**Appendix 1: Data for Savannah River watershed in Georgia, USA**

Once the generic optimization model has been formulated, it needs to be applied to a specific case study. Here, the model has been applied to a case study of five contiguous segments of the Savannah River in the state of Georgia, US. The necessary data for 29 point sources is reported in Table \*\*

Table 1: Data for point sources in the Savannah River watershed for trading problem solution

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Point source | Total volumetric discharge (MGD - Million Gallons per day) | Current discharge concentration (ng/l) | Targeted reduction (g/l) | Treatment cost without trading ($/y) |
| 1 | 46.1 | 4.65 | 0.1149 | 1.68 x 107 |
| 2 | 1.5 | 3.7 | 0.0017 | 328500 |
| 3 | 4.6 | 4.3 | 0.0092 | 1679000 |
| 4 | 1.5 | 3.4 | 0.0011 | 328500 |
| 5 | 2 | 3.88 | 0.0028 | 730000 |
| 6 | 2.24 | 3.7 | 0.0026 | 490560 |
| 7 | 1.2 | 3.9 | 0.0017 | 438000 |
| 8 | 27 | 4.83 | 0.074 | 1.48 x 107 |
| 9 | 4.5 | 4 | 0.0072 | 1642500 |
| 10 | 1 | 3.1 | 0.00035 | 219000 |
| 11 | 1 | 3.06 | 0.00029 | 219000 |
| 12 | 1 | 3.22 | 0.00052 | 219000 |
| 13 | 2 | 3.31 | 0.0013 | 438000 |
| 14 | 3.765 | 4.8 | 0.0101 | 2061337 |
| 15 | 18 | 4.33 | 0.0369 | 6570000 |
| 16 | 7.2 | 5.1 | 0.0224 | 3942000 |
| 17 | 58.6 | 4.87 | 0.1639 | 3.21 x 107 |
| 18 | 23 | 4.52 | 0.0532 | 8395000 |
| 19 | 1.152 | 5.05 | 0.0035 | 630720 |
| 20 | 0.362 | 4.14 | 0.00064 | 132130 |
| 21 | 108 | 4.58 | 0.2588 | 3.94 x 107 |
| 22 | 4.68 | 5.2 | 0.0152 | 2562300 |
| 23 | 28.09 | 4.41 | 0.0607 | 1.02 x 107 |
| 24 | 1.921 | 3.9 | 0.0028 | 701165 |
| 25 | 0.544 | 4.5 | 0.0012 | 198560 |
| 26 | 0.5 | 3.95 | 0.0008 | 182500 |
| 27 | 0.003 | 3.72 | 3.62 x 10-6 | 657 |
| 28 | 1.246 | 4.1 | 0.0021 | 454790 |
| 29 | 0.054 | 3.4 | 4.14 x 10-5 | 11826 |

Table 2: Data for mercury treatment technologies: The capital cost is for linear cost function

|  |  |  |
| --- | --- | --- |
| Mercury treatment technology | Mercury reduction capability (ng/l) | Capital requirement ($/1000 liters) |
| Coagulation and Filtration (A) | 2 | 1 |
| Activated carbon adsorption (B) | 3 | 1.5 |
| Ion exchange (C) | 1 | 0.6 |

The data for the calculation of health care cost are:

* = 0.4 mg/Kg,
* = 17.5 grams per person per day
* Mercury LC50 value for largemouth bass = 50 μg/liter
* = 2 liters per person per day
* P = 10000
* = $ 3 Million per person.