

# AN EMERGING RARE EARTHS PRODUCER FOR USERS WORLDWIDE

# MULGA RARE EARTHS PROSPECT DRILLING RESULTS

Emerging rare earths producer **Arafura Resources Limited (ASX: ARU)** ("**Arafura**" or the "**Company**") advises that it has received final assay results from a sixteen-hole reverse circulation (RC) drilling program at the Mulga rare earths prospect – an exploration target located approximately 500 metres north-east of the Nolans Bore rare earths deposit on EL 28473 in the Northern Territory.

Low-grade rare earths assays were identified in ten of the sixteen drill holes with the highest result in hole MU0014, being 1.69% TREO from 35 to 36 metres.

Overall, a total of 32 assay samples exceeded 0.25% TREO and of these, seven exceeded 0.5% TREO (Table 2). These results are consistent with geological logging, and down-hole optical scans that show discrete narrow veins of Nolans Bore-type mineralisation.

The purpose of the drilling program was to test for shallow mineralisation beneath transported alluvium, close to where wide intervals of rare earths had been identified in exploration drilling in 2011 (Figure 1). The program was guided by anomalous biogeochemical assays, generated by sampling vegetation (trees) along a high priority airborne geophysical (structural) trend thought to be related to the Nolans Bore deposit.

While the assay results are encouraging, no additional exploration drilling at Mulga is warranted at this time.

The Company will however continue to use biogeochemistry to explore for rare earths mineralisation on other parts of its cornerstone Aileron-Reynolds land package that are under cover.

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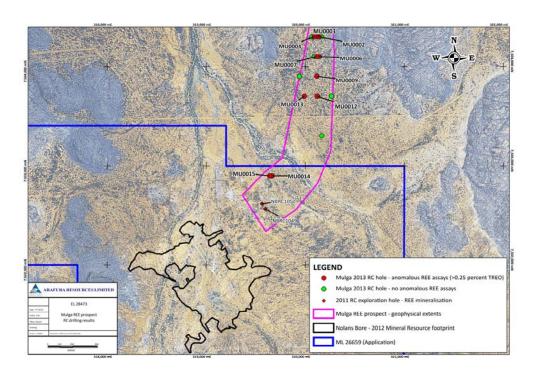


Figure 1: Mulga rare earths prospect and RC drilling on EL 28473, Northern Territory

Table 1: Details of RC drilling, Mulga prospect

HOLE NO.	EASTING m	NORTHING m	INCLINATION °	AZIMUTH °	TOTAL DEPTH m
MU0001	320165	7504300	60	90	48
MU0002	320140	7504300	60	90	60
MU0003	320115	7504300	60	90	60
MU0004	320090	7504300	60	90	60
MU0005	320065	7504300	60	90	60
MU0006	320140	7504100	60	90	60
MU0007	320115	7504100	60	90	60
MU0008	320090	7504100	60	90	60
MU0009	320115	7503900	60	90	57
MU0010	319940	7503900	60	90	60
MU0011	320265	7503700	60	90	60
MU0012	320120	7503700	60	90	60
MU0013	319990	7503700	60	90	60
MU0014	319665	7502900	60	90	60
MU0015	319640	7502900	60	90	60
MU0016	320165	7503300	60	90	60



Table 2: RC assay results, Mulga prospect

HOLE NO.	FROM m	TO m	INTERVAL m	TREO %	P <sub>2</sub> O <sub>5</sub> %	U₃O <sub>8</sub> ppm
MU0003	54	55	1	1.30	1.83	196
MU0013	37	38	1	0.55	1.03	28
MU0014	35	36	1	1.69	6.53	167
MU0014	36	37	1	1.50	4.58	125
MU0014	37	38	1	1.51	4.58	126
MU0014	38	39	1	0.61	1.83	58
MU0014	41	42	1	1.45	5.27	117



#### **JORC CODE 2012 COMPLIANCE STATEMENTS**

#### **Competent Person's Statement**

The information in this report that relates to Exploration Results is based on information compiled by Mr Kelvin Hussey, a Competent Person who is a Member of the Australian Institute of Geoscientists. Mr Hussey is a full time employee of Arafura Resources Limited. Mr Hussey has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Hussey consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

## Check list of assessment and reporting criteria for the Mulga prospect, November 2013

**Section 1: Sampling Techniques and Data** 

Criteria	Commentary
	Reverse Circulation (RC) drill chips collected via cone splitter at the drill rig.
	One representative ~4kg (average) sample taken for each one-metre drill length and collected in pre-numbered calico sample bag. Remaining RC sample residue from each one-metre drill length collected in pre-numbered polyweave bag and stacked in a systematic sequence with its matching calico sample placed on top. Where required, small <2kg calico bagged assay samples were re-combined with its original and then manually riffle split to achieve the desired 4kg assay sample.
	Quality of sampling, drill depth and sample numbers continuously monitored by Geologist during drilling operations.
Sampling techniques	Samples were selected for assay by the Competent Person following Arafura's standard sampling procedures and protocols. Of the 945 drilled metres, a total of 607 one-metre samples were selected for assay. Assayed intervals typically include samples with logged mineralisation, alteration, or samples above background levels of radioactivity plus material up to at least two metres away from possible alteration/mineralisation. In addition to this the top 20 metres of each hole was assayed. Analysis of the results demonstrates that all anomalous intervals are closed off.
	To monitor the representivity of the assay sample, ~4kg (average) field duplicate samples were collected manually by riffle splitting the entire onemetre RC residue from the polyweave bag. Field duplicates were collected into pre-numbered calico bags using a different number series. Field duplicates were collected at about 1 in 20 of the assayed samples and included a range of altered or mineralised samples and unmineralised country rocks.
	Reverse Circulation (RC) drilling employing a 140mm diameter face sampling hammer.
	The drill rig's air capacity was typically boosted via an auxiliary compressor.  This was done to ensure better recovery and the driest possible sample. Water injection was used to minimize dust emissions.
Drilling techniques	RC drilling tested anomalous biogeochemical signatures identified over a broad north-south geophysical feature based on a nominal 200mN x 25mE sample grid.
	Collars were sited and pegged by hand-held GPS so that the inclined exploration RC drill hole passed beneath the biogeochemical target at a drilling depth of about 20m.





RC sample recovery is recorded by the Geologist and based on how much sample is returned from the cone splitter. This is recorded for each one-metre RC drill sample as high (~71%), medium (~22%), low (~7%) and no recovery (~0.1%).

The moisture content of each recovered RC residue sample is recorded as dry (~7%), moist (~92%) or wet (~2%). Most samples were slightly moist as water injection was used to limit the amount of emitted dust (fines). Excessive water injection can mean that drill samples are wetter than anticipated. This was monitored by the Geologist and the Driller.

To ensure maximum sample recovery and the representivity of the sample, the Geologist is present during all drilling operations and monitored the drilling and sampling process.

Drill sample recovery

No significant sample recovery issues were encountered. As is typical of RC drilling, sample recovery was generally poor at the start of each hole but improved throughout the first rod (6m). Assay sample recoveries to the calico bag are typically acceptable. However on a number of occasions, the amount of sample delivered to the calico bag was deemed too low to be representative for assay, i.e. <2kg. In these cases, the sample in the calico bag was recombined with the residue in polyweave-bagged sample and the entire sample manually re-split again to achieve about a 4kg assay sample. The recovered assay sample from 0-1m in MU0001 was not assayed as it was not representative of the metre.

No twin RC or diamond drill holes have been completed. Hence it is not possible to assess sample bias due to preferential loss/gain of fine/coarse material or due to wet drilling.

Boosted air was employed for all RC drilling at the Mulga prospect, except the first 6 metres of each hole. Experience at the nearby Nolans Bore deposit has demonstrated that boosted air capacity typically provides better drill sample recoveries and keeps most samples relatively dry.

For each one-metre sample, representative RC chips were collected from the polyweave bag, sieved and washed clean for geological logging purposes. A representative sub-sample of these washed RC chips was carefully placed in pre-numbered chip trays by the Geologist. Chip trays are stored for reference.

Every individual one-metre drill interval was logged in detail by the Geologist, recording grainsize, texture, colour, mineralogy and rock type. The radioactivity of each one-metre polyweave bagged sample was also measured with a Geiger meter and the dosage recorded.

All primary data was electronically captured by the Geologist in the field via a Motion F5t Tablet with built-in GPS and entered directly into Arafura's Geobank Mobile® database. The database software has built-in validation routines that prevents or limits data entry errors. All geological logging data has been subsequently reviewed and checked.

Down hole geophysical data (azimuth, inclination, total magnetic field, natural gamma, gamma density, caliper and resistivity) was collected for all drill holes except MU0016, using open-hole survey methods. Not all holes remain open at depth which precludes 100% recovery of geophysical measurements from all drill holes. As a trial, down hole optical scans were run in nine holes, MU0001-MU0008 inclusive and MU0014. These optical scans were used to review and assess geological and assay data.

Down hole geophysical probes are routinely run through the Nolans Bore calibration hole at the start of each logging campaign to confirm the tools is operating correctly and performing within accepted margins of error.

The geologically logged interval corresponds to each one-metre drill sample and provides sufficient details to allow adequate assay sample selection.

This level of logging detail supports appropriate Mineral Resource estimation, mining studies and metallurgical studies.

Logging



RC chip samples of ~4kg were collected via automatic cone splitter into a prenumbered calico bag for each one-metre interval drilled. Samples were kept dry. Where possible small samples <2kg were recombined and manually riffle split to achieve the desired ~4kg sample size.

The sample size is considered appropriate to correctly represent this style of rare earth element (REE) mineralisation and associated alteration, the thickness and consistency of the intersections, sampling methodology, and the assay ranges for the primary elements of interest.

Sub-sampling techniques and sample preparation

Hand-held Geiger meters are used by the field assistants to measure and record the natural radioactivity of each one-metre RC sample. The instruments are routinely checked and monitored to ensure they are in good working order. Background activity is routinely measured at each drill site and recovered RC chip samples exceeding background levels are re-checked and confirmed by the Geologist.

The Competent Person assisted and supervised the first three days of drilling and sampling operations. Manual riffle splitting for assay samples and field duplicates was conducted by Arafura's experienced Senior Field Manager. Wet samples requiring manual riffle splitting were allowed to air dry for 1-3 days.

All RC samples to be assayed were submitted to Intertek Commodities in Alice Springs for sample preparation. RC samples were oven dried at 105°C for at least 6-8 hours before crushing in a Boyd jaw crusher with an RSD to achieve a 1-1.5kg split of -2mm material for milling in an LM5 Essa mill. Prepared pulps are p85/-100um. Assay samples were then prepared from the milled pulps as per Arafura's instructions. Equal quantities of the consecutive samples to be composited were accurately weighed and thoroughly mixed.

All prepared assay pulps were forwarded to Intertek NTEL in Darwin for assay by ICPMS/OES using Arafura's standard Nolans Bore assay scheme and suite of elements. Assay samples were digested using NTEL's G321 scheme which uses HCl/HNO<sub>3</sub>/HClO<sub>4</sub> and is an "ore-grade" digest suitable for Nolans Bore-type mineralisation. The assay values for Al, Ba, Ca, Ce, Dy, Er, Eu, Fe, Gd, Ho, La, Lu, Nd, P, Pr, Sm, Sr, Tb, Th, Tm, U, Y and Yb were then determined by ICPMS/OES.

Arafura's QAQC procedures involve the routine and systematic use of a CRM plus internal standards, field and laboratory duplicates, and blanks. A total of 126 QAQC samples were assayed in the six jobs. This included 12 assays of CRM ARA09-01, 31 assays of 16 internal standards, 19 blanks, 36 laboratory duplicates and 28 field duplicates. The CRM and the 16 internal standards cover the range of REE values reported and a suite of rock types commonly encountered at Nolans Bore. Minor variances and outliers were encountered in some of Arafura's internal standards but these were not material enough to discount the assay results. NTEL's assays should be regarded as preliminary results because planned confirmatory inter-laboratory checks have not yet been completed.

The blanks show there are no significant contamination issues and laboratory duplicates show the laboratory procedures are precise and well under control. Of the 28 field duplicates, 25 were found to pass within acceptable tolerance limits. The three low-grade suspect field duplicate are being investigated further.

All assay data is as reported by Intertek NTEL (NATA Accreditation No: 14610) for Laboratory Jobs NT37169 and NT37385-NT37389, inclusive. Assay results are reported to the Competent Person, electronically. Intertek NTEL is accredited for compliance with ISO/IEC 17025.

Down hole geophysical probes have been tested and calibrated and were also run through Arafura's calibration hole at Nolans Bore at the start of the logging campaign.

Quality of assay data and laboratory tests



The Competent Person has visited the Mulga prospect and spent the first three days of drilling operations supervising and assisting in field and sampling procedures.

The Geologist has logged all recovered RC chip samples and has conducted a review of all geological data. Significant intersections have been independently reviewed and verified by alternative company personnel (Competent Person).

The Competent Person has inspected the sample preparation facility at Intertek Commodities in Alice Springs, and the assay laboratory at Intertek NTEL in Darwin.

All assay data is as reported by Intertek NTEL (NATA Accreditation No: 14610) for Laboratory Jobs NT37169 and NT37385-NT37389, inclusive.

No adjustments have been made to any assay data, apart from the conversion to equivalent elemental oxides, the addition of elements or oxides as shown below, and as appropriate, the conversion from ppm values to % values.

The reported elemental data is stored in the Company's database, except for assays that produced below detection limit values which are reset to positive half detection value. Selected elemental oxides or summed elemental/oxide products are also stored in the database and are clearly labelled to avoid any confusion.

Verification of sampling and assaying

Oxide conversions and calculations are performed or reviewed by the Competent Person. The oxides were calculated from the reported elemental values according the following factors listed below:

 $\begin{array}{lll} La_2O_3; & 1.173 \ (i.e.\ ppm\ La\ x\ 1.173 = ppm\ La_2O_3); \ CeO_2; & 1.228; \ Pr_6O_{11}; & 1.208; \\ Nd_2O_3; & 1.166; \ Sm_2O_3; & 1.160; \ Eu_2O_3; & 1.158; \ Gd_2O_3; & 1.153; \ Tb_4O_7; & 1.176; \\ Dy_2O_3; & 1.148; \ Ho_2O_3; & 1.146; \ Er_2O_3; & 1.143; \ Tm_2O_3; & 1.142; \ Yb_2O_3; & 1.139; \\ Lu_2O_3; & 1.137; \ Y_2O_3; & 1.270; \ U_3O_8; & 1.179; \ and \ P_2O_5; & 2.291. \end{array}$ 

Rare earth oxide is the industry accepted form of reporting rare earths. The TREO (Total Rare Earth Oxide) is calculated as follows:

$$\begin{split} & \mathsf{TREO} = \mathsf{La}_2\mathsf{O}_3 + \mathsf{CeO}_2 + \mathsf{Pr}_6\mathsf{O}_{11} + \mathsf{Nd}_2\mathsf{O}_3 + \mathsf{Sm}_2\mathsf{O}_3 + \mathsf{Eu}_2\mathsf{O}_3 + \mathsf{Gd}_2\mathsf{O}_3 + \mathsf{Tb}_4\mathsf{O}_7 + \mathsf{Dy}_2\mathsf{O}_3 \\ & + \mathsf{Ho}_2\mathsf{O}_3 + \mathsf{Er}_2\mathsf{O}_3 + \mathsf{Tm}_2\mathsf{O}_3 + \mathsf{Yb}_2\mathsf{O}_3 + \mathsf{Lu}_2\mathsf{O}_3 + \mathsf{Y}_2\mathsf{O}_3. \end{split}$$

REE values are calculated and entered in the database using the following formula:

REE = La + Ce + Pr + Nd + Sm + Eu + Gd + Tb + Dy + Ho + Er + Tm + Yb + Lu

The Competent Person has used geological logs, assay results and selected geochemical ratios to determine and assess the REE mineralisation.

Location of data points

All collars were pegged by hand-held GPS with an accuracy of about 5 metres prior to drilling. No accurate topographic control is available. This level of accuracy is sufficient for the scope of the program undertaken.

The grid system for the Mulga prospect is based on GDA94 and MGA Zone 53 coordinates.

All holes are capped and clearly labelled. The acquisition of accurately surveyed collar locations is planned but has not yet occurred.

Down hole directional surveys have been acquired by Borehole Wireline Pty Ltd for all holes except MU0016. MU0016 will be logged at a later date.



Data spacing and distribution	Drill collars were sited and pegged by hand-held GPS so that the inclined exploration RC drill hole passed beneath the biogeochemical target at a drilling depth of about 20m. The drill collars were sometimes slightly offset from the target to align drill collars with a regular 200m-spaced grid coordinate.
	The first 20 metres of every RC drill hole was routinely included for assay. In addition, altered or mineralised intervals identified by geological and or radiometric logging, or those intervals considered to have some mineral potential, were included for assay by the Competent Person. Where possible, the assayed interval also included at least 2 metres of unmineralised country rock.
	A total of 307 assay samples were prepared from 607 routine one-metre RC samples. Samples were composited at the laboratory according to instructions from the Competent Person, based on geological similarities, lithology and measured radioactivity. A total of 104 routine one-metre samples were assayed along with 106 x two-metre and 97 x three-metre composited assay samples.
Orientation of data in relation to geological structure	Drilling targeted anomalous biogeochemical samples based on 200-metres spaced east-west sampling traverses. Exploration drill sections were designed to cross the broadly north-south geophysical feature at a high angle.
	Where available, down hole optical scans show discrete narrow mineralised veins at an angle to the RC drilling direction. As such, the assayed intervals are not true widths.
	Exploration drilling density at the Mulga prospect is not systematic and too widely spaced to establish the degree of geological and grade continuity appropriate for Mineral Resources and Ore Reserves estimation procedures and classifications to apply.
	The project area is remote and no unauthorised persons entered the property during drilling and sampling operations.
Sample security	Samples were collected from the drill site within 1-3 days of drilling and temporarily stored overnight at Arafura's field office at Aileron. Arafura's Senior Field Manager subsequently delivered the samples to the Intertek Commodities sample preparation facility in Alice Springs. Prepared assay sample pulps were transported to the Intertek NTEL laboratory in Darwin following NTEL's security procedures. Back up master assay pulps are securely stored at Intertek Commodities' facility in Alice Springs and were transported to Intertek NTEL separately.
	All dispatched assay samples were received at the assay laboratory and no samples were lost or damaged in transport.
	Assay sample pulps have been recovered from the laboratory for safe long- term storage at Arafura's exploration storage facility in Darwin.
	The Geologist has reviewed and audited geological data in the database. This has been reviewed by the Competent Person.
Audits or reviews	The Competent Person has randomly audited the reported assay data against that in the database.
	Where available, down-hole optical scans have been used to review and assess geological data and the selected assay sample intervals.



**Section 2: Reporting of Exploration Results** 

Criteria	Commentary
	The Mulga prospect is located wholly within Exploration Licence (EL) 28473 which is 100% owned by Arafura Resources Ltd. The southern parts of the Mulga prospect lie within the area covered by Mineral Lease (ML) application 26659 which is 100% owned by Arafura Rare Earths Pty Ltd., a wholly-owned subsidiary of Arafura Resources Ltd.
	The tenement is situated on Pastoral Land and the prospect spans the boundary between Aileron (PPL 1097) and Pine Hill (PPL 1030) Stations.
Mineral tenement and land tenure status	Arafura Resources has executed a Native Title Exploration Agreement with the Central Land Council (CLC) on behalf of the Native Title Holders for this tenement.
	Arafura was issued Sacred Site Clearance Certificate 2013-052 which provides clearance for the exploration drilling activities conducted at the Mulga prospect.
	At the time of reporting, there are no known impediments to obtaining a license to operate in the area and the tenement is in good standing.
	Arafura discovered this concealed prospect based on its exploration strategies.
Exploration done by other parties	PNC Exploration (Australia) Pty Ltd conducted regional exploration programs in the general area in 1994-1996 but no on-ground exploration has been completed by other parties at this prospect.
Geology	The Mulga prospect is located 0.5-2 km NNE of the Nolans Bore REE-P-U deposit in the Aileron Province of the Arunta Region. The prospect is hosted by metamorphosed Proterozoic sedimentary and igneous rock units, and is concealed beneath a thin layer of alluvial and colluvial transported cover. The host rocks are interpreted to be parts of the Aileron Metamorphics, Lander Rock beds and the Boothby Orthogneiss as mapped in nearby outcrops. Calcsilicate alteration has been logged in RC drill chips, and down hole optical scans confirm the alteration and that the mineralisation is vein hosted. This, together with the assays, suggests the mineralisation style is akin to Nolans Bore.
Drill hole information	Refer to Figure 1 and Table 1
	Assay data has not been aggregated in this release.
Data aggregation methods	The standard practice for Nolans Bore-type mineralisation and Mineral Resources estimation procedures, is to apply a nominal 5,000ppm (0.5%) REE cut-off to all REE grade calculations with a maximum of 2m continuous internal dilution allowed.
Relationship between mineralisation widths and intercept lengths	RC drilling is sampled and assayed in one-metre intervals. Based on the reported assays and knowledge gained from the nearby Nolans Bore REE-P-U deposit together with observations from the down hole optical scans, the mineralisation at the Mulga prospect is likely to be confined to discrete narrow veins. Where available the optical scans show the veins are intersected at an angle indicating the intercept lengths are not true lengths. Not all holes were optically scanned and digital capture was not always achieved for 100% of the hole.
Diagrams	A plan view of the drill collar locations is shown in Figure 1.



	All assay results exceeding 0.5% TREO are reported in Table 2.
Balanced reporting	For LREE-enriched Mineral Resources, Arafura adopts a nominal 0.5% (5,000ppm) REE cut-off for mineralisation and this has been routinely used in Mineral Resources categories and estimates for the Nolans Bore deposit. This cut-off equates to about 0.6% TREO for typical Nolans Bore-type mineralisation. However from an exploration point of view, REE values for LREE-enriched mineralisation above about 2,000 ppm (or about 0.25% TREO) can generally be regarded as geochemically anomalous, particularly when this is compared to the world average Upper Continental Crust (UCC) which is about 203 ppm TREO (Rudnick and Gao 2003). 10% of the Mulga program assays exceed 0.25% TREO.
	Three field duplicates are being re-checked as part of Arafura's routine QAQC protocols. These routine and duplicate pairs did not match within acceptable tolerance limits. They were for two low-grade and one weakly anomalous REE result. These differences are sometimes seen with low-grade Nolans Bore-type mineralisation and associated alteration and do not materially influence the reported results. The fact that 25 of 28 field duplicates matched within acceptable tolerance limits confirms the sampling protocols are acceptable, particularly as no medium- to high-grade mineralisation was encountered.
	Arafura acquired a detailed, low-level airborne magnetic and radiometric survey over the Aileron-Reynolds project area in 2008. This survey covers the Mulga prospect with additional adjoining airborne surveys acquired in 2011 and 2013. Arafura's proprietary airborne surveys are in addition to the publically available geophysical datasets.
	A regional airborne hyperspectral survey was also acquired over most of the outcropping areas in the Aileron-Reynolds project area in 2008. This covered the Mulga prospect.
Other substantive exploration data	Arafura acquired World View 2 satellite imagery (0.5m pixel resolution) over the Nolans Bore project area in 2012. The northern extent of this imagery also covers the southern part of the Mulga prospect and all of the area drilled. Additional regional and less detailed SPOT5 satellite imagery (2.5m pixel resolution) was also purchased over the project area in 2012.
	Arafura has conducted exploration and surface mapping programs in the project area but activities have largely focused on outcropping regions.
	A regolith mapping project was conducted over an area slightly larger than ML 26659. The northern parts of this regolith map cover part of the Mulga prospect.
	Arafura has collected extensive geological and metallurgical data from the Nolans Bore deposit and surrounds in support of its exploration and resource definition programs.
	Arafura has collected a substantial biogeochemical orientation dataset over Nolans Bore deposit and surrounds.
Further work	Geological mapping, prospecting and additional targeted biogeochemical sampling is planned across geophysical targets in Arafura's Aileron-Reynolds land package.

Reference: Rudnick R L and Gao S, 2003. Composition of the continental crust, p 1-64. *In* The Crust (editor: RL Rudnick) Volume 3, Treatise on Geochemistry. (Editors HD Holland and KK Turekian). Elsevier-Pergamon, Oxford.