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## **ENCOURAGING TOTAL HEAVY MINERAL SANDS RESULTS FROM MANNAR ISLAND, SRI LANKA, DRILLING**

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### **HIGHLIGHTS:**

- **Average of 10.61% total heavy minerals (THM) over 131cm from 115 boreholes using a 1% lower cut-off THM**
- **The amount of valuable heavy minerals (VHM) present in the total heavy minerals (THM) is estimated as 50% ilmenite, 12% leucoxene, 2% rutile and 3% zircon from initial studies. Additional mineralogical studies are being undertaken.**
- **The results show good concentrations of the valuable minerals in the assemblage and these results are generally positively comparable with other world class mineral sands resources globally**
- **The results were from drilling a very small proportion of the total licence area – the next step will be to test the extent of the mineralisation through lateral and vertical extension drilling**
- **The mineral assemblage would indicate that, if maintained, the project could have favourable economic criteria for short term exploitation**

Windimurra Vanadium Limited (“**Windimurra**”) is pleased to provide further results from the analysis of exploration drilling conducted on the heavy minerals sands project at Mannar Island in Sri Lanka.

The latest assessment, by GeoActiv (Pty) Ltd (“**GeoActiv**”), follows on earlier reports by the same consultant on Heavy Mineral Concentrate and exploration results in the Manner Island licence areas. This report assessed the mineral components, or assemblage, within the heavy mineral concentrate

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(HMC). This was achieved by conducting Carpc magnetic separation, X-Ray Fluorescence (XRF) chemical and mineralogical examination of selected samples from the work that was undertaken as part of the due diligence process in the now completed acquisition by the Company of Srinel Holdings Limited (“Srinel”), owner of 13 Sri Lankan exploration licences prospective for mineral sands.

These results follow previous reports received from GeoActiv that were announced on the ASX on 9 December 2014. A copy of the latest results and a summary report are attached.

In report 3, the samples collected from three licence areas, EL 182, EL 180 and EL 203 were analysed, after being constituted into 152 individual samples. The test suite at this stage of the process is intended to provide information on the characteristics of the minerals within the assemblage to help define methods that may be used for their eventual separation during commercial exploitation.

The first test, the Carpc magnetic susceptibility test shows the potential to separate different minerals using the magnetic characteristics. Almost 50% of the material in the samples is magnetically susceptible, the remainder being quite evenly split into low or no susceptibility. The highest TiO<sub>2</sub> content was recorded in the ilmenite fractions whilst rutile and zircon reported to the non-magnetic fraction. The non-magnetic fractions also contained high aluminium silicate levels.

Stereomicroscopy formed the basis of the mineralogical investigation and revealed that the ilmenite fraction consists of mainly unaltered ilmenite, with leucoxene forming the bulk of the altered ilmenite particles.

Overall, the ilmenite fractions in the samples show an encouragingly high TiO<sub>2</sub> content and low iron amounts, which suggests the ilmenite particles have been relatively enriched in TiO<sub>2</sub> due to Fe<sub>2</sub>O<sub>3</sub> depletion. Titanium also occurs in the fractions with lower magnetitic susceptibility, which is typical of the leucoxene – type mineralisation.

#### **Competent Persons Statement**

*The details contained in the document that pertains to exploration results are based upon information compiled by Mr. JN Badenhorst from GeoActiv (Pty) Ltd. Mr. Badenhorst is an independent consultant for Srinel. He is a Member of the South African Council for Natural Scientific Professions (registration number 400157/07) and has sufficient experience which is relevant to the style of mineralisation and type of deposits under consideration and to the activity which he is undertaking 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. Badenhorst consents to the inclusion in this release of the matters based on the information in the form and context in which it appears.*



JN Badenhorst

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**JORC  
TABLE 1  
Section 1 Sampling Techniques and  
Data**

(Criteria in this section apply to all succeeding sections.)

JORC Code Assessment Criteria	Comments
<p><b>Sampling Techniques</b>  <i>Nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.</i>  <i>Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.</i>  <i>Aspects of the determination of mineralisation that are Material to the Public Report. In cases where 'industry standard' work has been done this would be relatively simple (e.g. 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (e.g. submarine nodules) may warrant disclosure of detailed information.</i></p>	<p>A hand-auger specifically manufactured for the project was used for auger drilling. The bucket was designed to be able to do 0.5 m samples per drill run.            Sampling was therefore done on 0.5 m intervals, unless penetration problems caused incomplete samples at the end of holes. Where some minor penetration problems were experienced, smaller sample runs were done.            The full sample from the auger bucket was collected in a plastic sample bag and assigned an Alpha numerical sample number.            All samples were transported to Colombo after completion of drilling. Samples were riffled and homogenized before they were reduced to a ca. 1.5 kg size by using the riffle splitter. This size is seen as large enough to be representative of the original intersection.            All samples from the drilling program were prepped, even samples perceived to be low grade. All the samples were packed for transport. Permits for the export of the samples were sourced in Sri Lanka, on receipt of the permits the samples were couriered via air freight to Johannesburg where clearance took place for the samples. They were then air freighted to Cape Town where a representative from the laboratory, Scientific Services CC, collected the samples.</p>
<p><b>Drilling Techniques</b>  <i>Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc.), and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).</i></p>	<p>A hand-auger specifically manufactured for the project was used for auger drilling.            The bucket has a diameter of 100mm.            The auger bucket was designed to drill 0.5 m samples per drill run. Larger samples would have become too heavy and would have resulted in sample falling out of the bucket.            One meter drill rod extensions were used, with sufficient extensions on site to drill to 4m. The deepest auger hole drilled was NS06 drilled within EL182 to 3.70m.</p>
<p><b>Drill Sample Recovery</b>  <i>Method of recording and assessing core and chip sample recoveries and results assessed.</i>  <i>Measures taken to maximise sample recovery and ensure representative nature of the samples.</i>  <i>Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.</i></p>	<p>Care was taken that a full 0.5 m drill run resulted in a full sample bucket. Re-drilling took place where this was not the case, or the hole and sampling stopped where sample recovery became a problem.            The sample recovery or penetration problems were either linked to the shallow water table, or the limits to drilling depth with the hand held auger.</p>

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JORC Code Assessment Criteria	Comments
<p><b>Logging</b></p> <p><i>Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.</i></p> <p><i>Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc), photography.</i></p> <p><i>The total length and percentage of the relevant intersections logged.</i></p>	<p>Each sample was geologically logged for mineral composition, grain size, sorting, visual %silt, induration, and a rough visual estimate of the dark heavy mineral % component.</p> <p>Paper log information was transferred every night to an excel spreadsheet.</p>
<p><b>Sub-Sampling Techniques and Sample Preparation</b></p> <p><i>If core, whether cut or sawn and whether quarter, half or all core taken.</i></p> <p><i>If non-core, whether riffled, tube sampled, rotary split, etc, and whether sampled wet or dry.</i></p> <p><i>For all sample types, the nature, quality and appropriateness of the sample preparation technique.</i></p> <p><i>Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.</i></p> <p><i>Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.</i></p> <p><i>Whether sample sizes are appropriate to the grain size of the material being sampled.</i></p>	<p>The full samples were riffled and homogenized using a single layer riffler.</p> <p>The samples were then reduced to a ca. 1.5 kg size by using the riffle splitter.</p> <p>A duplicate sample was riffled from every 20th sample, i.e. 5% of the total.</p> <p>The riffler was thoroughly cleaned after each sample.</p>
<p><b>Quality of Assay Data and Laboratory Tests</b></p> <p><i>The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.</i></p> <p><i>For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.</i></p> <p><i>Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.</i></p>	<p>Analytical work on the tetrabromoethane (TBE) based THM determination and subsequent magnetic separation work is done by Scientific Services C.C., Cape Town. XRF work is done on the fractions of the magnetic separation samples.</p> <p>The determination of %THM sample concentrate using TBE at a specific gravity (SG) of 2.95, as well as the desliming work, are as follows:</p> <ul style="list-style-type: none"> <li>• TBE is placed into the glass flask up to the indicated mark.</li> <li>• Place approximate 1 scoop of sample into the flask.</li> <li>• Wash down the sides of the flask and impeller with TBE to ensure all material is in the TBE.</li> <li>• Run the mixer for about 10 seconds.</li> <li>• Wash down again to ensure no material is 'hung'.</li> <li>• Run the impeller mixer repeatable in 10 second bursts until sure that all heavies have been liberated.</li> <li>• Allow to stand for 5-10 minutes or until no more material cascades to bottom.</li> <li>• Once the discharge pipe is clear of suspended material release the tube to allow the concentrate to be captured in the filter paper. Store this labeled filter paper.</li> <li>• Process any remaining sample as above ensuring no concentrate is lost.</li> <li>• Finally flush out the floats by opening the tube and allowing the floats to fall into filter paper – allow this to stand capturing all the TBE which will be reused at a later stage.</li> <li>• Wash all concentrates and floats thoroughly with acetone to reclaim as much TBE as possible.</li> <li>• After the concentrate filter is acetone rinsed and dried, transfer the concentrate very carefully into a bag by opening the filter paper ensuring nothing is lost.</li> <li>• Place the floats into the waste drums unless specified by the client to do otherwise.</li> </ul>

JORC Code Assessment Criteria	Comments
	<ul style="list-style-type: none"> <li>• Check the SG of the TBE with the density tracers provided and re-use as appropriate.</li> <li>• The sample once received and reviewed with paperwork is then weighed.</li> <li>• Water and NaOH (0.2%) is added to the sample – approximate 3:1 (H2O: Sample). Attrition for 10minutes.</li> <li>• The sample is then wet screened through 1 mm and 45<math>\mu</math> screens.</li> <li>• Ensure that both screens are clean and free from any damage. If damage is evident - report this sieve to the QC.</li> <li>• Place the +1 mm and the -1mm, +45<math>\mu</math>, sample into stainless steel pans with tags representing the sample number. These trays are then placed in an oven for drying. The -45<math>\mu</math> is discarded in the wet screening process.</li> <li>• The dried samples are weighed to determine the % oversize and % slimes fractions.</li> </ul> <p>Depending on clients request the sample is either split with a Rotary Splitter or the entire sample is sent through for THM.</p>

<b>JORC Code Assessment Criteria</b>	<b>Comments</b>
<p><b>Verification of Sampling and Assaying</b></p> <p><i>The verification of significant intersections by either independent or alternative company personnel.</i></p> <p><i>The use of twinned holes.</i></p> <p><i>Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.</i></p> <p><i>Discuss any adjustment to assay data.</i></p>	<p>23% of the drilling that took place weretwinned historic boreholes on the project.</p> <p>QAQC of all the work done performed by JN Badenhorst and FJ Kruger of GeoActiv.</p>
<p><b>Location of Data Points</b></p> <p><i>Accuracy and quality of surveys used to locate drill holes (collar and downhole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.</i></p> <p><i>Specification of the grid system used.</i></p> <p><i>Quality and adequacy of topographic control.</i></p>	<p>Data and work was done in Lat Long, WGS84.</p> <p>A hand held Garmin GPS was used for the positioning and final position of the auger holes.</p> <p>The X and Y coordinates were collected and entered into the project spreadsheet.</p> <p>The Z data were found to be very inaccurate. A GeoEye satellite based Digital Terrain Model (DTM) study has been initiated. The X and Y coordinates of the boreholes was used to elevate the boreholes to the DTM surface prior to resource modelling taking place. This will supply significantly more accurate Z data as the DTM is based on 13 Differential GPS derived points.</p>
<p><b>Data Spacing and Distribution</b></p> <p><i>Data spacing for reporting of Exploration Results.</i></p> <p><i>Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.</i></p> <p><i>Whether sample compositing has been applied.</i></p>	<p>Historic drilling by Sri Lanka Geological Survey and Mines Bureau (GSMB) took place at 200 m inter-line spacing, perpendicular to the coast line. Drilling rarely reached further than 150 m inland from shoreline.</p> <p>The new drilling program aimed to verify historic data in mostly higher grade areas, but also checking some lower grade areas, by at least one borehole every 500 m inter-line spacing.</p> <p>Several new auger holes were drilled further inland to check for mineralization. Holes deeper inland were generally &lt;300 m from the coast line, but in EL182 some drilling took place 1,000 m from the coastline.</p>
<p><b>Orientation of Data in Relation to Geological Structure</b></p> <p><i>Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.</i></p> <p><i>If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.</i></p>	<p>Drilling took place in fences perpendicular to the coast line, in the tidal, beach and berm zones. Some drilling were further inland.</p>
<p><b>Sample Security</b></p> <p><i>The measures taken to ensure sample security.</i></p>	<p>All sampling, prep and packing work took place under supervision of a GeoActiv geologist.</p> <p>A representative from the Analytical laboratory, Scientific Services CC, collected the samples from the airport in Cape Town, South Africa.</p> <p>The GeoActiv geologist spent two days at the laboratory sorting the samples and getting them ready for analyses, in the process making sure all samples did arrive at the laboratory in acceptable condition.</p>
<p><b>Audits and Reviews</b></p> <p><i>The results of any audits or reviews of sampling techniques and data.</i></p>	<p>Statistical analyses of the QAQC samples were conducted by GeoActiv.</p> <p>No other audits or reviews have taken place.</p>
<p><b>Mineral Tenement and Land Tenure Status</b></p> <p><i>Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national</i></p>	<p>EL180 and EL182 are wholly owned by Supreme Solutions (Pvt) Ltd, the licences are valid to 1 September 2015.</p> <p>The opinion on tenure mentioned above was produced by a legal company in Sri Lanka called Varners.</p>

JORC Code Assessment Criteria	Comments
<p><i>park and environmental settings.</i>  <i>The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.</i></p>	<p>Srinel Holdings Limited is the legal and beneficial owner of all of the fully paid ordinary shares in the capital of Singha Lanka Investments (Private) Limited which in turn is the legal and beneficial owner of all of the fully paid ordinary shares in the capital of Supreme Solutions Limited, the holder of the exploration licences in Sri Lanka.</p>
<p><b>Exploration Done by Other Parties</b></p> <p><i>Acknowledgment and appraisal of exploration by other parties.</i></p>	<p>Between October and November 2011, a fieldwork exploration program was completed in EL180 and EL182 by personnel of the GSMB. An auger drilling and sampling program took place across the tidal, beach and berm zones throughout much of the licences at a spacing of 10 to 60 m on lines 200 m apart, perpendicular to the coastline.</p> <p>The auger drilling was done utilizing a hand-held auger machine, with drilling depth limited by the generally shallow water table and the limits to drilling depth set by the drilling technique.</p> <p>The auger sampling program only encompassed a narrow section of the foreshore sediments, with very few auger holes located in the backshore sediments.</p> <p>All of the auger samples collected by the GSMB were provided to Supreme and subsequently submitted to the VV Minerals (Pvt) Ltd laboratory in Tamil Nadu, India for mineralogical analysis.</p>
<p><b>Geology</b></p> <p><i>Deposit type, geological setting and style of mineralisation.</i></p>	<p>There is general consensus that the heavy minerals in Sri Lanka were derived from Precambrian (Proterozoic) high-grade metamorphic rocks that account for more than ninety percent of the island. These crystalline basement units are subdivided into 3 major litho-tectonic subdivisions, namely the Highland, Wannai and Vijayan Complexes.</p> <p>The heavy minerals ilmenite, rutile, zircon, sillimanite and garnet commonly occur in the coastal sands. Mineralization is high in the tidal, beach and berm areas, but can also be seen inland on Mannar Island.</p>
<p><b>Database Integrity</b></p> <p><i>Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.</i>  <i>Data validation procedures used.</i></p>	<p>The data was captured in Excel spreadsheets. GeoActiv performed validation checks on all the data and analyses before it was used in modelling.</p>
<p><b>Site Visits</b></p> <p><i>Comment on any site visits undertaken by the Competent Person and the outcome of those visits.</i>  <i>If no site visits have been undertaken indicate why this is the case.</i></p>	<p>The Competent Person, JN Badenhorst, visited the exploration sites during the auger drilling phase in 2014.</p>
<p><b>Geological Interpretation</b></p> <p><i>Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.</i>  <i>Nature of the data used and of any assumptions made.</i>  <i>The effect, if any, of alternative interpretations on Mineral Resource estimation. The use of geology in guiding and controlling Mineral Resource estimation.</i>  <i>The factors affecting continuity both of grade and geology.</i></p>	<p>All the drillhole intersections were considered as the mineralization envelope from surface to the end of holes. The shoreline or a.m.s.l. were taken as the boundary of the mineral sand resource on the seaside and a 50 m inland boundary from the dense drilled drillholes. The current drill spacing provides sufficient degree of confidence in the interpretation and continuity of grade for an Inferred Mineral Resource.</p>

JORC Code Assessment Criteria	Comments
<p><b>Dimensions</b></p> <p><i>The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.</i></p>	<p>The extents of the mineralization were in the EL182 - EL203 licence area, 20 300 m x 100 m x 1 m and in the EL180 licence area, 31 700 m x 100 m x 1 m.</p>
<p><b>Estimation and Modelling Techniques</b></p> <p><i>The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters, and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.</i></p> <p><i>The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data. The assumptions made regarding recovery of by-products. Estimation of deleterious elements or other non-grade variables of economic significance (e.g. sulfur for acid mine drainage characterisation).</i></p> <p><i>In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.</i></p> <p><i>Any assumptions behind modelling of selective mining units. Any assumptions about correlation between variables. Description of how the geological interpretation was used to control the resource estimates.</i></p> <p><i>Discussion of basis for using or not using grade cutting or capping.</i></p> <p><i>The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.</i></p>	<p>The block sizes that were created were 100 m X 100 m X 2 m and with minimum sub blocking of 25 m X 25 m X 0.5 m.</p> <p>Inverse distance to the power of 3 was used for <i>in situ</i> grade interpolation for all the variables.</p> <p>The general aspects of the estimation are as follows:</p> <ul style="list-style-type: none"> <li>• A minimum of 3 samples and a maximum of 15 samples were used for all inverse distance runs;</li> <li>• Pass 1: search radii set to 100 m for the major and 1 m for the vertical;</li> <li>• Pass 2: search radii set to 600 m for the major and 2 m for the vertical;</li> <li>• Pass 3: search radii set to 1000 m for the major and 10 m for the vertical;</li> <li>• Block discretisation was set to 4(X) by 4(Y) by 4(Z);</li> <li>• One sample limit per drillhole were applied; and</li> <li>• The mineral associations for ilmenite (ilm), leucoxene (leu), rutile (rut) and zircon (zir) are calculated with an expression derived from the mineralogical investigation.</li> </ul> <p>The model was validated visually and statistically. The result of the validation shows that the interpolation has performed as expected and the model was a reasonable representation of the data used and the estimation method applied.</p>

## **Report 3 for Srinel Holdings Limited on results from exploration drilling on heavy mineral sands project, Mannar Island, Sri Lanka**

Written by: JN Badenhorst  
Date: 01/04/2015  
Client: Srinel Holdings Limited

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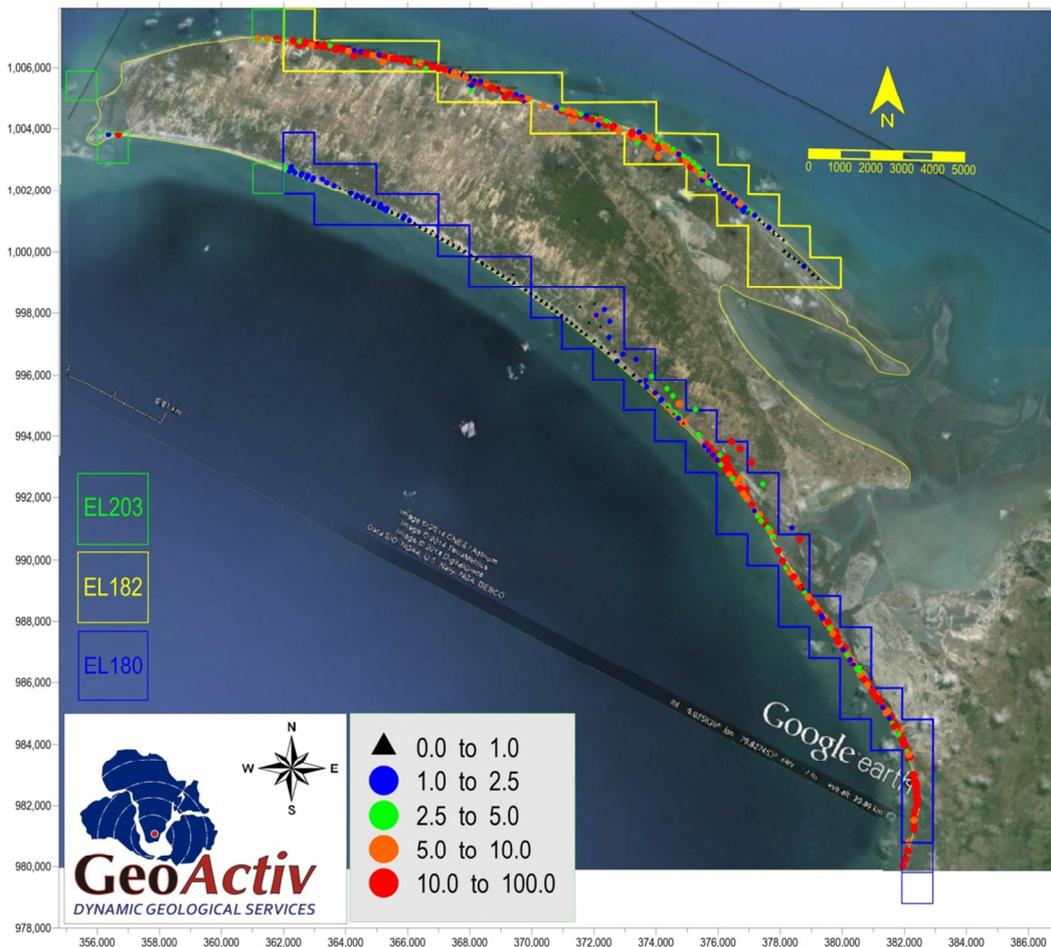
GeoActiv (Pty) Ltd (GeoActiv) is pleased to present to Srinel Holdings Limited (Srinel) results from the Carpc magnetic separation, the X-Ray Fluorescence (XRF) chemical results and mineralogical examination of selected samples. This report has been compiled by JN Badenhorst from GeoActiv, the geologist signing off as competent person, on behalf of Srinel. L Reyneke conducted the mineralogical examination under supervision of JN Badenhorst.

Srinel is the legal and beneficial owner of all of the fully paid ordinary shares in the capital of Singha Lanka Investments (Private) Limited, which in turn is the legal and beneficial owner of all of the fully paid ordinary shares in the capital of Supreme Solutions Limited, the holder of the exploration licenses in Sri Lanka.

## 1. Background

The exploration program, background on historical work and all Heavy Mineral Concentrate (HMC) / Total Heavy Mineral (THM) results received were reported on in “Report 1 for Srinel Holdings Limited on results from exploration drilling on heavy mineral sands project, Mannar Island, Sri Lanka” and “Report 2 for Srinel Holdings Limited on results from exploration drilling on heavy mineral sands project, Mannar Island, north-western Sri Lanka”. When conducting weighted averages on all THM data from all new program boreholes (BH’s), an average of **10.61% THM over 131cm for 115 BH’s** can be seen (using a bottom cut-off of 1% THM). Figure 1 indicates all BH’s drilled (historic and new) on the license areas in terms of the THM % results. Subsequent work reported on here includes Carpco magnetic separation, the X-Ray Fluorescence (XRF) chemical results and mineralogical examination of selected samples from EL180, EL182 and E203. The ultimate aim of this work is to determine the valuable heavy mineral (VHM) assemblage within the THM.

**Figure 1:** All drilling, historical and Srinel, done within EL 180, EL182 and EL203, with weighted %THM / HMC indicated.



## 2. Discussion on Carpco Magnetic Separation Results

For the Carpco magnetic separation and XRF work samples were composited according to THM grades (very low grade samples, e.g. < c. 1%THM, were not used in compositing) in borehole format, with samples representative of all areas drilled. A hundred and fifty two (152) composite samples were done by Scientific Services.

The four separate fractions obtained from Carpcoc magnetic separation represents the following:

- The 0.1 Amp fraction represents the highly magnetic susceptible minerals, nearly exclusively the magnetite content of the heavy mineral concentrate (HMC). As can be seen from the results in Table 2, the magnetite content is very low (average of c. 0.06% of the HMC for the 152 composite samples).
- The 1.1 Amp fraction (Crude ilmenite fraction) represents magnetic susceptible minerals, predominantly unaltered ilmenite, but altered ilmetite, leucoxene and magnetic silicate gangue minerals may also be present. This fraction represents nearly 50% of the HMC from the 152 composite samples.
- The 2.4 Amp fraction (Magnetic Others Fraction) represents slightly magnetic susceptible minerals, consisting of ilmenite, altered ilmetite, leucoxene and a variety silicate and other gangue minerals. This fraction represents c. 26% of the HMC from the 152 composite samples.
- The 2.4 Amp fraction (Non Magnetic Fraction) represents non-magnetic susceptible minerals (at 2.4 Amp), consisting of a variety of silicate and other gangue minerals, including rutile and zircon. This fraction represents c. 24% of the HMC from the 152 composite samples.

### 3. Discussion on XRF Results

XRF chemical analyses were conducted on the 1.1Amp, 2.4Amp Magnetic Others and 2.4Amp Non Magnetic fractions at Scientific Services for all 152 composite samples. No XRF was conducted on the 0.1Amp (magnetite) fraction as the Carpcoc magnetic separation showed this fraction to have very low % concentrations. The results were used during the mineralogical examination to determine the VHM content of the THM.

### 4. Discussion on mineralogical examination

The 1.1Amp Crude ilmenite, 2.4Amp Magnetic Others and 2.4Amp Non-Magnetic fractions from nine (9) composite samples, representing differed grades and from different areas from the deposit, were used for a mineralogical examination. The examination took place with stereomicroscopy and optical microscopy point counting.

The aim of this mineralogical investigation was to:

- Provide an initial identification of the minerals present in the fractions;
- Provide a mineralogical quantification of the magnetic separation fractions;
- Correlate the bulk chemical analyses of the fractions with the mineral data.

The stereomicroscopy findings were as follows:

- The **ilmenite fractions** from the different samples are similar with respect to mineral assemblages, as is the magnetic-others and non-magnetic fractions. These fractions consist mainly of unaltered, metallic iron-black ilmenite grains. Altered ilmenite particles, partially and completely transformed to leucoxene, also occur. The gangue minerals present seems to be mainly garnets while pyroboles (amphibole and/or pyroxenes) are also present.
- For the **Magnetic-others fractions** unaltered ilmenite is still a main constituent in this fraction, while particles exhibiting various stages and degrees of alteration to leucoxene also

occur. A variety of silicate gangue minerals are present. The main silicate appear to be pyrobole minerals with garnets also present. Some epidote may occur as well as occasionally Al-silicate minerals (kyanite and/or sillimanite).

- For the **Non-magnetic fractions** appreciable amounts of Al-silicate minerals, thought to include both kyanite and sillimanite, occur in this fraction. Quartz are present as well as small amounts of other gangue as in the magnetic-others fractions. Zircon is present, mainly as clear and colorless grains although staining in not uncommon. Red grains of primary rutile occur. Ilmenite grains transformed to leucoxene are present.

For the Optical microscopic particle-counting the following was seen:

- Essentially unaltered ilmenite generally occurs predominantly in the ilmenite fractions, although the magnetic-others also contain substantial amounts.
- Leucoxene (being by definition heterogeneous and therefore having varying magnetic properties) exhibit a strong appearance in the magnetic-others fractions.
- Rutile and zircon by preference occurs in the non-magnetic fractions.

## 5. Remarks

When comparing the chemical assays of the samples to the microscopic observations and particle-counting the following observations were made:

- Relative high TiO<sub>2</sub>-contents in the ilmenite fractions and comparatively low Fe-contents (when assuming the presence of predominantly ilmenite in these fractions) suggests the presence of Ti-enriched ilmenite particles (especially also in the light of the presence of the gangue minerals which may contain Fe as well).
- Elevated Mn, Mg, Si and Al-levels in the ilmenite fractions correlate with the identification of , pyroxene and amphibole minerals as the main gangue components. However, some of the Mn may also be an undesirable intrinsic constituent of the ilmenites.
- Ti-contents of the magnetic-other fractions are variable which is typical of the leucoxene-type particles reporting to these fractions.
- Again, elevated Ca, Mg, Si and Al-levels in the magnetic-others fractions can probably be attributed to the presence of high quantities of gangue minerals.
- Rutile and zircon by far report to the non-magnetic fractions.
- High Si and AL-levels in the non-magnetic fractions can be correlated to the presence of Al-silicate minerals in these fractions.

## 6. Conclusions

At this stage of the mineralogical characterization, the amount of valuable heavy minerals (VHM) present in the THM may be estimated as **50% ilmenite, 12% leucoxene, 2 % rutile and 3 % zircon**, hence the average **VHM portion of the THM is estimated at 67%** on average.

### Competent Person Statement

*The details contained in the document that pertains to exploration results are based upon information compiled by Mr. JN Badenhorst from GeoActiv (Pty) Ltd. Mr. Badenhorst is an independent consultant for Srinel. He is a Member of the South African Council for Natural Scientific Professions (registration number 400157/07) and has sufficient experience which is relevant to the style of mineralisation and type of deposits under consideration and to the activity which he is undertaking 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. Badenhorst consents to the inclusion in this release of the matters based on the information in the form and context in which it appears.*



JN Badenhorst

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