their elevated viscosity at natural conditions, heavy oil and bitumen typically have lower value than that of conventional, low viscosity oil. Often, heavy oil or bitumen are upgraded to yield synthetic crude oil which in turn can be refined to yield transportation fuels.

[008] There is an ongoing need for safe transport of heavy oil and bitumen to upgraders, refineries, and petrochemical plants. Transportation of heavy oil and bitumen in liquid form, with or without a solvent diluent, has risk for all known forms of transport including truck, rail car, pipeline, or ship. This risk consists of health, safety and environmental risks that can harm humans, processing plants, animals, ecosystems (e.g. rivers, land). Thus, there is a need to have safer methods for transportation of heavy oil and bitumen.

[009] The originality of the method described wherein lies in the conversion of heavy oil or bitumen or a mixture of heavy oil or bitumen with a dilutant to yield a valuable distillate oil product and a heavy oil cut product.

[010] The distillate oil product has low viscosity, typically lower than 50 cP, that is readily pipelineable and can be used as a dilutant for mixing with heavy oil or bitumen for transportation or as an oil product as feedstock for refineries.

[011] The heavy oil cut product can be transported in heated form as a feedstock for the viscous oil products including asphalt, tar, asphalt binder, asphalt additive, coker feed, or fuel.

[012] The heavy oil cut product can be transported by conversion to pellets to be transported in semi-solid form.

SUMMARY

[013] In general, the present specification describes a device to treat a heavy oil or bitumen or mixture of the two, collectively referred to as a source oil, or a mixture of a dilutant and source oil, referred to as a diluted oil.

[013a] In one aspect, the present disclosure refers to a system for continuously fractionating hydrocarbons, comprising:

providing a hydrocarbon feed fluid comprising a heavy oil component and a light

end component;

feeding the hydrocarbon feed fluid upwardly into an inner inlet tube of an upwardly inclined dual tube device, the dual tube device being inclined upwardly from horizontal by between 30° and 70°, the inner inlet tube being housed within an annular outer tube, the space between the inner inlet tube and the outer tube forming an annulus in fluid communication with the inlet tube, the upper end of the inner inlet tube terminating in an open inlet tube upper end within the outer tube, an upper portion of the outer tube extending above and beyond the open inlet tube upper end, so that the hydrocarbon feed fluid exits the open inlet tube upper end and flows downwardly into the annulus;

externally heating a lower portion of the outer tube, so that downwardly flowing hydrocarbon feed fluid in the annulus is heated, to form a heated hydrocarbon fluid in the annulus, the heated hydrocarbon fluid thereby providing counter-current heating of the hydrocarbon feed fluid in the inner inlet tube;

maintaining fractionating conditions within the annulus, so that the heated hydrocarbon fluid is thermally fractionated into a volatile upward gaseous fluid flow and a residual downward liquid fluid flow, the gaseous fluid comprising the light end component and the liquid fluid comprising the heavy oil component, the fractionating conditions comprising an effective residence time for the heated hydrocarbon fluid in the annulus of from 1 to 20 minutes, or from 1 to 10 minutes;

collecting the light end component from a light end outlet port in the upper end of the outer tube; and,

collecting the heavy oil component from a heavy oil outlet port in the lower end of the annulus.

[014] The method taught here consists of a heated inclined dual tube unit arrangement where feed oil enters the arrangement through the inner tube and which opens partway up the outer tube. Vaporized oil continues to flow up within the outer tube whereas the liquid oil product