Claims:

1. A hydrocarbon conversion process, comprising:

(a) providing a heavy hydrocarbon oil wherein the heavy hydrocarbon oil comprises molecules having an ASTM D86 initial boiling point of ≥ 300°C and at least 50 ppmw Ni/V/Fe;

(b) providing a utility fluid, the utility fluid comprising ≥ 20.0 wt. % aromatic carbon based on the weight of the utility fluid;

(c) exposing at least a portion of the heavy hydrocarbon oil to at least one hydroprocessing catalyst under catalytic hydroprocessing conditions in the presence of molecular hydrogen and the utility fluid at (i) an LHSV in the range of from 1.0 to 40.0 hr^{-1}, (ii) a temperature in the range of 300.0°C to 500.0°C, (iii) a pressure in the range of from 25 bar (absolute) to 75 bar (absolute), and at a utility fluid:heavy hydrocarbon weight ratio in the range of 0.05 to 20.0 to produce a hydroprocessed product; and

(d) separating a liquid phase from the hydroprocessed product, the liquid phase comprising ≥ 90.0 wt. % of the hydroprocessed product's molecules having at least four carbon atoms based on the weight of the hydroprocessed product wherein the utility fluid comprises the liquid phase in an amount ≥ 90.0 wt. % based on the weight of the utility fluid.

2. The process of claim 1, wherein the heavy hydrocarbon oil is selected form the group consisting of heavy crude oils, atmospheric residuum, vacuum residuum, heavy oils from catalytic treatment, heavy cycle oils from fluid catalytic cracking, ~~thermal tars, as oils from visbreaking,~~ oils from oil sands, bitumen, deasphlter rock, and heavy oils derived from coal.

3. The process of claim 1 or 2, wherein the heavy hydrocarbon oil further comprises greater than 25 wt.% 566°C+, greater than 1.5 wt.% heteroatom content, and greater than 15% C_A.

4. The process of ~~claims 1 or 2~~ claim 1, wherein the utility fluid comprises ≥30.0 wt. % aromatic carbon measured by NMR based on the weight of the utility fluid.

5. The process of ~~claims 1-3~~ claim 1, wherein the liquid phase comprises ≥ 90.0 wt. % of the hydroprocessed product's molecules having an atmospheric boiling point ≥65.0°C based on the weight of the hydroprocessed product.

6. The process of ~~any of claims 1-4~~ claim 1, wherein the liquid phase comprises ≥ 90.0 wt. % of the hydroprocessed product's molecules having an atmospheric boiling point ≥150.0°C based on the weight of the hydroprocessed product.

7. The process of ~~any of claims 1-5~~ claim 1, wherein the liquid phase comprises ≥ 90.0 wt. % of the hydroprocessed product's molecules having an atmospheric boiling point ≥260.0°C based on the weight of the hydroprocessed product .

8. The process of ~~any of claims 1-6~~ claim 1, wherein the density of the utility fluid at 15°C is less than the density of the heavy hydrocarbon oil at 15°C.

9. The process of ~~any of claims 1-7~~ claim 1, wherein the hydroprocessing conditions include one or more of a temperature in the range of 380°C to 430°C, a pressure in the range of 21 bar to 81 bar, a space velocity (LHSV) in the range of 1.0 to 40.0 hr^{-1}, and a hydrogen consumption rate of 200 SCF/B to 1000 SCF/B.

10. The process of ~~any of claims 1-8~~ claim 1, wherein the utility fluid:heavy hydrocarbon oil weight ratio of step (e) is in the range of 0.1 to 2.0.

11. The process of ~~any of claims 1-10~~ claim 1, further comprising conducting a second portion of the liquid phase away from the process.

12. The process of ~~any of claims 1-11~~ claim 1, further comprising (e) providing a supplemental utility fluid to step ~~(d)~~ (c) to replace at least a part of the utility fluid from a portion of the liquid phase in step ~~(g)~~ (d), the supplemental utility fluid comprising aromatics and having an ASTM D86 10% distillation point ≥ 60.0°C and a 90% distillation point ≤ 350.0°C.

~~13. A hydrocarbon conversion process, comprising: (a) providing a heavy hydrocarbon oil comprising molecules having an ASTM D86 initial boiling point of ≥ 300°C; (a) providing a utility fluid, the utility fluid comprising ≥ 20.0 wt. % aromatic carbon measured by NMR based on the weight of the utility fluid; (b) exposing at least a portion of the heavy hydrocarbon oil to at least one hydroprocessing catalyst under catalytic hydroprocessing conditions in the presence of molecular hydrogen and the utility fluid at a utility fluid:heavy hydrocarbon oil weight ratio in the range of 0.05 to 20.0 to produce a hydroprocessed product; (c) separating a liquid phase from the hydroprocessed product, the liquid phase comprising ≥ 90.0 wt. % of the hydroprocessed product's molecules having at least four carbon atoms based on the weight of the hydroprocessed product; and (d) separating from the liquid phase a light liquid and a heavy liquid, wherein the heavy liquid comprises 90 wt.% of the liquid phase's molecules having an atmospheric boiling point of ≥ 300°C; wherein the utility fluid comprises a portion of the separated light liquid in an amount ≥ 10.0 wt. % based on the weight of the utility fluid and the remainder of the utility fluid comprises a portion of the heavy liquid.~~

~~14. The process of claim 13 wherein the liquid phase comprises ≥ 90.0 wt. % of the hydroprocessed product's molecules having an atmospheric boiling point ≥65.0°C based on the weight of the hydroprocessed product.~~

~~15. The process of claims 13 or 14, wherein the liquid phase comprises ≥ 90.0 wt. % of the hydroprocessed product's molecules having an atmospheric boiling point ≥150.0°C based on the weight of the hydroprocessed product.~~

~~16. The process of claim any of claims 13-15, wherein the liquid phase comprises ≥ 90.0 wt. % of the hydroprocessed product's molecules having an atmospheric boiling point ≥260.0°C based on the weight of the hydroprocessed product.~~

~~17. The process of any of claims 13-16, wherein the heavy liquid comprises 90.0 wt.% of the liquid phase's molecules having an atmospheric boiling point of ≥ 250°C.~~

~~18. The process of any of claims 13-17, wherein the heavy liquid comprises 90.0 wt.% of the liquid phase's molecules having an atmospheric boiling point of ≥ 350°C.~~

~~19. The process of any of claims 13-18, further comprising conducting a second portion of the light liquid away from the process.~~

~~20.~~13. A continuous hydrocarbon conversion process, comprising:

(a) providing a heavy hydrocarbon oil comprising molecules having an ASTM D86 initial boiling point of ≥ 300°C and at least 50 ppmw Ni/V/Fe;

(b) providing a utility fluid, the utility fluid comprising ≥ 20.0 wt. % aromatic carbon measured by NMR based on the weight of the utility fluid;

(c) exposing ≥ 50.0 wt. % of the heavy hydrocarbon oil based on the weight of the second mixture's heavy hydrocarbon to at least one hydroprocessing catalyst under catalytic hydroprocessing conditions operating continuously for a time ≥ 24 hours, in the presence of the utility fluid and 50.0 sm^3/m^3 to 500.0 sm^3/m^3 molecular hydrogen at (i) an LHSV in the range

of from 1.0 to 40.0 hr^{-1}, (ii) a temperature in the range of 300.0°C to 500.0°C, (iii) a pressure in the range of from 25 bar (absolute) to 75 bar (absolute), and (iv) a utility fluid:heavy hydrocarbon oil weight ratio in the range of 0.05 to 20.0, to produce a hydroprocessed product; and

(d) separating a liquid phase from the hydroprocessed product, the liquid phase comprising ≥ 95.0 wt. % of the hydroprocessed product's molecules having at least four carbon atoms based on the weight of the hydroprocessed product;

wherein the utility fluid comprises the separated liquid phase in an amount ≥ 99.0 wt. % based on the weight of the utility fluid.

~~21.~~14. The continuous hydrocarbon conversion process of claim ~~20~~ 13, wherein the pressure drop across the exposing step (c) does not exceed the initial pressure drop by more than 200% after the 45 days of continuous operation.