BIA 650 A Homework#3 W&A Chapter 3, Problem 34a and b

# Management Overview

Problem Statement:

The Objective is to minimize the total cost in processing waste while satisfying the state regulations and to analyse the sensitivity of total cost to the change in percentage increase in requirement amount to waste to be removed.

Data Sources:

* + The **inputs** are identified as Cost of processing waste for each factory for each ton, Amount of pollutants removed in each category (P1 and p2)
  + The key **decision variables** are Number of tons of waste to be processed.
  + **Constraints** are that the total amount of pollutants reduced should be at least equal to the amount mandated by the state.
  + The **uncertain variable** here is the percent increase of minimum amount of Pollutants removed.
  + **Output** is the Total Cost incurred in processing waste

Model Approach:

* + Separate the data into inputs, decision variables, constraints and output.
  + The objective, Constraint and Decision variables are input into the solver and it is run. (This problem satisfies the LP assumptions.)
  + The model is revised so as to accommodate for percentage increases in the minimum amount of pollutants to be remove as mandated by the state.
  + An integer constraint is set to the decision variables for feasibility.

Sensitivity Analysis:

* **Percentage Increase Vs Amount of waste processed**

As the percentage increase goes from 10 to 100, the amount of waste processed in the factories also increases.

* **Percentage increase Vs Total Cost Incurred**

As the percentage increase goes from 0 to 100, the total cost also steadily increases

Solution:

* If the total amounts of P1 and P2 to be reduced are 30 and 40 respectively, 8 tonnes of waste from Factory 1 and 146 tonnes from Factory 2 should be processed and it incurs a cost of 158000
* The change in amount of waste processed and total cost to that of percentage increase is not linear.