MURUNTAU

GEOCHRONOLOGY
and GRANITES

Greg Hall
Golden Phoenix International Pty Ltd
Muruntau Production

- Discovered 1959 while seeking uranium
- Production commenced 1964
- Mining 64mtpa
- Milling 28mtpa@2.3gm/t in 2004 @1.5gm/t COG
- Stockpiling 32mtpa
- Heap leaching stockpiles (ex-Newmont JV)
- Open pit mining ceases 2025
- Stockpile reclamation to 2050
- Underground mining planned
Muruntau

- Pit 3km by 2km by 800m deep
- Pit expansion constrained by stockpiles
- New low grade open pit zones discovered north-east of pit
- Known zones east of pit at depth
Granite / hornfels / ore drillhole SG10

Depth 4288m.
Muran granite. Very coarse (possibly ?magmatic) muscovite and fresh appearance of biotite
Murun Granite sample

- MT42318 SG 10 4077m
- Medium to fine grained strongly albitised granite
- K feldspar, albite, quartz, biotite (primary)
- Muscovite, chlorite (secondary)
- U-rich zircon, Th-rich monazite, fergusonite, uraninite, coffinite, fluorite (accessory minerals)
Muran Granite

- 3 points from monazite grains
- 281-300ma Pb206/U238 age
- Preliminary age
Granite / hornfels / ore drillhole SG10

Depth 3900m.
Quartz.-calcsilicate-feldspar vein & alteration envelope cross-cutting main foliation and overprinting crenulation as do pyrrhotite-biotite-feldspar veins in high grade psammitic hornfels
Granite / hornfels / ore drillhole

SG10

Depth 3600m. High grade psammopelitic hornfels. Note coarse decussate biotite aggregates overprinting crenulation and ovoid greeny patches (retrogressed cordierite?)
Muruntau: Geochronology

Granite U/Pb Zircon
289.3±3.6 Ma MT43
293.3±2.1 Ma MT44
287.5±1.4 Ma MT45
Muruntau: Geochronology

Granite U/Pb Zircon
- 289.3±3.6 Ma MT43
- 293.3±2.1 Ma MT44
- 287.5±1.4 Ma MT45

Ore Arsenopyrite Re/OS
- 86±5 Ma

SG10
## Muruntau: Geochronology

<table>
<thead>
<tr>
<th>Granite U/Pb Zircon</th>
<th>Age (Ma) ± Error</th>
<th>Sample Code</th>
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<tbody>
<tr>
<td>289.3 ± 3.6</td>
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<th>Ore Ar/Ar Sericite</th>
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<th>Dyke U/Pb Zircon</th>
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<tr>
<th>Ore Arsenopyrite Re/OS</th>
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<td>286 ± 5</td>
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**Map**: Muruntau geological map with key features marked.
Pre-Mesozoic Outcrop Geology, Gravity & Gold Deposits

- Permian Granitoids (near surface)
- Mafic and ultramafic rocks
- Major gold deposit
- Geology outcrop boundary
Tamdytau Granite sample location

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Tamdytau Granite samples

- MT43 medium grained leucogranite, youngest phase, higher fractionation, autometasomatic alteration
- MT44 fine grained porphyritic to coarse grained leucogranite, commonly marginal facies, quenched contacts, overprinted by post magmatic alteration
- MT45 porphyritic coarse grained melanocratic monzogranite (adamellite) cut by leucocratic granites
Tamdytau Granite samples

- MT43  289.3 +/- 3.6 ma  23 ppb Au
- MT44  293.3 +/- 2.1 ma  15 ppb Au
- MT45  287.5 +/- 1.4 ma  24 ppb Au
Ore
Kspar-Biotite alteration & mineralisation

Ore Arsenopyrite Re/OS
286±5 Ma

Biotite-Kspar alteration around flat vein overprinted by patchy sericitic alteration

Arsenopyrite bearing, Kspar-biotite alteration, 1mm. across

Arsenopyrite bearing, Kspar-quartz vein in Kspar-biotite metasomatite
Minor felsic intrusions:

- sills & dykes
- postdate main stage mineralisation, but retrogressively altered
- predate major fault movements
- 236.5±1.4Ma U-Pb zircon ages
Muruntau: retrograde alteration

Southern fault zone, SW wall open pit Level 375; intense retrograde sericitic & graphitic alteration

Sericite Ar/Ar
226±2 Ma

Graphitic fault zone, SW wall open pit Level 375

Carbonate-sulphide-sericite-chlorite veins cutting stockwork; Level 210
Muruntau: local geology

Ore Ar/Ar Sericite 226±2 Ma

Dyke U/Pb Zircon 236.5 ±1.4 Ma

Muruntau & other deposits hosted in Besopan (BS₃)

Mainly from Goscomgeologia
Vic Wall 1944-2017
MURUNTAU

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