

TSRU Tailings Utilization and Disposal

Yuming Xu ^a, Jianying Wu ^a, Tadeusz Dabros ^a, Parviz Rahimia, and Jianmin Kan ^b

a CanmetENERGY, Natural Resources Canada, Devon, AB, Canada

b Total E&P Canada, Suite 2900, 240–Fourth Avenue SW, Calgary, AB T2P 4H4

TSRU tailings produced from paraffinic froth treatment process contain a significant fraction of asphaltenes that are still valuable hydrocarbons. In collaboration with Total E&P Canada (TEPCA), CanmetENERGY conducted an extensive research program to explore alternatives for TSRU tailings disposal and utilization. Various processes were investigated for TSRU tailings disposal, including flocculation and thickening, filtration, and centrifugation. Two methods were tested for recovery of the asphaltenes from TSRU tailings: solvent extraction and agglomeration.

The experimental results demonstrate that TSRU tailings can be flocculated and thickened to produce paste-like sediment, and the hot water can be recovered and recycled. The thickened TSRU tailings have good water drainage and deposition of the sediment on a beach would result in further dewatering. Centrifugation of the TSRU tailings or filtration of the flocculated tailings can produce a cake that appears to be very dry and suitable for disposal without pond containment. The experimental results also showed that more than 90% of the asphaltenes in the tailings can be recovered from the tailings by solvent extraction. The recovered asphaltenes contained only small fraction of mineral solids and may be used as coker feed, which was further demonstrated by several delayed coking experiments. In the second method, the TSRU tailings were agitated at elevated temperature (80°C) at which the asphaltene particles form large agglomerates and separated from the tailings, giving asphaltene-rich phase and almost asphaltene-free tailings. However, the recovered asphaltene agglomerates still contain significant amount of mineral solids and water and need further treatments.