

DEWATERING TRIAL PERFORMANCE
MILL RIVER DREDGING PROJECT
FAIRFIELD, CONNECTICUT

For:
Mr. Ralph Klass, P.E., L.E.P.
CCA, LLC
40 Old New Milford Road
Brookfield, CT 06804

By:
Randall V. Wilcox, P.E.
WaterSolve, LLC
4964 Starr St., SE
Grand Rapids, MI 49546
www.gowatersolve.com
616-575-8693



December 21, 2009

1. Scope of Work

WaterSolve, LLC was tasked to perform a Geotube® dewatering performance trial and Rapid Dewatering Test (RDT) and Geotube® Dewatering Test (GDT) on sediment samples collected by CCA, LLC. The objectives of these dewatering trials were to identify chemical conditioning program(s), identify polymer flocculent(s), and dosing rate(s) for a potential Geotube® dewatering application. The objectives of subsequent RDTs were to measure total solids (TS) of the flocculated, contained, and dewatered residual after passage through a GT500D Geotube® filter. The objectives of the GDT were to further evaluate the dewatering process with the recommended chemical conditioning program, to analyze the clarity and characteristics of the filtrate, and to predict the achievable percent solids concentrations over time.

A gravity settling analysis was also completed to evaluate the potential for dewatering the sediments without using Geotube® containers or mechanical dewatering methods.

2. Materials & Methods

Five five-gallon samples were received at WaterSolve's Laboratory (Grand Rapids, MI) on November 5, 2009. The samples were labeled as follows:

1. Fine Sediment- 3 containers
2. Coarse Sediment- 1 container
3. River Water- 1 container

This testing was completed as a part of a study comparing various dewatering technologies. The fine sediment sample was used for this portion of the analysis. Similar samples, diluted 2:1 (water:sediment by weight) were sent to various vendors to complete suitability testing for mechanical dewatering technologies.

Dilution of the samples was required to facilitate an appropriate dewatering floc. Dilution was completed with potable water and compared with the diluted samples with river water to determine if the chemical conditioning program would flocculate and dewater the sediment with the same effectiveness. The diluted sediments were homogenized and 150-mL samples were then placed in graduated, glass jars.

Twenty four cationic and anionic polymers and organic coagulants were "made-down" (200-mL) at a 0.5% concentration for this dewatering trial. Polymer and coagulant (1 to 15-mL; 33 to 500-ppm) was added to a sample with a 10-mL plastic syringe and moderately tumbled five to seven times. Observations of water release rate, water clarity, and flocculent appearance were recorded on appropriate data sheets (Appendix A). Polymer(s) that flocculated and dewatered these residuals most effectively were re-evaluated with lower doses in order to isolate the most efficient dewatering and flocculating polymer(s). Dual polymer conditioning programs were also evaluated for this Geotube® dewatering application in order to improve water clarity and release volume compared to single product applications.

Percent total solids (dry weight) of the initial residual sample, test sample, dewatered cake sample (captured on GT500D Geotube® filters), filtrate sample (passed through the filter) and dewatered GDT samples were measured according to U.S. EPA Methods 160.2 and 160.3. Turbidity of the filtrate was measured with a portable meter. Filtrate samples were collected and sent to ALS Laboratories for Total Suspended Solids and Total Lead concentrations.

The gravity dewatering evaluation was completed by placing 1,000-mL samples on a gang stirrer. One of the samples was conditioned with the recommended chemical conditioning program and the other was not. The samples were evaluated over time and re-agitated to determine the potential effectiveness of this method.

3. Results

3.1 Initial Chemical Conditioning Evaluation

Chemical conditioning with a dual product application of Solve 416 (100-ppm) followed by Solve 9330 (67-ppm) was determined to flocculate and dewater the diluted river sediments most effectively compared to the other chemical conditioning programs (Appendix A). Water release volume and flocculent appearance were good to excellent. Results were comparable when dilution was completed with either potable water or river water sample provided.

The sample provided was 35.6-percent dry weight solids. The diluted (2:1, water:sample) and homogenized sample provided was 14.6-percent dry weight solids. After passing a 150-mL test sample conditioned with Solve 416 (100-ppm) and Solve 9330 (67-ppm) through a GT500D Geotube® filter, percent solids increased to 24.5-percent after thirty minute drying time (Appendix C). From this 150-mL conditioned sample, 30-mL and 90-mL of water was released in one minute and thirty minutes, respectively, after passage through the filter. The filtrate was 0.3-percent dry weight solids. The turbidity of the RDT filtrate was 6.7-NTU.

3.2 Geotube® Dewatering Tests (GDTs)

Twenty gallons of diluted sediment were homogenized and conditioned with 100-ppm Solve 416 and 67-ppm Solve 9330. The conditioned test samples were poured into the GDT apparatus (Appendix B). Filtrate samples were collected for further analyses. Dewatered solids samples were collected from various points in the GDT container at 3, 5 and 10 days after the start of the test.

The percent dry weight solids results for the GDT is listed below:

| <u>Time After Test</u> | <u>Percent Dry Weight Solids</u> |
|------------------------|----------------------------------|
| <i>3 days</i> | <i>44.0%</i> |
| <i>5 days</i> | <i>47.7%</i> |
| <i>10 days</i> | <i>48.0%</i> |

The analytical testing for the filtrate collected from the GDT was completed and the results were as follows:

Total Suspended Solids= 8.0-mg/L

Total Lead = 0.31-mg/L

3.3 Gravity Settling Evaluation

As requested, an evaluation of gravity settling was completed to determine the potential for dewatering the sediment without the use of Geotube® containers or mechanical dewatering equipment. The evaluation was completed using 1,000-mL samples on a gang-stirrer. One diluted sample was placed next to a diluted and conditioned sample and photographed over several hours. After 24 hours, the samples were agitated and allowed to settle again. A sample of the supernatant from the unconditioned settled sample was collected and forwarded to ALS Laboratory Group for analytical testing.

The results from the analytical testing for the unconditioned supernatant are as follows:

Total Suspended Solids= 210-mg/L

Total Lead = 4.9-mg/L

If adequate space is available to allow settling of the dredged slurry, gravity settling may be an option to be considered. Under controlled laboratory conditions, chemical conditioning was not necessary to facilitate solids and water separation. However, when the samples were re-agitated after twenty-four hours, the water in the conditioned sample remained clear and separate from the floc solids and the unconditioned sample went back into solution.

4. Recommendations

We recommend a dual product application of Solve 416 followed by Solve 9330 for dewatering sediments in a Geotube® application in order to pass a paint filter test for subsequent removal and disposal. The dose of each product will vary based on the characteristics of the *in situ* material.

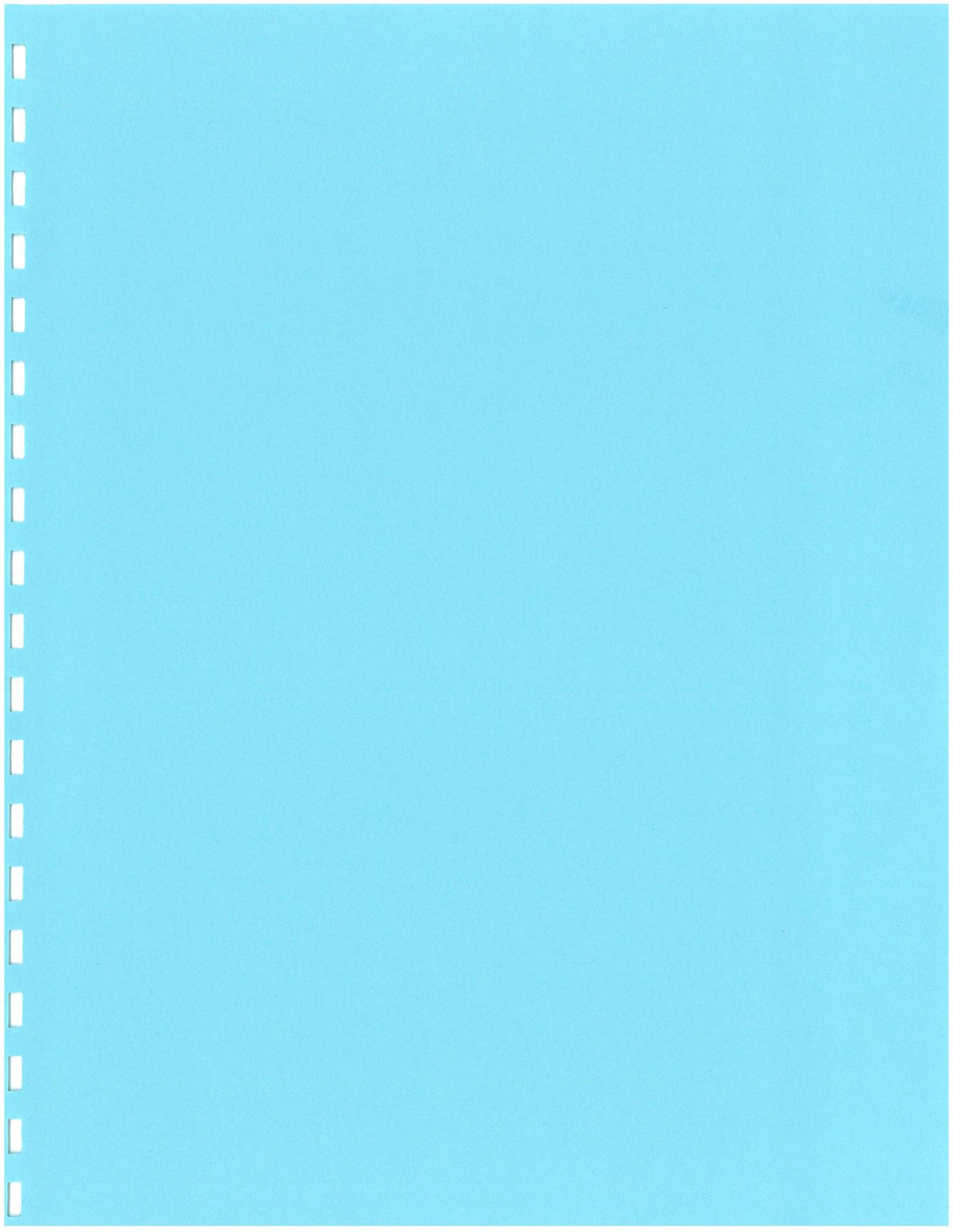
Solve 9330 is required to be made-down at 0.5% with a polymer make-down unit or aged in batch/feed tanks prior to injection into the residual line. Solve 416 should be fed neat prior to the Solve 9330 injection. Moderate to high mixing energy is required between the injection points and between the final injection point and the Geotube® containers (e.g., two to three bends in the discharge line and/or inline static mixers).

From these experiments, we recommend a 1:1 to 3:1 (water:sediment) inline ratio during pumping in order to facilitate sufficient mixing and a floc suitable for dewatering in Geotube® containers. As the project objectives for water clarity, flocculent appearance and water release rate are evaluated, dilution of the sediments may be modified.

Additional evaluation is recommended for determining optimal inline percent solids thresholds for Geotube® performance including filtrate release and solids consolidation over time. Expected time to being able pass a Paint Filter Test is unpredictable in a Geotube® container from these bench-scale experiments. An onsite or laboratory hanging bag or Geotube® dewatering trial (GDT) may be used and is recommended if the timeline for achieving project goals of dry weight solids and Geotube® filtrate characteristics are in question for this application. Additional dewatering evaluations over time are recommended if project objectives for consolidation are greater than passing a Paint Filter Test for subsequent excavation and/or disposal.

Additional evaluation would be required to determine the area and engineering requirements for the gravity settling option. If several acres of land for gravity settling are available at or near the project site, it should be considered further. If land is not readily available, gravity settling should not be considered a viable option. Chemical conditioning should be included in the gravity settling evaluation if considered further.

Due to potential variability of the material, daily on-site testing and chemical conditioning verification are recommended during dredging operations.





WaterSolve, LLC

Clearly thinking about your water treatment

DEWATERING TRIAL PERFORMANCE

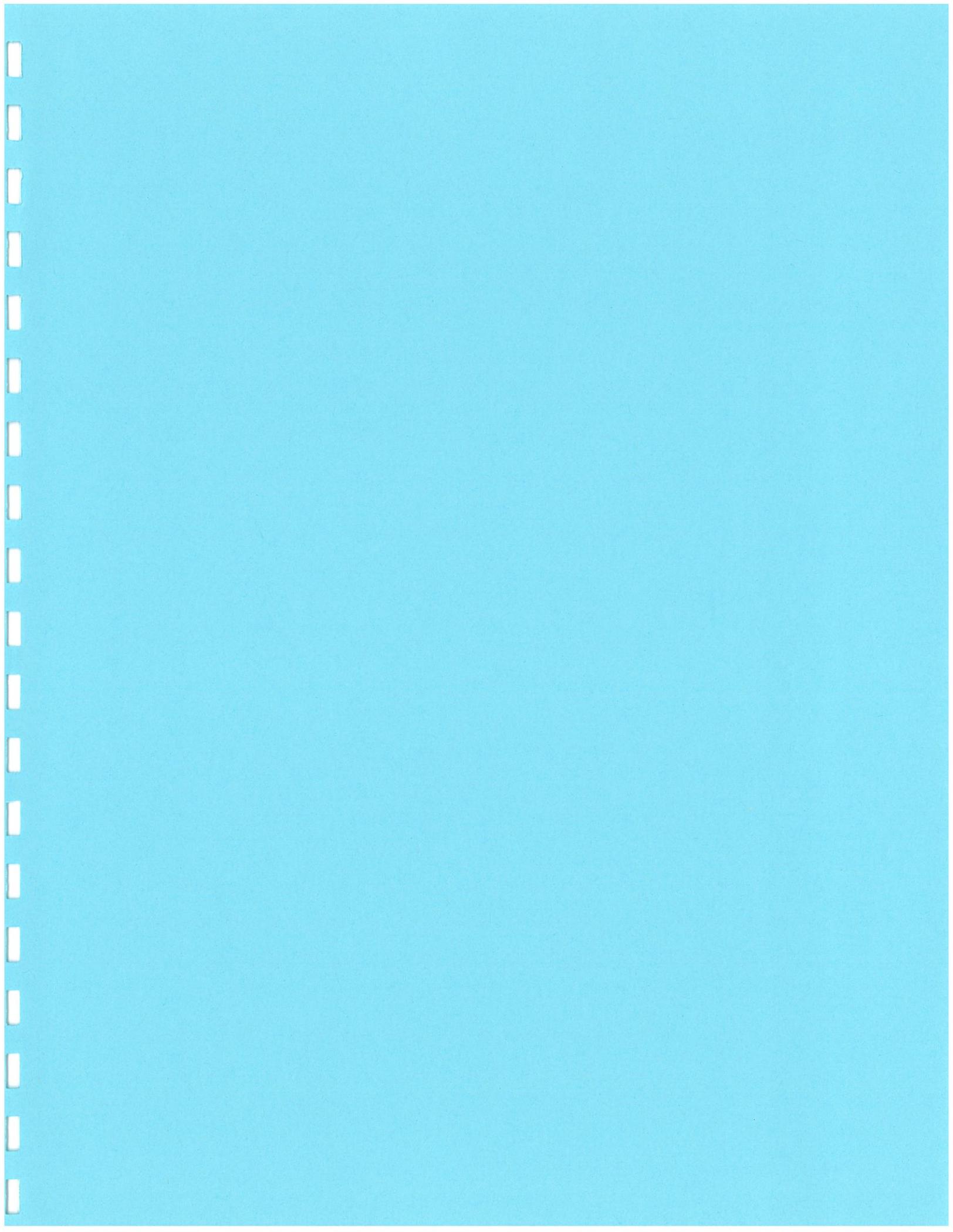
Date: 11/6/09
Analyst: RN

Customer: GRU LLC Mill River
Location:

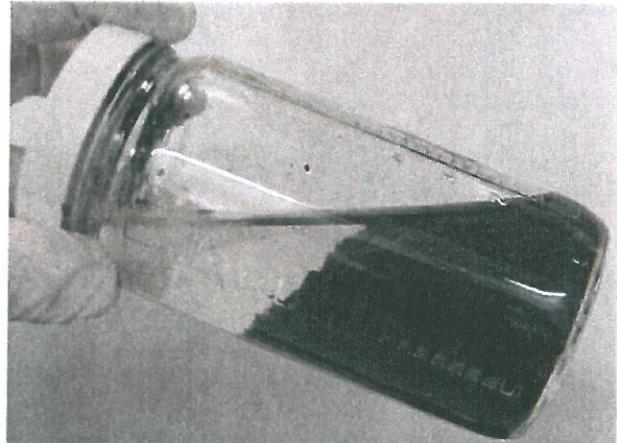
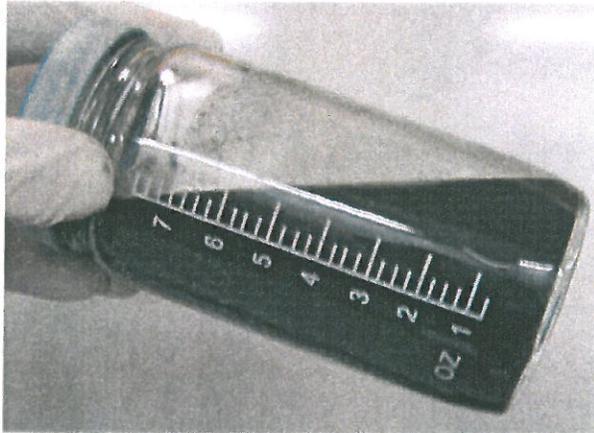
Equipment in Service:

1=Best 6=Worst

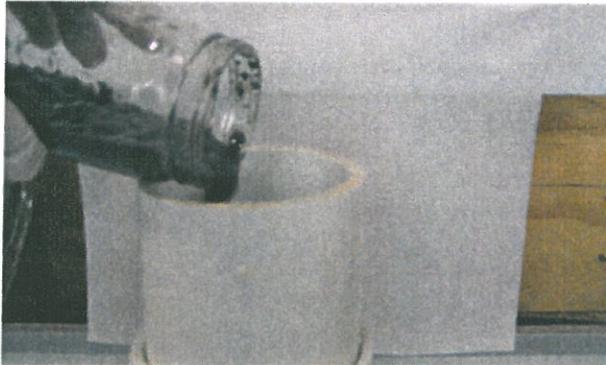
| Jar Number | Polymer Name | Polymer Dosage Pump Setting | Sludge Feed Rate | Water Rel. Rate | Water Clarity | Floc Appearance | Cake Appearance | Comments |
|--|----------------------|-----------------------------------|------------------|--------------------|--------------------|---------------------|-----------------|----------------------------|
| | | | | (1-6) | (1-6) | (1-6) | (1-6) | |
| Polymer make-down concentration = <u>0.5</u> % | | | | | | | | |
| Dilution of test sample = <u>1:6 Sample: water</u> | | | | | | | | |
| 1 | 9245 | <u>2ml</u> | <u>150ml</u> | <u>1</u> | <u>6</u> | <u>5-6</u> | | |
| 2 | 9248 | <u>10ml</u> | <u>150ml</u> | <u>5-6</u> | <u>5-6</u> | <u>4-5</u> | | |
| 3 | 9249 | <u>15ml</u> | <u>150ml</u> | <u>2</u> | <u>1-2</u> | <u>2</u> | | |
| 4 | 9330 | <u>3ml</u> | <u>150ml</u> | <u>2</u> | <u>3</u> | <u>2</u> | | |
| 5 | 9331 | <u>3ml</u> | <u>150ml</u> | <u>2</u> | <u>3</u> | <u>2</u> | | |
| 6 | 9336 | <u>3ml</u> | <u>150ml</u> | <u>2</u> | <u>2-3</u> | <u>2</u> | | <u>over load</u> |
| 7 | 426/9330 | <u>2ml/1ml</u> | <u>150ml</u> | <u>1</u> | <u>1-2</u> | <u>1-2</u> | | |
| 8 | 426/9330 | <u>1ml/1ml</u> | <u>150ml</u> | <u>1</u> | <u>2-3</u> | <u>2</u> | | |
| 9 | 426/9330 | <u>2ml/1ml</u> | <u>150ml</u> | <u>1</u> | <u>1-2</u> | <u>1-2</u> | | <u>Some fines</u> |
| 10 | 416/9330 | <u>2ml/1ml</u> | <u>150ml</u> | <u>1</u> | <u>1</u> | <u>1-2</u> | | <u>Some fines</u> |
| 11 | 416/9330 | <u>2ml/1ml</u> | <u>150ml</u> | <u>1-2</u> | <u>1-2</u> | <u>1-2</u> | | <u>Some fines</u> |
| 12 | 416/9330 | <u>2ml/1ml</u> | <u>150ml</u> | <u>2-3</u> | <u>1-2</u> | <u>3</u> | | |
| 13 | 416/9330 | <u>2ml/1ml</u> | <u>150ml</u> | <u>4</u> | <u>4</u> | <u>3</u> | | |
| 14 | 416/9330 | <u>2ml/1ml</u> | <u>150ml</u> | <u>4</u> | <u>4</u> | <u>4</u> | | |
| 15 | 416/9330 | <u>2ml/1ml</u> | <u>150ml</u> | <u>5-6</u> | <u>5-6</u> | <u>5-6</u> | | |
| 16 | 416/1163 | <u>2ml/1ml</u> | <u>150ml</u> | <u>2</u> | <u>1-2</u> | <u>2</u> | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | <u>1:6 dilution</u> | <u>4ml/9330</u> | <u>150ml</u> | <u>river water</u> | <u>river water</u> | <u>1:6 dilution</u> | | <u>Sample: River water</u> |
| 20 | | | | | | | | |
| 21 | <u>416/9330</u> | <u>2ml/1ml</u> | <u>150ml</u> | <u>1</u> | <u>1</u> | <u>1-2</u> | | |
| 22 | | | | | | | | |
| 23 | <u>PVT</u> | <u>Dilution: 4/16: 9330</u> | <u>150ml</u> | <u>2ml/1ml</u> | <u>Filterate</u> | <u>at 1min</u> | <u>30 ml</u> | |
| 24 | | | | | | | | |
| 25 | <u>Dilution: 1:2</u> | <u>Fine sediment: river water</u> | | | | <u>at 30min</u> | <u>70 ml</u> | |
| 26 | | | | | | | | |
| 27 | | | | | | | | |
| 28 | | | | | | | | |
| 29 | | | | | | | | |



Appendix B- Photographs



Diluted (2:1) river sediments prior to polymer addition (left). One hundred fifty milliliter sediment sample conditioned with 3.0-mL (100-ppm) Solve 416 and 1.0-mL (67-ppm) Solve 9330 (right).

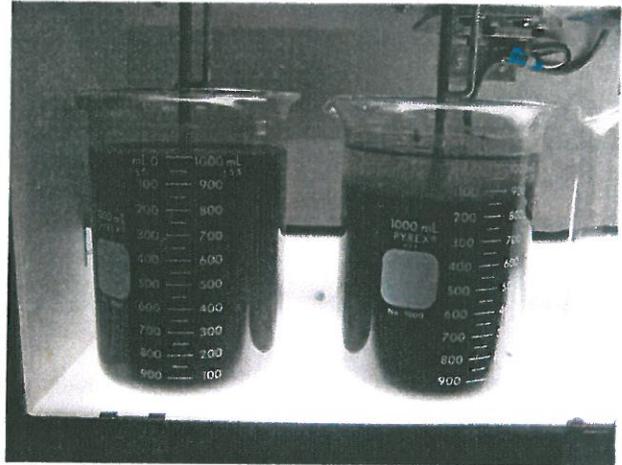


One hundred and fifty milliliter diluted and conditioned sediment was poured through a GT500D Geotube® filter (left). The cake captured on the RDT filter and the RDT filtrate are shown on the right.



Conditioned sediment was poured into the GDT apparatus (left). The complete apparatus is shown on the right.

Gravity Settling Photographs



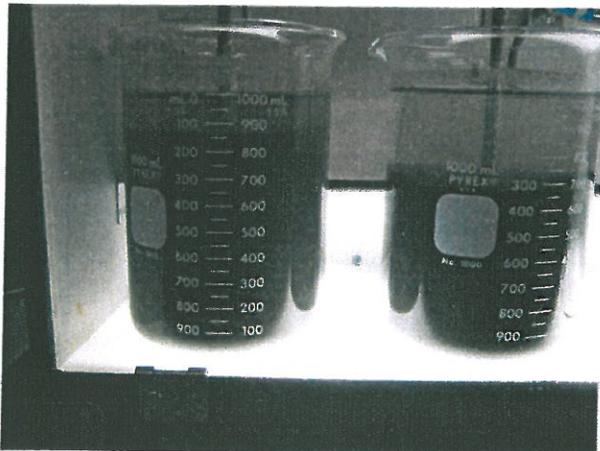
One-thousand milliliters of diluted sediment was placed in the left container. One thousand milliliters of diluted and conditioned (100-ppm Solve 416 followed by 67-ppm Solve 9330) sediment was placed in the right container. In the left photograph, the samples are agitated. The right photograph is one minute after agitation was stopped.



After five minutes.



Ten minutes.



Sixty minutes.

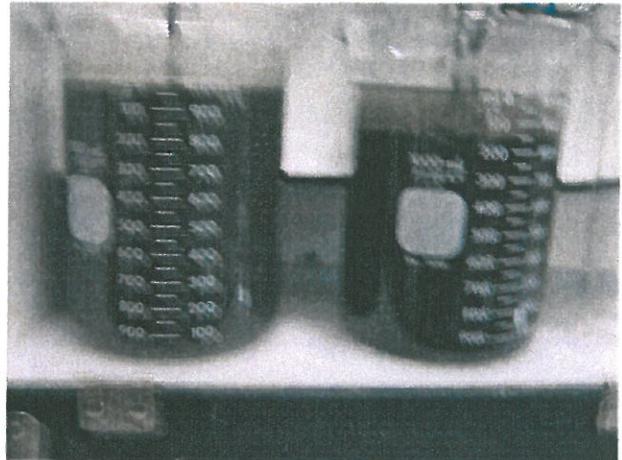


Six hours.

Gravity Settling Photographs (Continued)



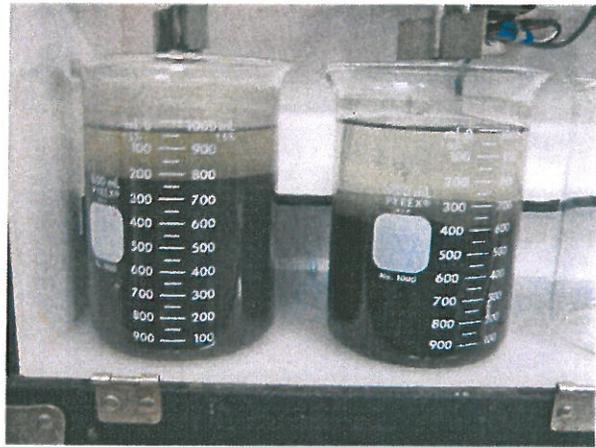
After 24 hours.



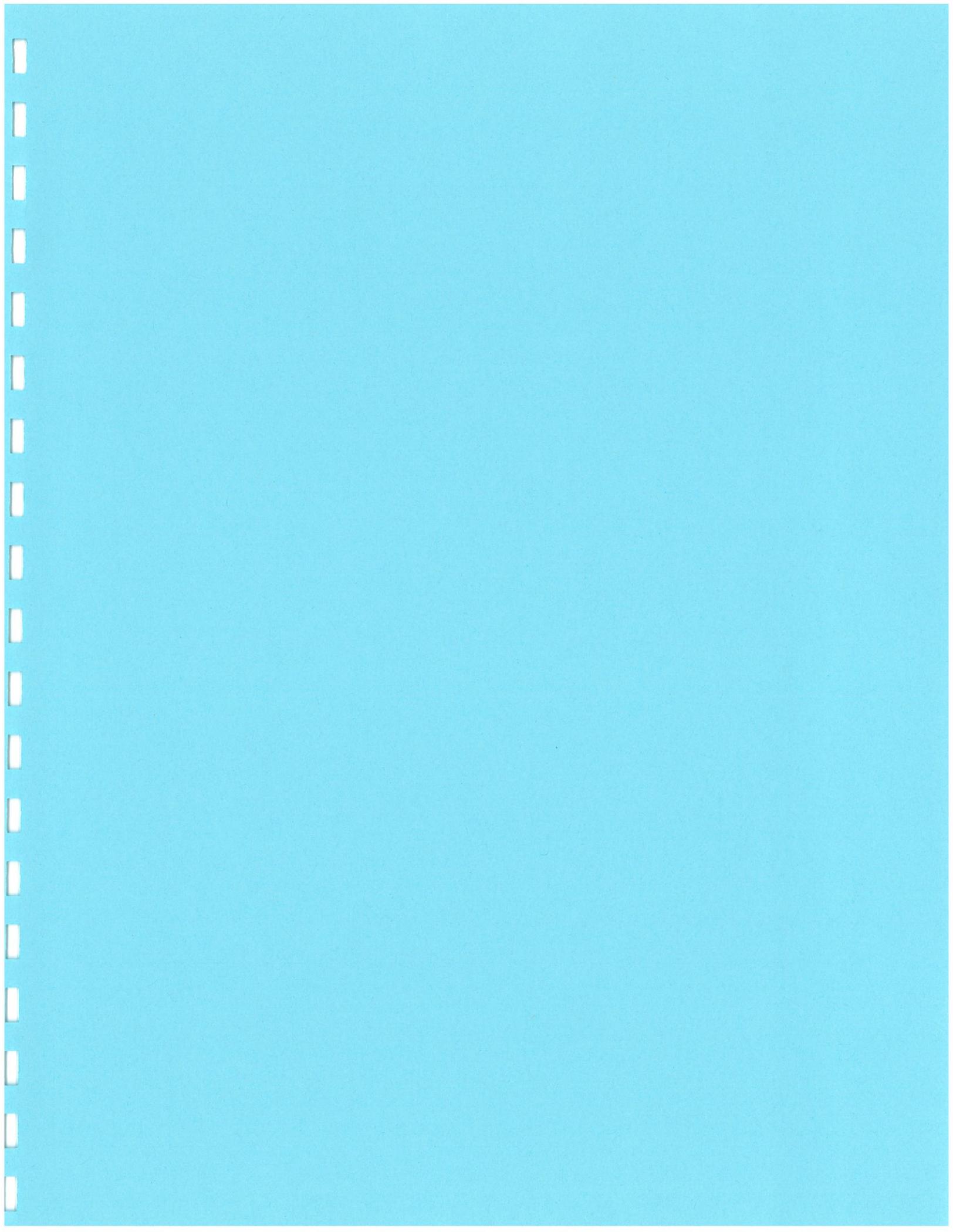
Samples are re-agitated.



One minute after re-agitation.



Thirty minutes after re-agitation.



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**Total Solids Determination
Percent Dry Weight**

Customer Name/Application CCA LLC Mill River Fine Sediment
Date 11/23/04 Technician DW Oven Temperature 105 °C

Sample ID Raw Dish Number 1 Dilution N/A
Dish (dry) = 51.101 g Dish, Sample (wet) = 125.367 g Dish, Sample (dry) = 74.540 g
Dish, sample (wet) - Dish (dry) = 74.263 (A) Dish, sample (dry) - Dish (dry) = 20.436 (B)
Total Solids $B \div A \times 100 =$ 35.6 % Dry Weight Solids

Sample ID Raw Dilution #1 Dish Number 2 Dilution 1:1 Sample: water
Dish (dry) = 52.497 g Dish, Sample (wet) = 122.335 g Dish, Sample (dry) = 62.460 g
Dish, sample (wet) - Dish (dry) = 69.838 (A) Dish, sample (dry) - Dish (dry) = 10.163 (B)
Total Solids $B \div A \times 100 =$ 14.6 % Dry Weight Solids

Sample ID Raw Dilution #2 Dish Number 3 Dilution 1:1 Sample: water
Dish (dry) = 52.950 g Dish, Sample (wet) = 125.175 g Dish, Sample (dry) = 67.127 g
Dish, sample (wet) - Dish (dry) = 72.225 (A) Dish, sample (dry) - Dish (dry) = 14.177 (B)
Total Solids $B \div A \times 100 =$ 19.6 % Dry Weight Solids

Sample ID Clake Dish Number 4 Dilution N/A
Dish (dry) = 74.358 g Dish, Sample (wet) = 112.168 g Dish, Sample (dry) = 68.518 g
Dish, sample (wet) - Dish (dry) = 57.810 (A) Dish, sample (dry) - Dish (dry) = 14.165 (B)
Total Solids $B \div A \times 100 =$ 24.5 % Dry Weight Solids

2/2

Total Solids Determination Percent Dry Weight

Customer Name/Application CCA CCO MILL RIVER FINE SEDIMENT

Date 11/9/09 Technician DN Oven Temperature 105°C

Sample ID Filtrate Dish Number 5 Dilution N/A Turbidity 670 n

Dish (dry) = 58.225 g Dish, Sample (wet) = 116.256 g Dish, Sample (dry) = 58.414 g

Dish, sample (wet) - Dish (dry) = 63.031 (A) Dish, sample (dry) - Dish (dry) = 0.189 (B)

Total Solids B ÷ A x 100 = 0.3 % Dry Weight Solids

Sample ID 53 Dish Number _____ Dilution _____

Dish (dry) = _____ g Dish, Sample (wet) = _____ g Dish, Sample (dry) = _____ g

Dish, sample (wet) - Dish (dry) = _____ (A) Dish, sample (dry) - Dish (dry) = _____ (B)

Total Solids B ÷ A x 100 = _____ % Dry Weight Solids

Sample ID _____ Dish Number _____ Dilution _____

Dish (dry) = _____ g Dish, Sample (wet) = _____ g Dish, Sample (dry) = _____ g

Dish, sample (wet) - Dish (dry) = _____ (A) Dish, sample (dry) - Dish (dry) = _____ (B)

Total Solids B ÷ A x 100 = _____ % Dry Weight Solids

Sample ID _____ Dish Number _____ Dilution _____

Dish (dry) = _____ g Dish, Sample (wet) = _____ g Dish, Sample (dry) = _____ g

Dish, sample (wet) - Dish (dry) = _____ (A) Dish, sample (dry) - Dish (dry) = _____ (B)

Total Solids B ÷ A x 100 = _____ % Dry Weight Solids

**Total Solids Determination
Percent Dry Weight**

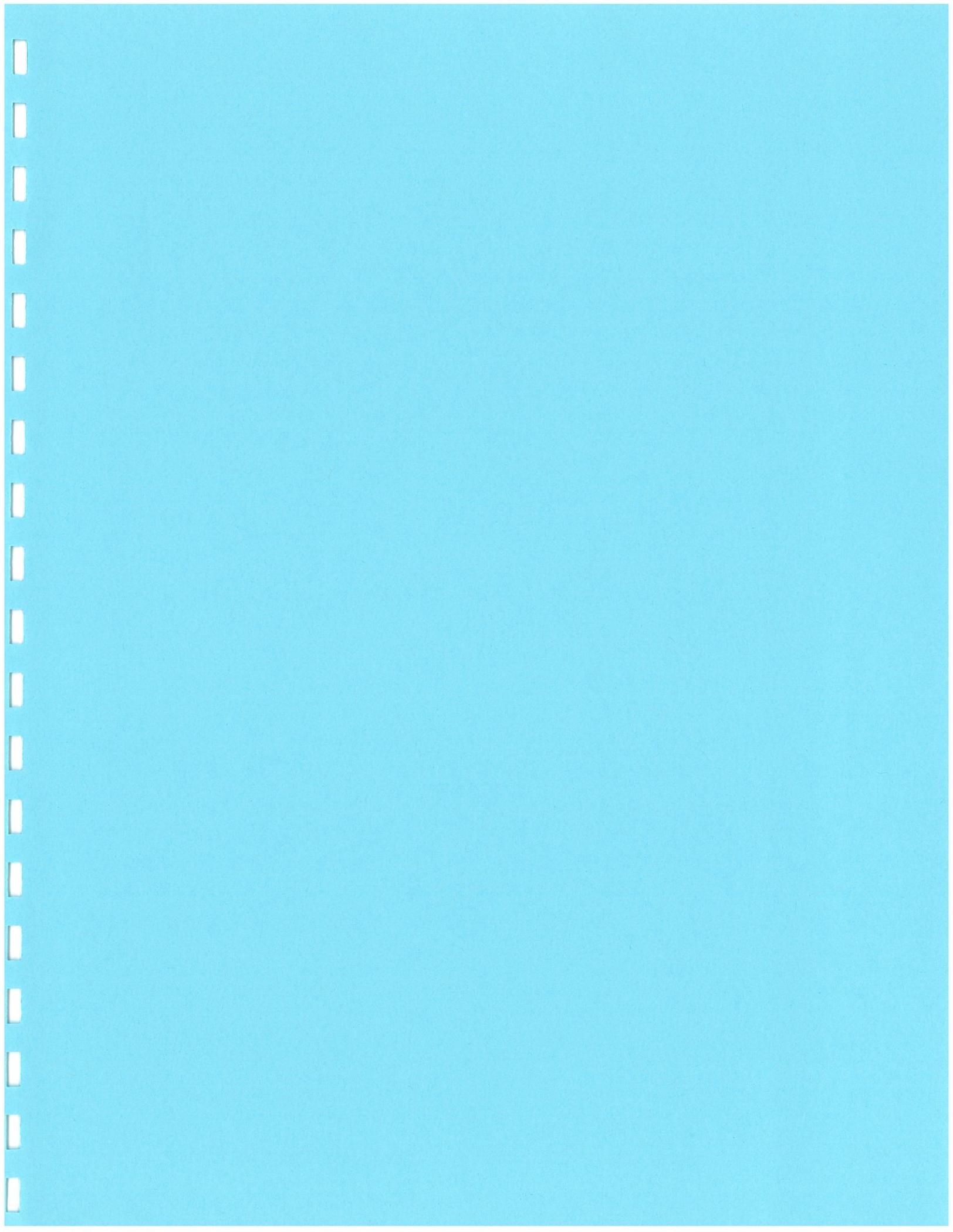
Customer Name/Application DCA LLC
Date 11/7/09 Technician DLJ Oven Temperature 106°C

Sample ID GDT CAKE⁹ ^(3 days) Dish Number 1 Dilution N/A
Dish (dry) = 50.815 g Dish, Sample (wet) = 122.840 g Dish, Sample (dry) = 82.510 g
Dish, sample (wet) - Dish (dry) = 71.975 (A) Dish, sample (dry) - Dish (dry) = 31.701 (B)
Total Solids $B \div A \times 100 =$ 44.0 % Dry Weight Solids

Sample ID GDT CK^{11/11} ^(5 days) Dish Number 7 Dilution —
Dish (dry) = 50.840 g Dish, Sample (wet) = 102.880 g Dish, Sample (dry) = 85.39 g
Dish, sample (wet) - Dish (dry) = 52.040 (A) Dish, sample (dry) - Dish (dry) = 27.699 (B)
Total Solids $B \div A \times 100 =$ 47.7 % Dry Weight Solids

Sample ID GDT Cake^{11/16} ^(10 days) Dish Number 4F Dilution —
Dish (dry) = 50.940 g Dish, Sample (wet) = 88.932 g Dish, Sample (dry) = 69.137 g
Dish, sample (wet) - Dish (dry) = 38.092 (A) Dish, sample (dry) - Dish (dry) = 18.297 (B)
Total Solids $B \div A \times 100 =$ 48.0 % Dry Weight Solids

Sample ID _____ Dish Number _____ Dilution _____
Dish (dry) = _____ g Dish, Sample (wet) = _____ g Dish, Sample (dry) = _____ g
Dish, sample (wet) - Dish (dry) = _____ (A) Dish, sample (dry) - Dish (dry) = _____ (B)
Total Solids $B \div A \times 100 =$ _____ % Dry Weight Solids



Appendix D

TURBIDITY

Customer Name/Application CCA LLC MILL RIVER

Date 11/5/09 Technician DW Turbidity goal (if specified) N/A NTU

Sample ID FINE SEDIMENT - RDT DILUTION 1:10 SAMPLE: RIVER WATER

Turbidity 10.72 NTU DILUTION 416:9850 150ml:Emi 1ml

Sample ID FINE SEDIMENT BPT FILTRATE INITIAL SAMPLE

Turbidity 50.9 NTU

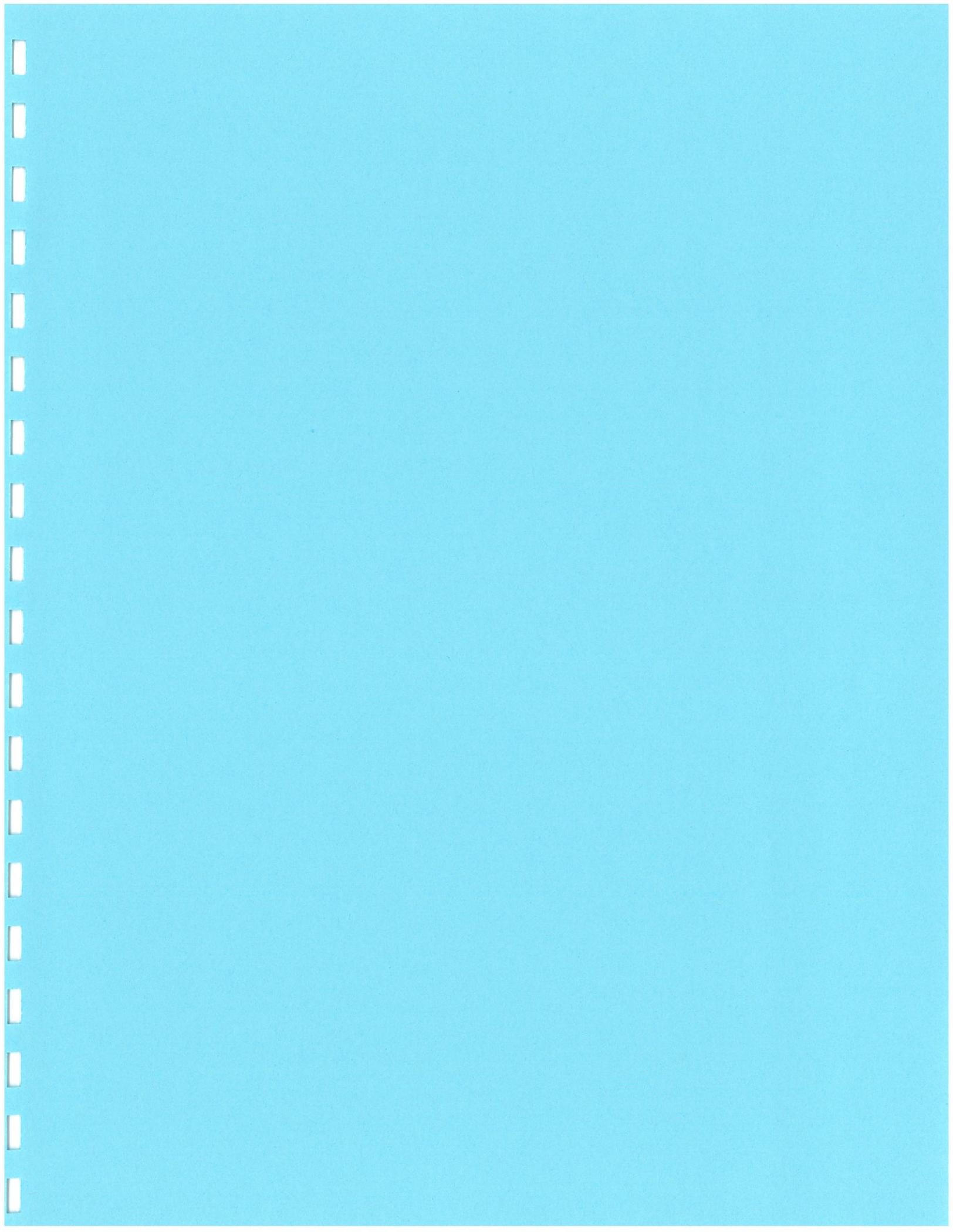
Sample ID FINE SEDIMENT BPT FILTRATE AFTER 10 MIN

Turbidity 1.27 NTU

Sample ID _____

Turbidity _____ NTU

Equipment used: HACH 2100P TURBIDIMETER



Appendix E- Laboratory Results

ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES



Environmental Division

21-Dec-2009

Randy Wilcox, PE
WaterSolve LLC
4964 Starr St SE
Grand Rapids, MI 49546

Tel: (616) 292-2666
Fax: (616) 575-9031

Re: Sample Analyses

Work Order: **0912352**

Dear Randy,

ALS Laboratory Group received 5 samples on 14-Dec-2009 for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Laboratory Group and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 13.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Electronically approved by: Tom Beamish

Tom Beamish
Project Manager



ALS USA MI, CORP
Part of the **ALS Laboratory Group**
3352 128th Avenue Holland, Michigan 49424-0203
Phone: (616) 399-6070 Fax: (616) 399-6185
www.alsglobal.com
A Campbell Brothers Limited Company

Client: WaterSolve LLC
Project: Sample Analyses
Work Order: 0912352

Work Order Sample Summary

| <u>Lab Samp ID</u> | <u>Client Sample ID</u> | <u>Matrix</u> | <u>Tag Number</u> | <u>Collection Date</u> | <u>Date Received</u> | <u>Hold</u> |
|--------------------|------------------------------|---------------|-------------------|------------------------|----------------------|--------------------------|
| 0912352-01 | GDT Filtrate | Water | | 12/14/09 | 12/14/09 16:00 | <input type="checkbox"/> |
| 0912352-02 | Gravity Settling | Water | | 12/14/09 | 12/14/09 16:00 | <input type="checkbox"/> |
| 0912352-03 | FKC - Screw Press | Water | | 12/14/09 | 12/14/09 16:00 | <input type="checkbox"/> |
| 0912352-04 | Ashbrook - Belt Filter Press | Water | | 12/14/09 | 12/14/09 16:00 | <input type="checkbox"/> |
| 0912352-05 | Siemens - Plate & Frame | Water | | 12/14/09 | 12/14/09 16:00 | <input type="checkbox"/> |

Client: WaterSolve LLC
 Project: Sample Analyses
 WorkOrder: 0912352

**QUALIFIERS,
 ACRONYMS, UNITS**

| <u>Qualifier</u> | <u>Description</u> |
|------------------|---|
| * | Value exceeds Regulatory Limit |
| a | Not accredited |
| B | Analyte detected in the associated Method Blank above the Reporting Limit |
| E | Value above quantitation range |
| H | Analyzed outside of Holding Time |
| J | Analyte detected below quantitation limit |
| n | Not offered for accreditation |
| ND | Not Detected at the Reporting Limit |
| O | Sample amount is > 4 times amount spiked |
| P | Dual Column results percent difference > 40% |
| R | RPD above laboratory control limit |
| S | Spike Recovery outside laboratory control limits |
| U | Analyzed but not detected above the MDL |

| <u>Acronvm</u> | <u>Description</u> |
|----------------|-------------------------------------|
| DUP | Method Duplicate |
| LCS | Laboratory Control Sample |
| LCSD | Laboratory Control Sample Duplicate |
| MBLK | Method Blank |
| MDL | Method Detection Limit |
| MQL | Method Quantitation Limit |
| MS | Matrix Spike |
| MSD | Matrix Spike Duplicate |
| PDS | Post Digestion Spike |
| PQL | Practical Quantitation Limit |
| SD | Serial Dilution |

| <u>Units Reported</u> | <u>Description</u> |
|-----------------------|----------------------|
| mg/L | Milligrams per Liter |

ALS Laboratory Group

Date: 21-Dec-09

Client: WaterSolve LLC
Project: Sample Analyses
Sample ID: GDT Filtrate
Collection Date: 12/14/09

Work Order: 0912352
Lab ID: 0912352-01
Matrix: WATER

| Analyses | Result | Qual | Report Limit | Units | Dilution Factor | Date Analyzed |
|-------------------------------|--------|------|----------------|-------|---------------------|-------------------|
| METALS BY ICP-MS | | | E200.8 | | Prep Date: 12/16/09 | Analyst: RH |
| Lead | 0.31 | | 0.0050 | mg/L | 1 | 12/18/09 09:56 AM |
| TOTAL SUSPENDED SOLIDS | | | A2540 D | | | Analyst: MB |
| Total Suspended Solids | 8.0 | | 6.0 | mg/L | 1 | 12/19/09 |

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Laboratory Group

Date: 21-Dec-09

Client: WaterSolve LLC
Project: Sample Analyses
Sample ID: Gravity Settling
Collection Date: 12/14/09

Work Order: 0912352
Lab ID: 0912352-02
Matrix: WATER

| Analyses | Result | Qual | Report Limit | Units | Dilution Factor | Date Analyzed |
|-------------------------------|--------|------|----------------|-------|---------------------|-------------------|
| METALS BY ICP-MS | | | E200.8 | | Prep Date: 12/16/09 | Analyst: RH |
| Lead | 4.9 | | 0.050 | mg/L | 10 | 12/17/09 03:10 PM |
| TOTAL SUSPENDED SOLIDS | | | A2540 D | | | Analyst: MB |
| Total Suspended Solids | 210 | | 6.0 | mg/L | 1 | 12/19/09 |

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Laboratory Group

Date: 21-Dec-09

Client: WaterSolve LLC
Project: Sample Analyses
Sample ID: FKC - Screw Press
Collection Date: 12/14/09

Work Order: 0912352
Lab ID: 0912352-03
Matrix: WATER

| Analyses | Result | Qual | Report Limit | Units | Dilution Factor | Date Analyzed |
|-------------------------------|--------|------|----------------|-------|---------------------|-------------------|
| METALS BY ICP-MS | | | E200.8 | | Prep Date: 12/16/09 | Analyst: RH |
| Lead | 0.64 | | 0.0050 | mg/L | 1 | 12/17/09 03:15 PM |
| TOTAL SUSPENDED SOLIDS | | | A2540 D | | | Analyst: MB |
| Total Suspended Solids | 92 | | 6.0 | mg/L | 1 | 12/19/09 |

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Laboratory Group

Date: 21-Dec-09

Client: WaterSolve LLC
Project: Sample Analyses
Sample ID: Ashbrook - Belt Filter Press
Collection Date: 12/14/09

Work Order: 0912352
Lab ID: 0912352-04
Matrix: WATER

| Analyses | Result | Qual | Report Limit | Units | Dilution Factor | Date Analyzed |
|-------------------------------|--------|------|----------------|-------|---------------------|-------------------|
| METALS BY ICP-MS | | | E200.8 | | Prep Date: 12/16/09 | Analyst: RH |
| Lead | 1.3 | | 0.0050 | mg/L | 1 | 12/17/09 03:20 PM |
| TOTAL SUSPENDED SOLIDS | | | A2540 D | | | Analyst: MB |
| Total Suspended Solids | 360 | | 6.0 | mg/L | 1 | 12/19/09 |

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Laboratory Group

Date: 21-Dec-09

Client: WaterSolve LLC
Project: Sample Analyses
Sample ID: Siemens - Plate & Frame
Collection Date: 12/14/09

Work Order: 0912352
Lab ID: 0912352-05
Matrix: WATER

| Analyses | Result | Qual | Report Limit | Units | Dilution Factor | Date Analyzed |
|-------------------------------|--------|------|----------------|-------|---------------------|-------------------|
| METALS BY ICP-MS | | | E200.8 | | Prep Date: 12/16/09 | Analyst: RH |
| Lead | 0.14 | | 0.0050 | mg/L | 1 | 12/17/09 03:25 PM |
| TOTAL SUSPENDED SOLIDS | | | A2540 D | | | Analyst: MB |
| Total Suspended Solids | ND | | 8.0 | mg/L | 1 | 12/19/09 |

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Laboratory Group

Date: 21-Dec-09

Client: WaterSolve LLC

QC BATCH REPORT

Work Order: 0912352

Project: Sample Analyses

| Batch ID: 25826 | Instrument ID ICPMS2 | Method: E200.8 | | | | | | | | |
|-----------------|-----------------------------|----------------|----------------------------------|---------------|------|---------------|---------------|-------|-----------|------|
| MBLK | Sample ID: MB-25826-25826 | Units: mg/L | Analysis Date: 12/16/09 01:00 PM | | | | | | | |
| Client ID: | Run ID: ICPMS2_091216A | SeqNo: 1259175 | Prep Date: 12/16/09 | DF: 1 | | | | | | |
| Analyte | Result | PQL | SPK Val | SPK Ref Value | %REC | Control Limit | RPD Ref Value | %RPD | RPD Limit | Qual |
| Lead | ND | 0.0050 | | | | | | | | |
| LCS | Sample ID: LCS-25826-25826 | Units: mg/L | Analysis Date: 12/16/09 01:05 PM | | | | | | | |
| Client ID: | Run ID: ICPMS2_091216A | SeqNo: 1259176 | Prep Date: 12/16/09 | DF: 1 | | | | | | |
| Analyte | Result | PQL | SPK Val | SPK Ref Value | %REC | Control Limit | RPD Ref Value | %RPD | RPD Limit | Qual |
| Lead | 0.09009 | 0.0050 | 0.1 | 0 | 90.1 | 65-115 | 0 | | | |
| LCSD | Sample ID: LCSD-25826-25826 | Units: mg/L | Analysis Date: 12/16/09 01:09 PM | | | | | | | |
| Client ID: | Run ID: ICPMS2_091216A | SeqNo: 1259177 | Prep Date: 12/16/09 | DF: 1 | | | | | | |
| Analyte | Result | PQL | SPK Val | SPK Ref Value | %REC | Control Limit | RPD Ref Value | %RPD | RPD Limit | Qual |
| Lead | 0.09164 | 0.0050 | 0.1 | 0 | 91.6 | 65-115 | 0.09009 | 1.71 | 20 | |
| MS | Sample ID: 0912387-02A MS | Units: mg/L | Analysis Date: 12/16/09 01:24 PM | | | | | | | |
| Client ID: | Run ID: ICPMS2_091216A | SeqNo: 1259181 | Prep Date: 12/16/09 | DF: 1 | | | | | | |
| Analyte | Result | PQL | SPK Val | SPK Ref Value | %REC | Control Limit | RPD Ref Value | %RPD | RPD Limit | Qual |
| Lead | 0.08936 | 0.0050 | 0.1 | 0.001946 | 87.1 | 70-130 | 0 | | | |
| MS | Sample ID: 0912354-01B MS | Units: mg/L | Analysis Date: 12/17/09 01:18 PM | | | | | | | |
| Client ID: | Run ID: ICPMS2_091217B | SeqNo: 1260089 | Prep Date: 12/16/09 | DF: 1 | | | | | | |
| Analyte | Result | PQL | SPK Val | SPK Ref Value | %REC | Control Limit | RPD Ref Value | %RPD | RPD Limit | Qual |
| Lead | 0.09723 | 0.0050 | 0.1 | 0.0004932 | 96.7 | 70-130 | 0 | | | |
| MSD | Sample ID: 0912387-02A MSD | Units: mg/L | Analysis Date: 12/16/09 01:28 PM | | | | | | | |
| Client ID: | Run ID: ICPMS2_091216A | SeqNo: 1259183 | Prep Date: 12/16/09 | DF: 1 | | | | | | |
| Analyte | Result | PQL | SPK Val | SPK Ref Value | %REC | Control Limit | RPD Ref Value | %RPD | RPD Limit | Qual |
| Lead | 0.09145 | 0.0050 | 0.1 | 0.001946 | 89.5 | 70-130 | 0.08906 | 2.65 | 20 | |
| MSD | Sample ID: 0912354-01B MSD | Units: mg/L | Analysis Date: 12/17/09 01:41 PM | | | | | | | |
| Client ID: | Run ID: ICPMS2_091217B | SeqNo: 1260144 | Prep Date: 12/16/09 | DF: 1 | | | | | | |
| Analyte | Result | PQL | SPK Val | SPK Ref Value | %REC | Control Limit | RPD Ref Value | %RPD | RPD Limit | Qual |
| Lead | 0.09667 | 0.0050 | 0.1 | 0.0004932 | 96.2 | 70-130 | 0.09723 | 0.578 | 20 | |

Note: See Qualifiers Page for a list of Qualifiers and their explanation

Client: WaterSolve LLC
Work Order: 0912352
Project: Sample Analyses

QC BATCH REPORT

Batch ID: 25826 Instrument ID ICPMS2 Method: E200.8

The following samples were analyzed in this batch:

| | | |
|-------------|-------------|-------------|
| 0912352-01B | 0912352-02B | 0912352-03B |
| 0912352-04B | 0912352-05B | |

Note: See Qualifiers Page for a list of Qualifiers and their explanation

Client: WaterSolve LLC
 Work Order: 0912352
 Project: Sample Analyses

QC BATCH REPORT

Batch ID: R73694 Instrument ID: TSS Method: A2540 D

| MBLK | Sample ID: MB-R73694-R73694 | Units: mg/L | Analysis Date: 12/19/09 | | | | | | | |
|------------------------|-----------------------------|----------------|-------------------------|---------------|------|---------------|---------------|------|-----------|-----|
| Client ID: | Run ID: TSS_091219A | SeqNo: 1261933 | Prep Date: DF: 1 | | | | | | | |
| Analyte | Result | PQL | SPK Val | SPK Ref Value | %REC | Control Limit | RPD Ref Value | %RPD | RPD Limit | Qua |
| Total Suspended Solids | ND | 6.0 | | | | | | | | |

| DUP | Sample ID: 0912084-15A DUP | Units: mg/L | Analysis Date: 12/19/09 | | | | | | | |
|------------------------|----------------------------|----------------|-------------------------|---------------|------|---------------|---------------|------|-----------|-----|
| Client ID: | Run ID: TSS_091219A | SeqNo: 1261937 | Prep Date: DF: 1 | | | | | | | |
| Analyte | Result | PQL | SPK Val | SPK Ref Value | %REC | Control Limit | RPD Ref Value | %RPD | RPD Limit | Qua |
| Total Suspended Solids | 155 | 6.0 | 0 | 0 | 0 | 0-0 | 194 | 3.14 | 30 | |

| DUP | Sample ID: 0912411-01B DUP | Units: mg/L | Analysis Date: 12/19/09 | | | | | | | |
|------------------------|----------------------------|----------------|-------------------------|---------------|------|---------------|---------------|------|-----------|-----|
| Client ID: | Run ID: TSS_091219A | SeqNo: 1261950 | Prep Date: DF: 1 | | | | | | | |
| Analyte | Result | PQL | SPK Val | SPK Ref Value | %REC | Control Limit | RPD Ref Value | %RPD | RPD Limit | Qua |
| Total Suspended Solids | 192 | 6.0 | 0 | 0 | 0 | 0-0 | 206 | 7.04 | 30 | |

The following samples were analyzed in this batch:

| | | |
|-------------|-------------|-------------|
| 0912352-01A | 0912352-02A | 0912352-03A |
| 0912352-04A | 0912352-05A | |

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

ALS Laboratory Group

Sample Receipt Checklist

Client Name: **WATERSOLVE**

Date/Time Received: **14-Dec-09 16:00**

Work Order: **0912352**

Received by: **DS**

Checklist completed by: *Diana Shiu* 14-Dec-09
Signature Date

Reviewed by: *Tom Hamilton* 15-Dec-09
Signature Date

Matrix: Water
Carrier name: ALSHN

| | | | |
|---|---|--|--|
| Shipping container/cooler in good condition? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | Not Present <input type="checkbox"/> |
| Custody seals intact on shipping container/cooler? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Not Present <input checked="" type="checkbox"/> |
| Custody seals intact on sample bottles? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Not Present <input checked="" type="checkbox"/> |
| Chain of custody present? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | |
| Chain of custody signed when relinquished and received? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | |
| Chain of custody agrees with sample labels? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | |
| Samples in proper container/bottle? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | |
| Sample containers intact? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | |
| Sufficient sample volume for indicated test? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | |
| All samples received within holding time? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | |
| Container/Temp Blank temperature in compliance? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | |
| Temperature(s)/Thermometer(s): | <u>1.2 g</u> | | |
| Cooler(s)/Kit(s) | <u></u> | | |
| Water - VOA vials have zero headspace? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | No VOA vials submitted <input checked="" type="checkbox"/> |
| Water - pH acceptable upon receipt? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | N/A <input type="checkbox"/> |
| pH adjusted? | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> | N/A <input type="checkbox"/> |
| pH adjusted by: | <u></u> | | |

Login Notes

Client Contacted:

Date Contacted:

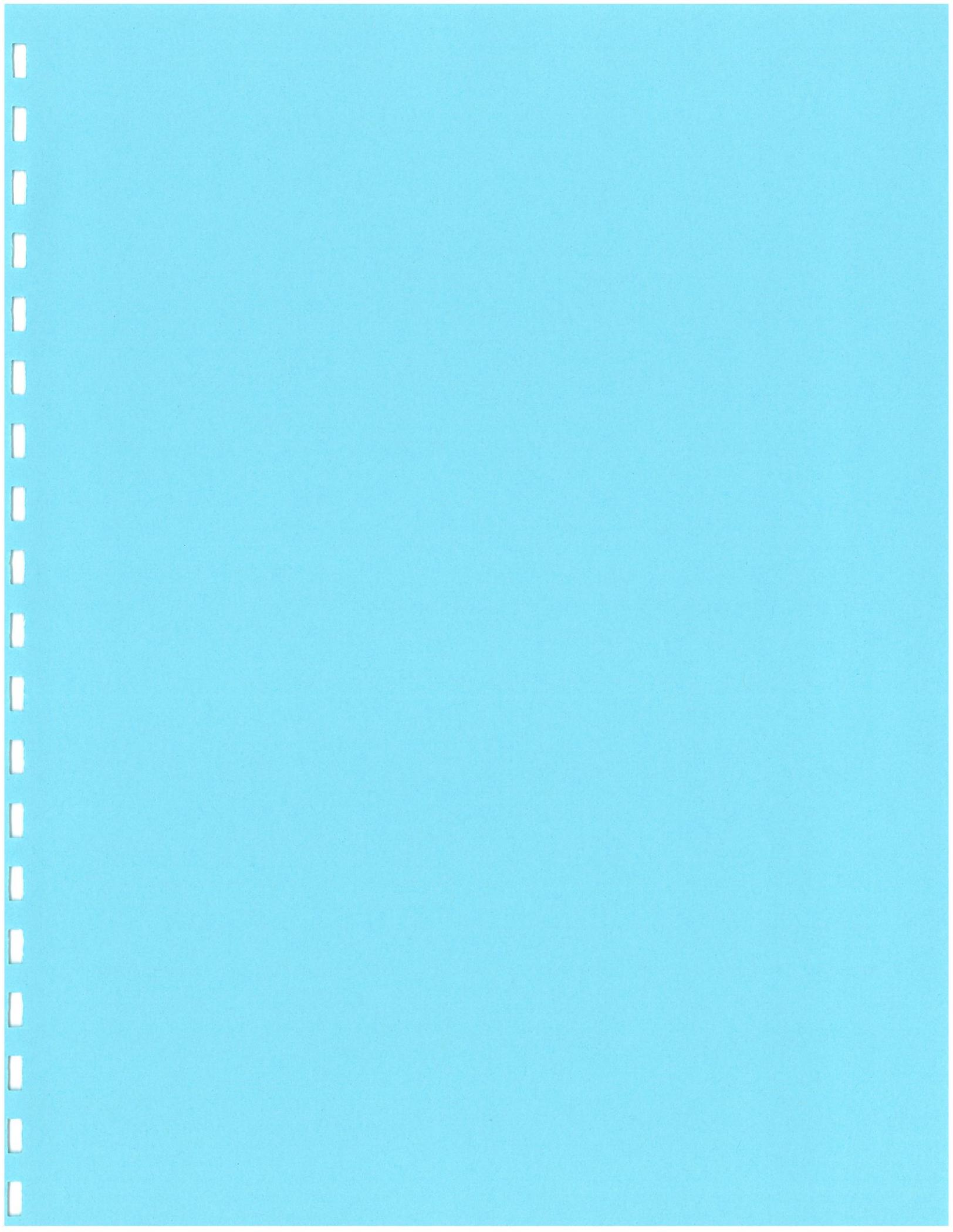
Person Contacted:

Contacted By:

Regarding:

Comments:

Corrective Action:



Appendix F- MSDS



Organic Cationic Coagulant Solve 416

Material Safety Data Sheet

Date Issued: 10-01/2006
Date Revised: 09/26/2006

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **SOLVE 416**
CHEMICAL FAMILY: Quaternary ammonium homopolymer
SYNONYMS: Polydimethyldiallyl ammonium chloride
Molecular Formula: Polymer
Molecular Weight: Polymer

COMPANY: **WaterSolve, LLC, Starr St. SE, Grand Rapids, MI 49546, USA**
For Product information call 616-575-8693.

EMERGENCY PHONE: For emergency involving spill, leak, fire, exposure or accident call
CHEMTREC: 1-800-424-9300 Outside the USA and Canada call 703-527-3887.

2. COMPOSITION/INFORMATION ON INGREDIENTS

OSHA Regulated Components

No Permissible Exposure Limits (PEL/TLV) have been established by OSHA or ACGIH.

| Component | CAS # | % |
|---------------------------------------|--------------|-----------|
| Polydiallyldimethyl ammonium chloride | 026062-79-3 | 10 – 70 % |
| Water | 007732-18-05 | 30 – 90 % |
| Diallyldimethyl ammonium chloride | 007398-69-8 | <1 % |
| Sodium Chloride | 007647-14-5 | <1 % |
| Ammonium Sulfate | 007783-20-2 | <0.4 % |

3. HAZARDS IDENTIFICATION

Emergency Overview

Appearance and odor: Straw liquid, characteristic odor.

Statement of Hazard: Caution! May cause skin irritation

Important! Spills of this product are very slippery when wet.

Potential Health effects

Effects of overexposure:

The acute oral (rat) LD 50, acute dermal (rabbit) LD50 and 4-hour inhalation (rat) LC 50 values are >10,000 mg/kg, >10,000 mg/kg, and > 20 mg/L, respectively. Direct contact with this material may cause minimal eye or skin irritation

4. **FIRST AID MEASURES**

Ingestion:

Material is not expected to be harmful by ingestion. No specific first aid measures are required.

Skin Contact:

Wash immediately with plenty of water and soap.

Eye Contact:

Rinse immediately with plenty of water for at least 15 minutes.

Inhalation:

Material is not expected to be harmful if inhaled. Remove to fresh air.

5. **FIRE FIGHTING MEASURES**

Suitable Extinguishing Media:

Use water spray, carbon dioxide or dry chemical.

Protective Equipment:

Firefighters, and others exposed, wear self-contained breathing apparatus.

Special Hazards:

Keep containers cool by spraying with water if exposed to fire.

6. **ACCIDENTAL RELEASE MEASURES**

Personal precautions:

Refer to Section 8 (Exposure Controls /Personal Protection) for appropriate personal protective equipment

Methods For Cleaning Up:

Products may cause a slip hazard. Spilled material should be absorbed onto an inert material and scooped up. Flush spill area thoroughly with water and scrub to remove residue. If slipperiness remains apply more dry-sweeping compound.

7. **HANDLING AND STORAGE**

HANDLING

Precautionary Measures: Spills should be scooped up or wiped up immediately, and the spill area flushed with water.

Special Handling Statements: None

STORAGE

To avoid product degradation and equipment corrosion, do not use iron, copper or aluminum containers or equipment.

8. **EXPOSURE CONTROLS/PERSONAL PROTECTION**

Engineering Measures:

Engineering controls are not usually necessary if good hygiene practices are followed.

Respiratory Protection:

Not recommended.

Eye Protection:

Wear eye/face protection.

Skin Protection:

Avoid skin contact. Wear impermeable gloves.

Additional Advice:

Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water.

9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|--|---|
| Appearance and Odor: | Straw colored liquid, characteristic odor |
| Boiling Point: | -100°C 212°F |
| Melting Point: | Not applicable |
| Vapor Pressure: | Not applicable |
| Specific Gravity: | 1.08 - 1.09 |
| Vapor Density: | Not applicable |
| % Volatile (By Wt): | ~60 |
| pH: | 5 - 7 |
| Saturation in Air (% by Vol): | Not applicable |
| Evaporation Rate: | Not applicable |
| Solubility in Water: | Complete |
| Volatile Organic Content: | Not available |
| Flash point: | Not applicable |
| Flammable Limits (% by vol): | Not available |
| Autoignition temp: | Not available |
| Decomposition temp: | Not available |
| Odor Threshold: | Not available |
| Partition coefficient (n-octanol/water) | Not available |

10. STABILITY AND REACTIVITY

| | |
|--------------------------------------|---|
| Stability: | Stable |
| Conditions to avoid: | None known |
| Polymerization: | Will not occur |
| Conditions to Avoid: | None known |
| Incompatible Materials: | Strong oxidizing agents. |
| Hazardous Decomposition Products: | Oxides of nitrogen Hydrogen chloride Oxides of carbon |

11. **TOXICOLOGICAL INFORMATION**

Toxicological information for the product is found under Section 3.
Toxicological information on the OSHA regulated components of this product is as follows:

12. **ECOLOGICAL INFORMATION LC50**

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. All ecological information provided was conducted on a structurally similar product. Acute toxicity tests conducted on the polymer using environmentally representative water gave the following results:

Green Algae (*Selenastrum capricornutum*), 72 hr IC50 > 10 - 100 mg/l

Water Flea (*Daphnia magna*) 48hr EC 50 >10-100 mg/l

Zebra Fish (*brachydanio rerio*) 96hr LC 50 10 >100 mg/l

DEGRADATION

Test: CO₂ Evolution; Modified Sturm (OECD 301B)

Duration: 28 day

Procedure: Ready biodegradability <70%

This material is not readily biodegradable (OECD 301B). The large polymer size is incompatible with transport across biological membranes and diffusion; the bioconcentration factor is therefore considered to be zero.

13. **DISPOSAL CONSIDERATIONS**

The information on RCRA waste classification and disposal methodology provided below applies only to the product, as applied. If the material has been altered or contaminated, or it has exceeded its recommended shelf life, the guidance may be inapplicable. Hazardous waste classification under federal regulations (40 CFR Part 261 et seq) is dependent upon whether a material is a RCRA "listed hazardous waste" or has any of the four RCRA "hazardous waste characteristics." Refer to 40 CFR Part 261.33 to determine if a given material to be disposed of is a RCRA "listed hazardous waste"; information contained in Section 15 of this MSDS is not intended to indicate if the product is a "listed hazardous waste." RCRA Hazardous Waste Characteristic. There are four characteristics defined in 40 CFR Section 261.21-61.24: Ignitability, Corrosivity, Reactivity, and Toxicity. To determine Ignitability, See Section 5 of this MSDS (flash point). For Corrosivity, see sections 9 and 14 (pH and DOT corrosivity). For Reactivity, see Section 10 (incompatible materials). For Toxicity, see Section 2 (composition). Federal regulations, may also apply to the classification of the material to be disposed. WaterSolve encourages the recycle, recovery and reuse of materials classified as RCRA hazardous wastes to be disposed of by thermal treatment or incineration at EPA approved facilities. WaterSolve has provided the foregoing for information only, the person generating the waste is responsible for determining the waste classification and disposal method.

14. **TRANSPORT INFORMATION**

This section provides basic shipping classification information. Refer to appropriate transportation regulations for specific requirements.
USDOT

Proper Shipping Name: Not applicable/Not regulated
Hazardous Substances: Not applicable

TRANSPORT CANADA

Proper Shipping Name: Not applicable/Not regulated

ICAO/IATA

Proper Shipping name: Not applicable/Not regulated
Packing instructions/maximum net quantity per package:
Passenger Aircraft:
Cargo Aircraft:

IMO

Proper shipping name: Not applicable Not regulated

15. REGULATORY INFORMATION

INVENTORY INFORMATION

USA : All components of this product are included on the TSCA Chemical Inventory or are not required to be listed on the TSCA Chemical I inventory.

Canada: All components of this product are included on the Domestic Substances List (DSL) or are not required to be listed on the DSL

European Union (EU): All components of this product are included on the European Inventory of Existing Chemical Substances (EINECS) or are not required to be listed on EINECS.

Australia: All components of this product are included in the Australian Inventory of Chemical Substances(AICA).

China: All components of this product are included on the Chinese inventory or are not required to be listed on the Chinese Inventory.

Japan: All components of this product are included on the Japanese (ENCS) inventory or are not required to be listed ion the Japanese Inventory.

Korea: All components of this product are included on the Korean (ECL) inventory or are not required to be listed on the Korean inventory

Philippines: All components of this product are included on the Philippine (PICCS) inventory or are not required to be listed on the Philippine inventory.

OTHER ENVIRONMENTAL INFORMATION

The following components of this product may be subject to reporting requirements pursuant to Section 313 of CERCLA (40 CFR 372), Section 12(b) of TSCA, or may be subject to release

reporting requirements (40 CFR 307, 40 CFR 311, etc.) See Section 13 for information on waste classification and waste disposal of this product. This product does not contain any components regulated under sections of the EPA.

| |
|--|
| Product Classification under section 311 of SARA |
| Not applicable |

16. **OTHER INFORMATION**

NFPA HAZARD RATING (National Fire Protection Association)

Health 2- Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

Fire 1 - Materials that must be preheated before ignition can occur.

Reactivity 0 - Materials that in themselves are normally stable, even under fire exposure conditions.

REASON FOR ISSUE: New Format

This information is for the specific material described only and may not be valid if the material is used in combination with any other material or in any process. The user is responsible to determine the completeness of the information and suitability for the user's own particular use. The knowledge and belief of WaterSolve, LLC, the information is accurate and reliable as of the date indicated but WaterSolve, LLC makes no express or implied warranty of merchantability for the material or the information. WaterSolve, LLC makes no express or implied warranty of fitness for a purpose for the material or for the information.



Organic Anionic Flocculant Solve 9330

Material Safety Data Sheet

Date Issued: 10/07/2008

Date Revised: 10/07/2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **SOLVE 9330**
CHEMICAL TYPE: Anionic emulsion polymer.
COMPANY: WaterSolve, LLC, 4964 Starr ST. SE, Grand Rapids, MI 49546, USA
For Product information call 616-575-8693.
EMERGENCY NUMBER (800) 424-9300 CHEMTEC

2. HAZARDS IDENTIFICATION

Emergency overview
Appearance: liquid, white

- CAUTION! MAY CAUSE EYE IRRITATION, MAY CAUSE SKIN AND RESPIRATORY TRACT IRRITATION, PROLONGED OR REPEATED CONTACT MAY DRY SKIN AND CAUSE DERMATITIS AND BURNS. NOTICE: WHILE THIS MATERIAL HAS A LOW LEVEL OF TOXICITY, GOOD INDUSTRIAL HYGIENE PRACTICES ARE INCOURAGED TO MINIMIZE EXPOSURE.

Potential health effects

Route of exposure

Inhalation, skin absorption, skin contact, eye contact, ingestion

Eye contact

Can cause eye irritation. Symptoms include stinging, tearing, redness, and swelling of eyes

Skin contact

Can cause skin irritation. Symptoms may include redness and burning of skin, and other skin damage. Prolonged or repeated contact may dry the skin. Symptoms may include redness, burning, and drying and cracking of skin, skin burns, and other skin damage

Ingestion

Swallowing small amounts of this material during normal handling is not likely to cause harmful effects. Swallowing large amounts may be harmful

Inhalation

It is possible to breathe this material under certain conditions of handling and use (for example, during heating, spraying, or stirring). Symptoms are not expected at air concentrations below the recommended exposure limits, if applicable (see Section 8).

Aggravated Medical Conditions

Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: Skin, lung (for example, asthma-like conditions), skin upper respiratory tract.

Symptoms

Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include: stomach or intestinal upset (nausea, vomiting, diarrhea), irritation (nose, throat, airways), lung irritation, cough, difficulty breathing, central nervous system depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness) lack of coordination, confusion, irregular heartbeat, narcosis (dazed or sluggish feeling), convulsions, coma.

Target Organs

Exposure to this material (or a component) has been found to cause kidney damage in male rats. The mechanism by which this toxicity occurs is specific to the male rat and the kidney effects are not expected to occur in humans. Studies with rabbits indicate that sustained, included skin contact with undiluted surfactant may result in the development of inflammatory changes in the lung. Overexposure to this material (or its components) has been suggested as a cause of the following effects in laboratory animals: mild, reversible liver effects mild, reversible kidney affects.

Carcinogenicity

This product (or a component) is a petroleum-derived material. Similar materials and certain compounds occurring naturally in petroleum oils have been shown to cause skin cancer in laboratory animals following repeated exposure without washing or removal. 2-Ethylhexanol did not cause cancer in male mice or in male or female rats when given to the animals through a stomach tube. It caused a possible increase in liver Tumors in female mice. This material is not listed as a carcinogen by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or the Occupational Safety and Health Administration (OSHA).

Reproductive hazard

There are no Data available for assessing risk to the fetus from material exposure to this material. Based on the available information, risk to the fetus from maternal exposure to this material cannot be assessed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

| Cas# | Component | Percent |
|----------------|-------------------------|-----------|
| 254504001-5181 | Polymer | >=30-<40% |
| 25404001-5164 | Aliphatic hydrocarbon | >=20-<30% |
| | Nonionic surfactant | >=1.5-<5% |
| 127087-87-0 | Ethoxylated nonylphenol | >=1-<1.5% |
| | polyoxyalkylene | |

4. FIRST AID MEASURES

- Eye Contact:** If symptoms develop, immediately move individual away from exposure and into fresh air. Flush eyes gently with water for at least 15 minutes, while holding eyelids open. Consult a physician.
- Skin Contact:** Remove contaminated clothing. Flush exposed area with large amounts of water. If skin is damaged, seek immediate medical attention. If skin is not damaged and symptoms persist, seek medical attention. Launder clothing before reuse.
- Ingestion:** Seek medical attention. If individual is drowsy or unconscious, do not give anything by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended.
- Inhalation:** If symptoms develop, move individual away from exposure and into fresh air. If Symptoms persist, seek medical attention. If breathing is difficult, administer oxygen. Keep person warm and quiet; seek immediate medical attention.

Notes to physician

Hazards: This material is an aspiration hazard. Potential danger from aspiration must be weighed against possible oral toxicity when deciding whether to induce vomiting.

Treatment: No information available.

5. **FIRE FIGHTING MEASURES**

Hazardous combustion products: Hydrocarbons, carbon dioxide and carbon monoxide, nitrogen oxides(NOx).

Suitable extinguishing media: Dry chemical, carbon dioxide (CO₂), water spray.

Protective equipment for firefighters: Wear full firefighting turn-out gear (full Bunker gear), and Respiratory protection (SCBA). DO NOT direct a solid stream of water or foam into hot, burning pools of liquid since this may cause frothing and increase fire intensity. Frothing can be violent and possibly endanger any firefighter standing too close to the burning liquid. Use water spray to cool fire exposed containers and structures until fire is out if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

Flammability Class for Flammable Liquids:

Combustible Liquid Class IIIB.

6. **ACCIDENTAL RELEASE MEASURES**

Personal precautions

For personal protection see Section 8. Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed.

Environmental precautions:

Prevent spreading over a wide area (e.g. by containment or oil barriers). Do not let product enter drains. Do not flush into surface water or sanitary sewer system.

Methods for cleaning up:

Keep in suitable, closed containers for disposal. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust).

Other information:

Comply with all applicable federal, state, and local regulations.

7. **HANDLING AND STORAGE**

Handling:

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed.

Storage:

Store in a cool, dry ventilated area.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ALIPHATIC HYDROCARBON

NJTS# 254504001-5164

| | | | |
|-------|----------------------------------|-----------------------|-------------|
| ACGIH | Time weighted average | 200 mg/m ³ | Non-aerosol |
| NIOSH | Recommended exposure limit (REL) | 100 mg/m ³ | |
| ACGIH | Time weighted average | 200 mg/m ³ | Non-aerosol |

General advice: These recommendations provide general guidance for handling this product. Personal Protective Equipment should be selected for individual for individual applications and should consider factors which affect exposure potential, such as handling practices, chemical concentrations and ventilation. It is ultimately the responsibility of the employer to follow regulatory guidelines established by local authorities.

Exposure controls: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below exposure guidelines (if applicable) or below levels that cause known, suspected or apparent adverse effects

Personal protection equipment

Respiratory protection: A NOISH-approved air-purifying respirator with an appropriate cartridge and/or filter may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits (if applicable) or if overexposure has otherwise been determined. Protection provided by air-purifying respirators is limited. Use a positive pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are not known or any other circumstances where an air-purifying respirator may not provide adequate protection.

Hand Protection: Impervious gloves (rubber or neoprene) are recommended. Discard gloves that show tears, pinholes, or signs of wear.

Eye protection: Wear chemical splash goggles when there is the potential for exposure of the eyes to liquid, vapor or mist. Maintain eye wash station near work area.

Skin/body protection: Wear resistant gloves (consult your safety equipment supplier). Wear normal work clothing including long pants, long-sleeved shirt and foot covering to prevent direct contact of the product with the skin. Launder clothing before reuse. If skin irritation develops, contact your facility health and safety professional or your local safety equipment supplier to determine the proper personal protective equipment for your use. Discard gloves that show tears, pinholes, or signs of wear.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form: liquid
 Color: white
 Odor: oily
 pH: 8.0@ 20g/L
 Solubility (H₂O): soluble in water
 Evaporation Rate: <1 (butyl acetate=1)
 Explosion Limits: No data.
 Vapor pressure: No data.
 Vapor Density: No data.
 Density: 1.03g/cm³ @ 68°F /20°C

Partition coefficient: n-octanol/water: No data.
 Log Pow: No data.
 Autoignition temperature: No data.
 Boiling point/boiling range: 96.00°C /205°F
 Melting Point (°C): <23°F /<-5°C
 Flash point: >212°F />100°C

10. **STABILITY AND REACTIVITY**

Stability: Stable under usual application conditions.
Conditions to avoid: Heat, flames and sparks.

Hazardous Decomposition Products:
 Hydrocarbons, carbon dioxide and carbon monoxide, nitrogen oxides (NOx), Acid, smoke and fumes.

Incompatibility: Strong oxidizing agents, acids strong reducing agents.

Hazardous Polymerization: Product will not undergo hazardous polymerization.
Thermal Decomposition: No data..

11. **TOXICOLOGICAL INFORMATION**

Acute oral toxicity

| | |
|-------------------------|------------------------|
| Polymer | No data available. |
| ALIPHATIC HYDROCARBON | LD50 Rat: >8,000 mg/kg |
| NONIONIC SURFACTANT | NO DATA AVAILABLE |
| ETHOXYLATED NONYLPHENOL | NO DATA AVAILABLE |
| POLYOXYALKYLENE | NO DATA AVAILABLE |

Acute inhalation toxicity

| | |
|-------------------------|--------------------------|
| Polymer | No data available |
| ALIPHATIC HYDROCARBON | LD 50 Rat: >2,500ppm, 4h |
| ETHOXYLATED NONYLPHENOL | NO DATA AVAILABLE |
| POLYOXYALKYLENE | NO DATA AVAILABLE |
| NONIONIC SURFACTANT | NO DATA AVAILABLE |

Acute dermal toxicity

| | |
|-------------------------|--------------------------|
| Polymer | No data available. |
| ALIPHATIC HYDROCARBON | LD50 Rabbit: >4,000mg/kg |
| ETHOXYLATED NONYLPHENOL | NO DATA AVAILABLE |
| POLYOXYALKYLENE | NO DATA AVAILABLE |
| NONIONIC SURFACTANT | NO DATA AVAILABLE |

5. **ECOLOGICAL INFORMATION**

Aquatic toxicity

Acute and Prolonged Toxicity to Fish

96 h LC50 leuciscus idus (Golden orfe) ca.175mg/L

This information given is based on data on the components and the ecotoxicology of similar products.

Acute Toxicity to Aquatic Invertebrates

No data.

Environmental Fate and Pathways:

Ca.470 mg/g

Based on similar product information.

Ca. 1,020 mg/g

Based on similar product information.

13. **DISPOSAL CONSIDERATIONS**

Disposal Instructions:

Contain and collect using absorbent material if needed. Follow all federal, State and local laws.

14. **TRANSPORT INFORMATION**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

15. **REGULATORY INFORMATION**

California Prop. 65

WARNING! This product contains a chemical known in the State of California to cause cancer.

ACRYLAMIDE
ETHYLENE OXIDE
ACETALDEHYDE
FORMALDEHYDE
1, 4-DIOXANE

WARNING! This product contains a chemical known in the State of California to cause birth defects or other reproductive harm.

ACRYLAMIDE
ETHYLENE OXIDE
ACETALDEHYDE
1, 4-DIOXANE

WARNING! This product contains a chemical known in the State of California to cause birth defects or other reproductive harm.

ETHYLENE OXIDE

SARA Hazard Classification: Acute Health Hazard

SARA 313 Components

Reportable quantity- Components

| Cas# | Component | |
|----------------|-------------------------|------|
| 254504001-5181 | Polymer | NONE |
| 25404001-5164 | Aliphatic hydrocarbon | NONE |
| | Nonionic surfactant | NONE |
| 127087-87-0 | Ethoxylated nonylphenol | NONE |
| | polyoxyalkylene | |

| HMIS / NFPA | HEALTH | FLAMMIBILTY | REACTIVITY | other |
|-------------|--------|-------------|------------|---------|
| | 1 | 1 | 0 | No data |

16. **OTHER INFORMATION**

Reasonable care has been taken in the preparation of this information, but the manufacturer makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances.

This information is for the specific material described only and may not be valid if the material is used in combination with any other materials or in any process. The user is responsible to determine the completeness of the information and suitability for the user's own particular use. The knowledge and belief of WaterSolve, LLC, the information is accurate and reliable as of the date indicated but WaterSolve, LLC makes no express or implied warranty of merchantability for the material or the information. WaterSolve, LLC makes no express or implied warranty of fitness for a purpose for the material or for the information.





WaterSolve LLC
4964 Starr St. SE
Grand Rapids, MI 49546
ph - 616-575-8693 fax - 616-575-9031

Mill River, Fairfield, Connecticut
River Sediments Dredged to Geotube® Containers
Ralph Klass, CCA, LLC
Budget Pricing 12/16/09

| | |
|--|---|
| TO: CCA, LLC Attn: Ralph Klass, P.E., L.E.P. 40 Old New Milford Road Brookfield, CT 06804 (203)775-6207 Fax (203)775-3628 | SHIP TO: Project Site Fairfield, CT |
|--|---|

Assumptions: 20,000-c.y. of sediment at 35% dry weight solids dewatered in Geotube® containers
 10.2-MG dredged at 15% solids to Geotube® containers. Flow rate = 1,500 gpm
 Conditioned with 100-ppm Solve 416 followed by 67-ppm Solve 9330
 Excavation for lay-down area and removal of dewatered solids is not included with this budget pricing.

| Proposal | Terms | REP | Ship Date | VIA | F.O.B. | Date |
|--------------|--------------|---|--------------------|----------------|------------------|--------------|
| CCA121609 | Net 30 | RW | 2-4 week lead time | Common Carrier | Delivered | 16-Dec-09 |
| Quantity | Item Code | Description | | | Unit Price | Amount |
| 1 | Mobilization | 2-men, setup, piping, plumbing, for chemical feed system | | | \$5,000.00 | \$5,000.00 |
| 1,800 l.f. | Geotube® | 100' circ. GT500D Geotube® container (11.79 c.y./l.f. capacity) | | | \$96.80/l.f. | \$174,240.00 |
| 3 totes | Polymer | Solve 9330 (67 ppm) - totes (2,290#), make-down required | | | \$1.60/lb | \$10,992.00 |
| 4 totes | Polymer | Solve 416 (100-ppm) - totes (2,250#), fed neat | | | \$1.80/lb. | \$16,200.00 |
| 103,400 s.f. | Liner | 15-mil polyethylene liner (220' x 470') - if necessary | | | \$0.45/s.f. | \$46,530.00 |
| 48 rolls | Geotube® | Geotube® filtration fabric, 6.5' W x 150' L, if necessary | | | \$475.00/roll | \$22,800.00 |
| 1 month | Equipment | WSLP-2400 polymer make down unit, rental* | | | \$2,500.00/month | \$2,500.00 |
| 1 month | Equipment | 10-gph chemical feed pump w/ high viscosity head, rental | | | \$325.00/month | \$325.00 |
| 1 each | Piping | 8" manifold/injection assembly with valves to all containers | | | \$40,000.00 | \$40,000.00 |
| 3 days | Tech Service | Onsite optimization, daily testing, training operators | | | \$1,250.00/day | \$3,750.00 |

WaterSolve, LLC Standard Terms and Conditions apply.

Total Budget Price = \$322,227.00

*Rental includes polymer injection ports, mixing manifold, sampling ports, and geoports (4)- all with 8" cam-lock fittings
 Preparation of lay-down area and grading verification by others (max. 0.5% end-to-end and max. 0.25% side-to-side).

Randy Wilcox, P.E.

randyw@gowatersolve.com
www.gowatersolve.com

Thank you for this opportunity to provide this budget pricing.

A change in project design or material character resulting in a change order is responsibility of the client.

Order acknowledgement/PO#: _____



Geotube® Estimator

English Units Input - Known Volume

Version 9.1

Licensed to: WaterSolve, LLC

| | |
|--------------------------|------------------------|
| Project Name: | Mill River |
| Location: | Fairfield, Connecticut |
| Contact: | Ralph Klass, CCA |
| Date: | 12/16/2009 |
| Type of Material: | Sandy Silt |

| Input | | Units |
|---------------------------|--------|-------------|
| Volume | 20,000 | Cubic Yards |
| Specific Gravity | 1.60 | |
| % Solids in Place | 35.0% | |
| % Solids During Pumping | 15.0% | |
| Target dewatered % Solids | 35% | |
| % Coarse grain & sand* | 5.0% | |

* % Coarse grain & sand is removed from the calculation for volume reduction due to dewatering and added back in at the end in required Geotube® volume.

Production:

| | |
|--------------------|-------|
| Pumping Rate (GPM) | 1,500 |
| Hours per Day | 12.0 |
| % Efficiency | 80% |

Material type:

Silts and/or Organics

Percent of Maximum Filled Capacity

80%

For MDS Applications:

| | | |
|------------------------|--|------|
| Legal Hauling Capacity | | Tons |
|------------------------|--|------|

| Output | | Units |
|----------------------------|------------|---------|
| Total Volume Pumped | 10,240,480 | Gallons |
| Wet Volume per day | 864,000 | Gallons |
| Wet Volume per day | 4,277.2 | CY |
| Total Bone Dry Tons | 6,787.7 | Tons |
| Estimated Pumping Days | 11.9 | Days |
| Estimated Dewatered Volume | 20,000.0 | CY |
| Estimated Dewatered Weight | 19,393.4 | Tons |

Estimated Geotube® Quantity:

| | |
|------------------------------|-------|
| Circumference X Max Fill Ht. | Feet |
| 100' X 8.5' | 1,913 |

Estimated MDS Geotube® Units:

| | |
|---------------|---------|
| MDS Dimension | Each |
| 22.5' X 22' | #DIV/0! |

Disclaimer: No warranty or guarantee expressed or implied is made regarding the performance of any product since the manner of handling and use is beyond our control. This document should not be construed as engineering advice, and the final design should be the responsibility of the project engineer and/or the project manager.



Geotube® Estimator

English Units Input - Known Volume

Version 9.1

Licensed to: WaterSolve, LLC

| | |
|--------------------------|------------------------|
| Project Name: | Mill River |
| Location: | Fairfield, Connecticut |
| Contact: | Ralph Klass, CCA |
| Date: | 12/16/2009 |
| Type of Material: | Sandy Silt |

| Input | | Units |
|---------------------------|--------|-------------|
| Volume | 20,000 | Cubic Yards |
| Specific Gravity | 1.60 | |
| % Solids in Place | 35.0% | |
| % Solids During Pumping | 15.0% | |
| Target dewatered % Solids | 50% | |
| % Coarse grain & sand* | 5.0% | |

| Output | | Units |
|----------------------------|------------|---------|
| Total Volume Pumped | 10,240,480 | Gallons |
| Wet Volume per day | 864,000 | Gallons |
| Wet Volume per day | 4,277.2 | CY |
| Total Bone Dry Tons | 6,787.7 | Tons |
| Estimated Pumping Days | 11.9 | Days |
| Estimated Dewatered Volume | 13,438.8 | CY |
| Estimated Dewatered Weight | 13,575.4 | Tons |

* % Coarse grain & sand is removed from the calculation for volume reduction due to dewatering and added back in at the end in required Geotube® volume.

Production:

| | |
|--------------------|-------|
| Pumping Rate (GPM) | 1,500 |
| Hours per Day | 12.0 |
| % Efficiency | 80% |

Estimated Geotube® Quantity:

| | |
|-------------------------------------|-------------|
| <i>Circumference X Max Fill Ht.</i> | <i>Feet</i> |
| 100' X 8.5' | 1,285 |

Material type:

Silts and/or Organics

Percent of Maximum Filled Capacity

80%

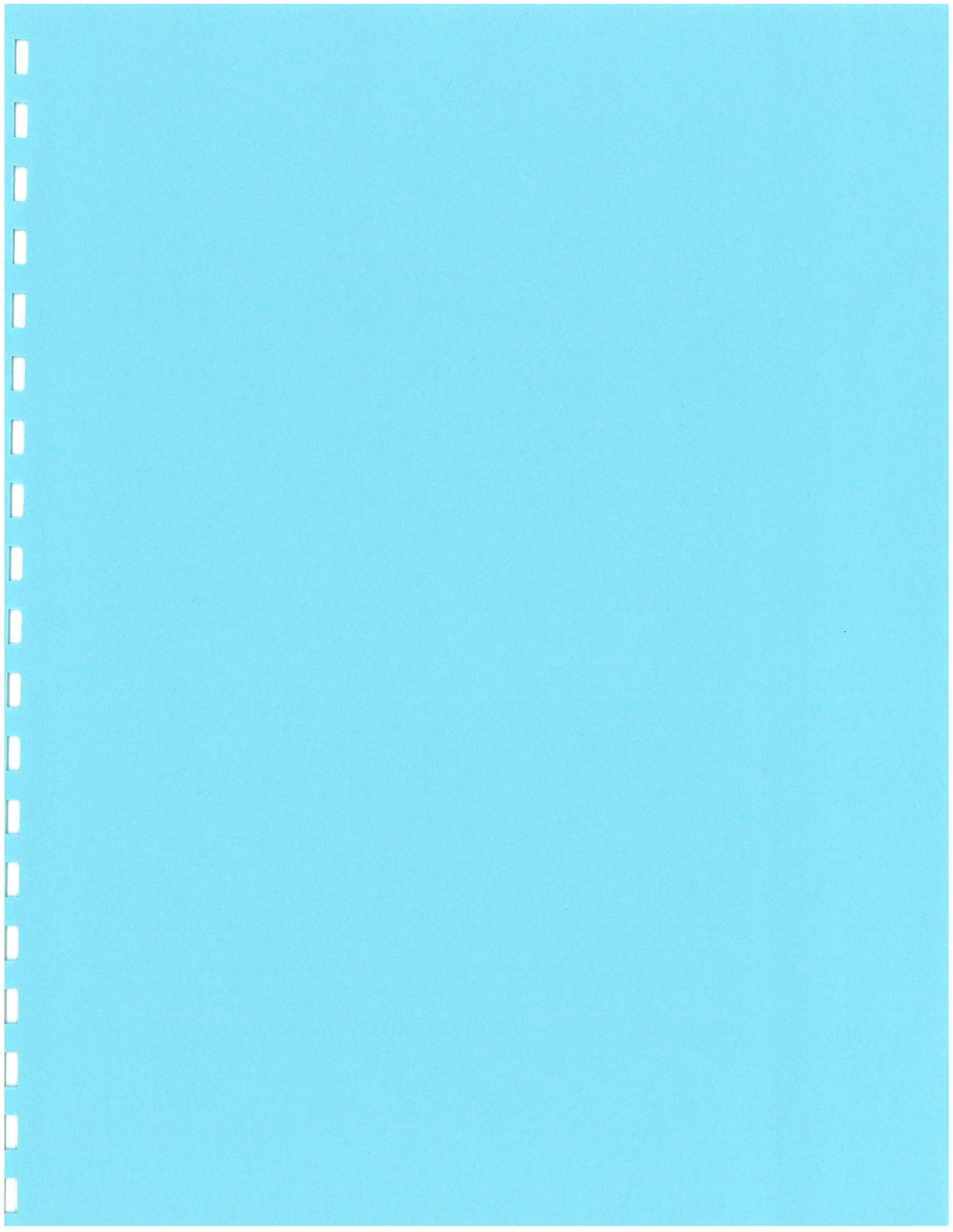
For MDS Applications:

| | | |
|------------------------|--|------|
| Legal Hauling Capacity | | Tons |
|------------------------|--|------|

Estimated MDS Geotube® Units:

| | |
|----------------------|-------------|
| <i>MDS Dimension</i> | <i>Each</i> |
| 22.5' X 22' | #DIV/0! |

Disclaimer: No warranty or guarantee expressed or implied is made regarding the performance of any product since the manner of handling and use is beyond our control. This document should not be construed as engineering advice, and the final design should be the responsibility of the project engineer and/or the project manager.



FILTER PRESS
DEWATERING
EVALUATION
FOR
WATERSOLVE, LLC
Grand Rapids, MI

December 17, 2009



**Lab Test #9361
River Sediment
Mill River Project**

SIEMENS

PREPARED BY

Siemens Water Technologies
2155 112th Avenue, Holland, MI 49424
PH: 616-772-9011, FX: 616-772-4516

Technical Sales Mgr: Paul Malik

Dewatering Evaluation

Testing was requested to evaluate the dewatering characteristics of a sample of river sediment from the Mill River Project. The slurry sample was submitted by Randy Wilcox.

Description of Slurry: River Sediment
Application Code: W135

The purpose of the testing is to generate relevant data to be used to size the dewatering equipment as well as to confirm key process parameters such as maximum feed pressure and cake thickness.

Test Method

Testing was performed as indicated below to determine the amenability of the slurry to pressure filtration. Conditioning of the sludge was required prior to testing to enhance or improve dewatering.

Benchtop pressure filtration tests were performed with a 3" Lab Filter Press. Slurry was placed in the sample reservoir, which was subsequently pressurized with compressed air. The feed pressure was started at 25psig and staged to a final pressure of 225psig. Completion of the filtration cycle was determined when the filtrate flow reached an approximate rate of 0.01 gpm per square foot of filtration area. Cake air blowdown was performed prior to discharging the filter cake.



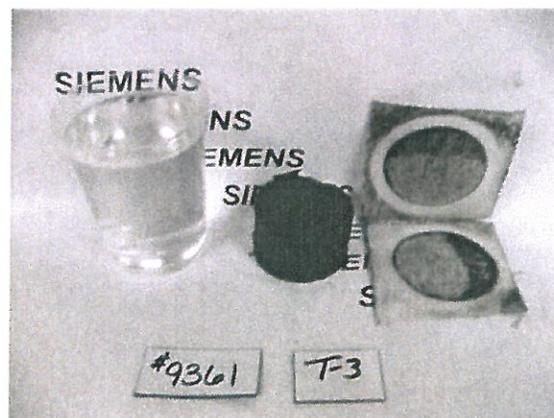
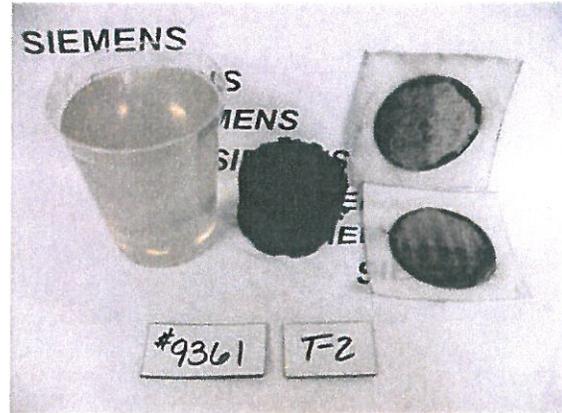
3" Lab Filter Press

Conclusions/Recommendations

The testing performed produced an acceptable filter cake that did not contain any free liquids, which therefore, would pass the "paint filter test". The dry solids content of the filter cake is expected to be from 50-60% by weight with a wet cake density of approximately 95 lbs/ft³. Total cycle time, excluding cake discharge, is estimated to be 1.25-1.5 hours. The time required for cake discharge would be determined by the type of plate shifting selected, if any, and/or the size of the filter press.

Conditioning of the slurry was required to achieve these results. Solve 416 and 9330, supplied by WaterSolve, were added to the slurry to improve its dewaterability. The dosages of any conditioning agents used are included in the summary of the results. Optimization of the chemical dosages was not performed.

The outcome of the test was based on the characteristics of the sample submitted. Actual performance may change if the future sludge characteristics are different or vary. The performance of the full-scale application will be dependent on the slurry being relatively similar to the sample tested.



Based on these test results, the selected equipment design and processes below are required for this application.

Maximum Feed Pressure: **100psig**
Cake Thickness: **32mm**
Slurry Conditioning: **Coagulant and flocculant as determined by WaterSolve**

- Even-fill**
- Cake air blow
- Double cake air blow**
- Core blow**
- Core scour/flush**
- Double end feed**
- Pre-fill press**
- Cloth pre-coat
- Slurry re-circulation
- Pump/line flush**
- High pressure cloth wash**
- Acid cloth wash
- CGR plates
- NG Plates**
- Mixed pack membrane plates
- 225psig recessed chamber plates

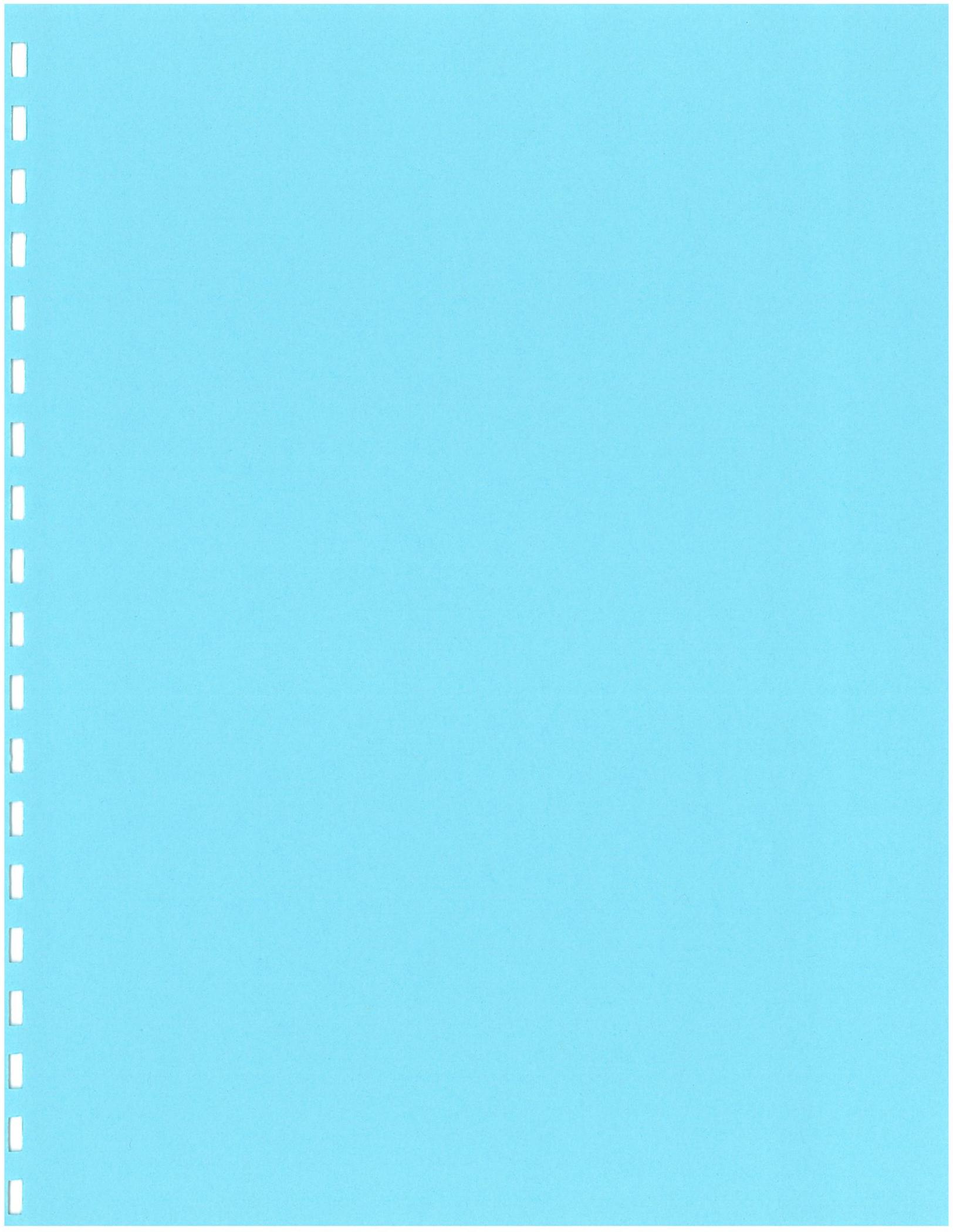
By: 
Robert Hamm
Testing Services Mgr

Summary of Test Results

| Sludge Type | River Sediment | | | | |
|--|----------------|--------------|--------------|------------|--|
| Trial Number | As-Received | 1 | 2 | 3 | |
| Total Susp. Solids (% w/w) | 7.66 | 7.66 | 7.66 | 7.66 | |
| Total Susp. Solids (mg/l) | 85,000 | 85,000 | 85,000 | 85,000 | |
| Total Solids (% w/w) | 14.3 | 14.3 | 14.3 | 14.3 | |
| Volatile Solids (% of TS) | 7.88 | 7.88 | 7.88 | 7.88 | |
| Specific Gravity | 1.11 | 1.11 | 1.11 | 1.11 | |
| pH (s.u.) | 6.79 | 6.79 | 6.79 | 6.79 | |
| Color | Dk. Brown | Dk. Brown | Dk. Brown | Dk. Brown | |
| CST (secs.) | - | - | - | - | |
| Coagulant Type | | - | Solve 416 | Solve 416 | |
| Coagulant Dosage (mg/l) | | - | 33 | 33 | |
| Polymer Type | | - | Solve 9330 | Solve 9330 | |
| Polymer Dosage (mg/l) | | - | 66 | 66 | |
| Polymer Dosage (#/tDS) | | - | 1.6 | 1.6 | |
| Cake Thickness (mm) | | 32 | 32 | 32 | |
| Filter Cloth Type | | Mo/Mi/PP-5 | Mo/Mi/PP-5 | Mi/PP-2 | |
| Cloth Precoat (Y/N) | | No | No | No | |
| Filtration Time (mins.) | | 45 | 65 | 65 | |
| Max. Filtration Press. (psig) | | 100 | 100 | 100 | |
| Filtrate Quality | | Clear | Sltly Turbid | Clear | |
| Slurry Temperature (°F) | | 70 | 70 | 70 | |
| Cake Air Blow (mins./psig) | | 10/40 | 10/40 | 10/40 | |
| Squeeze (mins./psig) | | - | - | - | |
| Cake Wash (volumes/mins./psig) | | - | - | - | |
| Nature of Cake | | Unacceptable | Firm | Firm | |
| Cake Release From Cloths | | - | Good | God | |
| Cake Dry Solids (% w/w) | | - | 53.2 | 60.1 | |
| Wet Cake Density (lbs/ft ³) | | - | 94 | 96 | |
| Dry Solids Output (lbs/ft ³) | | - | 50.0 | 57.7 | |
| Notes | | 1, | 2, | | |

- Notes:
1. Cake was firm on the edges and liquid in the center.
 2. Slight breakthrough of solids occurred at the pressure changes.

| Lab Testing Data Form | | | |
|--|--|-----------------------------|--------------------------------|
| Contact Name*: | Randy Wilcox | Date*: | 11/6/09 |
| Company*: | WaterSolve, LLC | Project Name*: | Mill River Sediment Dewatering |
| Shipping Address*: | 4954 Starr Street, SE | | |
| City*: | Grand Rapids | State or Country*: | MI Postal Code*: 49546 |
| Telephone No*: | (616)575-8593 | Fax Number*: | (616)575-9031 |
| E-Mail Address: | randydw@gowatersolve.com | | |
| Lab Testing For* (Select All That Apply): <input checked="" type="checkbox"/> Filter Press <input type="checkbox"/> J-Vap <input type="checkbox"/> Centrifuge <input type="checkbox"/> Belt Filter Press <input type="checkbox"/> GBT <input type="checkbox"/> RDT <input type="checkbox"/> Dryer | | | |
| Application Information (Attach Process Flow Diagram and/or Description of Treatment System) | | | |
| Description/Sample ID* | Sediment Slurry Sample | | |
| Process Generating the Slurry* | Dredging | | |
| Treatment Processes Employed: (check all that apply) | <input type="checkbox"/> None, <input checked="" type="checkbox"/> Chemical, Describe: Dual <input type="checkbox"/> Biological: _____ <input checked="" type="checkbox"/> Flocculation, <input checked="" type="checkbox"/> Coagulation <input type="checkbox"/> Neutralization with: _____, Other: _____ <input type="checkbox"/> Clarification, <input type="checkbox"/> Dissolved Air Flotation, <input type="checkbox"/> Thickening, <input type="checkbox"/> Microfiltration, <input type="checkbox"/> Ultrafiltration | | |
| Present Dewatering Method* | <input checked="" type="checkbox"/> None <input type="checkbox"/> Filter Press <input type="checkbox"/> Centrifuge <input type="checkbox"/> BFP <input type="checkbox"/> Other: | | |
| Slurry Generation* | <input type="checkbox"/> 7 days/wk, <input checked="" type="checkbox"/> 5 days/wk, <input type="checkbox"/> Other: | | |
| Proposed Equipment Operation* | <input type="checkbox"/> 7 days/wk, <input checked="" type="checkbox"/> 5 days/wk, <input type="checkbox"/> Other: Hours/day: _____ | | |
| Slurry Volume/Day* | gals. | 720,000 | Other Comments: |
| Dry Solids/Day* | lb. | 0 | |
| Slurry Characteristics (Include analysis of the slurry composition) (Filtrate is: <input type="checkbox"/> Product <input type="checkbox"/> Waste <input type="checkbox"/> to be reused/recycled)* | | | |
| Composition of Solids* | silt/sand | | |
| Composition of Liquid* | river water | | |
| TSS* (wt %) | 0.00 | pH* (s.u.) | 0.00 |
| TS (wt %) | | Temperature | |
| Volatile Solids(% of TS) | | Chlorides (ppm) | |
| Specific Gravity* (g/ml) | 0.00 | Oil & Grease (%) | |
| Other: | | Other: | |
| Other: | | Other: | |
| Test Conditions <input type="checkbox"/> Recessed Chamber, <input type="checkbox"/> Membrane Squeeze, <input type="checkbox"/> Thickening, <input type="checkbox"/> Dewatering | | | |
| Can the filter cloths be pre-coated? <input type="checkbox"/> No, <input type="checkbox"/> Yes Filtration Pressure: <input type="checkbox"/> 100psig/7 barg, <input type="checkbox"/> 225psig/16barg <input type="checkbox"/> Other: _____ | | | |
| Are there any limitations to what can be used to condition the slurry?* <input checked="" type="checkbox"/> N/A, <input type="checkbox"/> No, <input type="checkbox"/> Yes, Describe: _____ | | | |
| Can the slurry be heated?* <input checked="" type="checkbox"/> No, <input type="checkbox"/> Yes, To: _____ | | | |
| Is cake washing required?* <input checked="" type="checkbox"/> No, <input type="checkbox"/> Yes, Objective: _____ Wash Liquid: _____ Temperature: _____ | | | |
| Are there any equipment materials of construction issues?* <input checked="" type="checkbox"/> No, <input type="checkbox"/> Yes, Describe: _____ | | | |
| Special Conditions/Limitations: | | | |
| The following information is required if the sample submitted is classified as a HAZARDOUS WASTE (Only for samples submitted from within the USA). | | | |
| Generator's EPA ID #: | | | |
| Authorization is hereby given to Siemens Water Technologies to perform testing on the sample(s) described herein. | | | |
| Name: | Title: | Date: | |
| Shipping Instructions | | | |
| Send sample(s) FREIGHT PREPAID to: Siemens Water Technologies, 2155 112 th Ave, Holland, MI 49424 USA | | | |
| Submit 4 gallons of a representative sample for Filter Press/Centrifuge/BFP/GBT testing. | | | |
| Submit 1 quart, 1 liter or 1 pound of a representative cake sample for dryer testing. | | | |
| Submittal of biological or other samples that rapidly degrade require scheduling with the Lab. | | | |
| Contact the Laboratory at 800 245-3006 with any questions. | | | |



OPTI-PROSM



MOBILE DEWATERING SERVICES

Any volume, anytime, anywhere—**Opti-ProSM** provides turnkey dewatering services to reduce volume, reduce disposal costs and solve problems.

Featuring Aquabelt[®] and Klampress[®] technologies in fully mobile, skid or trailer-mounted configurations—in addition to world-renowned Ashbrook Simon-Hartley thickening and dewatering know-how.

Ideal solution for:

| | |
|--------------------|---|
| Wastewater Sludges | ● |
| Water Residuals | ● |
| Ponds/Lagoons | ● |

Turnkey Dewatering Services

- ⊘ No Land Application
- ⊘ No Bad Weather Shut-Downs
- ⊘ No Stabilization at Your Facility

Lower Disposal Costs Than Land Application Options



KLAMPRESS[®]



AQUAbelt[®]



A Service of Ashbrook Simon-Hartley



Featuring Ashbrook Simon-Hartley[®] Expertise, Quality, Precision, Reliability and Satisfaction Guarantee!

Featuring the Industry's Most Advanced and Fully Optimized Process Options, Including:

- Activated Sludge Technology
- Selector Technology
- Membrane Bioreactor
- Aerobic Digestion to achieve Class "B" Biosolids
- Nitrification/Denitrification
- Tertiary and Ultrafiltration
- Phosphorus Removal
- Disinfection Systems

Ashbrook Simon-Hartley Also Provides a Comprehensive Line of Fully Optimized Equipment and Systems, Including:

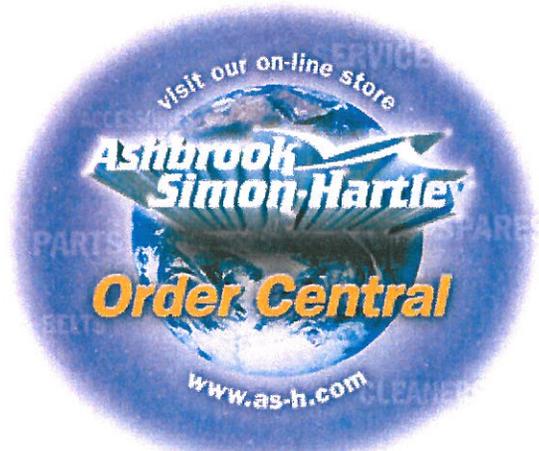
- Aeration Basins and Equipment, Including Diffused Aeration Systems
- Membrane Bioreactors
- Clarifiers
- Liquid/Solids Separation Technologies
 - Tertiary Filtration
 - ▲ Denitrification
 - ▲ Rapid Rate/Gravity Sand
 - ▲ Continuous Backwash
 - Ultrafiltration Membrane
 - High Performance Belt Filter Press Technologies
 - High Performance Belt Thickeners
 - Advanced Centrifuge Technologies
- Disinfection
 - Solution Feeders
 - Ultra-Violet
- Pasteurization and Digestion to Achieve Class "A" Biosolids
- Flow Equalization
- Primary Treatment
- Lift Stations
- Bar Screens and Grit Collection
- Electrical Controls & Automated Systems (PLC and SCADA)
- Ground Water Contamination Remediation
- Industrial Process Wastewater Treatment
- Advanced Flow Control Technologies
 - Sluice Gates and Weir Gates
 - Flap Valves (Rigid and Flexible)
 - Stop Logs and Gates
- Mobile Dewatering

Plus, Comprehensive Installation Services As Well As Optimized Rebuilds, Retrofits and Spare Parts.

The products pictured, described, or listed in this publication are illustrative only and are subject to change as appropriate.

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For more information:
Visit our website at
www.as-h.com

In North America—

Contact Ashbrook Simon-Hartley
at 800-362-9041
Fax: 281-449-1324
Address: 11600 East Hardy
Houston, TX 77093-1098

In Europe, Asia, and the Africas—

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at +44 (0) 1782 578650
Fax: +44 (0) 1782 260534
Address: 10/11 Brindley Court
Lyndale Business Park
Newcastle-under-Lyme
Staffordshire
ST5 9QH UK

In South America—

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at +56 (2) 224 7858
Fax: +56 (2) 224 9525
Address: Avenida Presidente Kennedy 5757
Torre Oriente, Oficina 501
Comuna de Las Condes
Santiago, Chile



Skid Mounted Dewatering Unit Ashbrook Simon-Hartley Belt Filter Press

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Ashbrook Simon-Hartley
800.362.9041
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Houston, TX 77093-1098
USA

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Torre Oriente, Oficina 501
Comuna de Las Condes
Santiago, Chile

2.0 Meter Klampress -extended Belt Filter Press

The Ashbrook Simon-Hartley Klampress temporary dewatering unit is an actual production of the two-meter effective belt width Klampress with extended gravity and wedge sections, which is skid mounted. The skid includes a liquid emulsion polymer feed system; one sludge feed pump, electrical control panel, wash water booster pump, as well as the belt filter press (see drawing SK001572).

The skid is 25'-9" long, 12' wide and 9'-10" high. The skid should be stationed on a flat, accessible area at least 30' long and 20' wide. The approximate weight is 45,000 pounds.

Utility requirements/connections are as follows:

Power : 460 Volts at 80 Amps, 60 cycle/3 phase **plus ground**
Wash Water: Minimum of 100 gpm wash water at 15 psi, 2" Quick Coupling
Sludge Feed: 40 - 200 gpm at 15 psi, 4" Quick Coupling
Filtrate: Six-inch NPT connection for filtrate drainage
Poly System: 2-20 gpm water, 1" MPT

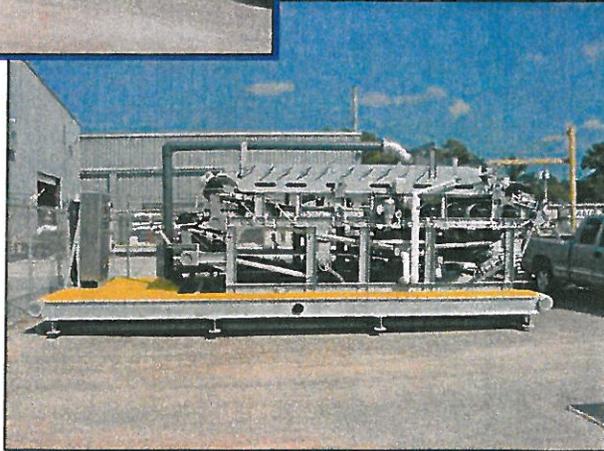
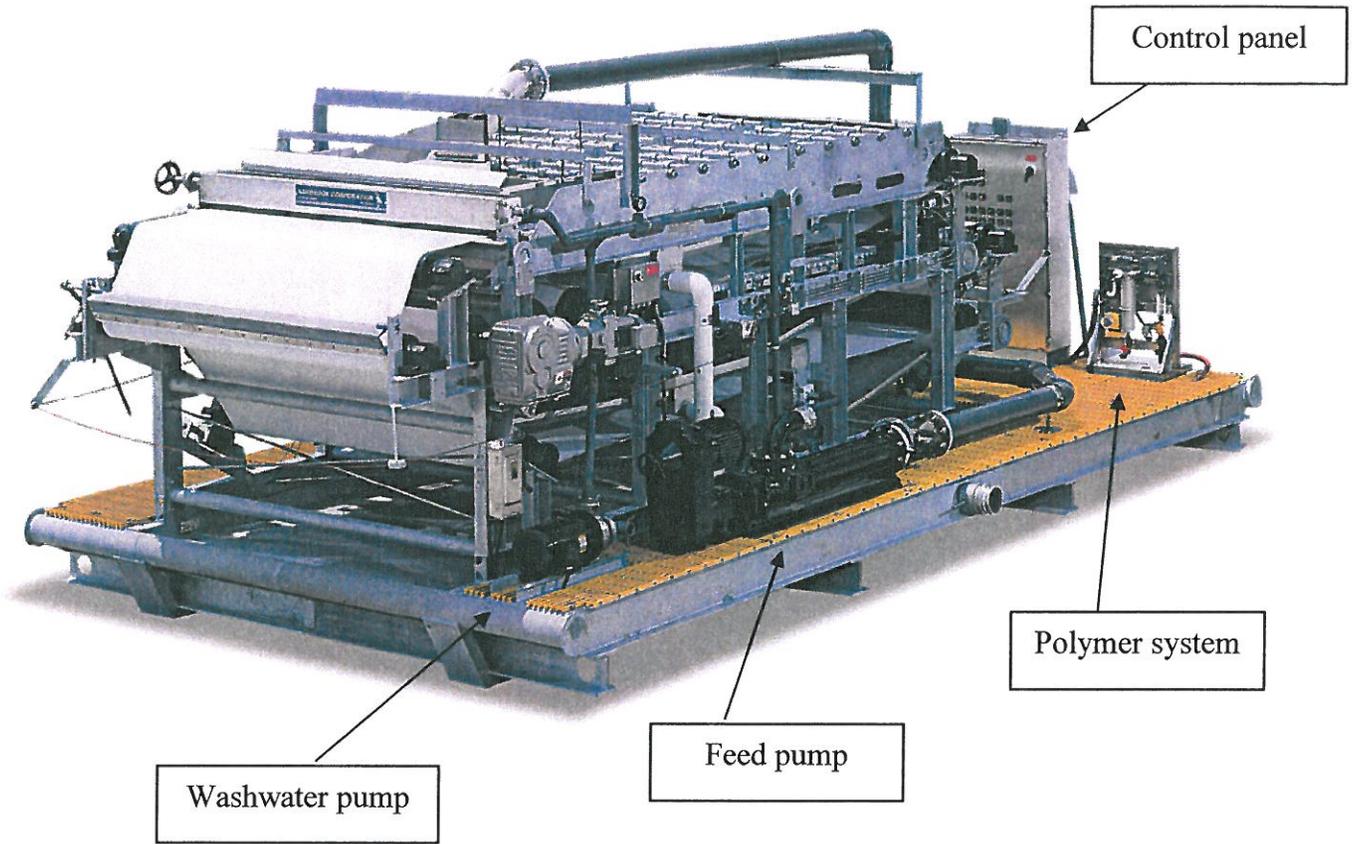
The sludge feed pump is a progressive cavity pump capable of feeding the belt filter press at its maximum capacity. Speed control for the pump is via a mechanical hand wheel at the pump. The dewatered sludge should be removed from the skid by means of a conveyor to a sludge container for disposal. Ashbrook does not supply the conveyor or the container.

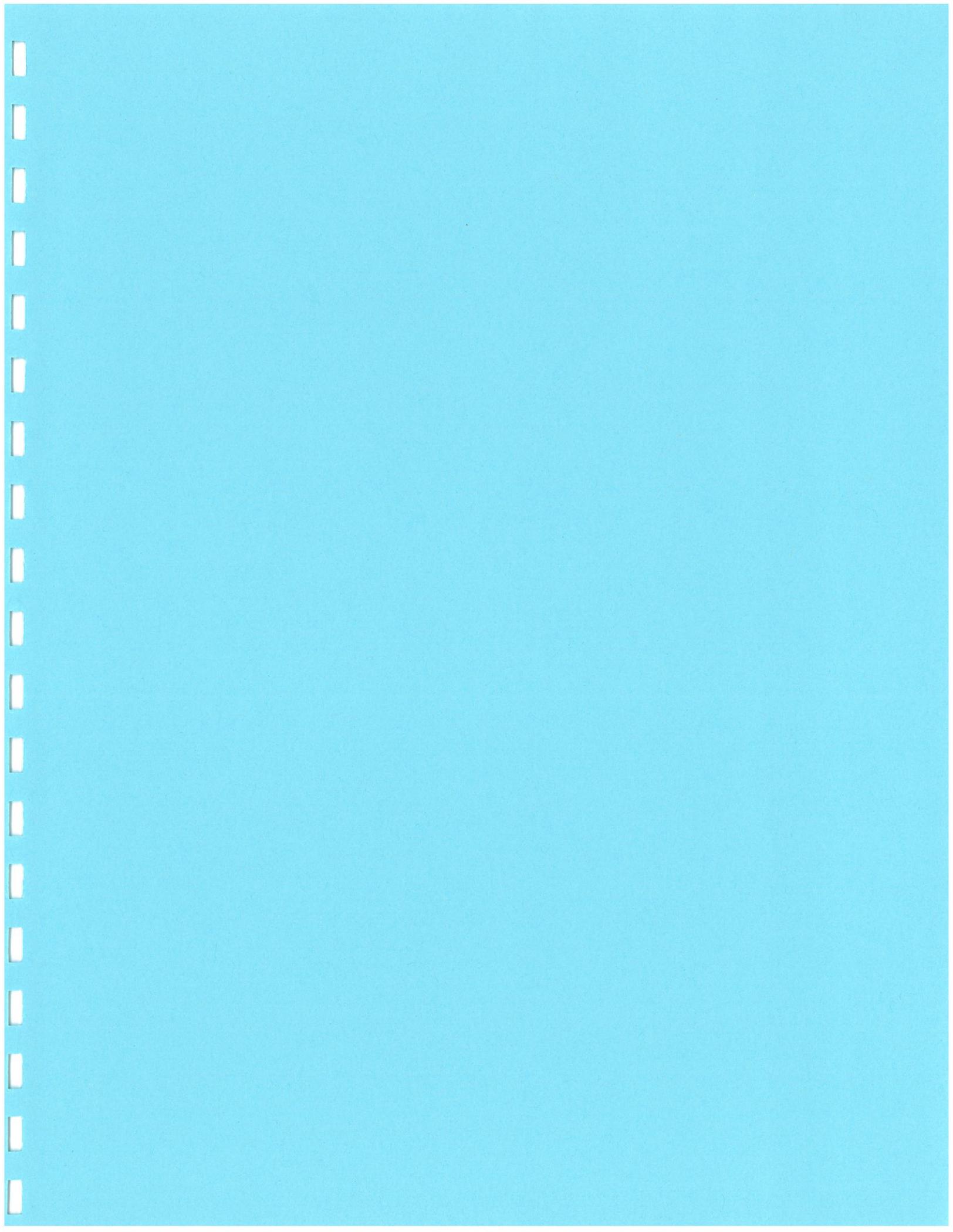
Belt wash water requirements are 100 GPM at a minimum of 15 PSI. Potable water is preferred, however, plant effluent can be used, provided it is of high quality (<30 mg/l suspended solids). A two inch (2") quick disconnect fitting will be required for the water connection. A four inch (4") quick disconnect fitting is required for the sludge feed connection. The skid contains sufficient hose and electrical cable to make connections within 50' only. If these requirements cannot be met, please contact an Ashbrook representative for arrangements.

The skid will be shipped on a flat bed trailer. Unloading the skid will require a 30-ton crane (within a 30-foot radius). Ashbrook does not include the unloading or reloading crane costs.

For Additional Information Contact:
Paul Bland, Rental Fleet Manager
713-252-1329 / paul.bland@as-h.com







FKC CO., LTD.

2708 West 18th Street
Port Angeles, WA 98363



(360) 452-9472
FAX (360) 452-6880

By e-Mail

Mr. Randy Wilcox, PE
WaterSolve, LLC
4964 Starr Street, SE
Grand Rapids, MI 49546

RE: FKC Laboratory Test Results

Dear Randy:

Following are the results of the testing of the mud sample which you recently sent to us for analysis.

I. Inlet conditions

| | |
|---------------------------------|--------|
| Inlet consistency (TS): | 15.09% |
| Color: | Brown |
| pH: | 7.0 |
| Material greater than 150 mesh: | 21 % |
| Ash content: | 61.5 % |

II. Conditioning requirements

| | |
|---------------------|------------|
| Polymer required: | Yes |
| Polymer used: | 416 & 9330 |
| Polymer dosage: | 1.0 lb./T |
| Floc size/strength: | Good |

III. Dewatering tests

| | |
|-------------------------|--------|
| Gravity drainage: | 22.7 % |
| Hand dewatering: | 38.0 % |
| Screw press simulation: | 51.4 % |

We hope this information is helpful. Please contact this office with any questions about the lab testing, or if we may be of further assistance to you.

Sincerely,
FKC Co., Ltd.

Wesley Bond

Instructions for Sending Samples for Laboratory Dewatering Tests

- What:** Any material(s) requiring thickening or dewatering with a rotary screen thickener and/or screw press.
- Ship to:** FKC Co., Ltd.
2708 W. 18th Street
Port Angeles, WA 98363
Tel: (360) 452-9472
Attn: Lab Work
- Amount:** 3-5 gallons is sufficient. If the sludge consistency is below 1% then send at least 5 gallons. If multiple materials are to be mixed prior to dewatering then separate 3-5 gallon samples of each material should be sent. They can then be mixed at a known mix ratio in our lab.
- When:** Samples should be sent to FKC Monday – Wednesday. Shipments on Thursday or Friday are discouraged because they could remain in transit over a weekend.
- How:** Ship overnight via courier such as FedEx, UPS etc.
- Packaging:** Any leak-proof container will work. Five gallon plastic buckets are the most commonly received containers. Containers will not be returned unless prior arrangements have been made. When labeling the containers, it is best to avoid using the word "SLUDGE". Occasionally there are delays in shipping when the word "SLUDGE" is used. Please use the phrase "WATER SAMPLE" when describing the contents.
- Other:** Please notify FKC at (360) 452-9472 or mail@fkcscrewpress.com when sending a sample. This ensures time is set aside to test your sample while it is fresh.

If you are currently dewatering and using polymer please also include a sample of neat polymer.

If possible, complete (as much as possible) and return an FKC Application Information Sheet or provide required design information.



**FKC Dewatering Equipment Application Information Sheet
Municipal Sludge Thickening/Dewatering**

1. Name of facility _____

2. Address of facility _____

3. Contact name _____ Tel _____ Fax _____

4. Which of the following are components of your facility?

- | | | |
|--|---|--|
| <input type="checkbox"/> Headworks screening | <input type="checkbox"/> Grit removal | <input type="checkbox"/> Primary clarification |
| <input type="checkbox"/> Aeration basin | <input type="checkbox"/> Aerated lagoon | <input type="checkbox"/> Oxidation ditch |
| <input type="checkbox"/> Trickling filter | <input type="checkbox"/> Rotating bio contactor | <input type="checkbox"/> Stabilization pond |
| <input type="checkbox"/> Secondary clarification | <input type="checkbox"/> Others _____ | |

5. Which of the following do you currently use to handle your solids?

- | | | |
|---|--|--|
| <input type="checkbox"/> Gravity belt thickener | <input type="checkbox"/> Dissolved air flotation | <input type="checkbox"/> Rotary screen thickener |
| <input type="checkbox"/> Lime stabilization | <input type="checkbox"/> Heat treatment | <input type="checkbox"/> Pasteurization |
| <input type="checkbox"/> Vacuum filtration | <input type="checkbox"/> Drying beds | <input type="checkbox"/> Belt filter press |
| <input type="checkbox"/> Centrifuge | <input type="checkbox"/> Plate and frame press | <input type="checkbox"/> Thermal dryer |
| <input type="checkbox"/> Composting | <input type="checkbox"/> Incineration | <input type="checkbox"/> Land application |
| <input type="checkbox"/> Landfill | <input type="checkbox"/> Others _____ | |

6. Please check the following to describe the solids you wish to thicken/dewater:

- | | | |
|--|---|--|
| <input type="checkbox"/> Septage | <input type="checkbox"/> Waste activated sludge | <input type="checkbox"/> Aerobic digestion |
| <input type="checkbox"/> Anaerobic digestion | <input type="checkbox"/> Thermophilic | <input type="checkbox"/> Mesophilic |
| <input type="checkbox"/> Pre-thickened | <input type="checkbox"/> 100% primary solids | <input type="checkbox"/> 100% secondary solids |
| <input type="checkbox"/> Others _____ | | |

7. If the material is a blend of primary/secondary solids, then answer the following:

- a. What percent is primary? _____% (by weight or volume?)
- b. What percent is secondary? _____% (by weight or volume?)
- c. Total solids of primary? _____%
- d. Total solids of secondary? _____%

8. Please answer the following about the solids to be thickened/dewatered:

- a. Total solids _____%
- b. Fiber content _____% (Fiber content is % of total solids that can't be washed through a 150-mesh screen)
- c. Volatile solids _____%
- d. Nonvolatile (ash) solids _____%

9. How much material do you want to process?

- a. _____ dry tons per year
- b. _____ dry lbs per hour
- c. _____ gallons per minute

10. How do you wish to operate?

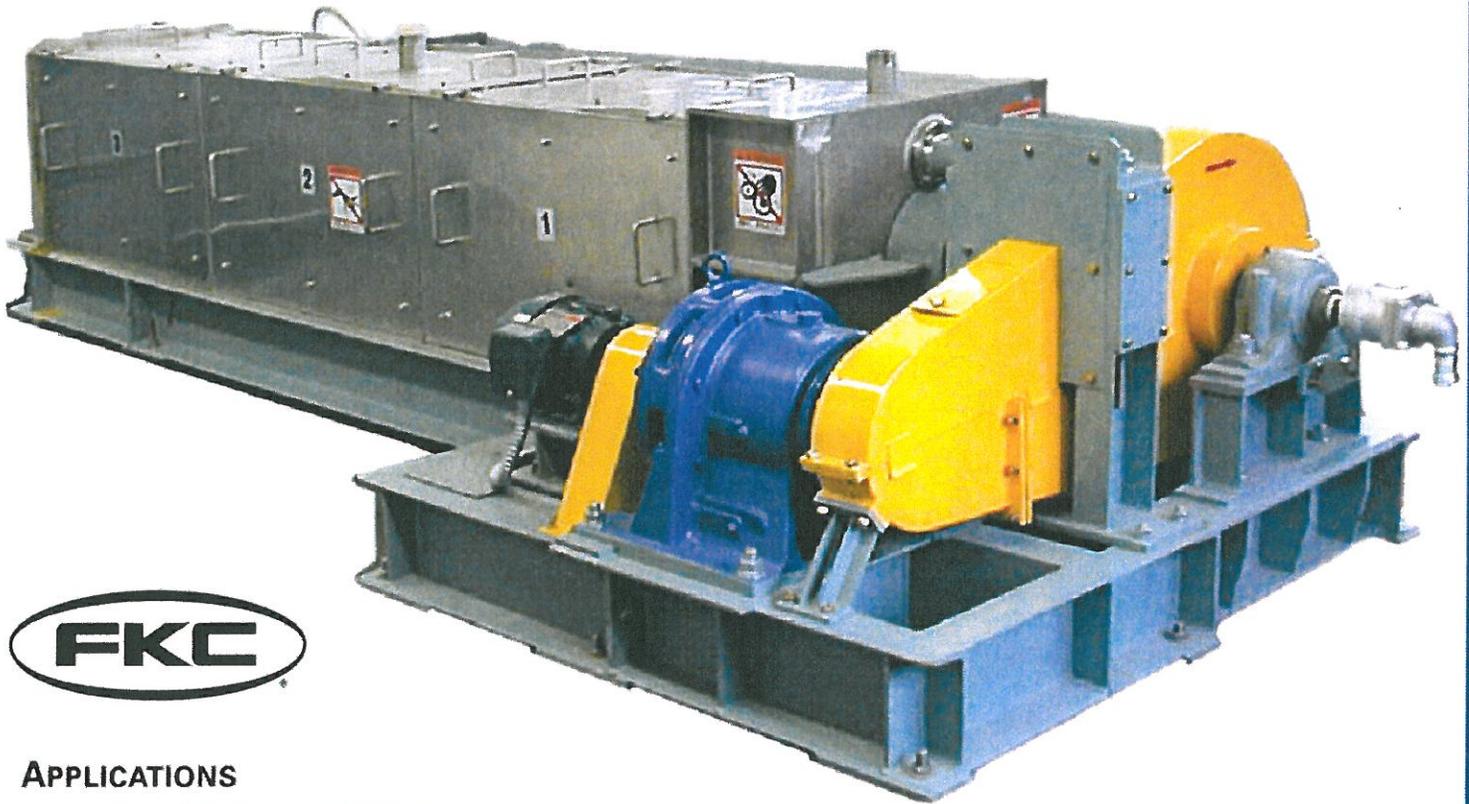
- a. _____ hours per day
- b. _____ days per week
- c. _____ days per month

11. How dry do you currently thicken/dewater the solids? _____% Total solids

12. How dry do you want to thicken/dewater the solids? _____% Total solids

BIOSOLIDS DEWATERING

FKC screw presses provide a unique, cost effective solution for dewatering of municipal and industrial biosolids. While relatively new to this market in North America, FKC screw presses have been dewatering various non-fibrous sludges and other materials for over 20 years in a wide variety of industries.



APPLICATIONS

- Municipal WWTP Sludges of All Types (Aerobically Digested, Anaerobically Digested, Raw)
- Primary, Secondary, or Mixed Sludges
- Industrial Biosolids
- Septage & Grease Trap
- Sludge Thickening

Small 12" diameter screw press installed at the City of Forks, WA

FEATURES OF THE FKC BIOSOLIDS DEWATERING SCREW PRESS

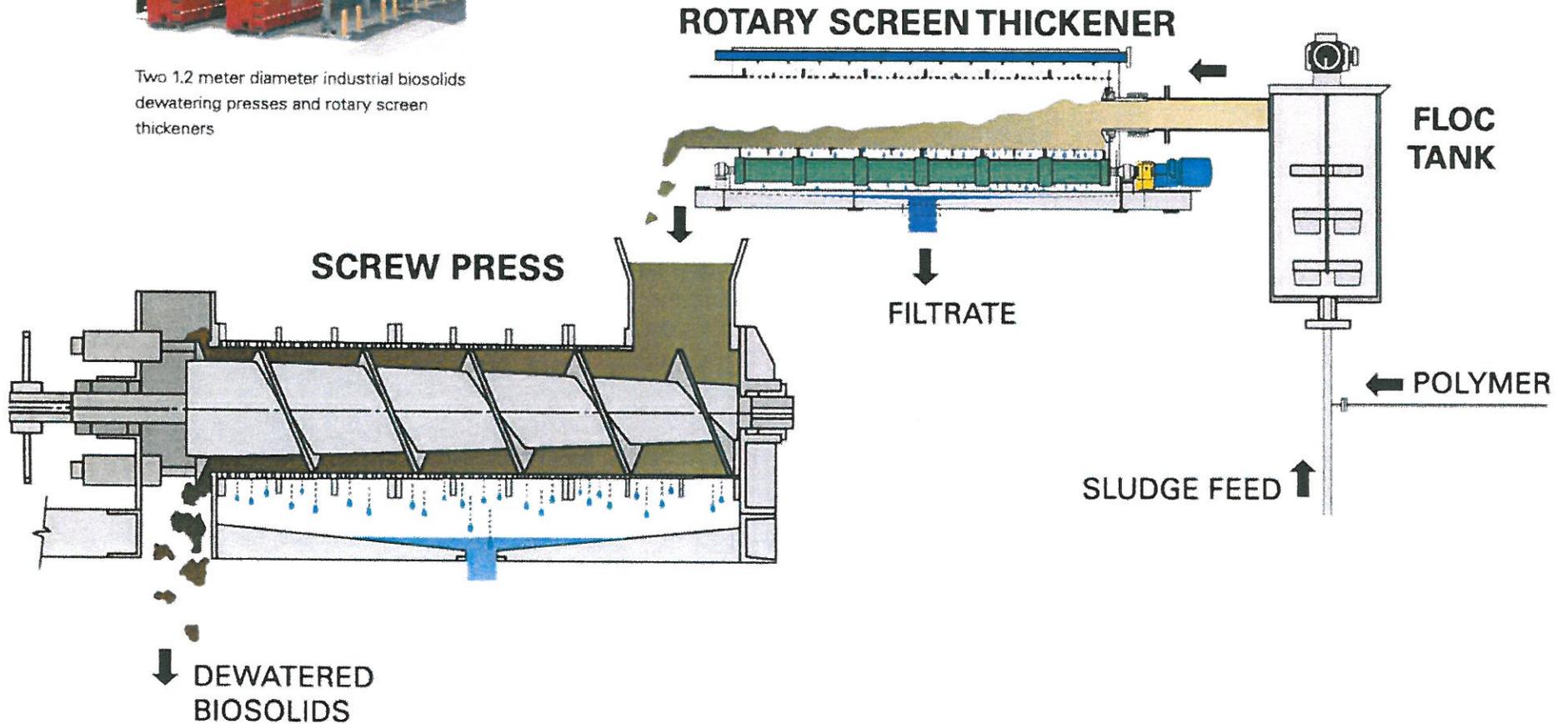
- Heavy Duty Construction
- High Outlet Consistency
- Slow Speed
- Few Moving Parts
- Very Low Maintenance
- Upgradeable to Produce Class A Biosolids
- Stainless Steel Wetted parts
- Low Power Consumption
- Fully Enclosed covers
- Simple, Unattended Operation
- Automated Washdown
- High Quality Construction



Three one meter diameter screw presses at the City of Tallahassee, FL



Two 1.2 meter diameter industrial biosolids dewatering presses and rotary screen thickeners

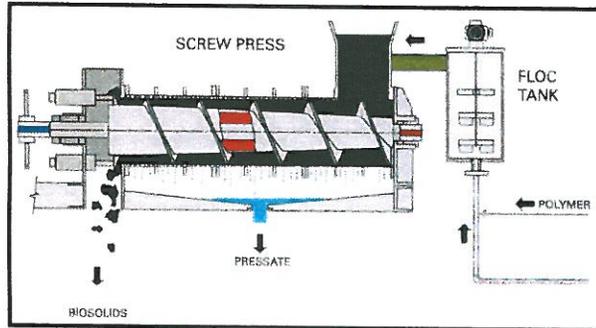


TYPICAL SLUDGE DEWATERING PROCESS FLOW DIAGRAM



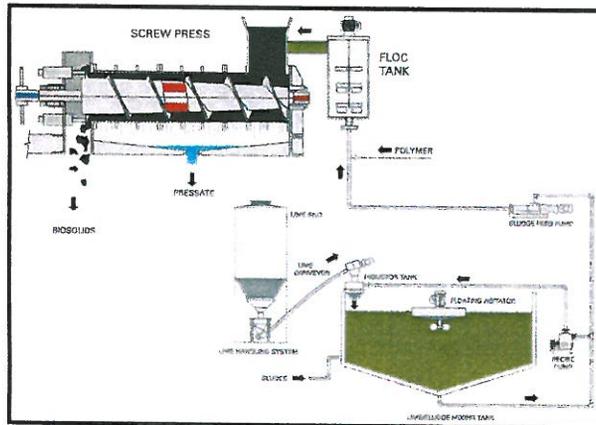
FKC Co., Ltd.
2708 W. 18th Street
Port Angeles, WA 98363
(360) 452-9472
www.fkcscrewpress.com
mail@fkcscrewpress.com

THREE WAYS TO DEWATER YOUR BIOSOLIDS USING AN FKC SCREW PRESS



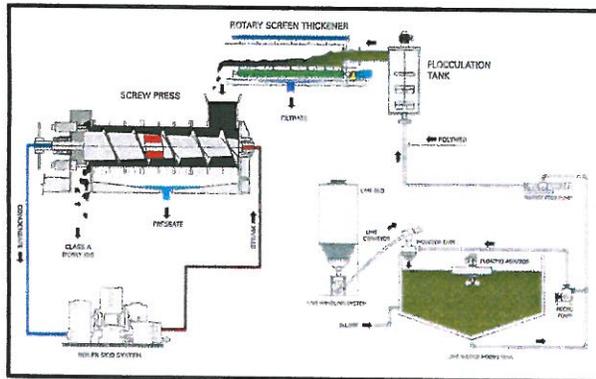
CLASS C or STRAIGHT DEWATERING

Polymer addition only. Biosolids is conditioned and mixed with polymer in the flocculation tank. Flocculated biosolids enters the headbox, pressate exits the bottom pan, and dry biosolids cake drops through the discharge box of the screw press. Biosolids cake ready for disposal or reuse if properly digested before screw press.



CLASS B DEWATERING

Lime and Polymer Addition. Take the FKC Class C or Straight Dewatering Option then add a Lime System to get Class B Biosolids per the EPA Part 503 regulations. Lime is added to reach a pH of 12.0 in the biosolids for 24 hours. Polymer is added to flocculate the limed biosolids. With lime added before dewatering, the biosolids cake exits the screw press as Class B Biosolids. Biosolids cake ready for reuse.



CLASS A DEWATERING (Patented)

Lime, Polymer and Heat Addition. Take the FKC Class B Dewatering Option then add a Boiler System to get Class A Biosolids per the EPA Part 503 regulations. Lime is added to reach a pH of 12 in the biosolids for 24 hours. Polymer is added to flocculate the limed biosolids. The biosolids is heated indirectly via the steam-heated screw. Biosolids cake exits the screw press as Class A Biosolids ready for unrestricted use.

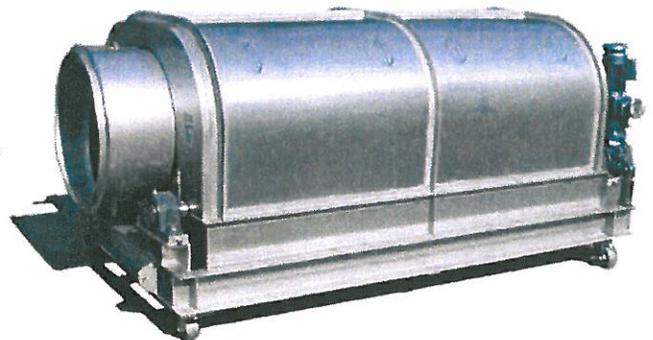
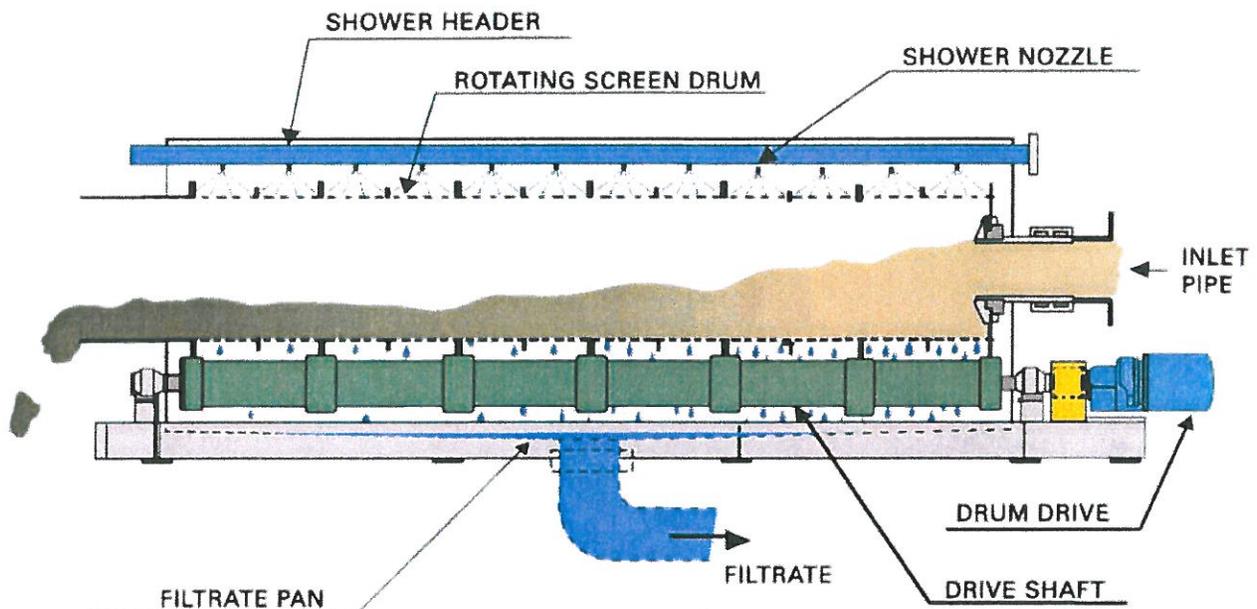


**ONE DEWATERING UNIT
THREE OPTIONS**

**FKC CO., LTD
2708 W 18TH STREET
PORT ANGELES, WA 98362
(360) 452-9472**

www.fkcscrewpress.com

CONVENTIONAL ROTARY SCREEN THICKENER (RST)



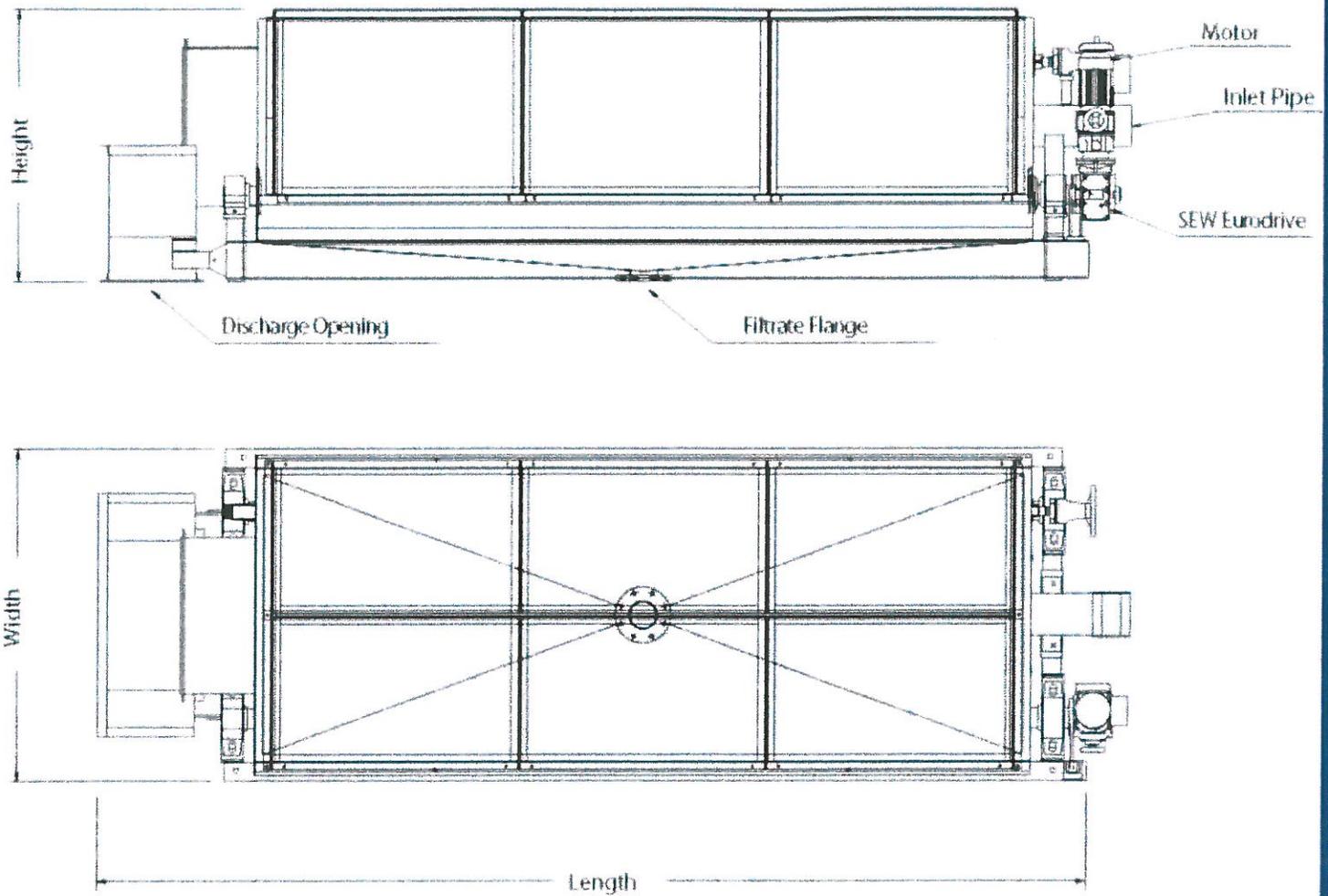
APPLICATIONS

- Prethickening prior to a screw press
- Thickening prior to an aerobic or anaerobic digester
- Thickening for reduced volume for transport
- Screening/Thickening of solids from a liquid/solids stream

FEATURES

- Stainless Steel Wetted parts
- Heavy Duty Construction
- Can Accept Inlet Consistencies <1%
- Outlet Consistency Typically Ranges 4-8%
- Spray Shower Keep Screens Clean
- Multiple Sizes for Any Flow Rate
- Easy to Install and Operate
- Over 150 units in Operation

RST plan and elevation view drawing



Conventional Rotary Screen Thickeners

| Model No. | Motor HP | Length | Height | Width | Weight | Shower gpm | Max. flow (gpm) |
|----------------|----------|--------|--------|-------|-----------|------------|-----------------|
| RST-S315x1000L | 3/4 | 69" | 26" | 35" | 1,350 lb. | 5-7 | 30 |
| RST-S480x2000L | 1 | 110" | 35" | 49" | 2,200 lb. | 10-14 | 80 |
| RST-S630x2000L | 1.5 | 116" | 43" | 53" | 2,500 lb. | 10-14 | 125 |
| RST-S630x3000L | 2 | 165" | 43" | 53" | 3,200 lb. | 15-20 | 200 |
| RST-S775x3600L | 3 | 193" | 50" | 58" | 4,900 lb. | 15-20 | 275 |
| RST-W630x3000L | 3 or 5 | 165" | 43" | 87" | 5,700 lb. | 30-40 | 400 |
| RST-W775x3600L | 5 | 193" | 51" | 93" | 9,200 lb. | 30-40 | 550 |

RST = rotary screen thickener

S = single drum model

W = double drum model

First number = drum diameter in millimeters

Second number = drum length in millimeters

Shower water pressure = 30-40 psi recommended

Maximum flow rate capability varies depending on the specifics of a given application



FKC Co., Ltd.
 2708 W. 18th Street
 Port Angeles, WA 98363
 (360) 452-9472
www.fkcscrowpress.com
mail@fkcscrowpress.com



SCREW PRESS

On Site Screw Press Trial Information

Over forty years of screw press experience has shown us that every dewatering application is unique. FKC custom designs and builds each screw press we sell, so the more information that we have about an application, the better. The best way for FKC to gather the information that allows us to provide the optimum equipment for each application is to perform on-site testing with a pilot scale screw press. FKC has the ability to perform on site testing by using one of two screw press test trailers that we have based in North America. The trailers are self-contained so only utility connections are necessary in order to begin testing.

On site pilot testing benefits both the customer and FKC in a number of ways.

- On site testing has proven to be the best method available to predict the performance of full size equipment.
- On site testing essentially allows the customer to try the equipment before they buy it, which can be valuable in generating the data necessary in order to justify the dewatering project.
- On site testing allows the plant personnel a chance to observe our screw press dewatering their material. This gives them a feeling for what future operation and maintenance requirements would be with full size equipment. This also tends to stimulate a beneficial exchange of ideas which leads to a better installation.
- On site testing allows FKC to observe variations in the material being dewatered and in the overall system over a period of a few days. In the event that a screw press is purchased, these observations help FKC to develop operational and control recommendations to aid the customer in optimizing the performance of the equipment.
- On site testing with FKC and other equipment manufactures' gives the plant personnel a chance to compare our screw presses with other equipment in a real life situation as opposed to just comparing product brochures.
- On site testing gives FKC a chance to try various chemical-conditioning strategies in order to maximize performance of the equipment.
- On site testing allows FKC to demonstrate the variation in performance of the equipment when operated at different speeds and to show the effect that steam heating has on screw press performance.
- The test trailer has 12 test screws, each with a different design. The on site trial allows FKC to test several different screws in our equipment in order to determine the optimum screw design for each application. This is an important part of our ongoing research and development regarding screw design.

Prior to performing on site trials, FKC requires that the customer send a representative 5-gallon sample of the material to FKC in Port Angeles for bench testing and polymer selection.

Please see the attached sheets for detailed information on the FKC Screw Press test trailers. Information is also included on the utility requirements and costs associated with performing on-site pilot testing. Please call us at (360) 452-9472 if you have questions.

On Site Screw Press Trial Details

1. Trial Unit Dimensions

Length = 40' Height = 12' Width = 8'

2. Power Requirements

460 or 575 volt, three-phase power is required to the test unit's control panel. The total amp requirement will not exceed 15 amps.

3. Water Requirements

One 3/4" water hose to the trial unit for polymer makedown, steam generation, rotary screen thickener shower, and clean up is required.

4. Sludge Supply

A sludge line to the sludge feed tank inlet valve located at the rear of the trailer is necessary. If there are two or more materials to be mixed, a separate tank with agitation and separate lines for each material to the tank need to be provided unless mix ratio can be readily and precisely controlled otherwise.

5. Kerosene

FKC requests that approximately 3-5 gallons of kerosene per day be provided for the duration of the test in order to power the boiler.

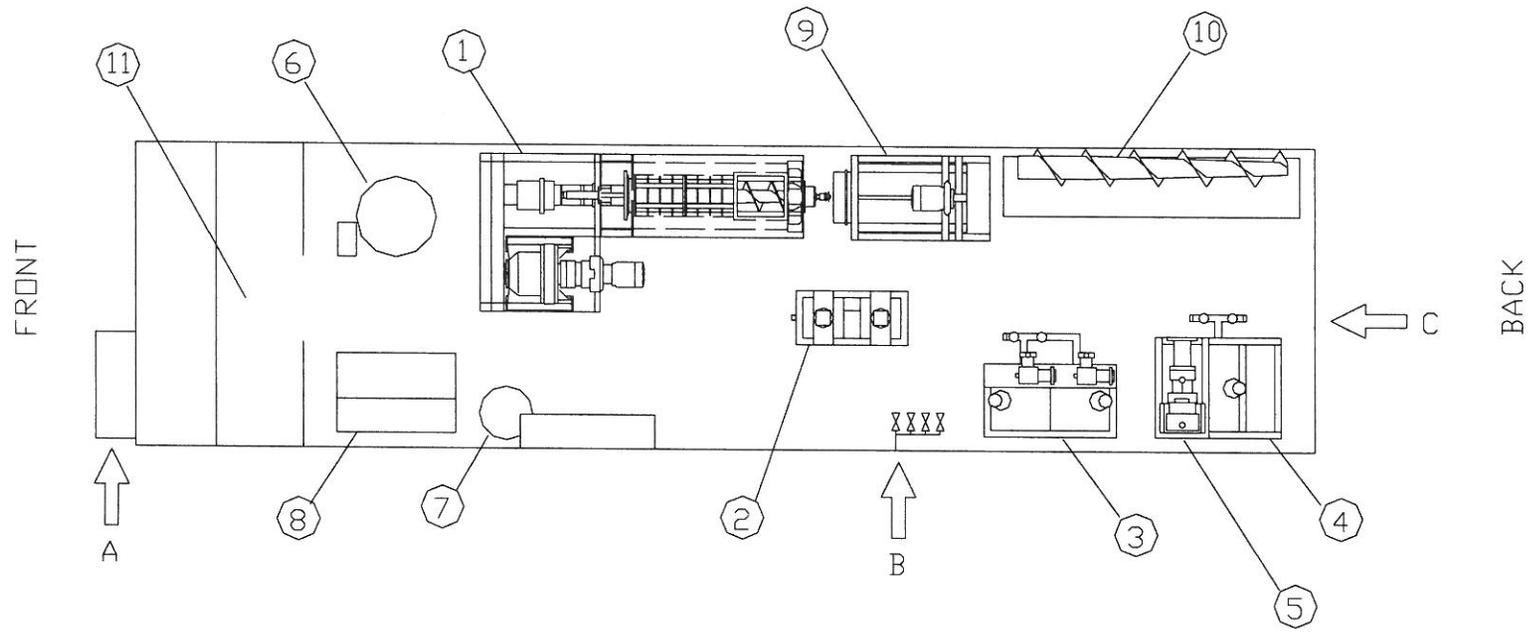
6. Other

A bin placed next to the trial unit or other provision for disposal of the dewatered sludge is helpful. Generally the trial unit will generate 100-200 lbs./hr. (300-400 lbs./hr with higher density materials) of dewatered cake during operation.

100 feet of 2 1/2" hose (20 foot sections with cam and groove couplings) is carried on the trailer for filtrate drainage and/or sludge supply use.

7. Cost

FKC requests that the client pay one-way freight for moving the trailer to the mill or plant site. In addition, we request that the client pay round trip airfare, coach class, for two technicians from Port Angeles, WA. All other expenses such as rental car, food and lodging etc. will be borne by FKC Co., Ltd.

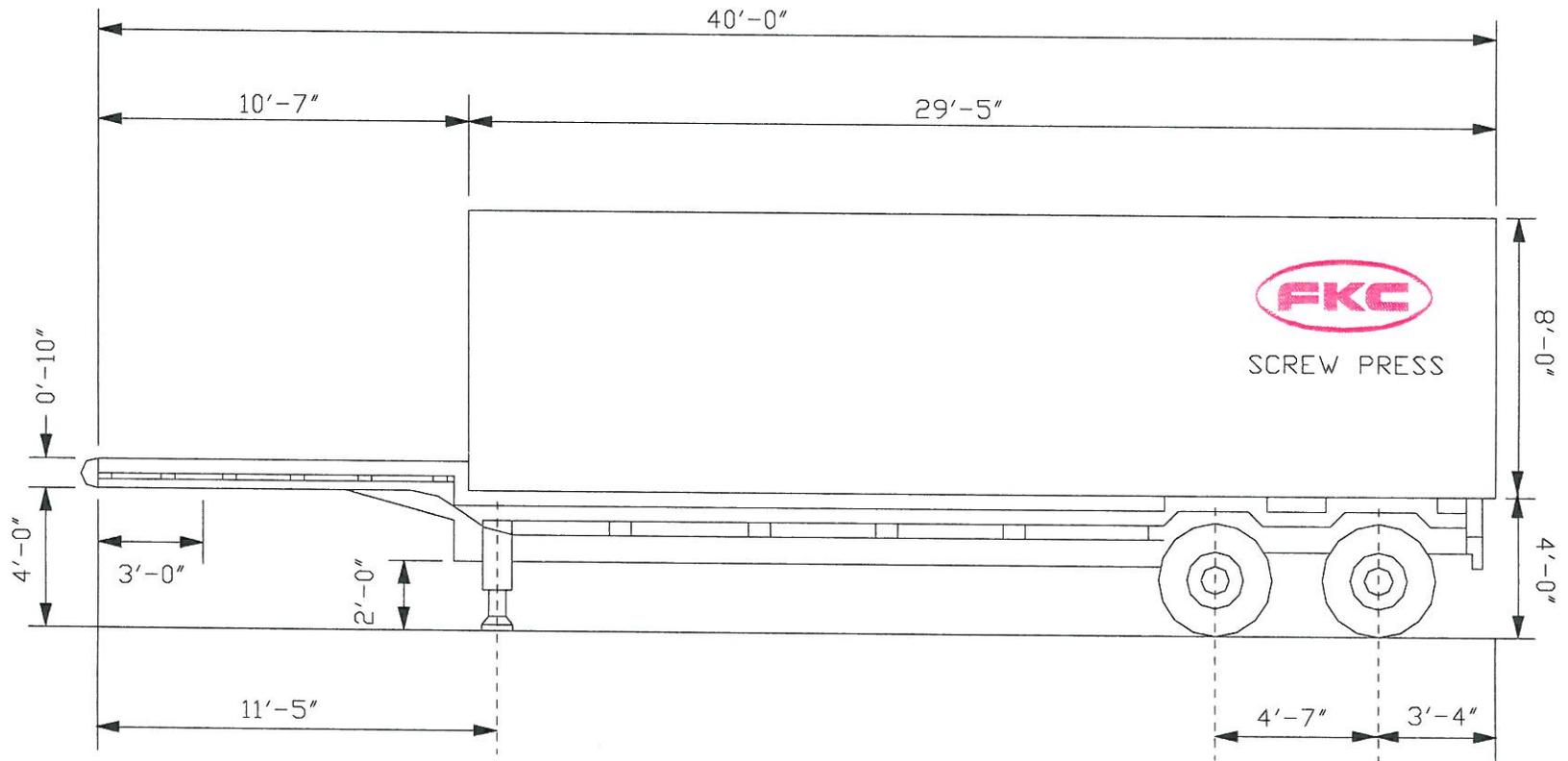


| | |
|----|---------------------------------|
| 1 | SCREW PRESS |
| 2 | FLOCCULATION TANKS W/ AGITATORS |
| 3 | POLYMER TANKS W/ AGITATORS |
| 4 | SLUDGE TANK W/ AGITATOR |
| 5 | SLUDGE FEED PUMP |
| 6 | BOILER |
| 7 | BOILER FUEL TANK |
| 8 | CONTROL PANEL |
| 9 | ROTARY SCREEN THICKNER |
| 10 | SPARE SCREWS SHELIVING |
| 11 | LAB |

| | |
|---|---|
| A | ELECTRICAL CONNECTION 575V or 480V / 3 PH / 15 AMP |
| B | WATER CONNECTION 3/4" NPT |
| C | SLUDGE CONNECTION 2 1/2" FEMALE CAMLOCK |

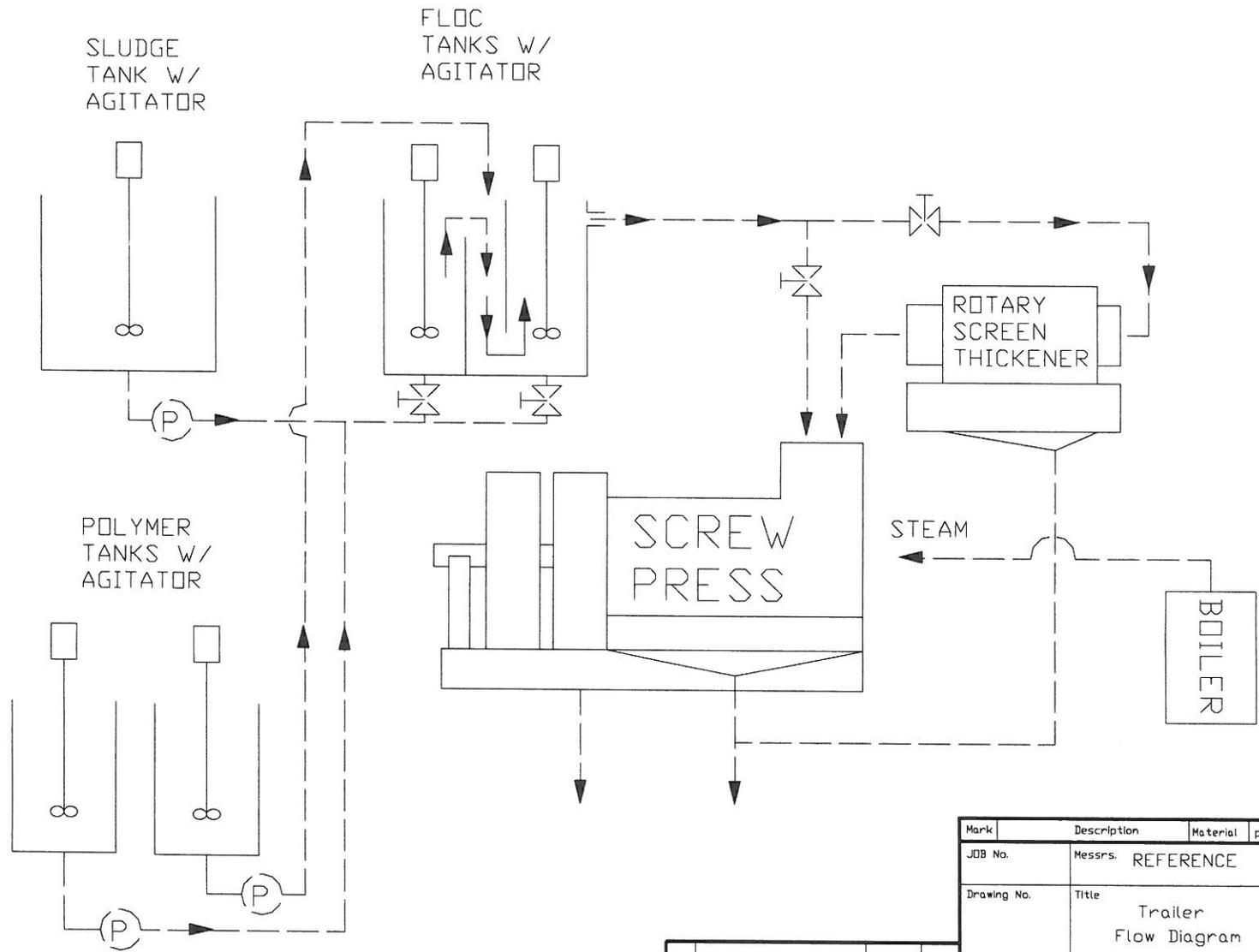
| | | | |
|-----|------------|------|-------|
| No. | Alteration | Date | Sign. |
| | | | |
| | | | |
| | | | |

| Mark | Description | Material | pcs. | Weight kg | Remarks |
|---------------|--|--|----------------|-----------------|--------------|
| JOB No. | Messrs. REFERENCE | | Quantity | Scale | |
| Drawing No. | Title Test Trailer General Arrangement | | Date | | |
| | | | Drawn by TB | | Ref. JOB No. |
| FKC CO., LTD. | | P.O. BOX 1677 DR 2708 W, 18TH ST. PORT ANGELES, WA 98262 (360) 452-9472 FAX (360) 452-6880 | | | |
| | | | REVISION 1 | SHEET 1 OF 1 | |



| Mark | Description | Material | pcs. | Weight kg. | Remarks |
|---------------|-------------------|--|------|------------|--------------|
| JOB No. | Messrs. REFERENCE | | | Quantity | Scale |
| Drawing No. | Title | | | Date | |
| | Test Trailer | | | Drawn by | |
| | | | | TB | Ref. JOB No. |
| FKC CO., LTD. | | P.O. BOX 1677 OR 2708 W. 18TH ST. PORT ANGELES, WA 98362 (360) 452-9472 FAX (360) 452-6880 | | REVISION | SHEET |
| | | | | 1 | 1 OF 1 |

| No. | Alteration | Date | Sign. |
|-----|------------|------|-------|
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| No. | Alteration | Date | Sign. |
|-----|------------|------|-------|
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| Mark | Description | Material | pcs. | Weight kg | Remarks |
|---------------|----------------------------------|--|------|----------------|--------------|
| JOB No. | Messrs. REFERENCE | | | Quantity | Scale |
| Drawing No. | Title Trailer Flow Diagram | | | Date | |
| | | | | Drawn by TB | |
| | | | | | Ref. JOB No. |
| FKC CO., LTD. | | P.O. BOX 1677 DR 2708 W, 18TH ST. PORT ANGELES, WA 98362 (360) 452-9472 FAX (360) 452-6880 | | | |
| | REVISION | | | SHEET | |
| | 1 | | | 1 OF 1 | |

FKC CO., LTD.

2708 West 18th Street
Port Angeles, WA 98363



(360) 452-9472
FAX (360) 452-6880

December 8, 2009

Randy Wilcox, PE
Water Solve, LLC

RE: QT120809A – Dewatering Mill River Sediment
Proposal for FKC Dewatering Equipment

Dear Randy ,

Attached to this letter is a proposal for FKC's largest screw press. The capacity of this machine is 337.5 dry Tons per 24 hours. Based on the desired capacity four machines will be required. This capacity is based on the sample provided. FKC would require a on-site trial to verify capacity. The pricing summary is as follows:

| | Qty | Unit Price | Total Price |
|------------------------------------|-----|----------------------|-----------------------|
| SHX-1350x8000L Screw Press | 1 | US \$ 1,000,000 Each | US \$ 1,000,000 Total |
| 500GL Horizontal Flocculation Tank | 1 | Included | Included |

Along with this pricing you will find information on other miscellaneous information such as delivery, payment terms, warranty and performance guarantees. We have also attached some reference drawings of the equipment.

Please note that these prices do not include any ancillary equipment needed for a dewatering installation, i.e. pumps, valves, field instrumentation, power control, logic control, conveyors, etc.

We hope this information is helpful. Please contact this office if you have questions or require any further information.

Sincerely,
FKC Co., Ltd.

Wesley Bond



SCREW PRESS

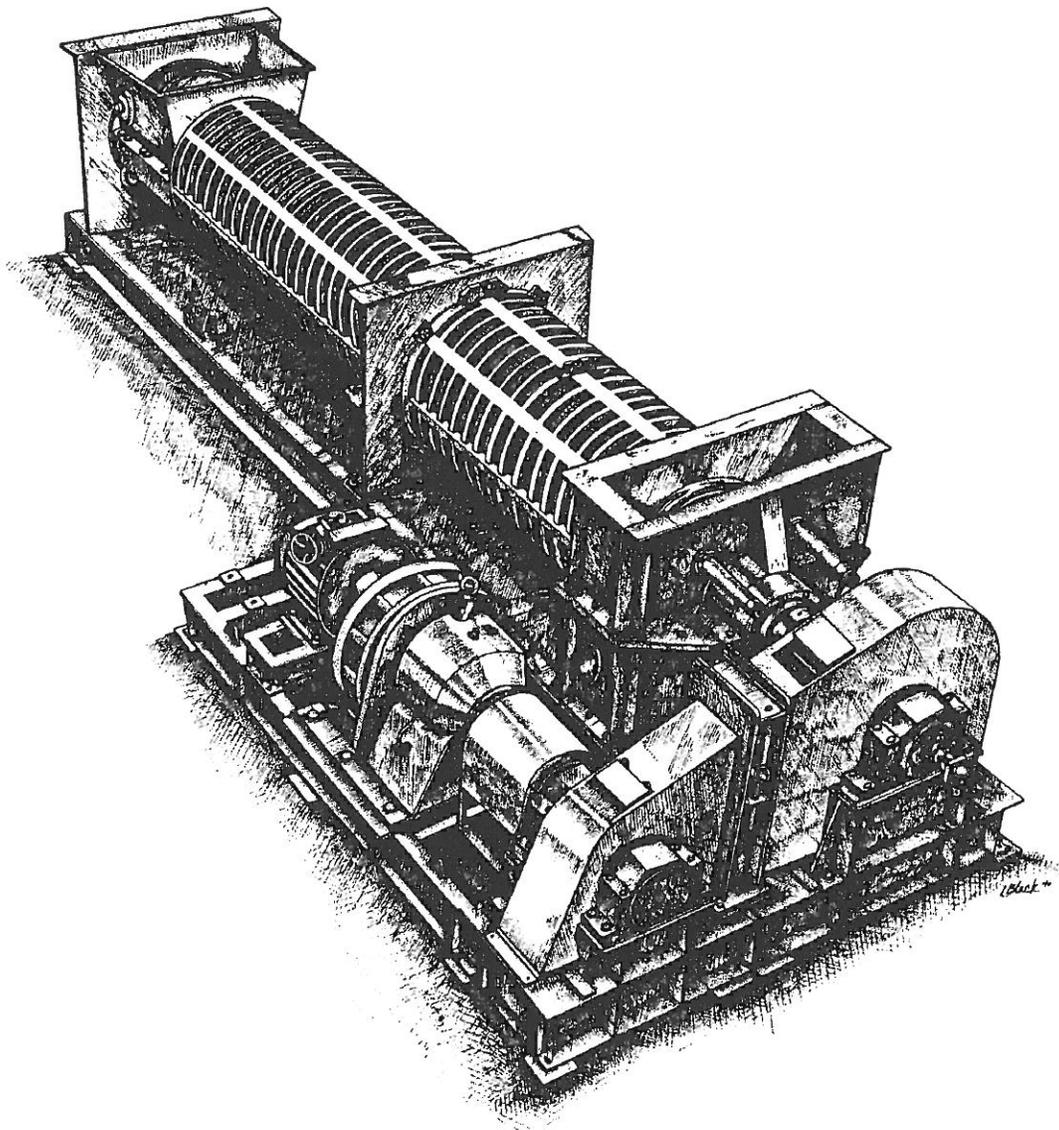


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| | | |
|----|---|---|
| 1. | Screw Press for Mud Dewatering (SHX 1350x8000)..... | 1 |
| 2. | Horizontal Flocculation Tank (500 gallon)..... | 2 |

B. Miscellaneous

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A. Proposed Equipment

1. Screw Press -

| <u>Qty.</u> | <u>Description</u> | <u>Price Delivered</u> <u>Dewatering</u> |
|-------------|---|--|
| 1 | FKC Screw Press Model BHX-1350x8000L | US\$1,00,000 each |
| | Material: | Mill River Sediment |
| | Capacity: | 337.5 Dry tons per day operating 24 hours |
| | Inlet consistency: | 15% or higher |
| | Outlet consistency: | 50 ± 3% with polymer use |
| | Fiber content: | 6% or higher |
| | Nonvolatile solids content: | 85% or higher |
| | Materials of construction: | SS-304 wetted parts, 17L SS Screw Flight Last meter of screw flight Cobalt wear plates Base coated CS Non-wetted parts coated CS |
| | Screw design: | Suitable for municipal dewatering |
| | Screens: | Punched SS-304 |
| | Speed reducer: | SEW Speed reducer |
| | Motor: | 60 HP, 1200 rpm, NEMA B, 480 VAC, 3 Ph, 60 Hz, C-face, included Suitable for variable speed operation w/ PWM constant torque inverter |
| | Other: | 1 set standard tools 1 set drum covers 1 motor coupling 4 spare screens |
| | Approx. shipping weight: | 14 tons per press |
| | Delivery: | Delivery within 6 (six) months after receipt of written purchase order |

A. Proposed Equipment

2. Horizontal Flocculation Tank

| <u>Qty.</u> | <u>Description</u> | <u>Unit Price Delivered</u> |
|-------------|--|---|
| 4 | Flocculation Tank 500 gal with variable speed agitator | Included |
| | Drive: | SEW Eurodrive |
| | Motor: | 10 HP, 1800 rpm, manufactured by SEW 480 VAC, 3 Ph, 60 Hz included |
| | Materials of construction: | SS-304 wetted parts |
| | Approx. shipping size/ weight: | 2.0 cubic meter / 500 Kg |
| | Delivery: | Delivery within 5 (five) months after receipt of written purchase order |

B. Miscellaneous

1. Delivery

The screw press, and flocculation tank will be ready to ship within five (5) months after receipt of written purchase order. Delivery will be within six (6) months after receipt of purchase order to your facility.

2. Shipping Arrangements

The FKC screw press will be shipped via 40' and/or 20' open top container from Fukoku Kogyo's (FKC Japan) Ishinomaki, Japan factory to local port then best way overland to the WWTP.

The flocculation tank will be shipped best way from Port Angeles, WA.

3. Options

Please contact FKC for optional equipment.

3. Price Summary

| | Qty | Unit Price | Total Price |
|---------------------------|------------|-------------------|--------------------|
| Screw Press | 4 | \$ 1,000,000 | \$ 4,000,000 |
| Flocculation Tank 500 gal | 4 | Included | Included |

4. Effective Period

This proposal shall remain valid **60** days from the date of the proposal.

5. Payment Terms

30% with certified drawings

30% with shipment

30% with delivery

10% with performance or within 6 months of delivery if the equipment has yet to start-up due to the schedule of the customer, whichever occurs first.

Net 30 days

7. Installation

The screw presses are shipped in one main section with the headboxes, covers, tool sets, and spare screens crated separately. Installation and assembly drawings are provided.

The Flocculation Tanks require minor assembly of the agitator assembly and field mounting of the agitator assembly on the tank.

Installation and erection assistance are not included in the price of the equipment and generally are not required. However, the service is available for our standard service rates (see the enclosed rate sheet).

8. Operator Training and Start Up

Operator and maintenance training and start up services are included in the price of the equipment.

Operator and maintenance training can be accomplished in approximately two hours per group. Ideal training sessions include both classroom and on-site (at the screw press) sessions.

Generally speaking training and start up can be accomplished in a three day period.

Erection assistance and a separate trip for training are not included in the price of the equipment. Additional engineering service days are billed at the rates on the enclosed rate sheet.

9. Warranty

FKC's mechanical warranty covers material and workmanship for a period of twelve (12) months from start-up or eighteen (18) months from delivery whichever occurs first.

10. Performance Guarantee

The performance figures and conditions denoted in section A of this proposal constitute FKC Co., Ltd.'s performance guarantee and the conditions required to meet the guarantee. All of the consistency figures are based on total solids (TS) not total suspended solids (TSS).

In the event that performance is not met, FKC will provide all parts, engineering, and labor associated with the work necessary to bring the equipment into conformance with the performance guarantee.

11. Documentation Schedule

- A. Approval Drawings - within 3 weeks after receipt of purchase order
- B. Certified Drawings - within 2 weeks after return of approval drawings
- C. Operation and Maintenance Manuals - 14-16 weeks after receipt of order

12. Spare Parts List

No spare parts are required for the first 1-2 year period of operation.
A list of long term spare parts is available upon request.

13. Service Rates

The following are rates and terms for professional and technical services furnished by FKC:

Weekdays

\$960.00 - Per eight (8) hour day (\$120/hr.) on weekdays plus, lodging, and rental car expenses.

\$180.00 - Per hour for all hours exceeding eight (8) hour workday on weekdays.

\$90.00 - Per hour for office engineering services and telephone consultations.

Saturdays, Sundays and Holidays

\$1,440.00 - Per eight (8) hour day plus lodging and rental car expenses.

\$270.00 - Per hour for all hours exceeding eight (8) hour workday.

Travel Time - Weekdays

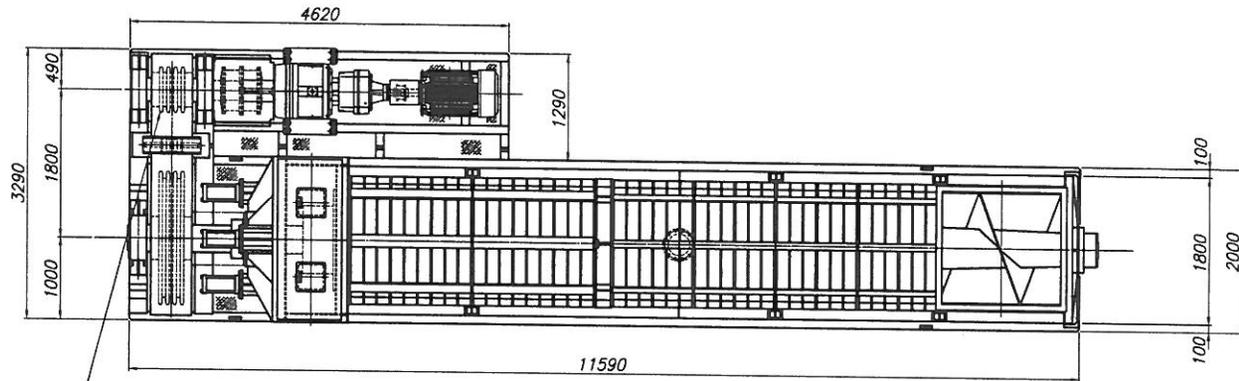
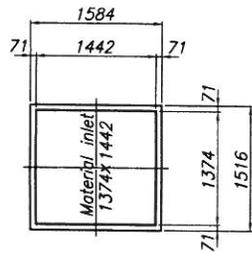
\$75.00 - Per hour travel time. (Not to exceed \$900/day)

Travel Time – Weekends and US Holidays

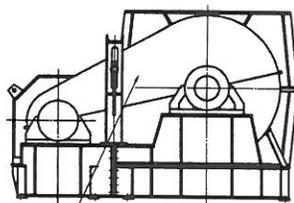
\$120.00 - Per hour travel time (Not to exceed \$1440/day)

The above rates are US\$.

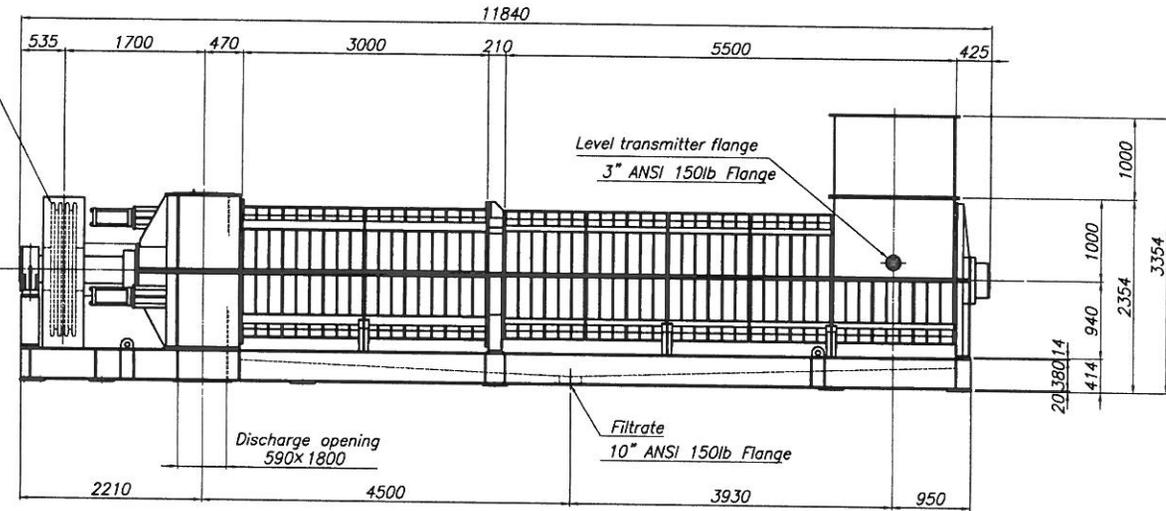
Payment terms: Net 30 days.



RS-240-4 CHAIN & SPROCKETS
NT18 DRIVER / NT65 DRIVEN



OIL BATH CHAIN GUARD



Gear Coupling

Falk Steelflex Coupling

SEW Planetary gear reducer
P071RF147AD8-KS, 278:1

Variable speed motor, Owner Supplied
100 HP, 1200 RPM, 460V, 444T frame

Total weight = 38,000 kg
Operating weight = 48,000 kg

Screw rev.
300 ~ 1175 rpm X 1/278 X 18/65 = .29 ~ 1.17 rpm

| | | | | | | |
|------|---------|-------------|----------|---------|----------|----------|
| Rev. | Date | Description | Drawn by | Rev. by | Appd. by | Appd. by |
| △ | 1/18/01 | First issue | H. Abe | Y. Ito | T. Ogawa | KAL |

| 符号 Mark | 名 称 Description | 材 質 Material | 数 量 Quantity | 重 量 Weight | 備 考 Remarks |
|-------------------|-------------------------------|-----------------|-----------------|---------------|----------------|
| 発注先 Purchaser | | | | | 配 布 先 貿易部 |
| 最終客先 End user | | | 1 | | F K G |
| 工事名称 Job name | SHX-1350x8500L Screw press | | Scale | | 管 装 部 |
| 図面名称 Dwg. name | Assembly | | 1/40 | | QC 部 |
| 工事番号 Job No. | Reference | | | | QC 部 |
| 図面番号 Dwg. No. | | | | | 製造部 |
| | | | | | 設計部 |
| | | | | | 調理工地 |
| | | | | | 大阪管装所 |
| | | | | | 富士管装所 |
| | | | Ref. job No | | 合 計 |

FUKOKU KOGYO CO., LTD.