- Appendix 3a to Exhibit G: Allocation Procedure –

User-Non-User

This Appendix 3a to Exhibit G, Allocation Procedure, is an exemplification of the complete set of equations constituting the Allocation Schedule. For the purpose of this Appendix 3a Crude Petroleum is delivered to the Pipeline by "Entrant A" designated as a Non-User and "Entrant B" designated as a User. However, an identical set of equations applies if a 3rd Entrant is introduced.

In the following, this set of equations illustrates the calculations to be made pursuant to steps 1-8 of the Allocation Schedule.

STEP 1 - CONVERSION OF WET VOLUMES TO WET MASSES FOR THE DAY

Flow measurements for use in the Allocation Schedule shall be in wet mass (tonnes). If only volume measurements are available, wet volume shall be converted to wet mass.

For each Day in the Allocation Period, the mass of each relevant stream shall be determined as the product of i) the measured wet volume of each stream and ii) the measured wet Density of the stream.

Finished Product Eqn. 1-2

$$Crude\ Oil = CO = M_{Fred,CO,,wet} = V_{Fred,CO,,wet} * D_{Fred,CO,,wet} = \ 23.957{,}4 * 824{,}3 = 19.748.112\ kg/d$$

Water

Dewater_water Eqn. 1-3

$$M_{Fred,dewater\ water,,wet} = V_{Fred,dewater\ water,,wet} * D_{Fred,dewater\ water,,wet} =$$

$$0 * 985{,}2 = 0\ kg/d$$

Degasser_water Eqn. 1-4

$$M_{Fred,degasser\ water,,wet} = V_{Fred,degasser\ water,,wet} * D_{Fred,degasser\ water,,wet} =$$

$$93{,}6 * 985{,}2 = 92.215\ kg/d$$

Fuel Gas Eqn. 1-5

$$HPfuel = M_{Fred,HPfuel,,wet} = V_{Fred,HPfuel,,wet} * D_{Fred,HPfuel,,wet} = 729{,}9 * 39{,}1 = 28.512\ kg/d$$

$$LPfuel = M_{Fred,LPfuel,,wet} = V_{Fred,LPfuel,,wet} * D_{Fred,LPfuel,,wet} = 3.873{,}1 * 10{,}2 = 39.384\ kg/d$$

$$Flare\ Pilot = M_{Fred,Flare\ pilot,,wet} = V_{Fred,Flare\ pilot,,wet} * D_{Fred,LPfuel,,wet} = 0{,}0 * 10{,}2 = 0\ kg/d$$

(Assumed to have the same Density as LP Fuel Gas)

$$Flare\ op\ purge = M_{Fred,Flare\ op\ purge,wet} = V_{Fred,Flare\ op\ purge,,wet} * D_{Fred,LPfuel,,wet} = 0{,}0 * 10{,}2 = 0\ kg/d$$

(Assumed to have the same Density as LP Fuel Gas)

$$Export = M_{Fred,Export,,wet} = V_{Fred,Export,,wet} * D_{Fred,LPfuel,,wet} = 0{,}0 * 10{,}2 = 0\ kg/d$$

(Assumed to have the same Density as LP Fuel Gas)

$$Import = M_{Fred,Import,,wet} = V_{Fred,Import,,wet} * D_{Fred,Import,,wet} = 0{,}0 * 0{,}7 = 0\ kg/d$$

STEP 2 - CONVERSION OF WET MASSES TO DRY MASSES FOR THE DAY

For each Day in the Allocation Period, the total dry mass of Crude Petroleum and Finished Products shall be determined as the sum of i) the total wet mass of the relevant stream, less ii) the measured mass of water in such stream.

Crude Petroleum streams at Gorm E Eqn. 2-1

$$Entrant\ A = A = M_{A,crude\ pet,H2O} = M_{A,crude\ pet,,wet} * \frac{BSW_{A,crude\ pet}}{100} = 15.893.856 * \frac{0,6}{100} = 101.304\ kg/d$$

$$Entrant\ B = B = M_{B,crude\ pet,H2O} = M_{B,crude\ pet,,wet} * \frac{BSW_{B,crude\ pet}}{100} = 4.268.538 * \frac{0,01}{100} = 598\ kg/d$$

Dry mass Eqn. 2-2

$$M_{A,crude\ pet,,dry} = M_{A,crude\ pet,,wet} - M_{A,crude\ pet,H2O} = 15.893.856 - 101.304 = 15.792.552\ kg/d$$

$$M_{B,crude\ pet,,dry} = M_{B,crude\ pet,,wet} - M_{B,crude\ pet,H2O} = 4.268.538 - 598 = 4.267.941\ kg/d$$

Finished product Eqn. 2-3

$$Propane = M_{Fred,Propane,H2O} = M_{Fred,Propane,,wet} * \frac{BSW_{Fred,Propane}}{100} = 100.680 * \frac{0}{100} = 0\ kg/d$$

$$Butane = M_{Fred,Butane,H2O} = M_{Fred,Butane,,wet} * \frac{BSW_{Fred,Butane}}{100} = 154.320 * \frac{0}{100} = 0\ kg/d$$

$$CO = M_{Fred,CO,H2O} = M_{Fred,CO,,wet} * \frac{BSW_{Fred,CO}}{100} = 19.748.112 * \frac{0,051}{100} = 10.072\ kg/d$$

($M_{Fred,CO,,wet}$ from Eqn 1-2)

Dry mass Eqn. 2-4

$$Propane = M_{Fred,Propane,,dry} = M_{Fred,Propane,,wet} - M_{Fred,Propane,H2O} = 100.680 - 0 = 100.680\ kg/d$$

$$Butane = M_{Fred,Butane,,dry} = M_{Fred,Butane,,wet} - M_{Fred,Butane,H2O} = 154.320 - 0 = 154.320\ kg/d$$

$$CO = M_{Fred,CO,,dry} = M_{Fred,CO,,wet} - M_{Fred,CO,H2O} = 19.748.112 - 10.072 = 19.738.040\ kg/d$$

Fuel Gas Eqn. 2-5

$$HPfuel = M_{Fred,HPfuel,H2O} = M_{Fred,HPfuel,,wet} * \frac{BSW_{Fred,HPfuel}}{100} = 28.512 * \frac{0,179}{100} = 51\ kg/d$$

$$LPfuel = M_{Fred,LPfuel,H2O} = M_{Fred,LPfuel,,wet} * \frac{BSW_{Fred,LPfuel}}{100} = 39.384 * \frac{0,28}{100} = 110\ kg/d$$

$$Flare\ Pilot = M_{Fred,Flare\ pilot,H2O} = M_{Fred,Flare\ pilot,,wet} * \frac{BSW_{Fred,flare\ pilot}}{100} = 0 * \frac{0,28}{100} = 0\ kg/d$$

$$Flare\ op\ purge = M_{Fred,Flare\ op\ purge,H2O} = M_{Fred,Flare\ op\ purge,,wet} * \frac{BSW_{Fred,Flare\ op\ purge}}{100} = 0 * \frac{0{,}28}{100} = 0\ kg/d$$

$$Export = M_{Fred,Export,H2O} = M_{Fred,Export,,wet} * \frac{BSW_{Fred,Export}}{100} = 0 * \frac{0{,}28}{100} = 0\ kg/d$$

$$Import = M_{Fred,Import,H2O} = M_{Fred,Import,,wet} * \frac{BSW_{Fred,Import}}{100} = 0 * \frac{0}{100} = 0\ kg/d$$

Fuel Gas dry mass Eqn. 2-6

$$HPfuel = M_{Fred,Hpfuel,,dry} = M_{Fred,HPfuel,,wet} - M_{Fred,HPfuel,H2O} = 28.512 - 51 = 28.461\ kg/d$$

$$LPfuel = M_{Fred,LPfuel,,dry} = M_{Fred,LPfuel,,wet} - M_{Fred,LPfuel,H2O} = 39.384 - 110 = 39.274\ kg/d$$

$$Flare\ Pilot = M_{Fred,Flare\ pilot,,dry} = M_{Fred,Flare\ pilot,,wet} - M_{Fred,Flare\ pilot,H2O} = 0 - 0 = 0\ kg/d$$

$$Flare\ op\ purge = M_{Fred,Flare\ op\ purge,,dry} = M_{Fred,Flare\ op\ purge,,wet} - M_{Fred,Flare\ op\ purge,H2O} = 0 - 0 = 0\ kg/d$$

$$Export = M_{Fred,Export,,dry} = M_{Fred,Export,,wet} - M_{Fred,Export,H2O} = 0 - 0 = 0\ kg/d$$

$$Import = M_{Fred,Import,,dry} = M_{Fred,Import,,wet} - M_{Fred,Import,H2O} = 0 - 0 = 0\ kg/d$$

Flare total

Wet mass Eqn. 2-7

$$Flare = M_{Fred,Flare,H2O} = M_{Fred,flare\ pilot,H2O} + M_{Fred,Flare\ op\ purge,H2O} = 0 + 0 = 0\ kg/d$$

Dry mass Eqn. 2-8

$$Flare = M_{Fred,Flare,,dry} = M_{Fred,flare\ pilot,,dry} + M_{Fred,Flare\ op\ purge,,dry} = 0 + 0 = 0\ kg/d$$

Off-spec Gas storage

In addition, for each Day of the Allocation Period, the change in mass of water in Off-spec Gas shall be determined by difference from the end of the previous Day.

Off-Spec Gas wet mass end of Day Eqn. 2-9

$$MClose_{Fred,Offspec,H2O} = MClose_{Fred,Offspec,,wet} * \frac{BSW_{Fred,Offspec}}{100} \rightarrow 0 * \frac{3}{100} = 0\ kg/d$$

Off-spec Gas dry mass Eqn. 2-10

$$MClose_{Fred,Offspec,,dry} = MClose_{Fred,Offspec,,wet} - MClose_{Fred,Offspec,H2O} \rightarrow 0 - 0 = 0\ kg/d$$

Change in water in Off-Spec Gas stock Eqn. 2-11

$$M_{Fred,Offspec\ inc,H2O} = MClose_{Fred,Offspec,H2O} - \left(MClose_{Fred,Offspec,H2O,,d-1} + MAdj_{Fred,Offspec,H2O}\right) \rightarrow$$
$$0 - (0 + 0) = 0\ kg/d$$

STEP 3 - CALCULATION OF COMPONENTS IN DELIVERED CRUDE PETROLEUM AND FINISHED PRODUCTS FOR THE DAY

For each Day of the Allocation Period, the total mass of each Component in the Entrant's Crude Petroleum and the total mass of each Component in Finished Products, respectively, shall be determined as the product of i) the total dry mass of the relevant stream, and ii) the most recent verified dry composition of such stream.

Component mass Eqn. 3-1

$$M_{A,Crude\ Pet,N2} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,N2} \rightarrow 15.792.552 * 0 = 0,0\ kg/d$$
$$M_{A,Crude\ Pet,CO2} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,CO2} \rightarrow 15.792.552 * 0,0002 = 2.527\ kg/d$$
$$M_{A,Crude\ Pet,C1} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,C1} \rightarrow 15.792.552 * 0,0003 = 3.948\ kg/d$$
$$M_{A,Crude\ Pet,C2} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,C2} \rightarrow 15.792.552 * 0,0010 = 15.793\ kg/d$$
$$M_{A,crude\ pet,C3} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,C3} \rightarrow 15.792.552 * 0,0047 = 74.383\ kg/d$$
$$M_{A,Crude\ Pet,iC4} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,iC4} \rightarrow 15.792.552 * 0,0043 = 67.276\ kg/d$$
$$M_{A,Crude\ Pet,nC4} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,nC4} \rightarrow 15.792.552 * 0,0100 = 158.241\ kg/d$$
$$M_{A,Crude\ Pet,iC5} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,iC5} \rightarrow 15.792.552 * 0,9796 = 15.470.384\ kg/d$$
$$M_{A,Crude\ Pet,nC5} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,nC5} \rightarrow 15.792.552 * 0,0000 = 0,0\ kg/d$$
$$M_{A,Crude\ Pet,C6} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,C6} \rightarrow 15.792.552 * 0,0000 = 0,0\ kg/d$$
$$M_{A,Crude\ Pet,C7} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,C7} \rightarrow 15.792.552 * 0,0000 = 0,0\ kg/d$$
$$M_{A,Crude\ Pet,C8} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,C8} \rightarrow 15.792.552 * 0,0000 = 0,0\ kg/d$$
$$M_{A,Crude\ Pet,C9} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,C9} \rightarrow 15.792.552 * 0,0000 = 0,0\ kg/d$$
$$M_{A,Crude\ Pet,C10} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,C10} \rightarrow 15.792.552 * 0,0000 = 0,0\ kg/d$$
$$M_{A,Crude\ Pet,C11} = M_{A,Crude\ Pet,,dry} * X_{A,crude\ Pet,C11} \rightarrow 15.792.552 * 0,0000 = 0,0\ kg/d$$
$$M_{A,Crude\ Pet,C12+} = M_{A,Crude\ Pet,,dry} * X_{A,Crude\ Pet,C12+} \rightarrow 15.792.552 * 0,0000 = 0,0\ kg/d$$

$$M_{B,Crude\ Pet,N2} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,N2} \rightarrow 4.267.941 * 0,0000 = 0,0\ kg/d$$
$$M_{B,Crude\ Pet,CO2} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,CO2} \rightarrow 4.267.941 * 0,0000 = 0,0\ kg/d$$
$$M_{B,Crude\ Pet,C1} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,C1} \rightarrow 4.267.941 * 0,00004 = 171\ kg/d$$
$$M_{B,Crude\ Pet,C2} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,C2} \rightarrow 4.267.941 * 0,0023 = 9.944\ kg/d$$
$$M_{B,crude\ pet,C3} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,C3} \rightarrow 4.267.941 * 0,0312 = 133.202\ kg/d$$
$$M_{B,Crude\ Pet,iC4} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,iC4} \rightarrow 4.267.941 * 0,0136 = 57.916\ kg/d$$
$$M_{B,Crude\ Pet,nC4} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,nC4} \rightarrow 4.267.941 * 0,0446 = 190.478\ kg/d$$
$$M_{B,Crude\ Pet,iC5} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,iC5} \rightarrow 4.267.941 * 0,9082 = 3.876.229\ kg/d$$
$$M_{B,Crude\ Pet,nC5} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,nC5} \rightarrow 4.267.941 * 0,0000 = 0,0\ kg/d$$
$$M_{B,Crude\ Pet,C6} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,C6} \rightarrow 4.267.941 * 0,0000 = 0,0\ kg/d$$
$$M_{B,Crude\ Pet,C7} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,C7} \rightarrow 4.267.941 * 0,0000 = 0,0\ kg/d$$
$$M_{B,Crude\ Pet,C8} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,C8} \rightarrow 4.267.941 * 0,0000 = 0,0\ kg/d$$
$$M_{B,Crude\ Pet,C9} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,C9} \rightarrow 4.267.941 * 0,0000 = 0,0\ kg/d$$
$$M_{B,Crude\ Pet,C10} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,C10} \rightarrow 4.267.941 * 0,0000 = 0,0\ kg/d$$
$$M_{B,Crude\ Pet,C11} = M_{B,Crude\ Pet,,dry} * X_{B,crude\ Pet,C11} \rightarrow 4.267.941 * 0,0000 = 0,0\ kg/d$$
$$M_{B,Crude\ Pet,C12+} = M_{B,Crude\ Pet,,dry} * X_{B,Crude\ Pet,C12+} \rightarrow 4.267.941 * 0,0000 = 0,0\ kg/d$$

($M_{A,crude\ pet,,dry}$, $M_{B,crude\ pet,,dry}$ from Eqn. 2-2)

Finished Products Component masses Eqn. 3-2

$$Fredericia = M_{Fred,Propane,C2} = M_{Fred,Propane,,dry} * X_{Fred,Propane,C2} \rightarrow 100.680 * 0,0207 = 2.083\ kg/d$$
$$M_{Fred,Butane,C3} = M_{Fred,Butane,,dry} * X_{Fred,Butane,C3} \rightarrow 154.320 * 0,0061 = 943\ kg/d$$
$$M_{Fred,CO,C2} = M_{Fred,CO,,dry} * X_{Fred,CO,C2} \rightarrow 19.738.040 * 0,0002 = 4.737\ kg/d$$

($M_{Fred,Propane,,dry}$, $M_{Fred,Butane,,dry}$, $M_{Fred,CO,,dry}$ from Eqn. 2-4)

The same for all Components N_2 to C_{12+}

Fuel Gas Eqn. 3-3

$$HPfuel = M_{Fred,HPfuel,CO2} = M_{Fred,HPfuel,,dry} * X_{Fred,HPfuel,CO2} \rightarrow 28.461 * 0,0392 = 1.115\ kg/d$$
$$LPfuel = M_{Fred,LPfuel,CO2} = M_{Fred,LPfuel,,dry} * X_{Fred,LPfuel,CO2} \rightarrow 39.274 * 0,0306 = 1.201\ kg/d$$
$$Flare = M_{Fred,Flare,CO2} = M_{Fred,Flare,,dry} * X_{Fred,Flare,CO2} \rightarrow 0 * 0,0306 = 0\ kg/d$$
$$Export = M_{Fred,Export,CO2} = M_{Fred,Export,,dry} * X_{Fred,Export,CO2} \rightarrow 0 * 0,0306 = 0\ kg/d$$
$$Import = M_{Fred,Import,CO2} = M_{Fred,Import,,dry} * X_{Fred,Import,CO2} \rightarrow 0 * 0,0300 = 0\ kg/d$$

($M_{Fred,HP\ fuel,,dry}$, $M_{Fred,HP\ fuel,,dry}$, $M_{Fred,HP\ fuel,,dry}$ from Eqn. 2-6)

The same for all Components N_2 to C_{12+}

Total Exported Fuel Gas Eqn. 3-4

$$M_{Fred,Export,H20} = M_{Fred,HP\ export,H2O} + M_{Fred,LP\ export,H2O} \rightarrow 51 + 0 = 51\ kg/d$$

The same for all Components N_2 to C_{12+}

Fuel Gas Total Eqn. 3-5

$$M_{Fred,FuelGas,CO2} = M_{Fred,HP\ fuel,CO2} + M_{Fred,LP\ fuel,CO2} + M_{Fred,Flare,CO2} - M_{Fred,Export,CO2} + M_{Fred,Import,CO2} \rightarrow 1.115 + 1.201 + 0 + 0 - 0 = 2.316\ kg/d$$

The same for all Components H_2O to C_{12+}

In addition, for each Day of the Allocation Period, the produced mass of each Component in Off-spec Gas shall be calculated as the mass change of such Component during the Day.

Off-spec Gas Stock Closing Eqn. 3-6

$$MClose_{Fred,Offspec,N2} = MClose_{Fred,Offspec,,dry} * XClose_{Fred,Offspec,N2} \rightarrow 0 * 0 = 0\ kg/d$$

The same for all Components N_2 to C_{12+}

Change in Off-spec Gas stock Eqn. 3-7

$$M_{Fred,Offspec\ inc,N2} = MClose_{Fred,Offspec,,dry} - \left(MClose_{Fred,Offspec,N2,,d-1} + MAdj_{Fred,Offspec,N2}\right) \rightarrow 0 - (0 + 0) = 0\ kg/d$$

The same for all Components N_2 to C_{12+}

STEP 4 – CALCULATION OF OPENING PIPELINE STOCK, CLOSING PIPELINE STOCK AND ALLOCATED TERMINAL INLET FOR THE ALLOCATION PERIOD

For the Allocation Period, the total mass of water at Terminal Inlet shall be equal to the sum of i) the total measured mass of water in Finished Products, ii) any change in mass of water in Off-spec Gas, iii) the total measured mass of water separated from the Crude Petroleum in the dewatering facilities, and iv) the total measured mass of water separated from the Crude Petroleum in the Degassing Facilities.

Water from Finished Product, Fuel Gas and Off-Spec Gas Eqn. 4-1

$$M_{Fred,oulet,H2O,,p} = M_{Fred,Propane,H2O} + M_{Fred,Butane,H2O} + M_{Fred,CO,H2O} + M_{Fred,HPfuel,H2O} + M_{Fred,LPfuel,H2O} + M_{Fred,Flare,H2O} + M_{Fred,Export,H2O} + MClose_{Fred,Offspec,H2O} - M_{Fred,Import,H2O}$$
$$\rightarrow 0 + 0 + 10.072 + 51 + 110 + 0 + 0 + 0 - 0 = 10.233\ kg$$

Total mass of water leaving Terminal Eqn. 4-2

$$M_{Fred,inlet,H2O} = M_{Fred,dewater\ water,,wet} + M_{Fred,degas\ water,,wet} + M_{Fred,outlet,H2O} = 0 + 92.215 + 10.233 = 102.448\ kg$$

For the Allocation Period, the total mass of each Component at Terminal Inlet shall be deemed equal to the sum of i) the total mass of such Component in Finished Products and ii) any change in mass of such Component in Off-spec Gas.

Component inlet mass Eqn. 4-3

$$M_{Fred,inlet,C3} = M_{Fred,Propane,C3} + M_{Fred,Butane,C3} + M_{Fred,CO,C3} + M_{Fred,FuelGas,C3} + M_{Fred,Offspec\ inc,C3} = \rightarrow 97.466 + 943 + 83.295 + 26.808 + 0 = 208.512\ kg$$

($M_{Fred,Propane,C3}$, $M_{Fred,Butane,C3}$, $M_{Fred,CO,C3}$ from Eqn. 3-2 , $M_{Fred,FuelGas,C3}$ from Eqn. 3-5 and $M_{Fred,Offspec\ inc,C3}$ from Eqn. 3-7

The same for all Components N_2 to C_{12+}

Total wet inlet mass Eqn. 4-4

$$Inlet\ wet\ mass = M_{Fred,inlet,,wet} = M_{Fred,inlet,H2O} + \sum_{c=N2}^{c=C12+} M_{Fred,inlet,c}$$
$$\rightarrow 102.448 + 0 + 2.513 + 4.097 + 25.728 + 208.512 + 125.016 + 348.030 + 19.346.879 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 20.163.223\ kg$$

For each Component and for each Entrant, the Opening Pipeline Stock shall be calculated from the sum of i) the previous Closing Pipeline Stock, ii) any adjustments to Pipeline Stock to be applied for the Allocation Period, and iii) the Entrant's Crude Petroleum for the Allocation Period.

Pipeline Stock Component masses Eqn. 4-5

$$MInitial_{A,Pipestock,H2O} = MClose_{A,Pipestock,H2O,d-1} + MAdj_{A,Pipestock,H2O} + M_{A,Crude\ Pet,H2O} \rightarrow 253.260 + 0 + 101.304 = 354.564\ kg$$

($M_{A,feed,H2O}$ from Eqn. 2-1)

$$MInitial_{A,Pipestock,C1} = MClose_{A,Pipestock,C1,d-1} + MAdj_{A,Pipestock,C1} + M_{A,Crude\ Pet,C1} \rightarrow 9.870 + 0 + 3.948 = 13.818\ kg$$

($M_{A,Crude\ Pet,C1}$ from Eqn. 3-1)

$$MInitial_{B,Pipestock,H2O} = MClose_{B,Pipestock,H2O,d-1} + MAdj_{B,Pipestock,H2O} + M_{B,Crude\ Pet,H2O} \rightarrow 1.494 + 0 + 598 = 2.092\ kg$$

($M_{B,Crude\ Pet,H2O}$ from Eqn. 3-1)

$$MInitial_{B,Pipestock,C1} = MClose_{B,Pipestock,C1,d-1} + MAdj_{B,Pipestock,C1} + M_{B,Crude\ Pet,C1} \rightarrow 427 + 0 + 171 = 598\ kg$$

($M_{B,Crude\ Pet,C1}$ from Eqn. 3-1)

The same for all components H_2O to C_{12+}

Pipeline Stock wet Eqn. 4-6

$$MInitial_{A,Pipestock,,wet} = \sum_{c=H2O}^{c=C12+} MInitial_{A,Pipestock,c} \rightarrow 354.564 + 0{,}0 + 8.844 + 13.818 + 55.274 + 260.340 + 235.467 + 553.845 + 54.146.344 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 55.628.496\ kg$$

$$MInitial_{B,Pipestock,,wet} = \sum_{c=H2O}^{c=C12+} MInitial_{B,Pipestock,c} \rightarrow 2.092 + 0 + 0 + 598 + 34.805 + 466.209 + 202.706 + 666.674 + 13.566.802 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 14.939.884\ kg$$

For each Component and for each Entrant, the Allocated Terminal Inlet shall be calculated as the product of i) the Entrant's delivery of Crude Petroleum and ii) the Entrant's Opening Pipeline Stock. The Allocated Terminal Inlet shall then be normalised against the total mass of each Component at Terminal Inlet in order to account for any Component imbalance across the Terminal and the Stabilisation Plant.

Target inlet Eqn. 4-7

$$If\ FStock_A = 0$$
$$Then\ MT_{A,inlet,,wet} = M_{A,Crude\ Pet,,wet} \rightarrow 15.893.856 = 15.893.856\ kg$$
$$Else\ MT_{A,inlet,,wet} = MT_{A,inlet,,wet}$$

$$Hejre = If\ FStock_B = 0$$
$$Then\ MT_{B,inlet,,wet} = M_{B,Crude\ Pet,,wet} \rightarrow 4.268.538 = 4.268.538\ kg$$
$$Else\ MT_{B,inlet,,wet} = MT_{B,inlet,,wet}$$

($M_{A,Crude\ Pet,,wet}$, $M_{B,Crude\ Pet,,wet}$ from Eqn. 1-1)

Initial Entrant inlet rate Eqn. 4-8

$$MI_{A,inlet,,wet} = M_{Fred,inlet,,wet} * \frac{MT_{A,inlet,,wet}}{\sum_E MT_{E,inlet,,wet}} \rightarrow 20.163.223 * \frac{15.893.856}{15.893.856 + 4.268.538} = 15.894.509\ kg$$

$$MI_{B,inlet,,wet} = M_{Fred,inlet,,wet} * \frac{MT_{B,inlet,,wet}}{\sum_E MT_{E,inlet,,wet}} \rightarrow 20.163.223 * \frac{4.268.538}{15.893.856+4.268.538} = 4.268.714\ kg$$

Initial Entrant inlet Component masses Eqn. 4-9

$$MI_{A,inlet,H2O} = MI_{A,inlet,,wet} * \frac{MInitial_{A,Pipestock,H2O}}{MInitial_{A,Pipestock,,wet}} \rightarrow 15.894.509 * \frac{354.564}{55.628.496} = 101.308\ kg$$

$$MI_{B,inlet,H2O} = MI_{B,inlet,,wet} * \frac{MInitial_{B,Pipestock,H2O}}{MInitial_{B,Pipestock,,wet}} \rightarrow 4.268.714 * \frac{2.092}{14.939.884} = 598\ kg$$

$$MI_{Fred,inlet,H2O} = MI_{A,inlet,H2O} + MI_{B,inlet,H2O} \rightarrow 101.308 + 598 = 101.906\ kg$$

The same for all Components H_2O to C_{12+}

Allocated Entrant inlet Component masses Eqn. 4-10

$$If\ MI_{A,inlet,H20} = 0 Then \qquad If\ MI_{A,inlet,,wet} + MI_{B,inlet,,wet} = 0$$

$$Then\ MI_{A,inlet,H2O} = 0$$

$$Else\ M_{A,inlet,H2O} = M_{Fred,inlet,H2O} * \frac{MI_{A,inlet,,wet}}{\sum_E MI_{E,inlet,,wet}}$$

$$Else\ M_{A,inlet,H2O} = M_{Fred,inlet,H2O} * \frac{MI_{A,inlet,H2O}}{MI_{Fred,inlet,H2O}}$$

$$MI_{A,inlet,H2O} \neq 0 \rightarrow MT_{A,inlet,H2O} = M_{Fred,inlet,H2O} * \frac{MI_{A,inlet,H2O}}{MI_{Fred,inlet,H2O}} \rightarrow 102.448 * \frac{101.308}{101.906} = 101.847\ kg$$

$$If\ MI_{B,inlet,H20} = 0$$

$$Then \qquad If\ MI_{A,inlet,,wet} + MI_{B,inlet,,wet} = 0$$

$$Then\ MI_{B,inlet,H2O} = 0$$

$$Else\ M_{B,inlet,H2O} = M_{Fred,inlet,H2O} * \frac{MI_{B,inlet,,wet}}{\sum_E MI_{E,inlet,,wet}}$$

$$Else\ M_{B,inlet,H2O} = M_{Fred,inlet,H2O} * \frac{MI_{B,inlet,H2O}}{MI_{Fred,inlet,H2O}}$$

$$MI_{B,inlet,H2O} \neq 0 \rightarrow MT_{B,inlet,H2O} = M_{Fred,inlet,H2O} * \frac{MI_{B,inlet,H2O}}{MI_{Fred,inlet,H2O}} \rightarrow 102.448 * \frac{598}{101.906} = 601\ kg$$

The same for all Components H_2O to C_{12+}

The sum of Allocated inlet Component masses Eqn. 4-12

$$M_{A,inlet,,dry} = \sum_{c=N2}^{c=C12+} M_{A,inlet,c}$$

$$= 0 + 2.513 + 3.927 + 15.787 + 74.715 + 67.182 + 157.929 + 15.470.597 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 15.792.649\ kg$$

$$M_{B,inlet,,wet} = \sum_{c=N2}^{c=C12+} M_{B,inlet,c} = 0 + 0 + 170 + 9.941 + 133.797 + 57.834 + 190.102 + 3.876.282 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 4.268.126\ kg$$

The sum of Allocated inlet Component masses with water Eqn. 4-13

$$M_{A,inlet,,wet} = M_{A,inlet,,dry} + M_{A,inlet,H2O} \rightarrow 15.792.649 + 101.847 = 15.894.496\ kg$$

$$M_{B,inlet,,wet} = M_{B,inlet,,dry} + M_{B,inlet,H2O} \rightarrow 4.268.126 + 601 = 4.268.727\ kg$$

Each Entrant's Components in Closing Pipeline Stock shall then be calculated from i) the Entrant's Components in Opening Pipeline Stock less ii) the Entrant's Components in Allocated Terminal Inlet.

Closing Pipeline Stock Component Eqn. 4-11

$$MClose_{A,pipestock,H2O} = MInitial_{A,pipestock,H2O} - M_{A,inlet,H2O} \rightarrow 354.564 - 101.847 = 252.717\ kg$$

$$MClose_{B,pipestock,H2O} = MInitial_{B,pipestock,H2O} - M_{B,inlet,H2O} \rightarrow 2.092 - 601 = 1.491\ kg$$

The same for all components H_2O to C_{12+}

The sum of Closing Pipeline Stock Component masses Eqn. 4-14

$$MClose_{A,Pipestock,,wet} = \sum_{c=H2O}^{c=C12+} MClose_{A,pipestock,c} = 252.717 + 0 + 6.331 + 9.891 + 39.487 + 185.625 + 168.285 + 395.916 + 38.675.747 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 39.734.000\ kg$$

$$MClose_{B,Pipestock,,wet} = \sum_{c=H2O}^{c=C12+} MClose_{B,pipestock,c} = 1.491 + 0 + 0 + 428 + 24.864 + 332.411 + 144.871 + 476.572 + 9.690.520 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 10.671.157\ kg$$

Warning on Pipeline Stock Eqn. 4-15

$$If\ MClose_{A,Pipesock,,wet} < MLimit_{A,Pipestock,,wet}\quad Then\ FError_A = 1 \rightarrow 36.721.411 < 39.734.000$$

$$If\ MClose_{HB,Pipesock,,wet} < MLimit_{B,Pipestock,,wet}\quad Then\ FError_B = 1 \rightarrow 12.240.470 < 10.671.157$$

For the Allocation Period, the total mass of water available for allocation to Finished Products shall then be calculated as i) the total mass of water at Terminal Inlet less ii) the mass of water separated from the Crude Petroleum less iii) any change in the mass of water in Off-spec Gas.

Allocated change in Off-Spec Gas in storage Eqn. 4-16

$$M_{A,Off\ Spec\ inc,H2O} = M_{Fred,Off\ Spec\ inc,H2O*}\frac{M_{A,inlet,H2O}}{M_{Fred,inlet,H2O}} \rightarrow 0 * \frac{101.847}{102.448} = 0\ kg/d$$

$$M_{B,Off\ Spec\ inc,H2O} = M_{Fred,Off\ Spec\ inc,H2O*}\frac{M_{B,inlet,H2O}}{M_{B,inlet,H2O}} \rightarrow 0 * \frac{170}{4.097} = 0\ kg/d$$

The same for all Components H_2O to C_{12+}

For the Allocation Period, the mass of water separated from the Crude Petroleum shall be allocated to an Entrant in proportion to such Entrant's mass of water in Terminal Inlet.

Mass of water to treatment Eqn. 4-17

$$M_{Fred,treated\ water,,wet} = M_{Fred,dewater\ water,,wet} + M_{Fred,degas\ water,,wet} = 92.215 + 0 = 92.215\ kg$$

Mass of water to treatment allocated to Entrant Eqn. 4-20

$$AM_{A,treated\ water} = M_{Fred,treated\ water,,wet} * \frac{M_{A,inlet,H2O}}{M_{Fred,inlet,H20}} = 92.215 * \frac{101.847}{102.448} = 91.674\ kg$$

$$AM_{B,treated\ water} = M_{Fred,treated\ water,,wet} * \frac{M_{B,inlet,H2O}}{M_{Fred,inlet,H20}} = 92.215 * \frac{601}{102.448} = 541\ kg$$

Similarly, for each Entrant, the mass of each Component available for allocation to Finished Products shall be calculated as i) the mass of such Component in Allocated Terminal Inlet, less ii) the change in the mass of such Component in Off-spec Gas. Such change in Off-spec Gas shall be allocated in proportion to each Entrant's Allocated Terminal Inlet.

Allocated inlet available water Eqn. 4-18

$$M_{Fred,inlet\ avail,H20} = M_{Fred,inlet,H20} - M_{Fred,treated\ water,,wet} - M_{Fred,Off\ Spec\ inc,H2O}$$
$$= 102.448 - 92.215 - 0 = 10.233\ kg$$

Allocated inlet available Component Eqn. 4-19

$$M_{Fred,inlet\ avail,CO2} = M_{Fred,inlet,CO2} - M_{Fred,Off\ Spec\ inc,CO2} = 2.513 - 0 = 2.513\ kg$$

The same for all Components N_2 to C_{12+}

Allocated inlet available water to Entrant Eqn. 4-21

$$M_{A,inlet\ avail,H2O} = M_{A,inlet,H2O} - AM_{A,treated\ water} - M_{A,Off\ Spec\ inc,H2O} = 101.847 - 91.674 - 0$$
$$= 10.173\ kg$$

$$M_{B,inlet\ avail,H2O} = M_{B,inlet,H2O} - AM_{B,treated\ water} - M_{B,Off\ Spec\ inc,H2O} = 601 - 541 - 0 = 60\ kg$$

Allocated inlet available Component to Entrant Eqn. 4-22

$$M_{A,inlet\ avail,CO2} = M_{A,inlet,CO2} - M_{A,Offspec\ inc,CO2} = 2.513 - 0 = 2.513\ kg$$

$$M_{B,inlet\ avail,C1} = M_{B,inlet,C1} - M_{B,Off\ Spec\ inc,C1} = 170 - 0 = 170\ kg$$

The same for all Components N_2 to C_{12+}

Total Allocated inlet available Component to Entrant Eqn. 4-23

$$M_{A,inlet\ avail,,dry} = \sum_{c=N2}^{c=C12+} M_{A,inlet\ avail,c} = 0 + 2.513 + 3.927 + 15.787 + 74.715 + 67.182 + 157.929 + 15.470.597 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 15.792.649\ kg$$

$$M_{B,inlet\ avail,,dry} = \sum_{c=N2}^{c=C12+} M_{B,inlet\ avail,c} = 0 + 0 + 170 + 9.941 + 133.797 + 57.834 + 190.102 + 3.876.282 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 4.268.126\ kg$$

STEP 5 – INITIAL ALLOCATION OF TOTAL COMPONENTS AVAILABLE TO ALLOCATED CRUDE OIL AND TOTAL COMPONENTS AVAILABLE TO RESIDUAL OFF GASES FOR THE ALLOCATION PERIOD

For each Entrant, the mass of each Component that can be initially allocated to the Allocated Crude Oil for the Allocation Period shall be determined by the product of i) the total mass of such Component in produced Crude Oil and ii) the proportional mass of such Component available from the Entrant's Allocated Terminal Inlet for allocation to Finished Products.

Initial Allocation of Allocated Crude Oil Component masses Eqn. 5-1

Allocated Crude Oil = ACO

$$If\ M_{Fred,inlet\ avail,c} <> 0 \rightarrow 10.233 > 0$$
$$Then\ IM_{AA,CO,H2O} = M_{Fred,CO,H2O} * \frac{M_{A,inlet\ avail,H2O}}{\sum_E M_{Fred,inlet\ avail,H2O}} \rightarrow 10.072 * \frac{10.173}{10.233} = 10.012\ kg$$
$$Else\ IM_{A,ACO,c} =* \frac{M_{E,inlet\ avail,dry}}{\sum_E M_{E,inlet\ avail,dry}}$$

$$Hejre = If\ M_{Fred,inlet\ avail,c} <> 0 \rightarrow 10.233 > 0$$
$$Then\ IM_{B,ACO,H2O} = M_{Fred,CO,H2O} * \frac{M_{B,inlet\ avail,H2O}}{\sum_E M_{Fred,inlet\ avail,H2O}} \rightarrow 10.072 * \frac{60}{10.233} = 59\ kg$$
$$Else\ IM_{B,ACO,c} =* \frac{M_{E,inlet\ avail,dry}}{\sum_E M_{E,inlet\ avail,dry}}$$

The same for all Components N_2 to C_{12+}

($M_{Fred,inlet\ avail,c}$ from Eqn. 4-18 and 4-19, $M_{Fred,CO,c}$ from Eqn. 3-2 and 2-3 and $M_{E,inlet\ avail,dry}$ from Eqn. 4-21 and 4-22)

For each Entrant, the total initially allocated Components to Residual Off Gases shall then be determined by difference between i) such Components in Allocated Terminal Inlet and ii) such Components initially allocated to Allocated Crude Oil.

Initial Allocation of Fuel Gas Component masses Eqn. 5-2

$$If\ M_{Fred,inlet\ avail,c} <> 0 \rightarrow 10.233 > 0$$
$$Then\ IM_{A,Fuel\ Gas,H2O} = M_{Fred,Fuel\ Gas,H2O} * \frac{M_{A,inlet\ avail,H2O}}{\sum_E M_{Fred,inlet\ avail,H2O}} \rightarrow 161 * \frac{10.173}{10.233} = 160\ kg$$
$$Else\ IM_{A,ACO,c} = M_{Fred,Fuel\ Gas,H2O} * \frac{M_{A,inlet\ avail,dry}}{\sum_E M_{E,inlet\ avail,dry}}$$

$$If\ M_{Fred,inlet\ avail,c} <> 0 \rightarrow 10.233 > 0$$
$$Then\ IM_{B,Fuel\ Gas,H2O} = M_{Fred,Fuel\ Gas,H2O} * \frac{M_{B,inlet\ avail,H2O}}{\sum_E M_{Fred,inlet\ avail,H2O}} \rightarrow 161 * \frac{60}{10.233} = 1\ kg$$
$$Else\ IM_{B,ACO,c} = M_{Fred,Fuel\ Gas,H2O} * \frac{M_{B,inlet\ avail,dry}}{\sum_E M_{E,inlet\ avail,dry}}$$

The same for all Components H_2O to C_{12+}

For each Entrant, the total mass of Components allocated to Residual Off Gases shall be determined by difference between i) the mass of such Components in Off Gases, and ii) the net mass of such Components in measured Fuel Gas.

Initial allocation of Residual Fuel Gas Component masses Eqn. 5-3

$$IM_{A,Res\ Off\ Gases,C2} = M_{A,inlet\ avail,C2} - IM_{A,ACO,C2} - IM_{A,Fuel\ Gas,C2} \rightarrow 15.787 - 2.907 - 11.602 = 1.278\ kg$$

$$IM_{B,Res\ Off\ Gases,C2} = M_{B,inlet\ avail,C2} - IM_{B,ACO,C2} - IM_{B,Fuel\ Gas,C2} \rightarrow 9.941 - 1.830 - 7.360 = 805\ kg$$

The same for all Components H_2O to C_{12+}

STEP 6 – DESIGNATION OF A USER, A LIGHT END DONOR AND A LIGHT END RECEIVER

An Entrant shall be designated a User in accordance with Section 11.3 of the Agreement.

The Allocation Schedule aims to approximate the quality of each Allocated Crude Oil to the quality of the Entrant's quality of Crude Oil if such Entrant's Crude Petroleum had not been part of the commingled stream from the Gorm "E" Platform to the Terminal.

C_{4-} in dry Crude Oil mass fraction Eqn. 6-1

$$X_{Fred,CO,C4-} = \frac{\sum_{c=C1}^{c=nC4} X_{Fred,CO,dry}}{\sum_{c=N2}^{c=C12+} X_{Fred,CO,c,dry}}$$

$$\rightarrow \frac{0{,}0002 + 0{,}0042 + 0{,}0037 + 0{,}0118}{0 + 0 + 0 + 0{,}0002 + 0{,}0042 + 0{,}0037 + 0{,}0118 + 0{,}9800 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0} = 2{,}00\ \%$$

C4- in Allocated Crude Oil mass fraction to Entrant Eqn. 6-2

$$IX_{A,ACO,C4-} = \frac{\sum_{c=C1}^{c=nC4} IM_{A,ACO,c}}{\sum_{c=N2}^{c=C12+} IM_{A,ACO,c}}$$

$$\rightarrow \frac{189 + 2.907 + 29.846 + 39.564 + 105.779}{0 + 197 + 189 + 2.907 + 29.846 + 39.564 + 105.779 + 15.467.403 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0}$$
$$= 1{,}14\ \%$$

$$IX_{B,CO,C4-} = \frac{\sum_{c=C1}^{c=nC4} IM_{B,CO,c}}{\sum_{c=N2}^{c=C12+} IM_{B,CO,c}}$$

$$\rightarrow \frac{8 + 1.830 + 53.448 + 34.059 + 127.328}{0 + 0 + 8 + 1.830 + 53.448 + 34.059 + 127.328 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0}$$
$$= 5{,}29\ \%$$

($IM_{A,ACO,c}$, $IM_{B,ACO,c}$from Eqn. 5-1)

Such mechanism requires a swap of C_{4-} Components between Light End Donors and Light End Receivers. Accordingly, each Entrant shall be designated a Light End Donor or a Light End Receiver by comparison of the actual mass of C_{4-} Components in the Crude Oil with the initially allocated mass of C_{4-} Components to each Entrant in step 5.

Light Ends to be received in Allocated Crude Oil Eqn. 6-3

$$If\ IX_{A,ACO,C4-} < X_{Fred,CO,C4-} \rightarrow 2{,}00\ \% < 1{,}14\ \%$$
$$Then\ LEType_A = LERecvr$$
$$Else\ LEType_E = "LEDonor"$$

$$If\ IX_{B,ACO,C4-} < X_{Fred,CO,C4-} \rightarrow 2{,}00\ \% < 5{,}29\ \%$$
$$Then\ LEType_E = LERecvr$$
$$Else\ LEType_B = "LEDonor"$$

STEP 7 – MOVEMENT OF C_{4-} COMPONENTS AND ALLOCATION OF FINISHED PRODUCTS

For an Entrant designated as a Light End Receiver, the mass of C_{4-} Components to be moved from Residual Off Gases into the Allocated Crude Oil shall be calculated as the product of i) such Entrant's excess C_{4-} Components in the actual Crude Oil compared with initially allocated C_{4-} Components to the Allocated Crude Oil, and ii) the C_{4-} Components initially allocated to the Entrant's Residual Off Gases and in proportion to iii) the C_{4-} Components in such Entrant's Residual Off Gases as calculated by difference from the measured proportion of actual C_{4-} Components in the Allocated Crude Oil.

Since the actual C4- Components in Residual Off Gases cannot be determined by measurement, such Components shall be calculated from the product of i) the allocated C4- Components in Residual Off Gases, and ii) 100% less the actual mass fraction of C4- Components in Crude Oil, and less iii) the C4- Components in inert gases.

Initial allocated Finished Product streams masse for (LE Donor) Eqn. 7A-1

$$If\ LEType_B = \text{LEDonor}\ Then\ IM\ LEDonor_{B,Res\ Off\ Gases,C2} = IM_{B,Res\ Off\ Gases,C2} = 805\ kg$$
$$Else\ IM\ LERecvr_{B,Off\ Gases,C2} = IM_{B,Off\ Gases,C2}$$

$$If\ LEType_B = \text{LEDonor}\ Then\ IM\ LEDonor_{B,ACO,H2O} = IM_{B,ACO,H2O} = 59\ kg$$
$$Else\ IM\ LERecvr_{B,ACO,H2O} = IM_{B,ACO,H2O}$$

The same for all Components H_2O to C_{12+}

($IM_{B,ACO,C2}$ from Eqn. 5-1and $IM_{B,Res\ Off\ Gases,C2}$ from Eqn. 5-3)

Initial allocated Finished Product streams masse for (LE Reciever) Eqn. 7A-1

$$If\ LEType_A = \text{LEDonor}\ Then\ IM\ LEDonor_{A,Res\ Off\ Gases,C2} = IM_{A,Res\ Off\ Gases,C2}$$
$$Else\ IM\ LERecvr_{A,Res\ Off\ Gases,H2O} = IM_{A,Res\ Off\ Gases,H2O} = 1.278\ kg$$

$$If\ LEType_A = \text{LEDonor}\ Then\ IM\ LEDonor_{A,ACO,C2} = IM_{A,ACO,C2}$$
$$Else\ IM\ LERecvr_{A,ACO,C2} = IM_{A,ACO,C2} = 10.012\ kg$$

The same for all Components H_2O to C_{12+}

($IM_{A,ACO,C2}$ from Eqn. 5-1and $IM_{A,Res\ Off\ Gases,C2}$ from Eqn. 5-3)

The mass of Components to be swapped shall however be limited by the mass of C_{4-} Components initially allocated to the Allocated Crude Oil of such Entrants designated as Light End Donors.

Maximum component mass that can be swapped into Allocated Crude Oil of LE Receivers Eqn. 7A-2

$$MSwapMax_{,,H2O} = Min\left[\sum_A IM\ LERecvr_{A,Res\ Off\ Gases,C2}\ or\ \sum_B IM\ LEDonor_{B,Res\ Off\ Gases,C2}\right]$$
$$\rightarrow 1.278 + 0\ \ or\ 0 + 1.830 = 1.278\ kg$$

The same for all Components N2 to C12+

Total mass that can be swapped for C4- Component Eqn. 7A-3

$$MSwapMaxC4 - = \sum_{c=C1}^{c=nC4} MSwapMax,,c \rightarrow 0 + 1.278 + 35.262 + 24.757 + 47.844 = 109.142\ kg$$

Initial mass of C4- in allocated dry Allocated Crude Oil Eqn. 7A-4

$$IM_{A,ACO,C4-} = \sum_{c=C1}^{c=nC4} IM_{A,ACO,c} \rightarrow 189 + 2.907 + 29.846 + 39.564 + 105.779 = 178.285\ kg$$

$$IM_{B,ACO,C4-} = \sum_{c=C1}^{c=nC4} IM_{B,ACO,c} \rightarrow 8 + 1.830 + 53.448 + 34.059 + 127.328 = 216.673\ kg$$

($IM_{B,ACO,C}$, $IM_{B,ACO,c}$ from Eqn. 5-1)

Initial mass of allocated dry Allocated Crude Oil Eqn. 7A-5

$$IM_{A,ACO,C4-} = \sum_{c=N2}^{c=C12+} IM_{A,ACO,c}$$
$$\rightarrow 0 + 197 + 189 + 2.907 + 29.846 + 39.564 + 105.779 + 15.467.403 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 15.645.885\ kg$$

$$IM_{B,ACO,C4-} = \sum_{c=N2}^{c=C12+} IM_{B,ACO,c}$$
$$\rightarrow 0 + 0 + 8 + 1.830 + 53.448 + 34.059 + 127.328 + 3.875.482 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 4.092.156\ kg$$

($IM_{B,ACO,C}$, $IM_{B,ACO,c}$ from Eqn. 5-1)

Initial mass of C4- in allocated Residual Off Gases Eqn. 7A-6

$$IM_{A,Res\ Off\ Gases,C4-} = \sum_{c=C1}^{c=nC4} IM_{A,Res\ Off\ Gases,c} \rightarrow 0 + 1.278 + 35.262 + 24.757 + 47.844 = 109.142\ kg$$

$$IM_{B,Res\ Off\ Gases,C4-} = \sum_{c=C1}^{c=nC4} IM_{B,Res\ Off\ Gases,c} \rightarrow 0 + 805 + 63.147 + 21.313 + 57.591 = 142.855\ kg$$

($IM_{B,Res\ Off\ Gaese,C}$, $IM_{A,Res\ Off\ Gases,c}$ from Eqn. 5-3)

Initial mass of inerts and C5+ in allocated dry Residual Off Gases Eqn. 7A-7

$$IM_{A,Res\ Off\ Gases,inerts} = \sum_{c=H2O}^{c=CO2} IM_{A,Res\ Off\ Gases,c} + \sum_{c=iC5}^{c=C12+} IM_{A,Res\ Off\ Gases,c}$$
$$= 0 + 0 + 0 + 2.401 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 2.401\ kg$$

$$IM_{B,Res\ Off\ Gases,inerts} = \sum_{c=C1}^{c=nC4} IM_{B,Res\ Off\ Gases,c} + \sum_{c=iC5}^{c=C12+} IM_{B,Res\ Off\ Gases,c}$$
$$\rightarrow 0 + 0 + 0 + 602 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 8602\ kg$$

($IM_{B,Res\ Off\ Gaese,C}$, $IM_{A,Res\ Off\ Gases,c}$ from Eqn. 5-3)

Target mass C4- to be moved into Allocated Crude Oil Eqn. 7A-8

$$If\ LEType_A = \text{LERecvr}\ Then\ MSwap_{A,,C4-} = \frac{\left(IM_{A,Res\ Off\ Gases,C4-} * \left(IM_{Fred,CO,,dry} * X_{Fred,CO,C4-} - IM_{A,ACO,C4-}\right)\right)}{\left(IM_{A,Res\ Off\ Gases,C4-} * \left(1 - X_{Fred,CO,C4-}\right) - X_{Fred,CO,C4-} * IM_{A,Res\ Off\ Gases,inerts}\right)}$$

$$\rightarrow \frac{(109.142 * (15.645.885 * 2,00 - 178.285))}{109.142 * (1 - 2,00) - 2 * 2.401} 137.603\ kg$$

$$Else\ MTSwap_{A,,C4-} = 0$$

$$If\ LEType_B = \text{LERecvr}\ Then\ MSwap_{B,,C4-} = \frac{\left(IM_{B,Res\ Off\ Gases,C4-} * \left(IM_{Fred,CO,,dry} * X_{Fred,CO,C4-} - IM_{B,ACO,C4-}\right)\right)}{\left(IM_{B,Res\ Off\ Gases,C4-} * \left(1 - X_{Fred,CO,C4-}\right) - X_{Fred,CO,C4-} * IM_{B,Res\ Off\ Gases,inerts}\right)}$$

$$Else\ MTSwap_{B,,C4-} = 0$$

For an Entrant designated as a Light End Receiver, each of the C4- Components shall be distributed to the Allocated Crude Oil in proportion to the mass of the Component in the total C4- Components to be moved.

Total mass of C4- to be moved into LE Receivers' Crude Oil Eqn. 7A-9

$$MSwap_{Fred,,C4-} = Minimum\left(MSwapMax_{,,C4-}, \sum_E MTSwap_{E,,C4-}\right) \rightarrow 109.142\ or\ 137.603 + 0 = 109.142\ kg$$

Mass of C4- Components to be moved into Allocated Crude Oil Eqn. 7A-10

$$MSwap_{Fred,,C2} = MSwap_{Fred,,C4-} * \frac{MSwapMax_{Fred,C2}}{\sum_E MSwapMax_{,,C4-}} \rightarrow 109.142 * \frac{1.278}{109.142} = 1.278\ kg$$

The same for C_1 to nC_4

Components mass to be moved into LE Receiver's Allocated Crude Oil Eqn. 7A-11

$$MSwapIN_{A,ACO,C2} = MSwap_{Fred,,C1} * \frac{IM\ LERecvr_{A,Res\ Off\ Gases,C2}}{\sum_E IM\ LERecvr_{E,Res\ Off\ Gases,C2}} \rightarrow 1.278 * \frac{1.278}{1.278 + 0} = 1.278\ kg$$

The same for C_1 to nC_4

Components mass to be moved out of LE Receiver's Residual Off Gases Eqn. 7A-12

$$MSwapOut_{A,Res\ Off\ Gases,C2} = -MSwapIn_{A,ACO,C2} = -1.278\ kg$$

The same for C_1 to nC_4

Fraction of C_{4-} moved from LE Receiver's dry Residual Off Gases Eqn. 7A-13

$$FOut_{A,Res\ Off\ Gases,C4-} = \frac{-\sum_{c=C1}^{c=nC4} MSwapOut_{A,Res\ Off\ Gases,c}}{\sum_{c=C1}^{c=nC4} IM_{A,Res\ Off\ Gases,c}} \rightarrow \frac{-0+-1.278+-35.262+-24.757+-47.844}{0+1.278+35.262+24.757+47.844} = 1{,}000\%$$

Target of remaining Components to move out of LE Receivers Residual Off Gases Eqn. 7A-14

$$MTSwapOut_{A,Res\ Off\ Gases,iC5} = -IM\ LERecvr_{A,Res\ Off\ Gases,iC5} * FOut_{A,Res\ Off\ Gases,C4-} \rightarrow -2.401 * 1{,}000\% = -2.401\ kg$$

The same for N_2 to CO_2 and for nC_5 to C_{12+}

Mass of inerts to move out of LE Receivers Residual Off Gases Eqn. 7A-15

$$Abs\left(\sum_E MTSwapOut_{A,Res\ Off\ Gases,iC5}\right) < MSwapMax_{,,iC5}$$

$$Then\ MSwapOut_{A,Res\ Off\ Gases,iC5} = MTSwapOut_{A,Res\ Off\ Gases,iC5} = -2.401\ kg$$

$$Else\ MSwapOut_{A,Res\ Off\ Gases,iC5} = -MSwapMax_{,,iC5} * \frac{MTSwapOut_{A,Res\ Off\ Gases,iC5}}{\sum_E MTSwapOut_{E,Res\ Off\ Gases,iC5}}$$

The same for N_2 to CO_2 and for nC_5 to C_{12+}

In order to maintain mass balance, an equivalent mass of C_{4-} Components shall be swapped from the Allocated Crude Oil initially allocated to those Entrants designated as Light End Donors and into such Entrants initially allocated Residual Off Gases.

Mass of inerts to be moved into LE Receivers Allocated Crude Oil Eqn. 7A-16

$$MSwapIn_{A,Res\ Off\ Gases,iC5} = -MSwapOut_{A,ACO,iC5} = 2.401\ kg$$

The same for N_2 to CO_2 and for nC_5 to C_{12+}

Component mass to be moved out of LE Donors Allocated Crude Oil Eqn. 7A-17

$$MSwapOut_{B,ACO,H2O} = -\sum_E MSwapIn_{E,iC5} * \frac{IM\ LEDonor_{B,ACO,iC5}}{\sum_E IM\ LEDonor_{E,ACO,iC5}} \rightarrow -1.278 * \frac{1.830}{0+1.830} = -1.278\ kg$$

The same for N_2 to C_{12+}

Component mass to be moved into LE Donors Off Gases Eqn. 7A-18

$$MSwapIn_{B,Res\ Off\ Gases,HC2} = -MSwapOut_{B,ACO,C2} = 1.278\ kg$$

The same for N_2 to C_{12+}

For each Entrant's Allocated Crude Oil and Residual Off Gases, the mass of Components to be allocated shall be calculated from the sum of i) the mass of Components initially allocated to the Entrant's Crude Oil and Off Gases, ii) the mass of Components swapped into the

Allocated Crude Oil and Residual Off Gases and iii) the mass of Components swapped out of the Allocated Crude Oil and Residual Off Gases.

Allocated component masses Eqn. 7A-19

$$AM_{A,Res\ Off\ Gases,H2O} = IM_{A,Res\ Off\ Gases,H2O} + MSwapIn_{A,Res\ Off\ Gases,H2O} + MSwapOut_{A,Res\ Off\ Gases,H2O}$$
$$\rightarrow 0 + -0 + 0 = 0\ kg$$
$$AM_{B,Res\ Off\ Gases,C2} = IM_{B,Res\ Off\ Gases} + MSwapIn_{B,Res\ Off\ Gases,C2} + MSwapOut_{B,Res\ Off\ Gases,C2}$$
$$\rightarrow 0 + 1.278 + 805 = 2.083\ kg$$

The same for Crude Oil

The same for N_2 to C_{12+}

($IM_{A,Res\ Off\ Gases}$, $IM_{B,Res\ Off\ Gases}$ from Eqn. 5-3)

For any Entrant that is designated a User, the measured mass of each Component in Propane and Butane, respectively, shall be distributed to such Entrant's allocated Propane and Butane in proportion to the mass of the Component in the Entrant's allocated Off Gases.

Allocated Off Gases component masse to Non-Users Eqn. 7B-1

$$If\ User = No$$
$$Then\ AM\ NonUser_{A,Off\ Gases,H2O} = AM_{A,Res\ Off\ Gases,H2O} + IM_{A,Fuel\ Gas} \rightarrow 160\ kg$$
$$Else\ AM\ User_{A,Off\ Gases} = AM_{A,Off\ Gases,H2O} + IM_{A,Fuel\ Gas}$$

$$If\ User = No$$
$$Then\ AM\ NonUser_{B,Off\ Gases,H2O} = AM_{B,Res\ Off\ Gases,H2O} + IM_{B,Fuel\ Gas}$$
$$Else\ AM\ User_{B,Off\ Gases} = AM_{B,Res\ Off\ Gases,H2O} + IM_{B,Fuel\ Gas} \rightarrow 1\ kg$$

($IM_{A,Fuel\ Gas}$, $IM_{B,Fuel\ Gas}$ from Eqn. 5-2)
The same for all Components N_2 to C_{12+}

Total Components mass for Propane and Butane (LPG) Eqn. 7B-2

$$M_{Fred,LPG,C2} = M_{Fred,propane,C2} + M_{Fred,Butane,C2} \rightarrow 2.083 + 0 = 2.083\ kg$$
($M_{Fred,propane,C2}$, $M_{Fred,Butane,C2}$ from Eqn. 3-2)

Allocation of Propane and Butane (LPG) to Users Eqn. 7B-3

$$B = If\ User = Yes$$
$$Then\ M_{B,LPG,C2} = Min\left(M_{Fred,LPG,C2}, M_{Fred,LPG,C2} * \frac{AM\ User_{B,Off\ Gases,C2}}{\sum_E AM\ User_{E,Off\ Gases,C2}}\right) \rightarrow 9.941\ or\ 2.083 * \frac{9.941}{0 + 9.941}$$
$$= 2.083\ kg$$
$$Else\ M_{B,LPG,C2} = 0$$

Unallocated LPG Eqn. 7B-4

$$M_{Fred,LPG\ Rem,C2} = M_{Fred,LPG,C2} - \sum_E M_{E,LPG,C2} \rightarrow 2.083 - (0 + 2.083) = 0\ kg$$

The same for all Components H_2O to C_{12+}

Allocation of Propane and Butane (LPG) to Non-Users Eqn. 7B-5

$$If\ User = Yes$$
$$Then\ AM_{A,LPG,C1} = M_{A,LPG,C1}$$
$$Else\ AM_{A,LPG,C1} = M_{Fred,LPG\ Rem,C1} * \frac{AM\ NonUser_{A,Off\ Gases,C1}}{\sum_E AM\ NonUser_{E,Off\ Gases,C1}} \rightarrow 0 * \frac{3.738}{3.738 + 0} = 0\ kg$$

$$If\ User = Yes$$
$$Then\ AM_{B,LPG,C2} = M_{B,LPG,C2} \rightarrow 2.083\ kg$$
$$Else\ AM_{B,LPG,C2} = M_{Fred,LPG\ Rem,C2} * \frac{AM\ NonUser_{B,Off\ Gases,C2}}{\sum_E AM\ NonUser_{E,Off\ Gases,C2}}$$

The same for all Components H_2O to C_{12+}

Allocation of Propane Eqn. 7B-6

$$AM_{A,Propane,C3} * \frac{M_{Fred,Propane,C3}}{M_{Fred,LPG,C3}} \rightarrow 0 * \frac{97.466}{98.409} = 0\ kg$$
$$AM_{B,Propane,C3} * \frac{M_{Fred,Propane,C3}}{M_{Fred,LPG,C3}} \rightarrow 98.409 * \frac{97.466}{98.409} = 97.466\ kg$$

The same for all Components H_2O to C_{12+}

Allocation of Butane Eqn. 7B-7

$$AM_{A,Butane,C3} * \frac{M_{Fred,Butane,C3}}{M_{Fred,LPG,C3}} \rightarrow 0 * \frac{943}{98.409} = 0\ kg$$
$$AM_{B,Butane,C3} * \frac{M_{Fred,Butane,C3}}{M_{Fred,LPG,C3}} \rightarrow 98.409 * \frac{943}{98.409} = 943\ kg$$

The same for all Components H_2O to C_{12+}

Finally, for each Entrant and each Component, the mass of such Component to be allocated to the Entrant's mass of Fuel Gas shall be calculated as i) the mass of the Component allocated to the Entrant's Residual Off Gases less ii) the mass of the Component allocated to the Entrant's Propane and Butane, respectively.

Allocation of Fuel Gas Eqn. 7B-8

$$AM_{A,FuelGas,C1} = AM_{A,Off\ Gases,C1} + IM_{A,Fuel\ Gas,C1} - AM_{A,Propane,C1} - AM_{A,Butane,C1} \rightarrow 0 + 3.738 - 0 - 0 = 3.738\ kg$$
$$AM_{B,FuelGas,C2} = AM_{B,Off\ Gases,C2} + IM_{B,Fuel\ Gas,C2} - AM_{B,Propane,C2} - AM_{B,Hejre,Butane,C2} \rightarrow 2.083 + 7.306 - 2.083 - 0 = 7.306\ kg$$

The same for all Components H_2O to C_{12+}

STEP 8 - CALCULATION OF ALLOCATED MASSES TO FINISHED PRODUCTS FOR THE ALLOCATION PERIOD AND CONVERSION FROM MASSES TO VOLUMES

For each Entrant, the total dry mass of Allocated Crude Oil for the Allocation Period shall be calculated as the sum of Components allocated to the Allocated Crude Oil for the Allocation Period.

Dry mass allocated Eqn. 8-1

$$AM_{A,FuelGas,,dry} = \sum_{c=N2}^{c=C12+} AM_{A,FuelGas,c}$$
$$\rightarrow 0 + 2.316 + 3.738 + 11.602 + 9.606 + 2.861 + 4.306 + 793 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 35.221\ kg$$

$$AM_{B,FuelGas,,dry} = \sum_{c=N2}^{c=C12+} AM_{B,FuelGas,c}$$
$$\rightarrow 0 + 0 + 162 + 7.306 + 17.202 + 2.463 + 5.183 + 199 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 32.514\ kg$$

The same for Propane, Butane and Allocated Crude Oil

Removed sum of components from Fuel Gas, Propane and Butane Eqn. 8-2

$$AM_{A,FP,H20,rem} = AM_{A,Fuel\ Gas,H20} + AM_{A,Propane,H20} + AM_{A,Butane,H20} + AM_{A,treated\_water} \rightarrow 160 + 0 + 0 + 91.674 = 91.834\ kg$$

$$AM_{A,FP,C1,rem} = AM_{A,Fuel\ Gas,C1} + AM_{A,Propane,C1} + AM_{A,Butane,C1} \rightarrow 3.738 + 0 + 0 = 3.738\ kg$$

$$AM_{B,FP,H20,rem} = AM_{B,Fuel\ Gas,H20} + AM_{B,Propane,H20} + AM_{B,Butane,H20} + AM_{B,treated\_water} \rightarrow 1 + 0 + 0 + 541 = 542\ kg$$

$$AM_{B,FP,C1,rem} = AM_{B,Fuel\ Gas,C1} + AM_{B,Propane,C1} + AM_{B,Butane,C1} \rightarrow 162 + 0 + 0 = 162\ kg$$

($AM_{A,Fuel\ Gas,H20}$, $AM_{A,Propane,H20}$, $AM_{A,Butane,H20}$, $AM_{B,Fuel\ Gas,H20}$, $AM_{B,Propane,H20}$, $AM_{B,Butane,H20}$ from Eqn. 7B-9 and $AM_{A,treated\_water}$, $AM_{B,treated\_water}$ from Eqn. 4-20

The same for all Components CO_2 to nC_5

Total sum of components redelivered Eqn. 8-3

$$AM_{A,red} = \sum_{c=CO2}^{c=nC5} AM_{A,FP,c,rem} + AM_{A,FP,H2O,rem} + \sum_{c=H2O}^{c=C12+} AM_{A,ACO,c}$$
$$\rightarrow 2.316 + 3.738 + 11.602 + 9.606 + 2.861 + 4.306 + 793 + 0 + 91.834 + 10.012 + 0 + 197 + 189 + 4.185 + 65.109 + 64.321 + 153.623 + 15.469.804 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 15.894.496\ kg$$

$$AM_{B,red} = \sum_{c=CO2}^{c=nC5} AM_{B,FP,c,rem} + AM_{B,FP,H2O,rem} + \sum_{c=H2O}^{c=C12+} AM_{B,ACO,c}$$

$$\rightarrow 0 + 162 + 9.389 + 115.611 + 48.533 + 110.618 + 3.202 + 0 + 542 + 59 + 0 + 0 + 8 + 552 + 18.186 + 9.302 + 79.484 + 3.873.081 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 4.268.727\ kg$$

($AM_{A,ACO,c}$,$AM_{B,ACO,c}$from Eqn. 7B-9)

Fraction of Components of redelivered Finished Products Eqn. 8-4

$$Frac\ AM_{A,FP,H2O,rem} = \frac{AM_{A,FP,H2O,rem}}{AM_{A,red}} \rightarrow \frac{91.834}{15.894.496} = 0,0058$$

$$Frac\ AM_{B,FP,H2O,rem} = \frac{AM_{B,FP,H2O,rem}}{AM_{B,red}} \rightarrow \frac{542}{4.268.727} = 0,0001$$

The same for all Components H_2O and CO_2 to nC_5

Fraction of Allocated Crude Oil of redelivered Finished Products Eqn. 8-5

$$Frac\ AM_{A,ACO} = \frac{\sum_{c=H2O}^{c=C12+} AM_{A,ACO,c}}{AM_{A,red}}$$

$$\rightarrow \frac{10.012 + 197 + 189 + 4.185 + 65.109 + 64.321 + 153.623 + 15.469.804 + 0 + 0 + 0 + 0 + 0 + 0 + 0}{15.894.496} = 0,9920$$

$$Frac\ AM_{B,ACO} = \frac{\sum_{c=H2O}^{c=C12+} AM_{B,ACO,c}}{AM_{B,red}}$$

$$\rightarrow \frac{59 + 0 + 8 + 552 + 18.186 + 9.302 + 79.484 + 3.873.081 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0}{4.268.727} = 0,9325$$

Fraction of Crude Petroleum Eqn. 8-6

$$If\ AM_{A,red} = M_{A,inlet,,wet,p}$$

$$Then\ Frac\ AM_{A,Crude\ Pet} = \frac{M_{A,inlet,,wet,p}}{AM_{A,red}} \rightarrow \frac{15.894.496}{15.894.496} = 1,000$$

$$Else\ Frac\ AM_{A,Crude\ Pet} = 1,0000$$

$$If\ AM_{B,red} = M_{B,inlet,,wet,p}$$

$$Then\ Frac\ AM_{B,Crude\ Pet} = \frac{M_{B,inlet,,wet,p}}{AM_{B,red}} \rightarrow \frac{4.268.727}{4.268.727} = 1,000$$

$$Else\ Frac\ AM_{B,Crude\ Pet} = 1,0000$$

Calculated density of Allocated Crude Oil Eqn. 8-7

$$D_{A,ACO} = \frac{Frac\ AM_{A,Crude\ Pet} * D_{A,crude\ Pet,,wet,d} - \left(Frac\ AM_{A,FP,H2O,rem} * D_{H2O} + \sum_{c=CO2}^{c=nC5} Frac\ AM_{A,FP,c,rem} * SD_c\right)}{Frac\ AM_{A,ACO}} \rightarrow$$

$$\frac{1,0000*850,9-(0,0058*985,2+0,0001*825,34+0,0002*299,39+0,0007*355,68+0,0006*506,68+0,0002*561,97+0,0003*583,22+0*623,44+0*629,73}{0,9920} =$$

851Sm[3]

$$D_{B,ACO} = \frac{Frac\ AM_{B,Crude\ Pet} * D_{B,crude\ Pet,,wet,d} - \left(Frac\ AM_{B,FP,H2O,rem} * D_{H2O} + \sum_{c=CO2}^{c=nC5} Frac\ AM_{B,FP,c,rem} * SD_c\right)}{Frac\ AM_{A,ACO}} \rightarrow$$

$$\frac{1,0000*762,5-(0,0001*985,2+0*825,34+0*299,39+0,0022*355,68+0,0271*506,68+0,0114*561,97+0,0259*583,22+0,0008*623,44+0*629,73}{0,9325} =$$

778 Sm^3

Allocated ideal volume in Allocated Crude Oil

The total volume of each an Entrant's Allocated Crude Oil shall then be calculated from the product of i) the total mass of each of the Entrant's Crude Oil and ii) the calculated Allocated Crude Oil Density for Entrant.

Water Eqn. 8-8

$$AV_{A,ACO,H2O} = \frac{AM_{A,ACO,H2O}}{D_{Fred,dewater\ water,,wet}} \rightarrow \frac{10.072}{985,2} = 10\ kg$$

$$AV_{B,ACO,H2O} = \frac{AM_{B,ACO,H2O}}{D_{Fred,dewater\ water,,wet}} \rightarrow \frac{0}{985,2} = 0\ kg$$

The same for all components C_1 to C_{12+}

Ideal volume in Allocated Crude Oil Eqn. 8-9

$$V_{A,ACO,,dry}^{Ideal} = \frac{AM_{A,ACO}}{D_{A,ACO}} \rightarrow \frac{15.757.428}{851} = 18.517\ kg$$

$$V_{B,ACO,,dry}^{Ideal} = \frac{AM_{B,ACO}}{D_{B,ACO}} \rightarrow \frac{3.980.612}{778} = 5.114\ kg$$

($AM_{A,ACO,C}$, $AM_{B,ACO,C}$ from Eqn. 7B-12)

Finally, the ideal volume of Allocated Crude Oil shall be normalised to the measured change in Crude Oil stock volume for the Allocation Period.

Allocated dry volume in Allocated Crude Oil Eqn. 8-10

$$V_{Fred,CO,,dry} = V_{Fred,CO,,wet} - \sum_E AV_{E,ACO,H2O} \rightarrow 23.957 - (10 + 0) = 23.947\ Sm^3$$

($V_{Fred,CO,,wet}$ from analysis)

Allocated dry volume to Allocated Crude Oil to Entrant Eqn. 8-11

$$AV_{A,ACO,,dry} = V_{Fred,CO,,dry} * \frac{V_{A,ACO,,dry}^{Ideal}}{V_{A,ACO,,dry}^{Ideal} + V_{B,ACO,,dry}^{Ideal}} \rightarrow 23.947 * \frac{18.517}{18.517 + 5.114} = 18.765 Sm^3$$

$$AV_{B,ACO,,dry} = V_{Fred,CO,,dry} * \frac{V_{B,CO,,dry}^{Ideal}}{V_{A,CO,,dry}^{Ideal} + V_{B,CO,,dry}^{Ideal}} \rightarrow 23.947 * \frac{5.114}{18.517 + 5.114} = 5.182\ Sm^3$$

Allocated dry volume in bbls Eqn. 8-12

$$AV_{A,ACO,,dry,bbls} = AV_{A,ACO,,dry,sm3} * \frac{bbls}{sm3} \rightarrow 18.756 * 6{,}292955 = 118.087 \text{ bbls}$$

$$AV_{B,ACO,,dry,bbls} = AV_{B,ACO,,dry,sm3} * \frac{bbls}{sm3} \rightarrow 5.182 * 6{,}292955 = 32.611 \text{ bbls}$$