

2. (1) Let W_xP_y be the quantity of oil which flows from Well x to Pump y

Let P_yR_z be the quantity of oil which moves along the Pump y to Refinery z .

The objective function is: Minimum

$$\begin{aligned} &1.52W_{1PA} + 1.6W_{1PB} + 1.4W_{1PC} + 1.7W_{2PA} + 1.63W_{2PB} + \\ &1.55W_{2PC} + 1.45W_{3PA} + 1.57W_{3PB} + 1.3W_{3PC} + 5.15PAR_1 + \\ &5.69PAR_2 + 6.13PAR_3 + 5.63PAR_4 + 5.8PAR_5 + 5.12PBR_1 + \\ &5.47PBR_2 + 6.05PBR_3 + 6.12PBR_4 + 5.71PBR_5 + 5.32PCR_1 + \\ &6.16PCR_2 + 6.25PCR_3 + 6.17PCR_4 + 5.87PCR_5 + 0PAR_6 + 0PBR_6 \\ &+ 0PCR_6 \end{aligned}$$

The constraints will be as follows:

$$W_{1PA} + W_{1PB} + W_{1PC} \leq 93$$

$$W_{2PA} + W_{2PB} + W_{2PC} \leq 88$$

$$W_{3PA} + W_{3PB} + W_{3PC} \leq 95$$

$$W_{1PA} + W_{2PA} + W_{3PA} = PAR_1 + PAR_2 + PAR_3 + PAR_4 + PAR_5$$

$$W_{1PB} + W_{2PB} + W_{3PB} = PBR_1 + PBR_2 + PBR_3 + PBR_4 + PBR_5$$

$$W_{1PC} + W_{2PC} + W_{3PC} = PCR_1 + PCR_2 + PCR_3 + PCR_4 + PCR_5$$

$$PAR_1 + PBR_1 + PCR_1 = 30$$

$$PAR_2 + PBR_2 + PCR_2 = 57$$

$$PAR_3 + PBR_3 + PCR_3 = 48$$

$$PAR_4 + PBR_4 + PCR_4 = 91$$

$$PAR_5 + PBR_5 + PCR_5 = 48$$

$WxPy, PyRz \geq 0$

(2) The Network diagram is as follows:

