Take home Model 25 points

By submitting you state that you have not received any help from any person other than Dr. Easton. Comparing Z values with someone else or discussing constraints is considered help.

You work at an oil refining facility, which has access to 7 pipelines. Each pipeline has an average grade of chemicals. These are given in the table. The EPA requirements regarding the blends are given in the table. You must produce 100,000 barrels a day.

You are currently negotiating the contract price. A barrel cost differs by the amount agreed to purchase each day. The other table has the cost of a barrel from a particular pipeline as well as the negotiated prices that would be achieved and the capacity that can be ordered per day. No pipeline can supply more than 30,000 barrels. Clearly, you want to minimize your cost to achieve the 100,000 barrels of production.

You can assume that the pipelines can blend perfectly. So 50% of pipeline 1 and 50% of pipeline 2 would have .0035 lead, .2 sulfur, 60 carbon, 6 MTBE, 87.5 octane and .003 mercury. Such a blend would not be a feasible blend, because lead is too high. If the person were to buy 15,000 of pipeline 1 and 5,000 of pipeline 2, then the cost would be 15,000\*49+5,000\*52. This blend would also be feasible in lead as the lead would now be (.002\*15000+.005\*5000)/ 20000 = .00275.

Submit a word document or text file with a readable solution and the model/code. This model/code can just be pasted after the solution in your word document. Points will be deducted for submitting a solution that is difficult to read or interpret. I do not need a report!

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Lead | Sulfur | Carbon | MTBE | Octane | Mercury |
| PipeLine1 | .002 | .1 | 50 | 5 | 85 | .002 |
| PipeLine2 | .005 | .3 | 70 | 7 | 90 | .004 |
| PipeLine3 | .001 | .2 | 90 | 11 | 91 | .003 |
| PipeLine4 | 0 | .6 | 79 | 2 | 87 | .001 |
| PipeLine5 | .003 | .1 | 45 | 6 | 88 | 0 |
| PipeLine6 | .003 | .4 | 63 | 8 | 84 | .001 |
| PipeLine7 | .002 | .2 | 27 | 2 | 92 | .005 |
| EPA Maximum | .00275 | .5 | 80 | 10 | 100 | .003 |
| EPA Minimum | 0 | .2 | 40 | 2 | 87 | 0 |

Cost per barrel (Bar)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Contract costs low | Contract cost medium | Contract cost high |
| PipeLine1 | $50 up to 10,000 Bar | $49 for 10,000-20,000 Bar | $47 over 20,000 Bar |
| PipeLine2 | $52 up to 10,000 Bar | $50 for 10,000-15,000 Bar | $49 over 15,000 Bar |
| PipeLine3 | $49 up to 5,000 Bar | $47 for 5,000-15,000 Bar | $46 over 15,000 Bar |
| PipeLine4 | $51 up to 10,000 Bar | $50 for 10,000-20,000 Bar | $49 over 20,000 Bar |
| PipeLine5 | $50 up to 20,000 Bar | $47 for over 20,000 Bar | $47 for over 20,000 Bar |
| PipeLine6 | $48 up to 10,000 Bar | $47 for 10,000-20,000 Bar | $46 over 20,000 Bar |
| PipeLine7 | $47 up to 20,000 Bar | $46 for over 20,000 Bar | $46 for over 20,000 Bar |