CLAIMS

1. A fuel (600) having a sulfur content limit of 3.5 wt.% sulfur or lower is formed by combination of three liquid hydrocarbonaeous streams (10, 60, 70) wherein

a. flow rate of each stream (10, 60, 70) to the combination (600) is determined by its respective sulfur content and related contribution to overall final sulfur content limit of the combination, taking into consideration flow rate of each of the other two streams and their respective sulfur content, and

b. such streams are formed by fractionating (100) crude (2), either with or without presence of added steam, into three liquid fractions F1 (10), F2 (20), and F3 (30) wherein yield cut, as wt.% of crude feed, of each fraction is determined by its sulfur content such that sulfur content of fraction F1 (10) is less than that of fraction F2 (20) which is less than fraction F3 (30),

c. fraction F2 (20) is subsequently treated (300), and two portions (40, 80) of fraction F3 (30), one being a portion (80) from solvent separation (500), are subsequently treated (400), for each treated stream (60, 70) to have a sulfur content of less than the fuel sulfur content limit,

wherein said crude (2) comprises contaminants containing metals or asphaltenes and crude feed rate and fractionation conditions are adjusted such that substantially all such contaminants are concentrated in fraction F3; and

fraction F1 forms untreated stream S1 having sulfur content X1 and essentially metal free; and

fraction F2 when subsequently treated with hydrogen in the presence of catalyst under conditions adjusted to form stream S2 having reduced sulfur content X2 and essentially metal free; and

fraction F3, at least a portion of which when subsequently treated with hydrogen in the presence of catalyst under conditions adjusted to form stream S3 having reduced sulfur content X3 and essentially metal free; and

wherein X1>X2 and X3>X2 and streams S1, S2 and S3 are combined to form said fuel, and

d. yield cut of fraction F1 (10) is maximized in relation to fractions F2 and F3, whereby maximization of fraction F1 maximizes quantity and type of distillates within fraction F1 and minimizes quantity of light distillates within fraction F2 and fraction F1 remains

untreated and when fraction F1 is combined with treated fraction F2 (60) and treated portions (70) of fraction F3 (30), the final sulfur content limit of 3.5 wt.% sulfur or lower of the combination (600) is not exceeded.

2. A fuel in accordance with Claim 1 formed wherein said yield cut of fraction F1(10) is maximized within a range from light overhead unstabilized whole naphtha to kerosene range components or at least a portion of other light distillates by overhead partial condensation of condensable entrained light gases but without added stabilization steps to remove butanes and other lighter components.

3. A fuel in accordance with Claim 1 wherein said combination (600) contains 0.5 wt.% sulfur or less.

4. A fuel in accordance with Claim 1 wherein fraction F2 has a sulfur content, % mass of crude, greater than 0.1 wt.% prior to subsequent treating and sulfur content of 6 to 25 ppmwt after treating.

5. A fuel in accordance with Claim 1 wherein said combination (600) contains 0.1 wt.% sulfur or less.

6. A fuel in accordance with Claim 1 wherein fraction F3 (30) is

a. subjected to vacuum distillation (200) at reduced hydrocarbon partial pressures, either with or without presence of added steam, to form:

(i) one or more light and heavy vacuum gas oil side streams (40) having a sulfur content, % mass of crude, in the range of about 0.1 to 5 wt.% prior to subsequent treating, which are directed to hydrotreating (400) and then are separately treated with hydrogen in the presence of catalyst in a different zone (400) than fraction F2 and under different hydrotreating conditions than fraction F2 to form stream S3 (70) having less than 1 ppmwt metals; and

(ii) vacuum residue (50) which does not boil at said reduced pressures is directed to solvent deasphalting (500) where mixed with one or more paraffinic solvents, asphaltenes and other residue heavy components are precipitated out of solution to produce

(A) a reduced contaminant deasphalted oil (80)

which is fed to the fraction F3 hydrotreater (400) either separately or combined with one or more of the vacuum gas oil side streams of 6.a.1 (40) above, and

(B) a highly contaminated pitch stream (90) that contains the majority of metal, asphaltenes, and other contaminants of the original crude feed (2); and

b. stream S3 (70) so formed is combined with streams S1 (10) and S2 (60) to form said fuel.

7. A fuel in accordance with Claim 6 wherein said pitch stream is used as feed to a gasification unit, boiler, or asphalt production.

8. A fuel in accordance with Claim 6 wherein said pitch stream is fed to a gasification unit which converts the pitch stream to synthesis gas consisting of hydrogen and CO and purifies the hydrogen which is directed to hydrogenation of components forming streams S2 and S3.

9. A fuel in accordance with Claim 6 which is a polished turbine fuel formed by the combination of steams S1, S2 and S3 and has a maximum 0.1 wt. % sulfur content and contains less than 1 ppmwt metals.

10. Combustion of a fuel produced in accordance with the process of Claim 1 in marine or land based engines, combustion gas turbines, or fired heaters.