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Report prepared by

On behalf of

UNIVERSAL SPLENDOUR INVESTMENTS
TENEMENT SUMMARY REPORT FOR THE PERIOD
DECEMBER 23 2009 TO DECEMBER 23 2010 FOR EL
27371

17 January 2011

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document are the results of a comprehensive study and analysis of the available data and theory at the time of this documents
creation.
EXECUTIVE SUMMARY

Universal Splendour Investments (USI) hold exploration license EL27371 which is one of seven EL’s in the region collectively referred to as the Amadeus project area (Figure 1). This block of tenements is located in the southern portion of the Northern Territory, approximately 90km southwest of Alice Springs.

A desktop study was undertaken on the Amadeus project area (Lindsay-Park, 2010). This report contains a brief summary of the geology and previous exploration on the project area. This report builds on the previous report and refines the understanding of any potential mineralisation within the tenements.

Trace amounts of Mn are recorded throughout the region. The source of the Mn is unclear but early indications suggest that the Madderns Yard Metamorphic Complex and the Bitter Springs Formation.

A study of the geology indicates that conditions have existed for deposition of Mn in a shallow water environment where the anoxic conditions are disturbed during periods of marine transgression and regression. Both Mn oxide and carbonate mineralisation may be possible. A source of marine Mn is in the Palaeoproterozoic to Mesoproterozoic Madderns Yard Metamorphic Complex of the Arunta Block crystalline basement.

Support for this interpretation is provided by several Mn occurrences clustered within this Formation along strike to the east (eg: Fenn Gap (Figure 1). The Fenn Gap occurrence, averaging 39% Mn, is sub-vertical and consists of pyrolusite-stained brecciated dolostone. The mineralisation is limited to the surface and appears fault-controlled (Ferenczi, 2001).

There is moderate potential for uranium deposits in the Amadeus Basin.
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1 INTRODUCTION

Universal Splendour Investments (USI) hold exploration license EL 27371 is one of seven EL’s collectively referred to as the Amadeus project area (Figure 1). This block of tenements is located in the southern portion of the Northern Territory, approximately 90km southwest of Alice Springs.

A desktop study was undertaken on the Amadeus project area (Lindsay-Park, 2010). This report contains a brief summary of the geology and previous exploration on the project area. The aim of this report is to refine the understanding of any potential mineralisation within the tenements.

The reason for selecting the Amadeus tenements was the close proximity to a known manganese occurrence at Fenn Gap (Figure 1). This occurrence is reported to average 39% Mn with a maximum of 50.9%.

In order to expand on the previous desktop study (Lindsay-Park, 2010) an assessment of the freely available geospatial data as well as an assessment of the geochemical data will be compared to potential mineralisation types expected in this region as well as the results of current explorers surrounding USI’s tenements. With this information, the potential prospective areas of interest can be identified.

To better assess the Amadeus project area for potential mineralisation a planned field visit (Phase 2) is required. The main aim of Phase 2 is to identify any potential Mn mineralisation with a secondary focus on other commodities, mainly uranium and Pb-Zn-Ag-Cu.
Figure 1: Location of USI’s tenements collectively referred to as the Amadeus project area. The Fenn Gap Mn mineralisation occurrence is indicated as a blue square. Base image is an Ortho-rectified image from Bing Maps.
2 GEOSPATIAL DATA COMPILATION

To compile all freely available geospatial data, the NT government was contacted and provided a large amount of data. In addition to the NT data, ortho-rectified images from Bing Maps (www.bing.com/maps/) were used. Below is a summary of the acquired geospatial data.

2.1 MAGNETICS

Several individual and regional magnetic airborne surveys cover the EL’s. These surveys consisted of the regional surveys, Amadeus Central, Amadeus West, Napperby-Hermannsburg and the Rodinga surveys. All were in grid format and were able to be imaged to produce the reduced-to-pole (RTP) total magnetic intensity (TMI) image (Figure 2) and the 1st vertical derivative (1VD) (Figure 3).

At this stage of exploration, the magnetic data was not fully interpreted. More detailed exploration may be assisted by detailed interpretation of the data. Advanced processing of the magnetic data needs to be carried out to utilise the freely available data.
Figure 2: Compilation of airborne surveys (Amadeus Central, Amadeus West, Napperby-Hermannsburg and Rodinga). Reduced to Pole Total Magnetic Intensity (RTP TMI). Note the surveys have not been merged and levelled.
Figure 3: Compilation of airborne surveys (Amadeus Central, Amadeus West, Napperby-Hermannsburg and Rodinga). First Vertical Derivative (1VD) of the Reduced to Pole Total Magnetic Intensity (RTP TMI). Note the surveys have not been merged and levelled.
2.2 RADIOMETRICS

Radiometric data was available as grids of the potassium, thorium, uranium and total count. Figure 4 is a radiometric ternary image representing potassium, thorium and uranium as red, green blue respectively. Although the resolution of the data is not as high as the Landsat, ASTER or Bing Maps, it was useful for mapping the outcrop and transported material. Higher resolution radiometrics data may prove useful in later stages of exploration.

Figure 4: Compilation of airborne surveys (Amadeus Central, Amadeus West, Napperby-Hermannsburg and Rodinga). Radiometric ternary image representing Potassium, Thorium, Uranium as Red, Green, Blue. Note the surveys have not been merged and levelled.
2.3 LANDSAT

The NT government provided various forms of Landsat data including; merged grids, merged images, and individual tiles. To procure the best possible Landsat data other sources were also acquired. The Landsat bands were imaged to produce various composite images which best enhance the geology of the area. For this interpretation two image were most useful, these were 742 (Figure 5) and 741, which are represented by red, green and blue respectively.

Figure 5: Landsat image representing bands 7, 4, 2 as Red, Green, Blue.
2.4 ELEVATION

Due to the variable relief of the topography and the large amount of outcrop in the project area the elevation data provided by the NT government is a valuable dataset to map the stratigraphy and terrain. The regional SRTM (Shuttle Radar Topography Mission) elevation data is 90m resolution and was downloaded and mosaicked (Figure 6).

Figure 6: Regional SRTM elevation image.
2.5 GEOGRAPHIC

All geographic data was provided by the NT government. Figure 7 shows the main and minor roads, tracks, main and minor watercourses, airstrips and main and minor localities. This information will be useful for field planning. Any additional information acquired during field visits will be added to this geographic database.

Figure 7: Geographic data for the Amadeus project area. Base image is an ortho-rectified image from Bing Maps.
2.6 GEOCHEMICAL

A considerable amount of geochemical data was available for the Amadeus project area (Figure 8). A suite of elements was assayed and a preliminary assessment of the results has been included in the MINERALISATION section of this report. All samples with recorded Mn assays were extracted from the database and coloured from green to red to represent relatively low to high Mn values (Figure 9).

Figure 8: Geochemical samples for the Amadeus project area.
Figure 9: Manganese geochemical assay values for the Amadeus project area. Colour scale indicates relative high and low Mn values based on the distribution of the available data.
3 PREVIOUS EXPLORATION

Three exploration companies, Toro Energy Ltd, Crossland Uranium Mines Ltd and Northern Mining Ltd, are undertaking work near USI’s Amadeus project area for a variety of commodities (Figure 10).

Figure 10: Location of EL’s from other exploration companies near USI’s Amadeus project area.

3.1 TORO ENERGY LIMITED

Toro Energy have been granted three EL’s abutting two of USI’s EL’s, two south of EL27/799 and one to the east of EL27/343. Toro maintains a 100% interest in the three tenements. Several other EL’s within the region are currently under application.
Toro’s exploration focus is uranium and specifically roll-front and structurally controlled sandstone-hosted deposits. Toro reports that “the tenements cover part of the mapped Hermannsburg Sandstone which stratigraphically equates with Pertnjara Group comprising Upper Devonian – Lower Carboniferous fluvio-continental sediments. This sequence and its equivalents host the Pamela Angela uranium deposits south of Alice Springs and the Bigryi, Malawiri and Dingo’s Rest deposits of the Ngalia Basin to the north.” Toro also report that “in the vicinity of the Amadeus West tenement (ELs 25049 and 27183), there is exposure of an exhumed Tertiary palaeochannel with strong radiometric signature (Figure 11).”

![Figure 11: Regional radiometric (uranium channel) showing the strong signature of exhumed Tertiary palaeochannels and the Mereenie Sandstone of the Amadeus Basin (after Toro Energy).](image)

3.2 CROSSLAND URANIUM MINES LIMITED

Crossland Uranium has been granted several EL’s north and northeast of USI’s Amadeus project area. Collectively these tenements are referred to as the Charley Creek project and are “targeting granite-related uranium; with calcrete and redox-related palaeodrainage uranium targets; and layered mafic intrusive-related copper, nickel and platinoids as secondary targets”. Crossland maintains a 100% interest in the Charley Creek project tenements.

Currently Crossland have commenced a core drilling program on four target areas for uranium within the Teapot Granite. No results have been released to date. Figure 12 shows Crossland’s current uranium model.
3.3 NORTHERN MINING LIMITED

Northern Mining have been granted several EL’s within the Amadeus Region, four of which adjoin USI’s EL’s (Figure 10). The main focus for Northern Mining in this region is for manganese on their Camel Prospect (EL24/961) which lies to the east of USI’s EL27/800 and to the west of USI’s EL27/805. Northern Mining maintains a 100% interest in all tenements in Figure 10 except EL24/438 which they maintain an 80% interest, the remaining interest is held by Imperial Granite & Minerals Pty Ltd.

To date Northern Mining has undertaken a reconnaissance sampling program of outcropping manganese mineralisation. In total 8 samples were collected from discontinuous outcrops which extend for over 1.2 km. Assay results for these 8 samples vary (Table 1) but a maximum of 15.6% Mn was obtained in one sample.

The manganese is reported to replace carbonate, sandstone and breccia units within the Amadeus Basin.

Table 1: Assays for samples collected over Northern Mining’s Camel Prospect. Assays were determined by fusion-disc XRF and have not been recalculated for loss-on-ignition.

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Figure 13: Location of manganese assays by Northern Mining within EL 24/961. Assay values are displayed as %Mn based on the information in Table 1.
4 REGIONAL GEOLOGY

The majority of the geological information was sourced from Warren and Shaw (1995) unless otherwise indicated.

The regional geology surrounding the Amadeus project area consists of three main tectonostratigraphic subdivisions; a Palaeoproterozoic to Mesoproterozoic Arunta Block in the north (Figure 14); a Neoproterozoic to mid-Palaeozoic Amadeus Basin in the central and south (Figure 14) and a veneer of intra-cratonic Permian and Tertiary to Quaternary sediments.

The Arunta Block is divided into three Provinces (Northern, Central and Southern), only the Central and Southern lie within the Amadeus project area. The Central and Southern Provinces are separated by the WNW trending Redbank Thrust Zone (RTZ). The RTZ is a high-strain zone of anastomosing shears that separate granulite-facies rocks of the Central Province from amphibolite-facies rocks of the Southern Province.

The Amadeus Basin represents a relic of sediments that covered central Australia from the Neoproterozoic to the end of the Devonian. It consists of a basal unit of Heavitree Quartzite with an overlying Bitter Springs Formation. Unconformably overlying these basal units are the Areyonga, Pioneer and Pertatataka Formations. These units are then unconformably overlain by the Arumbera Sandstone. Several units of clastic and carbonate rocks have been deposited from the Cambrian through to the Devonian.

The Heavitree Quartzite was deposited on the eroded surface of the Arunta Block. It forms a prominent ridge marking the northern edge of the basin.

The Bitter Springs Formation consists of carbonates, evaporates and fine-grained clastic sediments. This formation has been developed due to a deepening of the basin and a rapid decline in the supply of terrigenous sediment under anoxic conditions and progressing to high-stand sediments.

The overlying Areyonga Formation consists largely of diamictite and was deposited on the eroded surface of the Bitter Springs Formation. Clasts in this unit were derived from the Arunta basement, Heavitree Quartzite and Bitter Springs Formation.

The Pioneer Sandstone is a shallow-marine to tidal unit confined to the central part of the Amadeus Basin. It rests unconformably on the Areyonga and Bitter Spring Formations.

The Pertatataka Formation was originally thought to consist of two clastic units separated by a dolomitic layer but now only the lower clastic unit is mapped as Pertatataka Formation. The dolomitic layer now belongs to the Julie Formation and the upper clastic unit to the Arumbera Sandstone.

The Arumbera Sandstone represents a prograding delta and marine deposit within elongated troughs. It consists of two coarsening-upwards sequences of siltstone and sandstone. Conflicting information places this unit within the base of the Cambrian Pertaoorrta Group.

4.1 DEFORMATION

Structurally the region is divided into three tectonic events; the formation and cratonisation of the Arunta Block, the development of the Amadeus Basin and the deposition of cover material and deformation of the Arunta Block and Amadeus Basin.

The formation of the Arunta Block ended with the emplacement of the Teapot Granite Complex and the emplacement of the Stuart Dykes. This period of deformation involved several events, the most important of which were the Chewings Orogeny (1600 Ma) and the Anmatjira Uplift Phase (1500-1400 Ma).
The Chewing Orogeny imposed a regional, predominantly east-west, pervasive foliation in the Southern Province. This event was responsible for forming the Chewings High-Strain Zones, which are characterised by highly schistose and mylonitic amphibolite-facies rocks.

The Anmatjira Uplift Phase formed the high-strain zones of the RTZ and shows north-over-south sense of shear and represents a Mesoproterozoic thrusting episode.

The development of the Amadeus Basin began with subsidence at about 1080 Ma. Subsequent development was influenced by episodes of compression and block tilting. The basin closed with the start of the Alice Springs Orogeny.

The Alice Springs Orogeny was a major compressional event involving folding, thrusting and overall uplift. It affected both the Arunta Block and the Amadeus Basin.

From the end of the Devonian onwards, central Australia has remained stable, with gentle warping and small-scale fault movements. Late Permian sediments were trapped in a depression, probably fault-controlled, at the northern edge of the RTZ. In the Mesozoic and Tertiary, tectonic movements, which generally reactivated earlier faults, caused uplift and gentle tilting.
Figure 14: 1:2.5 million interpreted geology map from the NTGS digital data. The legend has been modified from the original digital data to correlate with the explanatory notes.
4.2 EL 27/542 and 27/371

The geology of EL 27/542 and 27/371 is dominated by the Madderns Yard Metamorphic Complex and the Teapot Granite Complex in the north of the ELs (Figure 15). The dominant deformation within these units consists of WNW trending faults as well as a small portion of outcropping Chewings High-Strain Zone. The majority of the contact between these northern units and the younger, Neoproterozoic to Devonian, units is obscured by Quaternary and Tertiary cover.

The general strike of the southern units, which are dominated by clastic sediments and carbonates of the Amadeus Basin, are ESE and dipping to the SSW. This package of sediments is within a large syncline, with the axial trace to the south, and therefore the general younging direction is from north to south on the northern limb.

Topographically the most prominent unit within the area is the Heavitree Quartzite which forms resistive ridges approximately following the regional trend to the WNW.

Approximately 50% of the EL 27/542 and 80% of EL 27/371 is covered in Tertiary and Quaternary sediment, the majority of which is sand.
Figure 15: Geology map for ELs 27/371 and 27/542 derived from the NTGS 250K HERMANNSBERG digital data.
5 MINERALISATION

The Amadeus project area is currently being investigated by exploration companies surrounding USI’s ELs for uranium and manganese. In addition to these commodities, Pb-Zn-Cu-Ag mineralisation as well as Cu and Gypsum also appear to be present within and surrounding USI’s ELs (Figure 16).

![Figure 16: Mineral occurrences from the NT database throughout the Amadeus project Area.](image)

### 5.1 MANGANESE

The NT geological survey has an extensive database of geochemical data including rock chip samples, whole rock samples, soil samples and stream sediment samples across the Northern Territory. In addition to this extensive database are 8 samples by Northern Mining Limited which were analysed using XRF method.

Although the Amadeus project area does not have any producing manganese mines in the area there are some encouraging results and potential for follow-up within USI’s ELs.
5.1.1 EL 27/542 and 27/371

Trace amounts of Mn are recorded throughout EL 27/542 and 27/371 (Figure 17). The source of the Mn is unclear but early indications suggest that the Madderns Yard Metamorphic Complex and the Bitter Springs Formation.

The main categories of Mn deposits can be divided into; sedimentary (e.g. Groote Eylandt), surficial (e.g. Masterton No2) and hydrothermal (e.g. Bootu Creek). If the Madderns Yard Metamorphic Complex is the source rock for the trace amounts of Mn in the area it may represent a hydrothermal type deposit or re-worked surficial / sedimentary deposit.

The Bitter Springs Formation consists of; dolostone, minor sandstone, siltstone, shale, gypsum and halite clasts, and may prove to contain a potential surficial carbonate-hosted Mn deposit. Several Mn occurrences are clustered within this Formation along strike to the east of EL 27/542 (eg: Fenn Gap (Figure 1). The Fenn Gap occurrence, averaging 39% Mn, is sub-vertical and consists of pyrolusite-stained brecciated dolostone. The mineralisation is limited to the surface and appears fault-controlled (Ferenczi, 2001). Although a limited amount of this Formation outcrops within the EL any field visit should involve a close inspection of this unit for obvious signs of Mn mineralisation.
Figure 17: Geochemical assay values of Mn for; rock chip samples, whole rock samples and stream sediment samples. Assays are over the Ortho-rectified imagery (Top) and 250K digital geology (Bottom).
5.2 URANIUM

The Amadeus project area is currently being investigated by two exploration companies (Toro Energy Limited and Crossland Uranium Mines) (Figure 18). The Teapot Granite Complex is the most likely source for any potential uranium deposit in the area as it displays a high radiometric signature compared to any of the other lithologies in the area (Figure 4).

![Figure 18: Location of Sandstone Uranium occurrences relative to the Teapot Granite Complex and other Uranium exploration companies.](image-url)

5.2.2 EL 27/371 and 27/542

Crossland Uranium Mines are exploring for uranium to the east of USI's EL 27/542. Their current model appears to favour the sediments to the north of the Mesoproterozoic Teapot Granite Complex as the host of a potential deposit (Figure 19, Top). The Teapot Granite Complex is particularly high in uranium (Figure 19, Middle).
To identify any anomalous zones with respect to uranium ratios of the radioelements can provide further constraints for identifying potential uranium deposits. Wyborn et al. (1994) showed that alteration zones associated with Coronation Hill-style mineralisation have slightly elevated uranium but are strongly depleted in thorium compared to the surrounding rocks which have high levels of both uranium and thorium. A ratio of $U^2/Th$ proved effective in highlighting uranium mineralisation in the area (Figure 19).

The $U^2/Th$ ratio is also effective in separating the primary uranium, associated with uranium-bearing granites (Teapot Granite), from secondary uranium associated with palaeochannel calcrete. High $U^2/Th$ ratio values are associated with many uranium deposits in Australia and can be used to highlight new areas of potential mineralisation.

Several $U^2/Th$ anomalies have been identified within EL 27/542 but only the anomalies associated with the sediments postdating the granite are considered worth following-up.
Figure 19: Correlation between the 250K NTGS geology with Crossland Uranium Mines Uranium Model (Top), relative Uranium abundance with white as high and purple as low (Middle) and Uranium\(^2\) / Thorium image which indicated potential Uranium anomalies (Bottom). The potential Uranium anomalies within USI’s EL which were identified in the U\(^2\) / Th image have been outlined in green and overlaid on each image.
5.3 Pb-Zn-Cu-Ag

Surrounding ELs 27/542 and 27/371 are three Pb-Zn-Cu-Ag mineral occurrences (Figure 20). The Stokes Yard occurrence lies approximately 750 m to the north of EL 27/371. This occurrence is reported in the NT mineral database to be within a pegmatite. The average assay results are; 2.1% Zn (50 samples), 1.4% Pb (49 samples), 0.23% Cu (65 samples) and 30.6 g/t Ag. The area is reported to be structurally complex. Diamond drilling in 1972 by the NTGS failed to intersect the mineralised unit at depth. The NTGS identified the mineralised unit to be deficient in Fe and suggested that it represents a deformed and metamorphosed Mississippi Valley Type (MVT) deposit.

A study by Leach et al., (2005) compared data from 247 sediment-hosted Pb-Zn deposits and determined that the SEDEX type, Broken Hill Type deposits (BHT) contain significantly higher Ag and Pb relative to other SEDEX categories. Comparison of the average assay values associated with the Stokes Yard mineral occurrence to the distribution of Pb-Zn-Cu-Ag for each deposit type, the assays appear to correlate with the BHT deposit.

Regardless of the possible proto-deposit type, it appears that the Stokes Yard mineral occurrence is representing a reworked MVT or SEDEX deposit. If the mineralisation of this occurrence can be found to extend into USI’s tenement(s) then a significant investigation is recommended to confirm the mineralisation style.

Also located in the area are two Cu-Pb-Zn-Ag mineralised veins, one within EL 27/542 (Glen Helen II) and one lie approximately 750 m to the east of the EL (Glen Helen III). The veins are associated with quartz and contain malachite, chalcocite and rare chalcopyrite. Further investigation of these veins is recommended.
Figure 20: Pb-Zn-Cu-Ag mineral occurrences surrounding ELs 27/543 and 27/371 (Top) with the stream sediment assay distributions represented as proportional symbols (bottom four images).
6 SUMMARY OF MINERALISATION POTENTIAL

Manganese

Trace amounts of Mn are recorded throughout 27/371. The source of the Mn is unclear but early indications suggest that the Madderns Yard Metamorphic Complex and the Bitter Springs Formation.

The Anmatjira Uplift Phase formed an uplifted area subjected to erosion prior to the development of the Amadeus Basin with subsidence at about 1080 Ma. The Heavitree Quartzite was deposited on the eroded surface of the Arunta Block. It forms a prominent ridge marking the northern edge of the basin. The Bitter Springs Formation overlies the Heavitree Formation. Later deposition indicates periods of marine transgression and regression with erosion of the Bitter Springs surface subsequent to the deposition of the Areyonga Formation on the eroded surface of the Bitter Springs Formation.

The Bitter Springs Formation consists of dolostone, minor sandstone, siltstone, shale, gypsum and halite clasts. This formation has been developed due to a deepening of the Amadeus Basin following the regression and a rapid decline in the supply of terrigenous sediment under anoxic conditions and progressing to highstand sediments.

These conditions provide an environment suitable for deposition on Mn in a shallow water environment where the anoxic conditions are disturbed during periods of marine transgression and regression. Both Mn oxide and carbonate mineralisation may be possible. A source of marine Mn is indicated in the Palaeoproterozoic to Mesoproterozoic Madderns Yard Metamorphic Complex of the Arunta Block crystalline basement.

Support for this interpretation is provided by several Mn occurrences are clustered within this Formation along strike to the east of EL 27/542 (eg: Fenn Gap (Figure 1). The Fenn Gap occurrence, averaging 39% Mn, is sub-vertical and consists of pyrolusite-stained brecciated dolostone. The mineralisation is limited to the surface and appears fault-controlled (Ferenczi, 2001).

Base metals

Base metal mineralisation is indicated in the Arunta Block at Stokes Yard approximately 750 m to the north of EL 27/371. The style of mineralisation is unclear but the elemental composition suggest it may be Pb-Zn of Broken Hill Sedex type.

If the mineralisation of this occurrence can be found to extend into USI’s tenement(s) then a significant investigation is recommended to confirm the mineralisation style.

Uranium

The potential for uranium in a roll front uranium in the Amadeus Basin is clearly demonstrated by the discovery of the Angela (Pamela) deposit. The Angela deposit, 25 km south of Alice Springs was discovered in 1973 and extensively drilled by Uranerz Australia in 1989, under a Uranerz-MIM joint venture. It has about 11,500 tonnes of U3O8 at 0.13%, spread over several kilometres in sandstone. The deposit is sometimes referred to as "Pamela".

The uranium deposit lies above the aquifer from which Alice Springs draws its town water supply. This has resulted in extensive opposition to mining by present owner Cameco and Palladin. The proximity to Alice Springs, road and railway corridors and relatively easy mining techniques made this an attractive prospect. However, the proximity has also
created a strong opposition group supported by those who fear for Alice Springs water supply.
7 REFERENCES


