CONCLUSIONS

Overall

An integrated hydrometallurgical pilot plant was successfully operated for 5 days using a feed concentrate from the Bear Lodge deposit. The feed solids to the process contained 3.08% REO and the final product was a 98% pure REO bulk concentrate or RE oxalate precipitate cake. The overall individual recoveries of critical rare earths were: 87% Dy, 93% Eu, 95% Nd, 95% Pr, 89% Tb, and 81% Y. The overall recovery of REEs averaged 86%. Low temperature counter current leaching was found to be effective in selectively extracting REEs from bastnaesite/ancylite ores. The oxalate precipitation route was quantitatively proven as an excellent tool for separating REEs from base metals without the need to pre-treat the PLS.

Leach Process

REE extraction in the counter current leach step ranged from 85% to 99% (averaging 93%). The extraction of critical rare earth elements during steady state conditions (297 kg/t HCl addition at 45°C) were 89% Dy, 94% Eu, 96% Nd, 97% Pr, 93% Tb, and 86% Y. Iron extraction during this period was 44%

Oxalate Precipitation Process

The precipitation efficiency of critical REE elements during steady state conditions (90.4 g/L total oxalate) were 98% Dy, 99% Eu, 96% Nd, 95% Pr, 98% Tb, and 91% Y. Oxalate were recycled during this campaign. The final product of the plant generated during the steady state conditions contained 44.6% TREE (96.2% of which were LREE) with the greatest impurities being 4970 g/t Th, 1.24% Ca, and 0.9% Si. Efficient PLS filtration prior to REE precipitation and optimized crystallization of oxalates from barren PLS are necessary process steps to lower calcium and silicate impurities in the final product.

REFERENCES

Ray, J., Van Rythoven, A., & Clark, J. (2014). Mineralogical Modeling of Bull Hill and White Ridge Deposits. Rare Element Resources Inc., Internal RER Report.