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G e n e r a l A l g e b r a i c M o d e l i n g S y s t e m

C o m p i l a t i o n

The code solves the problem for a single TMDL (not the whole range) to get

the

detail data on each problem solution.

The code solves te deterministic trading problem for Mercury.

The choice is between a set of possible treatment options and the option o

f

trading.

The details of the three treatement technologies are:

1. Coagulation and Filteration

2. Activated Carbon

3. Ion Exchange

The code takes the value of TMDL and does the rest of the calculations aut

omatically.

This will be used to see the variations of the results with TMDL changes.

The code also considers the health cost for the humans. So an increased TM

DL

results in an increased value of the health. The health cost is derived fr

om the

WQS, the resulting conc. of Hg in fishes, the LC50 value for the aquatic l

ife

(assumed to be close to that of humans) and the dietary intake of fish by

humans.

21

COMPILATION TIME = 0.047 SECONDS 3 MB 24.1.3 r41464 WEX-WEI

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G e n e r a l A l g e b r a i c M o d e l i n g S y s t e m

Model Statistics SOLVE problem Using MIP From line 132

MODEL STATISTICS

BLOCKS OF EQUATIONS 3 SINGLE EQUATIONS 59

BLOCKS OF VARIABLES 2 SINGLE VARIABLES 88

NON ZERO ELEMENTS 262 DISCRETE VARIABLES 87

GENERATION TIME = 0.218 SECONDS 4 MB 24.1.3 r41464 WEX-WEI

EXECUTION TIME = 0.249 SECONDS 4 MB 24.1.3 r41464 WEX-WEI

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G e n e r a l A l g e b r a i c M o d e l i n g S y s t e m

Solution Report SOLVE problem Using MIP From line 132

S O L V E S U M M A R Y

MODEL problem OBJECTIVE obj

TYPE MIP DIRECTION MINIMIZE

SOLVER CPLEX FROM LINE 132

\*\*\*\* SOLVER STATUS 1 Normal Completion

\*\*\*\* MODEL STATUS 1 Optimal

\*\*\*\* OBJECTIVE VALUE 199468576.2500

RESOURCE USAGE, LIMIT 0.936 1000.000

ITERATION COUNT, LIMIT 0 2000000000

IBM ILOG CPLEX 24.1.3 r41464 Released Jul 26, 2013 WEI x86\_64/MS Windows

--- GAMS/Cplex licensed for continuous and discrete problems.

Cplex 12.5.1.0

MIP status(101): integer optimal solution

Cplex Time: 0.58sec (det. 13.31 ticks)

Fixing integer variables, and solving final LP...

Fixed MIP status(1): optimal

Cplex Time: 0.00sec (det. 0.05 ticks)

Proven optimal solution.

MIP Solution: 199468576.250000 (0 iterations, 0 nodes)

Final Solve: 199468576.250000 (0 iterations)

Best possible: 199468576.250000

Absolute gap: 0.000000

Relative gap: 0.000000

\*\*\*\* REPORT SUMMARY : 0 NONOPT

0 INFEASIBLE

0 UNBOUNDED

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G e n e r a l A l g e b r a i c M o d e l i n g S y s t e m

E x e c u t i o n

---- 156 PARAMETER WQS\_final Final water standard achieved after reduction

1

1 1.650

2 1.700

3 1.300

4 1.400

5 1.880

6 1.700

7 1.900

8 1.830

9 1.000

10 1.100

11 1.060

12 1.220

13 1.310

14 1.800

15 1.330

16 1.100

17 1.870

18 1.520

19 1.050

20 1.140

21 1.580

22 1.200

23 1.410

24 1.900

25 1.500

26 1.950

27 1.720

28 1.100

29 1.400

---- 156 PARAMETER WQS\_avg = 1.599 The average WQS for t

he industries after t

he reduction

---- 156 VARIABLE b.L binary variable specifying the process selection

1 2 3

1 1.000

2 1.000

3 1.000

4 1.000

5 1.000

6 1.000

7 1.000

8 1.000

9 1.000

10 1.000

11 1.000

12 1.000

13 1.000

14 1.000

15 1.000

16 1.000 1.000

17 1.000

18 1.000

19 1.000 1.000

20 1.000

21 1.000

22 1.000 1.000

23 1.000

24 1.000

25 1.000

26 1.000

27 1.000

28 1.000

29 1.000

---- 156 PARAMETER Results To store and display the final results

1 2 3 4 5

1 1.284 1.458 2.855109E+7 1.994686E+8 2.280197E+8

---- 156 PARAMETER red\_final Final reduction in the discharge achieved by ea

ch industry after optimization

1

1 0.191

2 0.004

3 0.019

4 0.004

5 0.006

6 0.006

7 0.003

8 0.112

9 0.019

10 0.003

11 0.003

12 0.003

13 0.006

14 0.016

15 0.075

16 0.040

17 0.243

18 0.095

19 0.006

20 0.002

21 0.448

22 0.026

23 0.116

24 0.005

25 0.002

26 0.001

27 8.288055E-6

28 0.005

29 1.491850E-4

---- 156 PARAMETER cost cost incurred by each industry due to waste treatmen

t setup

1

1 2.608108E+7

2 547500.000

3 2602450.000

4 547500.000

5 730000.000

6 817600.000

7 438000.000

8 1.527525E+7

9 2545875.000

10 365000.000

11 365000.000

12 365000.000

13 730000.000

14 2130048.750

15 1.018350E+7

16 5781600.000

17 3.315295E+7

18 1.301225E+7

19 925056.000

20 204801.500

21 6.110100E+7

22 3758040.000

23 1.589192E+7

24 701165.000

25 307768.000

26 182500.000

27 1095.000

28 704924.500

29 19710.000

EXECUTION TIME = 0.000 SECONDS 3 MB 24.1.3 r41464 WEX-WEI

USER: Jeff Polasek G130903:1641AS-WIN

Texas A&M University, Artie McFerrin Department of ChemicaDC10525

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\*\*\*\* FILE SUMMARY

Input C:\Users\debalinasengupta\Desktop\TechnologySelection.gms

Output C:\Users\debalinasengupta\Documents\gamsdir\projdir\TechnologySelecti

on.lst