

Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

***RESEARCH AND DEVELOPMENT
DEPARTMENT***

REPORT NO. 07-12

CALUMET EAST SLUDGE DRYING AREA

FOURTH QUARTER 2006

MARCH 2007

Metropolitan Water Reclamation District of Greater Chicago

100 EAST ERIE STREET CHICAGO, ILLINOIS 60611-3154 312-751-5600

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March 29, 2007

Mr. S. Alan Keller, P.E.
Manager, Permit Section
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794 -9276

Dear Mr. Keller:

Subject: Calumet East Solids Management Area - Stickney WRP, Contract No. 85-273-2P, L170401, IEPA Permit No. 2005-AO-4281-1, Monitoring Report for October, November, and December 2006

The attached six tables contain the monitoring data for the Calumet East Solids Management Area for October, November, and December 2006 as required by IEPA Operating Permit No. 2005-AO-4281-1. In a letter dated January 19, 2007, the IEPA granted permission to terminate the monitoring of lysimeter L-1. Therefore, monitoring data for this lysimeter will not be included in this and subsequent reports.

The data reported are as follows:

Table 1, Analysis of Water from Lysimeters L-1 through L-6 at the Calumet East Solids Management Area Sampled on October 4, 2006

Table 2, Analysis of Water from Lysimeters L-1 through L-6 at the Calumet East Solids Management Area Sampled on November 1, 2006

Table 3, Analysis of Water from Lysimeters L-1 through L-6 at the Calumet East Solids Management Area Sampled on December 13, 2006

Table 4, Analysis of Monthly Compositing Digested Biosolids Placed in the Calumet East Solids Management Drying Area During October 2006

Table 5, Analysis of Monthly Compositing Processed Digested Biosolids Removed from the Calumet East Solids Management Drying Area During October 2006

Subject: Calumet East Solids Management Area - Stickney WRP, Contract No. 85-273-2P, L170401, IEPA Permit No. 2005-AO-4281-1, Monitoring Report for October, November, and December 2006

Table 6, Analysis of Monthly Composited Processed Digested Biosolids Removed from the Calumet East Solids Management Drying Area During November 2006

Biosolids were placed in the solids drying area during October 2006. Biosolids were removed from the solids drying area during October and November 2006.

Very truly yours,

Louis Kollias
Director
Research and Development

LK:PL:spy
Attachments

cc w/att: Mr. Sulski, IEPA
Records Unit, IEPA
Mr. W. Stuba
Dr. T. Granato
Dr. A. Cox
Dr. P. Lindo
Ms. M. Patel

cc wo/att: Ms. M. Sharma
Mr. S. Levy
Mr. O. Jamjun
Mr. A. Quintanilla
Mr. A. Ryzak

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 1

ANALYSIS OF WATER FROM LYSIMETERS
L-1 THROUGH L-6 AT THE CALUMET EAST
SOLIDS MANAGEMENT AREA SAMPLED ON OCTOBER 4, 2006

| Parameter | Unit | Lysimeter No. | | | | |
|--------------------------------------|------|---------------|---------|---------|---------|---------|
| | | L-1 | L-1N | L-2 | L-3 | L-4 |
| pH ¹ | | 7.4 | 7.4 | 7.3 | 7.5 | 7.1 |
| EC | mS/m | 410 | 347 | 376 | 167 | 344 |
| Total Dissolved Solids | mg/L | NA | 3,710 | 2,138 | 1,760 | 4,638 |
| Total Diss. Org. Carbon | " | NA | 9 | 2 | 7 | 3 |
| Cl ⁻ | " | 177 | 166 | 91 | 49 | 557 |
| SO ₄ ⁼ | " | NA | 1,667 | 984 | 618 | 1,563 |
| TKN | " | 0.52 | 13 | 0.44 | 1.5 | 1.3 |
| NH ₃ -N | " | <0.04 | 2.8 | <0.02 | <0.02 | 0.61 |
| NO ₂ + NO ₃ -N | " | 0.33 | 0.16 | 0.69 | 0.08 | 0.17 |
| Total P | " | 0.10 | <0.05 | <0.05 | <0.05 | <0.05 |
| Alkalinity as CaCO ₃ | " | 576 | 541 | 241 | 503 | 363 |
| Al | " | 0.054 | 0.032 | 0.029 | 0.025 | 0.038 |
| Ca | " | 559 | 443 | 280 | 210 | 511 |
| Cd | " | <0.0008 | 0.0006 | <0.0004 | <0.0004 | <0.0004 |
| Cr | " | <0.0010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cu | " | 0.010 | <0.002 | <0.002 | <0.002 | <0.002 |
| Fe | " | 0.028 | 9.17 | 0.007 | 0.016 | 21.1 |
| Hg | μg/L | <0.10 | <0.05 | <0.05 | <0.05 | <0.05 |
| K | mg/L | 10 | 11 | 3 | 3 | 7 |
| Mg | " | 326 | 251 | 133 | 129 | 264 |
| Mn | " | 0.0106 | 0.3149 | 0.0023 | 0.0010 | 0.1457 |
| Na | " | 203 | 162 | 72 | 59 | 149 |
| Ni | " | <0.0008 | <0.0004 | 0.0016 | 0.0010 | <0.0004 |
| Pb | " | <0.008 | <0.004 | <0.004 | <0.004 | <0.004 |
| Zn | " | 0.094 | 0.009 | 0.031 | 0.021 | 0.024 |

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TABLE 1 (Continued)

ANALYSIS OF WATER FROM LYSIMETERS
L-1 THROUGH L-6 AT THE CALUMET EAST
SOLIDS MANAGEMENT AREA SAMPLED ON OCTOBER 4, 2006

| Parameter | Unit | Lysimeter No. | |
|--------------------------------------|------|---------------|---------|
| | | L-5 | L-6 |
| pH ¹ | | 7.5 | 7.6 |
| EC | mS/m | 186 | 168 |
| Total Dissolved Solids | mg/L | 1,810 | 1,414 |
| Total Diss. Org. Carbon | " | 1 | 1 |
| Cl ⁻ | " | 227 | 16 |
| SO ₄ ⁼ | " | 515 | 582 |
| TKN | " | 0.76 | 0.49 |
| NH ₃ -N | " | 0.39 | 0.21 |
| NO ₂ + NO ₃ -N | " | 0.30 | 0.34 |
| Total P | " | <0.05 | 0.05 |
| Alkalinity as CaCO ₃ | " | 246 | 279 |
| Al | " | 0.025 | 0.028 |
| Ca | " | 201 | 166 |
| Cd | " | 0.0005 | 0.0004 |
| Cr | " | <0.0005 | <0.0005 |
| Cu | " | <0.002 | <0.002 |
| Fe | " | 2.83 | 0.834 |
| Hg | μg/L | <0.05 | <0.05 |
| K | mg/L | 4 | 3 |
| Mg | " | 94.4 | 83.7 |
| Mn | " | 0.0508 | 0.0356 |
| Na | " | 85 | 70 |
| Ni | " | <0.0004 | <0.0004 |
| Pb | " | <0.004 | <0.004 |
| Zn | " | 0.007 | 0.007 |

¹pH analyzed beyond recommended holding time of 15 minutes.

NA = No analysis; insufficient sample.

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TABLE 2

ANALYSIS OF WATER FROM LYSIMETERS
L-1 THROUGH L-6 AT THE CALUMET EAST
SOLIDS MANAGEMENT AREA SAMPLED ON NOVEMBER 1, 2006

| Parameter | Unit | Lysimeter No. | | | | |
|--------------------------------------|------|---------------|---------|---------|---------|---------|
| | | L-1 | L-1N | L-2 | L-3 | L-4 |
| pH ¹ | | | 7.4 | 7.4 | 7.3 | 7.0 |
| EC | mS/m | | 348 | 362 | 179 | 439 |
| Total Dissolved Solids | mg/L | | 3,864 | 4,220 | 1,752 | 4,550 |
| Total Diss. Org. Carbon | " | | 10 | 4 | 6 | 3 |
| Cl ⁻ | " | | 180 | 184 | 47 | 570 |
| SO ₄ ⁼ | " | | 1,797 | 2,080 | 674 | 1,625 |
| TKN | " | | 14 | 1.0 | 0.47 | 1.3 |
| NH ₃ -N | " | L | 3.7 | <0.04 | <0.02 | 0.59 |
| NO ₂ + NO ₃ -N | " | Y | 0.24 | 0.61 | 0.20 | 0.20 |
| Total P | " | S | 0.08 | 0.16 | 0.08 | 0.09 |
| Alkalinity as CaCO ₃ | " | I | 620 | 480 | 516 | 373 |
| | | M | | | | |
| Al | " | E | 0.054 | 0.064 | 0.033 | 0.055 |
| Ca | " | T | 447 | 557 | 210 | 507 |
| Cd | " | E | <0.0004 | <0.0008 | <0.0004 | <0.0004 |
| Cr | " | R | <0.0005 | <0.0010 | <0.0005 | <0.0005 |
| Cu | " | | <0.002 | <0.004 | <0.002 | <0.002 |
| | | D | | | | |
| Fe | " | R | 8.28 | 0.032 | 0.023 | 21.4 |
| Hg | μg/L | Y | <0.05 | <0.10 | <0.05 | <0.05 |
| K | mg/L | | 12 | 6 | 3 | 6 |
| Mg | " | | 253 | 265 | 131 | 261 |
| Mn | " | | 0.3727 | 0.0092 | 0.0013 | 0.1473 |
| | | | | | | |
| Na | " | | 165 | 143 | 59 | 147 |
| Ni | " | | <0.0004 | 0.0036 | 0.0015 | <0.0004 |
| Pb | " | | <0.004 | <0.008 | <0.004 | <0.004 |
| Zn | " | | 0.024 | 0.092 | 0.024 | 0.016 |

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TABLE 2 (Continued)

ANALYSIS OF WATER FROM LYSIMETERS
L-1 THROUGH L-6 AT THE CALUMET EAST
SOLIDS MANAGEMENT AREA SAMPLED ON NOVEMBER 1, 2006

| Parameter | Unit | Lysimeter No. | |
|--------------------------------------|------|---------------|---------|
| | | L-5 | L-6 |
| pH ¹ | | 7.4 | 7.6 |
| EC | mS/m | 183 | 140 |
| Total Dissolved Solids | mg/L | 1,826 | 1,380 |
| Total Diss. Org. Carbon | " | 0.8 | 1 |
| Cl ⁻ | " | 234 | 16 |
| SO ₄ ⁼ | " | 558 | 624 |
| TKN | " | 0.75 | 0.55 |
| NH ₃ -N | " | 0.30 | 0.17 |
| NO ₂ + NO ₃ -N | " | 0.28 | 0.34 |
| Total P | " | 0.09 | 0.08 |
| Alkalinity as CaCO ₃ | " | 253 | 289 |
| Al | " | 0.028 | 0.025 |
| Ca | " | 202 | 161 |
| Cd | " | <0.0004 | <0.0004 |
| Cr | " | <0.0005 | <0.0005 |
| Cu | " | <0.002 | <0.002 |
| Fe | " | 3.18 | 0.783 |
| Hg | µg/L | <0.05 | <0.05 |
| K | mg/L | 4 | 3 |
| Mg | " | 94.3 | 81.2 |
| Mn | " | 0.0524 | 0.0357 |
| Na | " | 84 | 68 |
| Ni | " | <0.0004 | <0.0004 |
| Pb | " | <0.004 | <0.004 |
| Zn | " | 0.009 | 0.008 |

¹pH analyzed beyond recommended holding time of 15 minutes.

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TABLE 3

ANALYSIS OF WATER FROM LYSIMETERS
L-1 THROUGH L-6 AT THE CALUMET EAST
SOLIDS MANAGEMENT AREA SAMPLED ON DECEMBER 13, 2006

| Parameter | Unit | Lysimeter No. | | | | |
|--------------------------------------|------|---------------|---------|---------|---------|---------|
| | | L-1 | L-1N | L-2 | L-3 | L-4 |
| pH ¹ | | 7.8 | 7.3 | 7.2 | 7.3 | 7.0 |
| EC | mS/m | 409 | 342 | 368 | 170 | 408 |
| Total Dissolved Solids | mg/L | 4,700 | 3,814 | 4,154 | 1,592 | 4,288 |
| Total Diss. Org. Carbon | " | NA | 9 | NA | 8 | 3 |
| Cl ⁻ | " | 177 | 168 | 183 | 40 | 560 |
| SO ₄ ⁼ | " | NA | 1,833 | NA | 577 | 1,632 |
| TKN | " | 0.28 | 13 | 0.76 | 0.31 | 1.2 |
| NH ₃ -N | " | <0.04 | 3.0 | <0.02 | <0.02 | 0.70 |
| NO ₂ + NO ₃ -N | " | 0.12 | 0.10 | 0.11 | 0.08 | 0.20 |
| Total P | " | 0.18 | 0.09 | 0.08 | 0.08 | 0.11 |
| Alkalinity as CaCO ₃ | " | 600 | 527 | 484 | 504 | 361 |
| Al | " | NA | 0.076 | 0.094 | 0.055 | 0.085 |
| Ca | " | NA | 436 | 552 | 192 | 513 |
| Cd | " | NA | 0.0005 | 0.0004 | <0.0004 | 0.0004 |
| Cr | " | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cu | " | NA | <0.002 | <0.002 | <0.002 | <0.002 |
| Fe | " | NA | 9.65 | 0.011 | 0.045 | 22.2 |
| Hg | μg/L | NA | <0.05 | <0.05 | <0.05 | <0.05 |
| K | mg/L | NA | 11 | 7 | 2 | 7 |
| Mg | " | NA | 251 | 259 | 121 | 265 |
| Mn | " | NA | 0.3068 | 0.0056 | 0.0022 | 0.1496 |
| Na | " | NA | 165 | 146 | 53 | 149 |
| Ni | " | NA | <0.0004 | 0.0032 | 0.0010 | <0.0004 |
| Pb | " | NA | <0.004 | <0.004 | 0.007 | <0.004 |
| Zn | " | NA | 0.017 | 0.037 | 0.033 | 0.004 |

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TABLE 3 (Continued)

ANALYSIS OF WATER FROM LYSIMETERS
L-1 THROUGH L-6 AT THE CALUMET EAST
SOLIDS MANAGEMENT AREA SAMPLED ON DECEMBER 13, 2006

| Parameter | Unit | Lysimeter No. | |
|--------------------------------------|------|---------------|---------|
| | | L-5 | L-6 |
| pH ¹ | | 7.4 | 7.6 |
| EC | mS/m | 186 | 140 |
| Total Dissolved Solids | mg/L | 1,640 | 1,330 |
| Total Diss. Org. Carbon | " | 1 | 2 |
| Cl ⁻ | " | 228 | 14 |
| SO ₄ ⁼ | " | 538 | 594 |
| TKN | " | 0.51 | 0.29 |
| NH ₃ -N | " | 0.37 | 0.21 |
| NO ₂ + NO ₃ -N | " | 0.15 | 0.35 |
| Total P | " | 0.09 | 0.10 |
| Alkalinity as CaCO ₃ | " | 241 | 277 |
| Al | " | 0.042 | 0.041 |
| Ca | " | 202 | 166 |
| Cd | " | <0.0004 | <0.0004 |
| Cr | " | <0.0005 | <0.0005 |
| Cu | " | <0.002 | <0.002 |
| Fe | " | 3.95 | 0.785 |
| Hg | µg/L | <0.05 | <0.05 |
| K | mg/L | 4 | 4 |
| Mg | " | 94.9 | 82.4 |
| Mn | " | 0.0515 | 0.0373 |
| Na | " | 85 | 70 |
| Ni | " | <0.0004 | <0.0004 |
| Pb | " | 0.006 | 0.007 |
| Zn | " | 0.003 | 0.004 |

¹pH analyzed beyond recommended holding time of 15 minutes.

NA = No analysis; insufficient sample.

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TABLE 4

ANALYSIS OF MONTHLY COMPOSITED DIGESTED
 BIOSOLIDS PLACED IN THE CALUMET EAST
 SOLIDS MANAGEMENT DRYING AREA DURING OCTOBER 2006

| Parameter | Unit | Concentration* |
|-----------------------|-------|----------------|
| pH | | 7.8 |
| Total Solids | % | 15.0 |
| Total Volatile Solids | % | 42.0 |
| TKN | mg/kg | 30,111 |
| NH ₃ -N | " | 8,124 |

*Values are the means of two samples.

**Total volatile solids as a percentage of total solids.

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TABLE 5

ANALYSIS OF MONTHLY COMPOSITED PROCESSED DIGESTED
BIOSOLIDS REMOVED FROM THE CALUMET EAST
SOLIDS MANAGEMENT DRYING AREA DURING OCTOBER 2006

| Parameter | Unit | Concentration* |
|-----------------------|-------|----------------|
| pH | | 7.4 |
| Total Solids | % | 33.0 |
| Total Volatile Solids | % | 41.4 |
| TKN | mg/kg | 21,089 |
| NH ₃ -N | " | 4,313 |
| Total P | " | 22,498 |
| Al | " | 14,450 |
| As | " | 6 |
| Ca | " | 49,108 |
| Cd | " | 6.1 |
| Cr | " | 112 |
| Cu | " | 416 |
| Fe | " | 26,626 |
| Hg | " | 1.4 |
| K | " | 3,404 |
| Mg | " | 17,168 |
| Mn | " | 835 |
| Mo | " | 14 |
| Na | " | 1,421 |
| Ni | " | 40 |
| Pb | " | 116 |
| Se | " | 12 |
| Zn | " | 1,116 |

*Values are the means of four samples.

**Total volatile solids as a percentage of total solids.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 6

ANALYSIS OF MONTHLY COMPOSITED PROCESSED DIGESTED
BIOSOLIDS REMOVED FROM THE CALUMET EAST
SOLIDS MANAGEMENT DRYING AREA DURING NOVEMBER 2006

| Parameter | Unit | Concentration* |
|-----------------------|-------|----------------|
| pH | | 6.5 |
| Total Solids | % | 65.1 |
| Total Volatile Solids | % | 40.8 |
| TKN | mg/kg | 8,794 |
| NH ₃ -N | '' | 653 |
| Total P | '' | 21,154 |
| Al | '' | 13,257 |
| As | '' | 8 |
| Ca | '' | 54,845 |
| Cd | '' | 8.0 |
| Cr | '' | 141 |
| Cu | '' | 466 |
| Fe | '' | 26,618 |
| Hg | '' | 1.5 |
| K | '' | 2,760 |
| Mg | '' | 17,407 |
| Mn | '' | 828 |
| Mo | '' | 12 |
| Na | '' | 851 |
| Ni | '' | 34 |
| Pb | '' | 123 |
| Se | '' | 17 |
| Zn | '' | 1,359 |

*Values are the means of three samples.

**Total volatile solids as a percentage of total solids.