ha, Stage 1		
4. BELOW GROUND / IN-PIT FACILITIES			
4.1 Initial pit depth (maximum): m	4.2 Area of pit base: ha		
4.3 Thickness of tailings (present): m	4.3.4 Expected maximum: m		
4.4 Current surface area of tailings: ha	4.5 Final surface area of tailings: ha		
5 PROPERTIES OF WATER			
5.1 TDS: 18,000mg/L	5.2 pH:3-8	5.3 Solids content: N/A	5.4 Deposited density: N/A
5.5 Potentially hazardous substances:[15]		5.6 WAD CN: N/A	5.7Total CN: N/A
		5.8 Any other NPI listed substances in the TSF?:[16].. Not reportable	

Not to be recorded in the database; for 1, 2, 3 etc see explanatory notes on the next page.

EXPLANATORY NOTES FOR COMPLETING STORAGE DATA SHEET

The following notes are provided to assist the proponent to complete the tailings storage data sheet.

1. Paddock (ring-dyke), cross-valley, side-hill, in-pit, depression, waste fill etc.
2. Number of cells operated using the same decant arrangement.
3. See Table 1 in the Guidelines.
4. See Figure 1 in the Guidelines
5. Internal for paddock (ring-dyke) type, internal plus external catchment for other facilities.
6. End of pipe (fixed), end of pipe (movable), single spigot, multi-spigots, cyclone, CTD (Central Thickened Discharge) etc.
7. Gravity feed decant, pumped decant, floating pump etc.
8. Clay, synthetic etc.
9. See list below for ore process method.
10. Tonnes of solids per year
11. Record only the main material(s) used for construction eg: clay, sand, silt, gravel, laterite, fresh rock, weathered rock, tailings, clayey sand, clayey gravel, sandy clay, silty clay, gravelly clay, etc or any combination of these materials.
12. Wall lifting method during the reporting period, if raised.
13. If the wall has been raised during the reporting period, the wall lifting material used. Is it tailings or any other (or combination of) material(s) listed under item 11 above.
14. Maximum wall height above the ground level (not AHD or RL).
15. Arsenic, Asbestos, Caustic soda, Copper sulphide, Cyanide, Iron sulphide, Lead, Mercury, Nickel sulphide, Sulphuric acid, Xanthates etc.
16. NPI – National Pollution Inventory. Contact Dept of Environmental Protection for information on NPI listed substances.

ORE PROCESS METHODS

The ore process methods may be recorded as follows:

Atmospheric Acid Leaching	Atmospheric Alkali Leaching
Bayer process	Becher process
BIOX	CIL/CIP
Crushing and screening	Flotation
Gravity separation	Heap Leaching
Magnetic separation	Ore sorters
Pressure Acid leaching	Pressure Alkali leaching
Pyromet	SX/EW (Solvent Extraction/Electro Wining)
Vat leaching	Washing and screening

TRILOGY
WATER STORAGE FACILITY
NOTICE OF INTENT
PHILLIPS RIVER PROJECT

Report prepared for:

TECTONIC RESOURCES NL
SUITE 4
100 HAY STREET
SUBIACO WA 6902

Report prepared by:

SOIL & ROCK ENGINEERING
(A Division of Coffey Geosciences Pty Ltd)
PO BOX 1530
OSBORNE PARK WA 6916

Ref: PS5720.03-AF wsfnoi Rev 0
Date: 17 June, 2005

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TRILOGY
WATER
STORAGE FACILITY

PHILLIPS RIVER
PROJECT

NOTICE
OF
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for

TECTONIC
RESOURCES
NL

PS5720.03

17 June, 2005

SOIL & ROCK ENGINEERING