CLAIMS

1. A fuel characterized by reference to components of the feed from which said fuel is formed wherein said fuel comprises ~~comprising~~ a combination of hydrocarbons derived from a feed of one or more crude~~s~~ oils, either alone or combined with one or more feeds of light tight oils or high sulfur fuel oils or other heavier residual oils, said fuel comprising hydrocarbons ranging from:

(a) the lowest boiling hydrocarbon~~portion~~ of an untreated liquid fraction comprising unstabilized naphtha from atmospheric distillation at or below sulfur breakpoint cut of said feed, and~~split in hydrocarbon containing liquids which boil above the end point of the range for naphtha but below or at the breakpoint at which sulfur content begins to rapidly increase, or increases exponentially, in terms of high change rate of rise over per unit run, where for the run change is change in unit volume of fraction and for rise change is change in unit of sulfur content~~ to

(b) the highest boiling ~~portion~~ soluble hydrocarbon from solvent separation of ~~hydrotreated solubles of~~ liquid fractions of over said sulfur breakpoint cut of said feed, ~~wherein said soluble are from solvent separation,~~ wherein solvent is selected from propane or other paraffinic solvent such as butane, pentane and others up to and including to heptane,

wherein said sulfur breakpoint of said feed is determined by reference to an assay of said feed, with percent mass or volume of said feed as the x-axis as run, with sulfur content of said feed as the y-axis as rise, and

said sulfur breakpoint is the point at which change of unit rise in sulfur content of said feed compared with unit run change of mass or volume of said feed is comparison by line slope ratio rise to run range is greater than zero and within 0.2 to 1.0.

2. A fuel in accordance with Claim 1, wherein said hydrocarbon feed is selected from the group consisting of one or more of

(a) a single crude oil,

(b) combination of two or more crude oils,

(c) combination of crude oil with light tight oil selected from light crude or associated or non-associated well head condensate, and

(d) combination of crude oil and heavy residual comprising high sulfur fuel oil or heavier oils. ~~having an initial boiling point being the lowest boiling point of any fraction within untreated streams in said fuel and highest boiling point being the highest boiling portion of treated effluent from solvent separation and forms a portion said fuel, said fuel having an actual sulfur content at or below a target sulfur content limit level.~~

3. A fuel in accordance with Claim 1 comprising

(a) untreated unstabilized wild straight run naphtha and other atmospheric distillation cut below or at sulfur breakpoint cut of the feed from which the fuel was formed

(b) hydrotreated distillate effluent comprising wild naphtha ~~and all or a portion of low sulfur diesel~~, and

(c) hydrotreated oils comprising hydrotreated diesel and hydrotreated oil heavier than diesel of the feed from which the fuel was formed having highest boiling point being the highest boiling portion of treated effluent from solvent separation.

4. A fuel in accordance with claim 1 having an actual sulfur content at or below a target sulfur content limit level comprising a blend of at least three components each having different sulfur contents, wherein actual sulfur content of said fuel is characterized relative sulfur content of a untreated component at or below sulfur breakpoint of the feed from which the fuel was formed and two treated components above the sulfur breakpoint of the feed from which the fuel was formed~~up to a highest boiling point being the highest boiling portion of treated effluent from solvent separation~~.

5. A fuel in accordance with claim 1, wherein said fuel is further characterized in that said fuel comprises range from C3 of unstabilized naphtha of said hydrocarbon feed from which said fuel was formed

(a) except insoluble residues not soluble in solvent have been removed by solvent separation of insolubles derived from said feed from solubles derived from said feed and

(b) except hydrocarbons lighter than three (3) carbons C3 have been removed,

(c) wherein said fuel is further characterized in that each hydrocarbon component of the fuel which has not been treated with hydrogen in the presence of catalyst to remove sulfur has a sulfur content below or at the atmospheric distillation sulfur breakpoint of said hydrocarbon feed from which said fuel is formed, and

(d) wherein said fuel is further characterized in that said fuel meets or exceeds all ISO RMA 10 (ISO 8217-10 of 2016) specifications except (1) flashpoint is less than 60ºC and (2) sulfur is 0.50% m/m (wt.%) or less.

~~comprising actual sulfur content limit level characterized by increased or decreased amounts of hydrotreated distillate or hydrotreated heavy oil relative to reference sulfur content~~.

6. A fuel in accordance with claim 1 comprising actual sulfur content limit level characterized by increased or decreased amounts of feeds to distillation, distillate or heavy oil hydrotreating, or solvent separation relative to reference to end of the sulfur breakpoint cut of the feed from which the fuel was formed or start of exponential rate of rise of sulfur content over run of unit volume of the feed from which the fuel was formed.

7. A fuel in accordance with claim 1 comprising actual sulfur content limit level characterized by components having a sulfur content greater than or less than the target sulfur content limit level of processed high sulfur fuel oil or other heavy residue having a sulfur content greater than or less than the target sulfur content limit level, of increased or decreased amounts to distillation, distillate or heavy oil hydrotreating, or solvent separation, relative to reference to end of the sulfur breakpoint cut of the feed from which the fuel was formed or start of exponential rate of rise of sulfur content over run of unit volume of the feed from which the fuel was formed.

8. A fuel in accordance with claim 1 comprising actual sulfur content limit level characterized by components having a sulfur content greater than or less than the target sulfur content limit level of light tight oil or condensate, or a combination of light tight oil or condensate, or process light tight oil or condensate, of increased or decreased amounts to distillation, distillate or heavy oil hydrotreating, or solvent separation, relative to reference to end of the sulfur breakpoint cut of the feed from

which the fuel was formed or start of exponential rate of rise of sulfur content over run of unit volume of the feed from which the fuel was formed.

9. A fuel in accordance with claim 1 wherein sulfur content of each untreated component liquid fraction of the fuel has actual sulfur below or at the breakpoint of the feed from which the fuel was formed and each other component is a treated component, and fuel does not exceed the sulfur target sulfur content.

10. A fuel in accordance with claim 1 wherein (i) said hydrocarbons ranging from the lowest boiling portion of an untreated liquid fraction from atmospheric distillation at or below sulfur breakpoint of the feed from which the fuel was formed comprises comprising hydrocarbons having an initial boiling point in the range about 35 °C to about 315 °C and higher and (ii) said up to a highest boiling portion of hydrotreated solubles from solvent separation of liquid fractions of over sulfur breakpoint of the feed from which the fuel was formed has a maximum boiling point being the initial boiling point of the end of deasphalted oil within said fuel and start of deasphalted residue which is not soluble in solvent selected for solvent separation and not within said fuel. to highest boiling portion of hydrotreated solubles from solvent separation of liquid fractions of over sulfur breakpoint of the feed from which the fuel was formed.

11. A fuel comprising a combination of hydrocarbons ranging from the lowest boiling portion of an untreated liquid fraction from atmospheric distillation at or below sulfur breakpoint of the feed from which the fuel was formed to highest boiling portion of hydrotreated solubles from solvent separation of liquid fractions of over sulfur breakpoint from atmospheric distillation at or below sulfur breakpoint of the feed from which the fuel was formed.

12. A fuel derived from processing crude oil feed characterized in that said fuel has an actual sulfur content of 0.50% m/m (wt.%) or less, density at 15 ºC in range of 820 to 880 Kg/M3, a pour point (upper) of 0 (zero) ºC or less, kinetic viscosity at 50 ºC of 10 cSt or less, and comprises a range of ~~crude oil derived~~ hydrocarbons derived from said crude oil from C5 of stabilised naphtha to greater than C20, said hydrocarbons having:

(a) an initial boiling point being the lowest boiling point component of any fraction within untreated streams at or below sulfur breakpoint of the feed from which the fuel was formed combined in said fuel, ~~wherein breakpoint is determined in reference to an assay of said crude oil feed by plotting % mass or volume of crude as the x-axis, with sulfur content as the y-axis, and breakpoint is the point at which sulfur content begins to rapidly increase from at or near horizontal, or increases exponentially, in terms of high change rate of rise of sulfur content over per unit run of % mass or volume, where delta for the run is change in unit of mass or volume fraction and delta for rise is change in unit of sulfur content and slope is the rise over run, and wherein said slope of such rise over run starts from near zero or horizontal for zero rise sulfur content over each run % mass or volume increase, and at breakpoint, change of unit sulfur content over change of % mass or volume is in range from over 0.2 rise per 1 run toward 1 rise per 1 run~~, and

(b) highest boiling point being the highest boiling point component of a liquid fraction over said sulfur breakpoint of the feed from which the fuel was formed, which component has been hydrotreated after removal of metals enriched residue insoluble in one or more solvents used in solvent separation and combined in said fuel,

wherein breakpoint of said feed is determined in reference to an assay of said crude oil feed by comparing % mass or volume of crude as the x-axis, with sulfur content as the y- axis, and

and said breakpoint is the point at which sulfur content begins to rapidly increase from at or near horizontal, or increases exponentially, in terms of high change rate of rise of sulfur content over per unit run of % mass or volume, where delta for the run is change in unit of mass or volume fraction and delta for rise is change in unit of sulfur content and slope is the rise over run, and wherein said slope of such rise over run starts from near zero or horizontal for zero rise sulfur content over each run % mass or volume increase, and at breakpoint, change of unit sulfur content over change of % mass or volume is in range from over 0.2 rise per 1 run toward 1 rise per 1 run.