GREVILLEA Zn-Pb-Ag PROSPECT, NW QUEENSLAND

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LOCATION

The Grevillea prospect is approximately 200 km NNW of Mount Isa at 19°34'S, 138°18'E; Camooweal 1:250 000 map sheet (SE54-13).

DISCOVERY HISTORY

In 1993, Terra Search Pty Ltd conducted a regional drainage geochemistry survey for Coolgardie Gold NL and defined several Zn anomalies on the tenements. Follow-up of a catchment with 100 ppm Zn in stream sediments led to three prominent gossans. The northernmost gossan was drilled in 1994 and yielded 25 m of stratiform mineralization with 5.2% Zn, 1.1% Pb and 29 g/t Ag. Soil sampling around, and rock chip sampling of, the gossan gave a strong Pb, As and Ag response, but Zn was low.

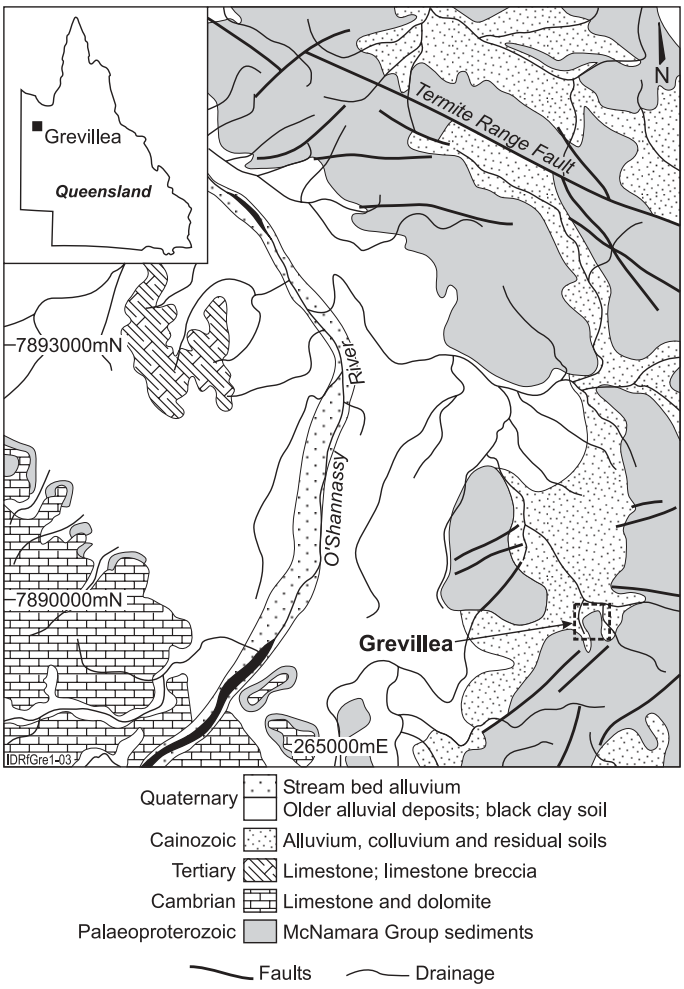

Figure 1. Geological and location map of the Grevillea prospect with the ephemeral and minor drainages feeding the O'Shannassy River (geology after Sweet and Hutton, 1982).

PHYSICAL FEATURES AND ENVIRONMENT

Grevillea lies in low hills (maximum relief of about 50 m) toward the SW limit of outcropping Proterozoic rocks. Further W (Figure 1), the Proterozoic rocks are covered by flat lying Cambrian limestones and Cainozoic colluvium and alluvium (Sweet and Hutton, 1982). The gossan occurs as two prominent NW-trending black outcrops with several metres of relief (Figure 2).

The climate is semi-arid to subhumid tropical with an annual rainfall of about 500 mm, mainly falling from December to March and average maximum temperatures from about 26ºC in July to 38ºC in January (Slayter and Christian, 1954). Consequently, small streams are ephemeral but the major drainage and many waterholes on tributary streams contain water throughout the year.

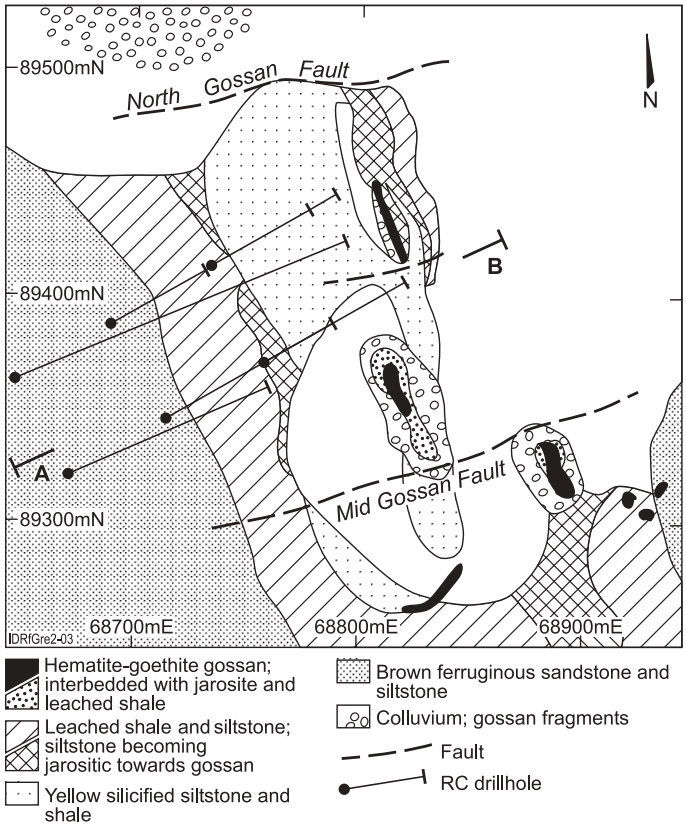

Figure 2. Regolith geology of the southern gossans area, Grevillea deposit; grid is from Riversleigh 1:100,000 map sheet (6659). A-B is the section in Figure 3.

GEOLOGICAL SETTING

The prospect occurs in largely unmetamorphosed late Palaeoproterozic McNamara Group sediments (Figure 1) of the central Lawn Hill Platform (Blake, 1987), stratigraphically equivalent to the host rocks of the Century Zn Deposit. Regionally, the Proterozoic units have open folds, expressed as broad dome and basin structures. Prominent NE-trending faults (including the Termite Range Fault about 9 km NE of Grevillea) and subordinate NW faults cut the Proterozoic (Figure 1). Sedimentary facies and thickness changes are associated with the NE-trending faults, indicating that they were active during sedimentation (Sweet and Hutton, 1982; Jenkins *et al.*, 1998). At Grevillea, the Riversleigh Siltstone Formation comprises fine- to medium-grained sandstone with carbonaceous and pyritic siltstones and shales that host the base metal sulphides.

REGOLITH

The Grevillea gossans and surrounding saprock and saprolite (Figure 2) are more resistant than the siltstones and shales of the Riversleigh Formation and form a discontinuous NNW-trending ridge within a valley bordered by outcropping Shady Bore Quartzite and Riversleigh Formation sandstones (Jenkins *et al.,* 1998; Hann, 1999). Thin colluvium from the gossan and weathered host rocks blanket the lower slopes. To the N and E, low-lying areas are covered by Cenozoic alluvium in the drainage of the O'Shannassy River (Figure 1). Ground geophysical surveys and shallow drilling beneath this alluvium indicate that the pyritic sequence extends more than 1 km N of the gossan (Jenkins *et al.,* 1998).

MINERALIZATION

Pyrite occurs over a stratigraphic thickness of at least 300 m. The upper part comprises 140 m of highly pyritic (40-50% pyrite) and base metal sulphide-mineralized beds (Jenkins *et al.,* 1998). Base metal sulphides (up to 25 m thick) and barite infill and impregnate delicately laminated, highly pyritic rocks and (less commonly) replace oolitic beds

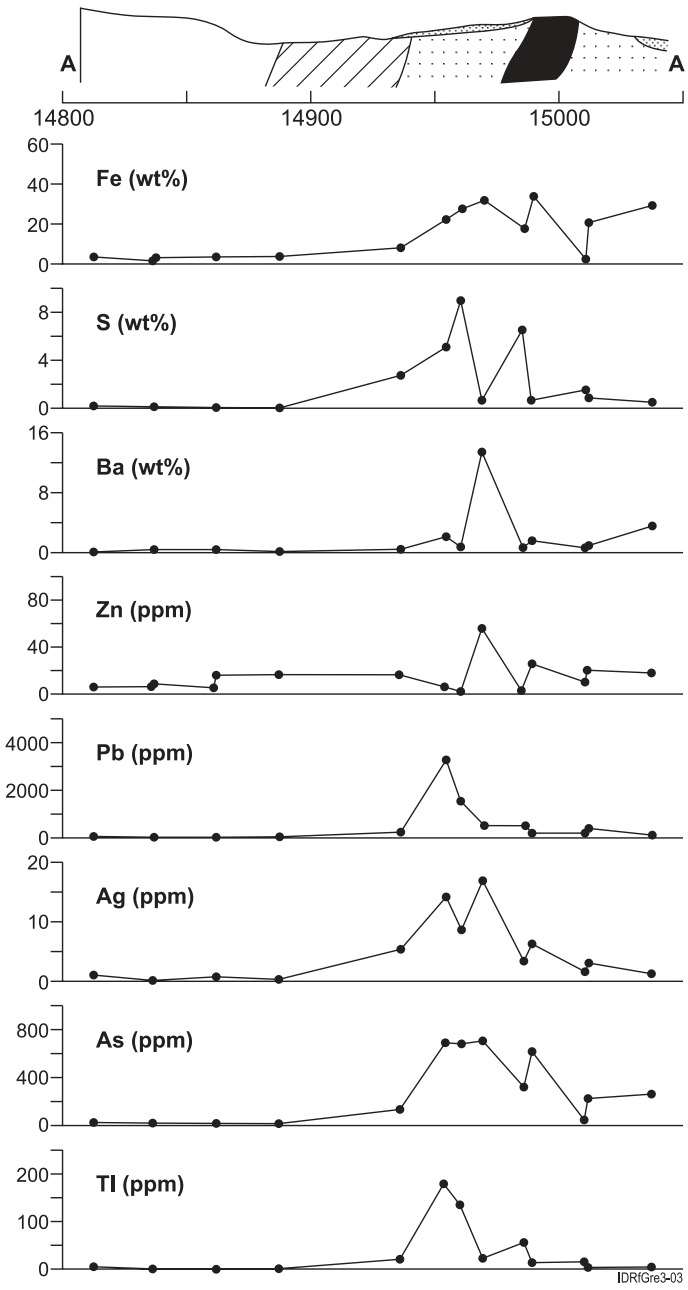

Figure 3. Rock chip geochemistry along transect A-B (see Figure 2 for location).

(McGoldrick, 1998). Coarse barite pseudomorphs primary gypsum or anhydrite. Siderite, ferroan-dolomite, pyrite and base metal sulphides are interbedded in the siltstones.

REGOLITH EXPRESSION

The pyritic sequence and its contained Zn-Pb mineralization are expressed in the regolith as mixed siliceous, hematitiic, goethitic and jarositic gossanous residuum. Primary sedimentary layering is commonly preserved, particularly in the jarositic and siliceous gossan (Hann, 1999). Drilling indicates that weathered and gossanous materials persist to approximately the present water table (about 30 m depth). Detailed mapping of the southern gossans (Hann, 1999) distinguished a number of regolith units (Figure 2). These include: -

Hematite-goethite gossan
Much of the resistant gossans are jaspilites consisting of laminated and massive to brecciated hematite, goethite and silica. In more siliceous gossans, the original layering of the sediment is preserved as cm- and mm-scale lamination. Bands of coarsely crystalline barite are parallel and discordant to the lamination and, in many places, the barite is intergrown with bladed hematite. The massive gossan is mainly botryoidal- and boxwork-textured goethite. It is partly silicified and contains subordinate jarosite, clays, minor quartz and barite.

Initial rock chip samples from the gossans contained up to 3600 ppm Pb, 650 ppm As, 16 ppm Ag but only 100 ppm Zn (Jenkins *et al.,* 1998). Subsequent rock chip sampling (Figure 3) of a transect (A-B on Figure 2), perpendicular to the strike of the gossans, confirmed that ore-related elements Pb, Ag, As, and Tl are closely dispersed around the gossans. Iron, Ba and S are also enhanced in regolith units derived from the gossans. Maxima in Pb and Tl are slightly displaced to the SW of the gossan ridges (Figure 3).

Leached siltstone and shale
This is mainly pale, soft, crumbly shale and siltstone, consisting mainly of amorphous silica. It is more indurated close to the gossan ridges.

Yellow silicified siltstone and shale
These are leached, bleached and silicified. Silicification is strongly developed close to the gossan ridges. Primary bedding is at cm to tens of cm scale, sedimentary laminations are at 0.1-2.0 mm scale and some red, cherty, hematitic beds are preserved.

Brown sandstone and siltstone
This consists of fine-grained, ferruginous, honey-brown to purplish brown sandstone and lesser siltstone and is mainly confined to the hangingwall near the gossans.

Colluvial gravels
These are ferruginous gravels that have been shed from the gossan

SAMPLE MEDIA - SUMMARY TABLE

Sample medium	Indicator elements	Analytical methods	Detection limits	Background	Maximum anomaly (ppm)	Dispersion distance (n
Primary mineralization	Zn, Pb	ICP-MS	few ppm to sub-ppm	10s to 100s ppm	few %	metres
	Ag, As, Sb	ICP-MS	few ppm to sub-ppm	few ppm	100s	metres
	Tl	ICP-MS	few ppm to sub-ppm	10s to 1000s ppm	100s	100s m
	S	ICP-OES	0.1%/few ppm	0.1%/few ppm	few %	metres
	Fe	ICP-OES	few ppm to sub-ppm	0.1 to few %	few %	100s m
	Mn	ICP-MS	1 to 2 ppm	0.1 to few %	1000s	
			0.1 %			
			0.1 %			
Gossan	Pb, Ag, As, Sb	ICP-MS	few ppm to sub-ppm	few ppm	10s to 100s ppm	metres
	Fe, S	ICP-OES/MS	0.1%/few ppm	0.1 to few %	10s %	10s m

Mixed HF-$HClO_4$-HNO_3 digest

ridges. They extend for about 10 m around the gossans and then pass gradationally into colluvium of a more diverse provenance.

REFERENCES

Blake, D. H., 1987. Geology of the Mount Isa Inlier and environs, Queensland and the Northern Territory. B.M.R. Australia Bulletin 225, 83pp.

Hann, V., 1999. The geochemistry and textures of the Grevillea Gossan, Northwest Queensland. BSc(Hons) Thesis, University of Tasmania, 97pp. (Unpublished).

Jenkins, D.R., Laurie, J.P., and Beams, S.D., 1998. Grevillea zinc-lead-silver deposit. In: D.A. Berkman, and D.H. Mackenzie, (Editors), Geology of Australian and Papua New Guinean Mineral Deposits. Monograph 22, Australasian Institute of Mining and Metallurgy, Melbourne, 753-758.

McGoldrick, P.J., 1998. Lithogeochemical, isotopic and petrographic studies of the Grevillea prospect, Riversleigh area, north west Queensland. AMIRA Project P384A Final Report, 2, 101-133 (unpublished).

Slayter, R.O., and Christian, C.S., 1954. Climate of the Barkly region. CSIRO Land Research Series, 3:17-33.

Sweet, I. P. and Hutton. L. J., 1982, Lawn Hill Region, Queensland. Bureau of Mineral Resources Geology and Geophysics 1:100 000 geological map commentary. 36 pp.