**Nithin Das, CWID: 10422784, Date: 10/03/19 Assignment W&A 4th Edition, Ch 3, Q 34, Page 124**

I pledge on my honor that I have not given or received any unauthorized assistance on this

assignment/examination. I further pledge that I have not copied any material from a book, article,

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Signature: NITHIN DAS

Date: 10/03/2019

**Management Overview**

* **Problem Statement**

To develop a model to determine the amount of waste to be processed in order to minimize the total cost of reducing the pollution subject to specific constraints.

* **Data Sources**

The waste processing costs per ton for each factory, reduction in P1 level per ton for each factory, reduction in P2 level per ton for each factories and the State’s criteria for P1 and P2 level in the river.

* **Model Approach**
* Enter the input data in the spreadsheet.
* Create the ‘*Waste to be Processed’* by entering random values initially.
* Compute the ‘*Reduced P1/ton*’ by multiplying ‘*Reduction in P1/ton*’ by ‘*Waste to be Processed*’ for respective factories
* Compute the ‘*Reduced P2/ton*’ by multiplying ‘*Reduction in P2/ton*’ by ‘*Waste to be Processed* for respective factories
* Compute ‘*Total Reduced P1 amount*’ field as sumof‘*Reduced P1/ton*’
* Compute ‘*Total Reduced P2 amount*’ field as sumof‘*Reduced P2/ton*’
* Compute ‘Cost for Reducing Pollution’ as the SUMPRODUCT of ‘*Waste Processing Costs/ton*’ and ‘*Waste to be Processed*’
* Use Solver to compute the minimized cost of waste reduction. While computing, add the State’s criteria for P1 and P2 levels as constraints
* Use SolverTable to perform sensitivity analysis on Total costs and Amount to be processed with the same percentage changes of State’s P1,P2 levels
* **Solution & Sensitivity Analysis**

Results:

The minimized cost of reducing the pollution is $157,692.

The total waste to be processed to obtain the minimized cost is 7.69 ton for factory 1, 146.15 ton for factory 2 and 0 ton for factory 3.

All the linear programming assumptions are satisfied in this model.

Sensitivity Analysis

The sensitivity analysis on Total Costs of waste reduction and State’s criteria on P1,P2 levels shows a linear increment.

The sensitivity analysis Amount to be Processed and State’s criteria on P1,P2 levels shows a linear increment for factory 1 and factory 2. However, the amount to be processed for factory 3 remains 0.

* **Recommendations**

The amount of waste to be processed by the factory 3 remains 0 even after increasing the State’s criteria by 100%. This shows that the Cost of processing waste at factory 3 is significantly high. The factory 3 needs to come up with an efficient waste processing system to reduce the processing cost.