Predictive Modelling for Iron Exploration Targeting: 5-7 Bt Xaudum Iron Exploration Target*(Botswana)

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Key words: Inversion, VPmg, Iron Ore, Ground Magnetics.

** It is important to note that the tonnages and grade quoted in this exploration target are conceptual in nature, there has been insufficient exploration to define this fully as a mineral resource and that it is uncertain if further exploration will result in the target being delineated as a mineral resource.*

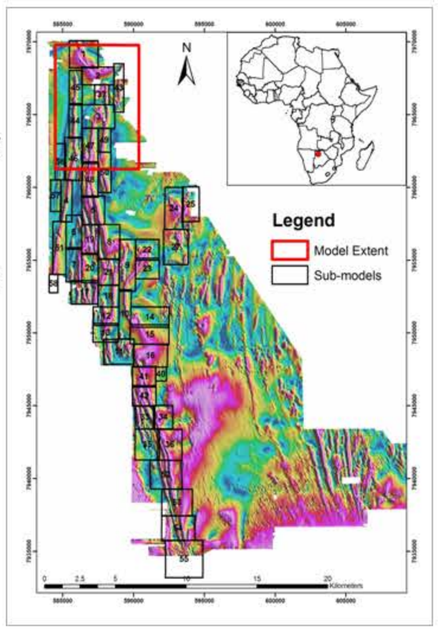
Introduction

The principal objective of the research was to determine an exploration target estimate for the Xaudom Iron Formation project. Geophysical data inversion modelling was carried out and the results calibrated against local drill hole interpretation-based geological models. Subsequent drilling and geological modelling have yielded CIM compliant resources that are similar to the initial inversion based modelling estimates within optimised pit shells, showing the robustness of the Exploration Target technique.

Tsodilo Resources recently released an Exploration Target* of 5-7 Bt of iron at 15 to 40% Fe. This was followed by a maiden CIM compliant resource estimate for Block 1 of 441 Mt at 29.4% Fe (NI 43-101 MRE technical report by SRK, Baker, 2014).

The principle results indicate that the Exploration Target Methodology may be applied as a conservative exploration tool in other regional magnetite-rich iron exploration programs.

Figure 1 The Xaudom Iron Formation is situated in NW Botswana and stretches over 36.8 km.



Methodology

The constrained block model inversion, based on the Xaudum Iron Formation (XIF) ground magnetic footprint, provides the starting point. The steps are as follows:

1: Create the inversion model from ground magnetic data using VPmg GOCAD

2: Smaller volumes are created using high magnetic susceptibility iso-surfaces to create volumes closer to reality due to volume over-sizing in the initial inversion model (Figure 2A).

3: The volumes are further reduced using the drilling data and creation of section models based on this drilling data (Figure 2B).

4: The reduced model volume is compared to the local model volume and offset factors are applied to the whole model to bring the inversion model closer to a reality approximation (Figure 2C).

5: The most conservative volumes are then converted to tonnes by using the average density to create the exploration target tonnage range (Figure 2D).

The conservative volume range is then converted to a tonnage range by using an average XIF density value of 3.3 g/cm^3. For further details see: http://www.tsodiloresources.com/s/Metals.asp?ReportID=619797.

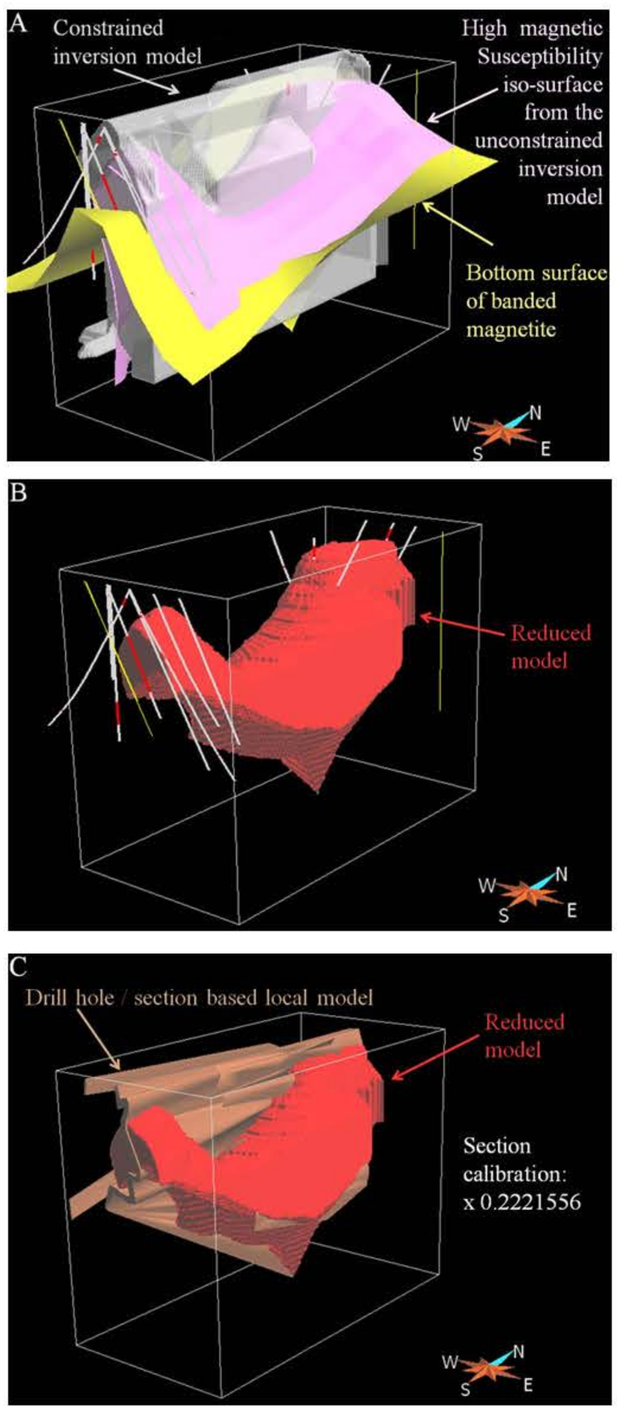


Figure 2 A

Figure 2 B

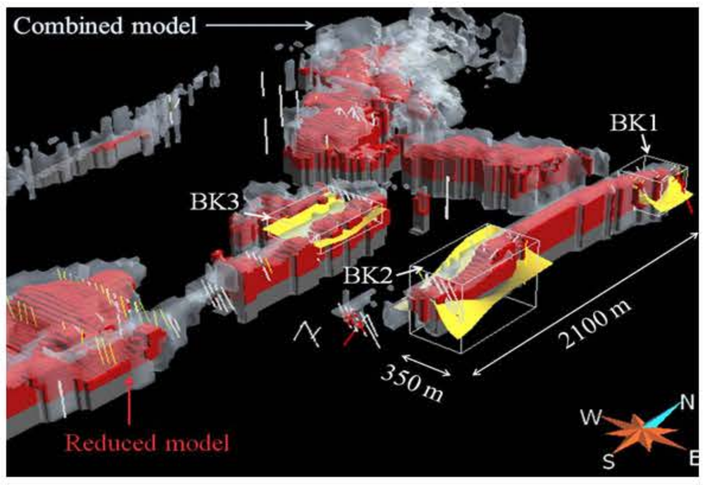
Figure 2 C

Figure 2 D

Results

Tonnages for the entire strike of the mineralization body, based on the conservative valued calibration factors, varied from 4.940 to 7.015 Bt (rounded to 5.0 to 7.0 Bt for the exploration target). A limitation of the method is that these estimates are based on local model calibrations (Figure 3). Geological model comparisons suggest that these factors are indicative of conservative minimum estimations.

Figure 3. Location of geological models used to for offset factors.



The NI 43-101 tonnage estimated by SRK for the material inside the optimised pit shell of the geological model for Block 1 (Figure 5), based on geodomains is 441 Mt (Table 1) (Baker, 2014).

Table 1. Tonnages calculated by SRK for the optimised pit shell regions based on the geological model for Block 1. (DMW = weathered DIM, MBW= weathered MBA)

Geodomain	Tonnage (Mt)	Grade Fe (%)
MBA	236	35.6
MBW	21	34.3
DIM	148	20.9
DMW	29	20.5
MGS	7	22.1
Total	441	29.4

Figure 4. Geological model geodomains MBA (red) and DIM (green) relative to the reduced model (pale blue).

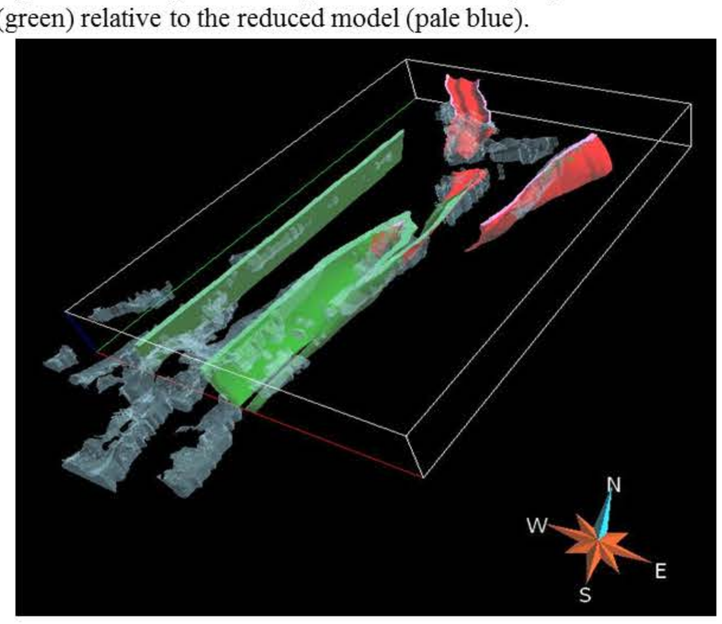
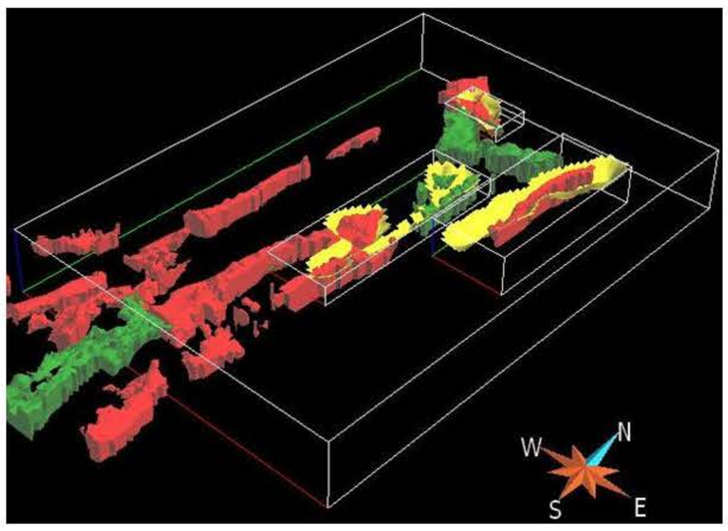


Figure 5. Optimised pit shells (yellow) relative to the reduced inversion model.



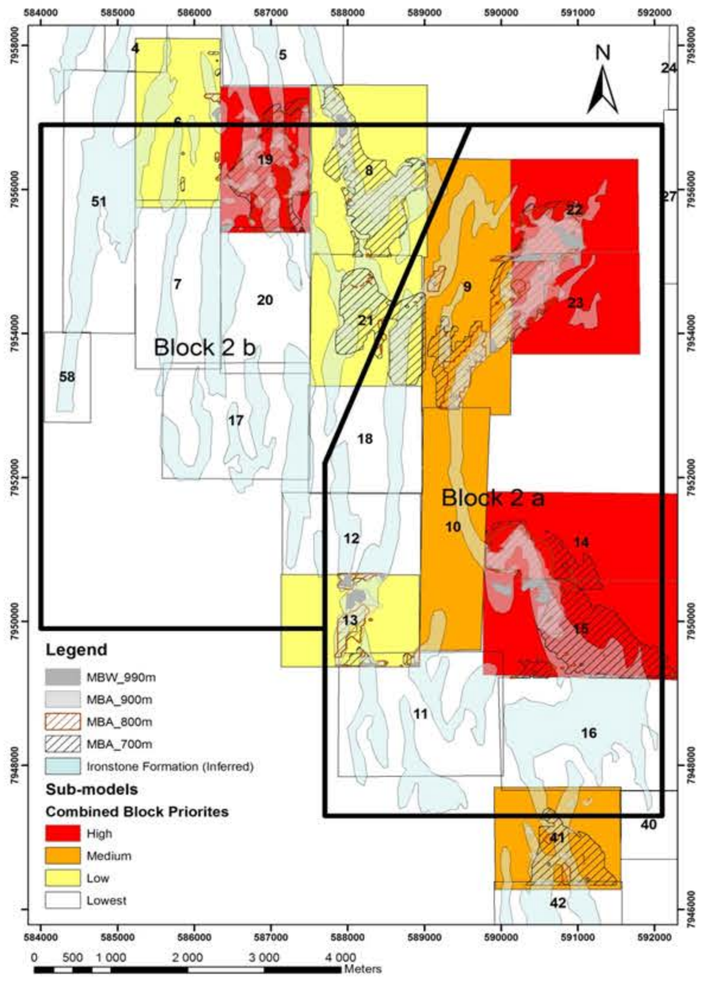
The results based on the method described here are presented in Table 2. The measured volume was converted to tonnage as follows: [Volume x Geodomain offset (0.566) x Section-based offset x 3.3 (g/cm3) /1000000]. The minimum and maximum estimates are based on section offsets of 0.300 and 0.426 respectively. The results (273 – 388 Mt) are towards the low side of the CIM compliant MRE report resource tonnages (Baker, 2014). However, the results are very close and indicate that the Exploration Target is (as we anticipated) a conservative tonnage estimate for the entire XIF region.

Table 2. Tonnage for unconstrained reduced models in the optimised pit shell regions. (DIM +DMW +MBA +MBW)

Geodomain (All)	Volume m^3x10^3	Min (Mt)	Max (Mt)
TOTAL	487637	273	388

A further useful consequence of the inversion model is that the results have allowed us to hone in on a MBA-type magnetic susceptibility value (S.I.) signature range. This signature is currently being used to help prioritise areas of potential higher grade MBA-like magnetic signature areas, and DIM magnetic signature areas, within the zones of iron formation as inferred from the 2nd vertical derivative of the magnetic data (Figure 6).

Figure 6. Application of the sub-models to prioritise drill holes with higher iron content.



Conclusions

(1) The Exploration Target methodology detailed here may be applied to obtain conservative minimum tonnage estimates.

(2) It is anticipated that the overall methodology is generic, but that the offsets are region / mineralization specific.

(3) Comparison of the Exploration Target within the same optimised pit shells used for the NI 43-101 compliant XIF MRE report resource figures compare extremely favourably and to the low side. This suggests that the figures for the Exploration Target are as anticipated a conservative estimation of the total tonnages we can expect from the entire XIF region.

(4) The S.I. value statistics of the reduced inversion sub-models may be used to target areas of higher iron content such as MBA-like material within the XIF region.

Acknowledgments

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Key Reference

Baker, H. (2014) Mineral Resource Estimate for the Xaudum Iron Project (Block 1), Republic of Botswana. Prepared for Gcwihaba Resources (Pty) Ltd by SRK Consulting (UK) Ltd.

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