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A facies model for the E9Ec reef as developed on Cooke 4 shaft, Randfontein Estates

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A sedimentological study of the E9Ec, a Denny's Reef correlative [1], was undertaken in the southern part of Cooke 4 shaft, Middle Elsburg section, in order to understand the processes responsible for controlling gold and uranium concentration in the reef (a modified placer model is assumed). In addition this information was required in order to assist with the creation of a facies model that could be used for Mineral Resource Estimation.

Primary and secondary data were gathered and interpreted, these include:

- Palaeocurrent direction
- Detailed borehole logging and profile mapping
- Nature of the reef (% conglomerate, packing and sorting of clasts, colour and nature of the matrix *etc.*)
- Reef thickness and bed roughness indexes
- Gold and uranium distribution

Following the completion of the study, four depositional units (cycles) were defined:

- Unit 1: A discontinuous channel deposit, thought to be the remnants of a proximal braided channel system that may reach 4m in thickness. This is generally associated with low gold and uranium grades.
- Unit 2: This unit may overly Unit 1 or form the bottom reef contact. The conglomerate is generally well mineralised (gold and uranium). The overlying quartzites, where present, are trough cross bedded. Unit 2 is thought to have been deposited in a fluvial mid-fan environment.
- Unit 3: Unit 3 is generally thinner than the underlying units and overlying quartzites are not always preserved. Gold and uranium grades are generally lower than those found in Unit 2. A similar depositional environment to Unit 2 is assumed.
- Unit 4: Unit 4 is extremely variable in thickness as well as sedimentological characteristics. It varies from a thin (2cm) horizontally laminated shale drape to a well-developed, clast supported conglomerate of greater than 20 cm. This unit, due to its variable and discontinuous nature, is thought to represent a distal environment, where local erosion and reworking of the underlying sediments occurred.

It was found that the individual depositional units could be combined into a number of discrete stacked combinations that could be used to define facies zones that could be used to assist in Mineral Resource

Estimation. The results of the study corresponded with the results of a similar project undertaken in the southern portion of Cooke 3 on the UE1A5, the lateral equivalent of the E9Ec [2].

References:

- [1] Lombard, H, (1992), The Enigma of the Denny's reef and its correlatives around the Witwatersrand
- [2] Lionett, M.D and Grodner, M.W, (1993), Sedimentary Facies of the A1 (UE1A), at Cooke 3 shaft, REGM.

