An Exploration and Development Case-History of the Salinbaş Gold-Silver Deposit, NE Turkey

Kerim Şener & Zack van Coller

17 October 2018
Setting the Scene

Turkey: the largest producer of gold in Europe
Introduction

Multi-million ounce potential in NE Turkey

- 100% Ariana Resources-owned Salınbaş Project is a company transformative project demonstrating substantial exploration upside

- **Salınbaş**: Gently dipping tabular gold-silver enriched epithermal replacement zone containing a current resource of 10Mt @ 2.0 g/t Au and 10.2 g/t Ag (650,000oz Au)

- **Ardala**: Highly gold and molybdenum enriched porphyry copper system containing exceptional historic drilling results including 135m @ 2.28g/t Au: current resources of 16Mt @ 0.6 g/t gold, with copper (0.22%) and molybdenum (0.014%) zones

- **Hizarlıyayla**: Grass-roots exploration prospect showing potential for a buried porphyry system located within a structurally-controlled corridor of alteration and mineralisation between Hot Maden to the south (6km) and Salınbaş to the north (5km)

- Partially explored project area with much of the Hot Gold Corridor (“HGC”) contained within project licences
Geological Context

Summary of exploration results
Summary
A journey of a thousand miles begins with a single step

- History of the project area, outlining the work conducted at each stage and the external factors that contributed towards its development

- Current work being undertaken on the project and future expectations

- Key observations:
  - Geoscience is an integral part of the mineral exploration process but it is important to recognise that other factors also contribute dramatically towards (or against) exploration success
  
  - Political and economic developments over time are one of the most important inputs into the exploration process and cannot be underestimated

  - Salınbaş is a case-study which demonstrates that discoveries are often influenced by the fact that someone, some time, has been there before
“The development of a nation is dependent on the evaluation and exploitation of its subterranean resources”

Mustafa Kemal Ataturk, 1935
Georgian Influence

Earliest mining in the region: Middle Ages

- Earliest mining activity undertaken across NE Turkey was likely to have been undertaken from at least the Middle Ages
- Region was under the influence of the Georgian Bagrationi Dynasty throughout the Middle Ages
- Castles built in the area are attributed in part to the Kingdom of Imereti from 1455, including the nearby Okumuşlar Castle
- Remains of smelter slag attributable to the Middle Ages suggest that mining activities were widespread in the region at this time
WW1, Russian Occupation and DRG

First known mining activity: 1914-1921

Maximum extent of Russian military advance into the Ottoman Empire by 1917 (Wikipedia)

The short-lived Democratic Republic of Georgia, showing claimed borders in 1918-1921 (Wikipedia)

Troops from the Russian Caucasus Army manning trenches in the forests of Sarikamış, 1914 (Wikipedia)
Abandoned and Forgotten

Before foreign investment in mining: 1921-1989

- Project area is abandoned as Russian and subsequent Georgian interest in the area ceases from 1918 onwards

- Mineralisation is recognised 2km north of Gümüşhane village before 1963; old workings continue to collapse and some are buried

- Maden Tetkik ve Arama (MTA) is the first to document the Ardala porphyry (Kraeff, 1963): rock-chip samples from the mineralised intrusion yield 0.05% Cu, 0.5 g/t Au and 8 g/t Ag

- Other mineralisation described as contact metasomatism between limestone and intrusive albite-dacite provide rock-chip samples of up to 0.28% Cu, 1 g/t Au and 10-37 g/t Ag

- 1985 Mining Law of Turkey comes in to force and encourages for the first time serious foreign investment in the mining sector

Project geologist, Burak Mert, inspecting and sampling an old Russian (1915-18?) working
Enter Anglo American
Intrepid years of foreign exploration: 1989-1993

- **New technology**: Landsat 4 multi-spectral scanner revolutionises regional targeting via remote-sensing from 1983

- Anglo-Tur Madencilik re-discovers the porphyry mineralisation in late 1989 after defining significant alteration utilising Landsat imagery

- 16 diamond drill holes (GMS01 to GMS16) with all core used for analysis (no data remains from these holes)

- 13 diamond drill holes (GMS17-29) defined a non-JORC compliant resource of 20 Mt @ 0.45 g/t Au, 0.25% Cu and 65ppm Mo

- Mapping and lithological sampling completed as part of a PhD thesis on the Ardala porphyry funded by Anglo (Rockl, 1994)

- PhD provides detailed intrusion and relative mineralisation timing events using drill hole data from GMS001 to 29

Important interpretive cross-section showing the alteration styles, host rocks and mineralisation encountered in the Anglo-Tur drilling (Rockl, 1994)
Uncertainty and Hiatus

Security issues and economic turmoil: 1993-2005

- Anglo-Tur Madencilik ceases project activity in response to a deteriorating security in eastern Turkey from 1993

- Downgrade of Turkish debt to junk status in 1994, capital flight and currency crisis; request submitted to the IMF for stand-by facility

- Project area is allowed to lapse into the government auction system

- Project area is acquired by a Turkish individual in 1996 through government auction

- YAMAS enters into an agreement to explore the licence and commences a limited rock-chip sampling programme

- Financial and political crisis leads to interest rates soaring to 3,000% in 2001; Istanbul stock-market crashes

- No further work is conducted on the licence until 2005

Turkish security forces on patrol in eastern Turkey during a dramatic resurgence of PKK activity in 1993 (Gaziantep Sabah)
Rio Tinto-YAMAS JV

- From 2005 through to 2007 a Rio Tinto funded joint venture with YAMAS commences work on this and other projects in eastern Turkey
- Reappraisal of project area and limited new rock-chip sampling around the Ardala porphyry
- Two diamond drill holes are completed on the north side of the porphyry to test extensions of the porphyry beneath limestone cover
- Ground magnetic geophysical survey is conducted over and around the porphyry
- YAMAS chooses to relinquish its interest in the project when Rio Tinto ceases funding in 2007
Acquisition by Ariana
Recognising the potential: 2007-2015

- **New technology**: Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) dramatically improves targeting via remote-sensing from 2000

- Ariana uses ASTER to identify the area around the Ardala porphyry as prospective in 2004

- Ariana acquires the project area in 2007 following three years of successful exploration primarily in western Turkey

- Ariana completes a JV agreement with European Goldfields in 2008 (now Eldorado Gold)

- Salinbaş discovery outcrop sampled by the JV for the first time in late 2008

- Exploratory trenching in 2009 leads to the discovery of the Salinbaş Zone

- 2010-2013 completion of extensive exploration and resource drilling at Salinbaş

- 2015 completion of scoping study and initial metallurgical testwork

2008/9 Salinbaş discovery outcrop 15.4g/t Au + 102g/t Ag
Seize the Day

Opportunity within uncertainty: 2015-Present

• Increasing levels of terrorist activities in Turkey, in part resulting from the destabilisation of Syria, commence from early 2015 leading to c. 70 incidents

• 15 July 2016: Rogue element within the Turkish armed forces mobilise against the Government – coup attempt defeated the following morning after the loss of 249 lives

• Eldorado Gold decides under these circumstances that it will not continue to work on the project from Q3 2016

• 21 December 2016: Ariana acquires 100% of the Salınbaş Project in exchange for an Net Smelter Return (NSR) royalty of up to 2% of future production payable to Eldorado Gold
Developments Since Late-2016

New work and improved understanding

- **New technology**: Field portable XRF devices come in to use during the late 2000’s

- Ariana commences using an Innov-X Delta (now Olympus) instrument in 2011 and puts it to use across its projects as a rapid geochemical prospecting tool and in drilling programmes

- Extensive new geological mapping and sampling campaigns are conducted in 2017 at Salinbaş including the completion of a major pXRF geochemical programme over the project area (5,234 samples along 210km of tracks)

- Conventional soil geochemistry and rock-chip sampling used to complement and follow up on pXRF geochemistry (totalling hundreds of samples)

- Several new discoveries made including Ardala North and Salinbaş North, in addition to further targets throughout the project area

2017 Phase 1 pXRF geochemical results for arsenic – highlights two significantly anomalous areas at Ardala/Salinbaş and at Hizarliyayla
Salinbaş Deposit
2012 Geological Model

- Previous geological model was based on a series of thrust-faults interpreted from the regional geology which were envisaged as a conduit for mineralising fluids.

- Drill core logging was heavily influenced by the prevailing geological interpretation, documenting a large number of intercepts of “tectonic breccias” and resulting in problematic data for geological modelling.

- Resulted in the development of a geologically complex model in which drilling data was not fully consistent with surface mapping and the sub-surface distribution of mineralisation.

- Provided for less predictable mineralisation and restricting the wider potential for exploration in other locations around the Ardala Intrusive Complex.
Salinbaş Deposit
Geological mapping and improved understanding

- New geological mapping and drill-core logging has better defined the character and localisation of the Salinbaş deposit

- Salinbaş-style of mineralisation is typically identified as a replacement-type and is sulphide-rich to gossanous in character

- Interpreted to have formed along an unconformable boundary which formed a plane of higher porosity for mineralising fluids to infiltrate

- On a broader scale multiple styles of mineralisation in contact with two primary geological formations is identified

- Simplified the exploration model for Salinbaş-type mineralisation and its relationship to the Ardala porphyry

- Ardala porphyry was intruded at about 52 million years ago and was the source of the mineralising fluids
Salinbaş Deposit
Re-logging of Drill Core

- Several significant new observations derived from the 2018 re-logging exercise (7,800m of drill core) and from field geological mapping

- Originally missed or misinterpreted when geological mapping relationships could not be correlated with the drill core

- Graded conglomerates (upper image) were originally interpreted as tectonic fault breccias – but material clearly displays rounded polymictic clasts in a sandy limestone matrix with repeated graded sequences (palaeokarstic horizon?)

- Conglomerates are located between two major lithological units and are preferentially mineralised by fluids due to higher porosity caused by sandy matrix

- Where mineralised this material looks like a chaotic polymictic hydrothermal breccia which had previously contributed to the development of the thrust-fault model (lower image)
Salinbaş Deposit
2018 Geological Model

- Exploration potential was previously restricted by the previous thrust-fault model
- New geological model is significantly simpler and allows for greater predictive capability (note recent discoveries)
- Lithological units and specific stratigraphic horizons can now be targeted directly for potential mineralisation
- Internally coherent geological model for Salinbaş defined reliably within all data including surface geochemistry, geological mapping, structural mapping and drill core logging
Salinbaş Deposit
Discoveries based on new model

- **Salinbaş North** – discovery made at contact between Kızılçık and Ziyarettepe Formations: target defined in pXRF data and from anomalous soil assay data including: 3.83 g/t Au + 108 g/t Ag, 2.97 g/t Au + 94 g/t Ag and 1.67 g/t Au + 91 g/t Ag

- **Ardala North** – discovered on the edge of the Ardala porphyry: target defined in pXRF data and through mapping of historic workings
As a result of new data derived from field activities and the reinterpretation of old data since early 2017, a significant JORC Exploration Target is defined across three areas in the vicinity of the Salinbaş deposit.
## Salinbaş Deposit

**JORC Exploration Target**

<table>
<thead>
<tr>
<th>Target</th>
<th>Tonnage (t)</th>
<th>Element</th>
<th>Grade (g/t)</th>
<th>Contained Metal (oz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>From</td>
<td>To</td>
<td></td>
<td>From</td>
</tr>
<tr>
<td><strong>Salinbaş North</strong></td>
<td>19,370,000</td>
<td>29,055,000</td>
<td>Au</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ag</td>
<td>10.0</td>
</tr>
<tr>
<td><strong>Salinbaş South</strong></td>
<td>2,535,000</td>
<td>5,070,000</td>
<td>Au</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ag</td>
<td>10.0</td>
</tr>
<tr>
<td><strong>Salinbaş Main</strong></td>
<td>169,000</td>
<td>338,000</td>
<td>Au</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Extension</strong></td>
<td></td>
<td></td>
<td>Ag</td>
<td>10.0</td>
</tr>
<tr>
<td><strong>Global Total Ounces Au</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Global Total Ounces Ag</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Proof of the Pudding
Latest results from the field
Site Video
Historically every £1 expended by the Company:

- £0.6 derived from project partners or bank finance
- £0.4 equity funding via placings on AIM

Since February 2018 Company has become self-financing through its JV in western Turkey – cash-flow received to date has exceeded £1 million

*As at early June 2017*
Project History
What can we learn?

- Demonstrates the intermittent successes and largely haphazard nature of the mineral exploration process

- Lack of continuity and the loss of knowledge from one generation of explorers to the next is a major contributing factor towards decreasing the efficiency of exploration while simultaneously increasing discovery risk

- Each step in the exploration and development of a project will build upon what is discovered and passed on in terms of information and insight from previous steps

- Highlights the role of new technologies and how they have contributed to exploration success (e.g. Landsat, ASTER and field portable XRF)

- Considers the significance of political considerations and the importance of stable governments with sound policies for mineral project development

- Projects are often advanced when capital is more readily available and when capable of being deployed in appropriate environments

- Importance of sound geoscience, particularly GEOLOGICAL MAPPING, and the overall capability and efficiency of the exploration team

- Lastly is there really no substitute for mineral exploration success other than just being in the right place at the right time?
Thank You

We would like to express our gratitude to the countless generations of opportunistic adventurers, prospectors, miners and geologists that went before us. They are the true pioneers without which none of our work would have been possible…

“We see more and farther than our predecessors, not because we have keener vision or greater height, but because we are lifted up and borne aloft on their gigantic stature”

Bernard of Chartres, 12th Century philosopher