

***PRIME SOLUTION
ROTARY FAN
PRESS® PILOT
TESTING REPORT
FOR SLUDGE
DEWATERING***

**Winchester WWTP
(Winchester, NH)**



Testing Date(s): June 3rd – 4th, 2021

**PRIME
SOLUTION**

***DEWATERING PERFORMANCE
SIMPLIFIED***

**Prime Solution, Inc.
610 S. Platt Street
Otsego, MI 49078
(269) 694-6666**

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Key Information:

Plant Site:	Winchester WWTP 64 Duso Rd. Winchester, NH 03470
Plant Contact:	Mr. Rick Meleshi 603-903-3912 sewerdept@winchester.nh.gov
Prime Solution Sales Representative:	BAU / Hopkins Mr. Gene Weeks 207-245-8829 gweeks@nauhopkins.com
Testing Date(s):	June 3 rd – 4 th , 2021
Prime Solution Pilot Equipment:	RFP2.0-24S Rotary Fan Press 2.0
Application Type:	Municipal
Sludge Type:	Secondary
Process Type:	Ox Ditch - Activated
Sludge Age:	~2 - 3 Days
pH Level:	6
Feed Solids Ranged:	1.14 – 1.31% TS
Volatile Solids Ranged:	73.9 – 78.3% TVS
Dry Cake Solids Range:	21.1 – 23.4% TS
Averaged Dry Cake Solids:	22.1% TS
Averaged Capture Rate:	97.4% TSS
Active Polymer Usage Range:	10.5 – 39.7 lbs/dry ton
Optimal Polymer Usage:	10.5 lbs/dry ton
Averaged Press Energy Usage:	0.422 kW
Lab(s):	Prime Solution, Inc.
Prime Solution Regional Sales Manager:	Mr. Michael Stone (325) 430-2531 Mstone@psirotary.com
Report Prepared By:	Mrs. Randi Yeaman (269) 694-6666 ryeaman@psirotary.com
Report #:	PR210614-1

Pilot Summary:

On-site pilot testing was performed by Prime Solution, Inc. on June 3rd – 4th, 2021 for the Winchester WWTP in Winchester, NH. The purpose of the pilot test was to determine the dewaterability of the Municipal Activated Secondary Sludge that is produced at the Plant. The results listed in this report confirm that the Rotary Fan Press 2.0 can effectively dewater the sludge produced at the Plant.

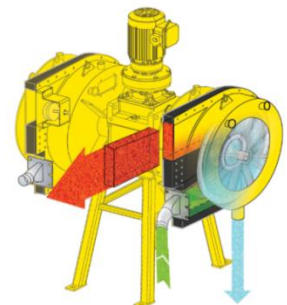
The Rotary Fan Press operated consistently over the two (2) day trial period with a total number of ten (10) samples pulled at various sludge flow rates. All samples were collected and tested by Prime Solution. The cake solids ranged in dryness from 21.1 – 23.4% TS during the testing period with excellent capture rates averaging 97.4% TSS.

Piloting Equipment Description:

The mobile pilot unit that was used for the testing is a full-scale Prime Rotary Fan Press® Model #RFP2.0-24S including all of the necessary equipment to condition the sludge/slurry, pump the filtrate back to the plant and transfer the dewatered cake solids for disposal.

➤ RFP2.0-24S Rotary Fan Press (2.0)	➤ In-Line Grinder
➤ PrimeBlend Emulsion Polymer System	➤ Flocculator Assembly
➤ Rotary Lobe Sludge Feed Pump	➤ Folding Sludge Cake Conveyor
➤ Wash Water Booster Pump	➤ Central Operator Control Panel
➤ Filtrate Pump w/ Float Control	➤ Chemical Feed System

The Prime Rotary Fan Press® operates using the low differential pressure between the incoming conditioned sludge and the outgoing sludge cake combined with the very slow (<1 rpm) rotational motion of the two (2) filter screens to advance the sludge through the press. As the conditioned sludge enters the annular space between the filter screens a pressure differential develops within the press where the liquid portion of the conditioned sludge seeks to the path of least resistance through the filter screens. The remaining solids are collected inside the annular space between the filter screens which advance towards the discharge end of the press. At the discharge end of the press, an adjustable restrictor gate arm slows down the advancing solids forming a “cake” plug. As the plug builds within the restriction discharge area, it pushes towards the inside walls of the filter screens and the slow rotation/friction of the filter screens continuously moves the cake solids past the restrictor gate arm to be discharged for disposal or further processing. Operation of the Prime Rotary Fan Press® can either be continuous or intermittent depending on your application. Clean-up is a simple push of a button which will automatically run the wash cycle.



Pilot Testing Results:

The Rotary Fan Press was on-site Winchester WWTP for two days (June 3rd – 4th, 2021) and operated at varying flow rates, polymer types and polymer dosages. Day one, June 3rd, was used as set up. Then that day and the next day several samples were taken of the sludge cake/filtrate and sent to Prime Solution, Inc. for analysis. Using different polymers at different concentrations showed varying results, which was noted on the last day the mixing energy used to blend the polymer with the sludge had an equal effect on the cake solid dryness.

Results Overview:

Sludge flow ranged 1.43 – 1.67 gpm/ft², Feed solids averaged 1.22% TS, Solids loading ranged 2.85 – 3.83 lbs/hr/ft², Averaged cake solids were 22.1% TS, Capture rates averaged 97.4% TSS, Averaged press energy was 0.422 kW & pH Level was 6 for the testing period.

Polymer Consumption:

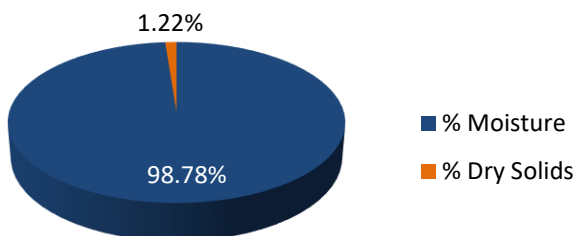
Drawing the sludge into the Rotary Fan Press system and at the suction side of the pump, the diluted/blended polymer was added to the incoming sludge where it was mixed in-line to form a stable floc before entering the dewatering channel(s) of the Rotary Fan Press. The polymer dosage for the

pilot testing ranged between 10.5 – 39.7 active lbs/dry ton, with the optimal polymer dosage being 10.5 active lbs/dry ton.

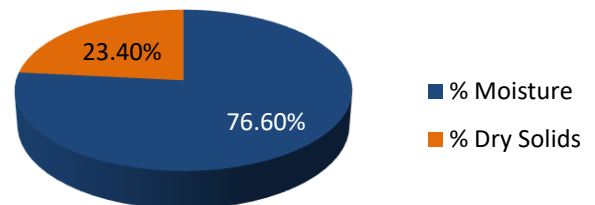
The Table on The Following Page Details the Following:

Date and time of sample collection, Rotary Fan Press operating parameters: press speed %, energy usage (press kW), inlet and gate pressures, polymer results, sludge processing flow (gpm/ft²), feed solid concentration (% TS), solids loading (lbs/hr/ft²), cake solids (%TS) and capture rate (mg/L & %TSS).

Averaged Feed Solids
% Moisture vs. % Dry Solids



Maximum Cake Solids
% Moisture vs. % Dry Solids



Pilot Testing Results Continued:



Plant: Winchester WWTP

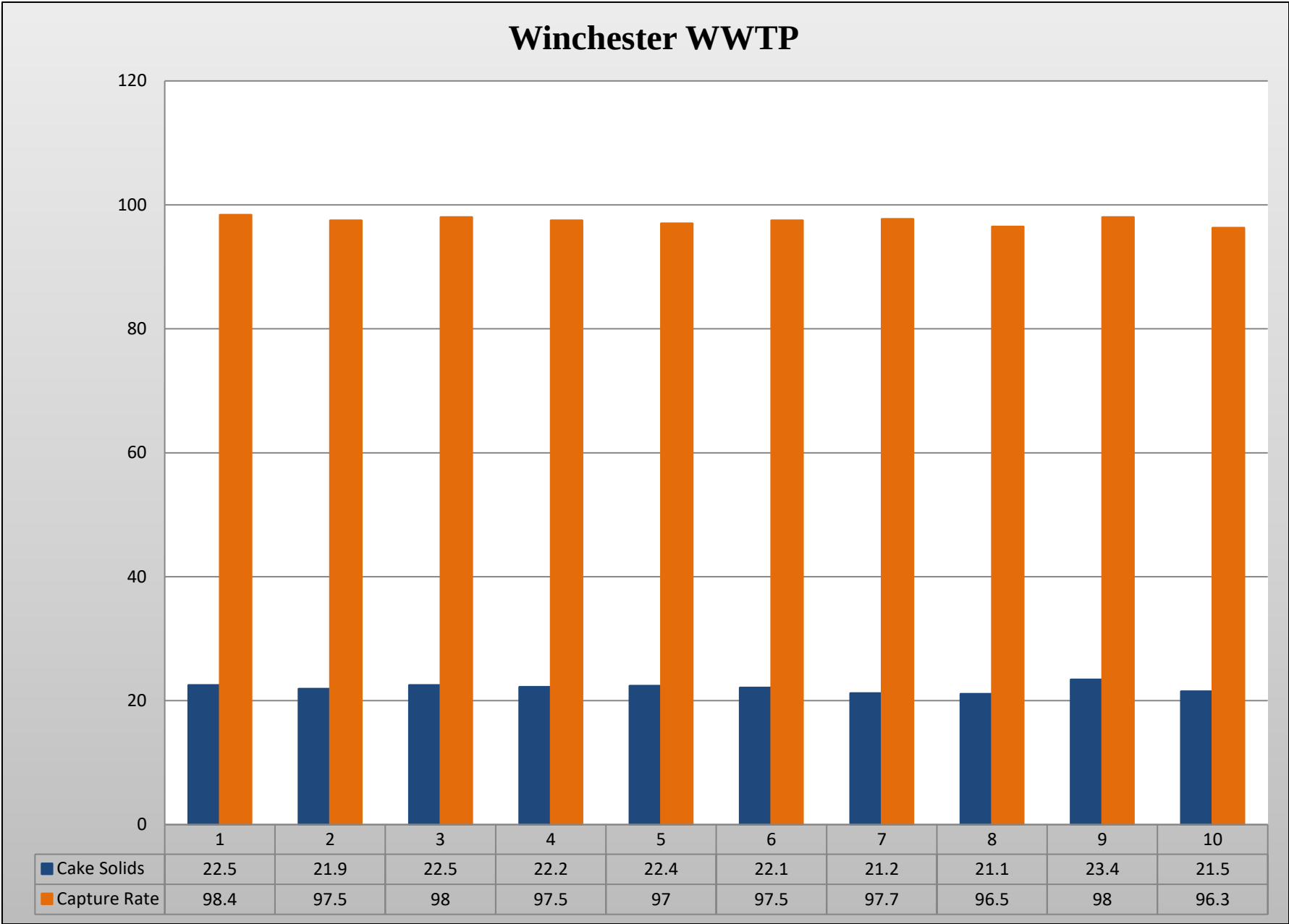
Sludge Type: Municipal

Process: Secondary

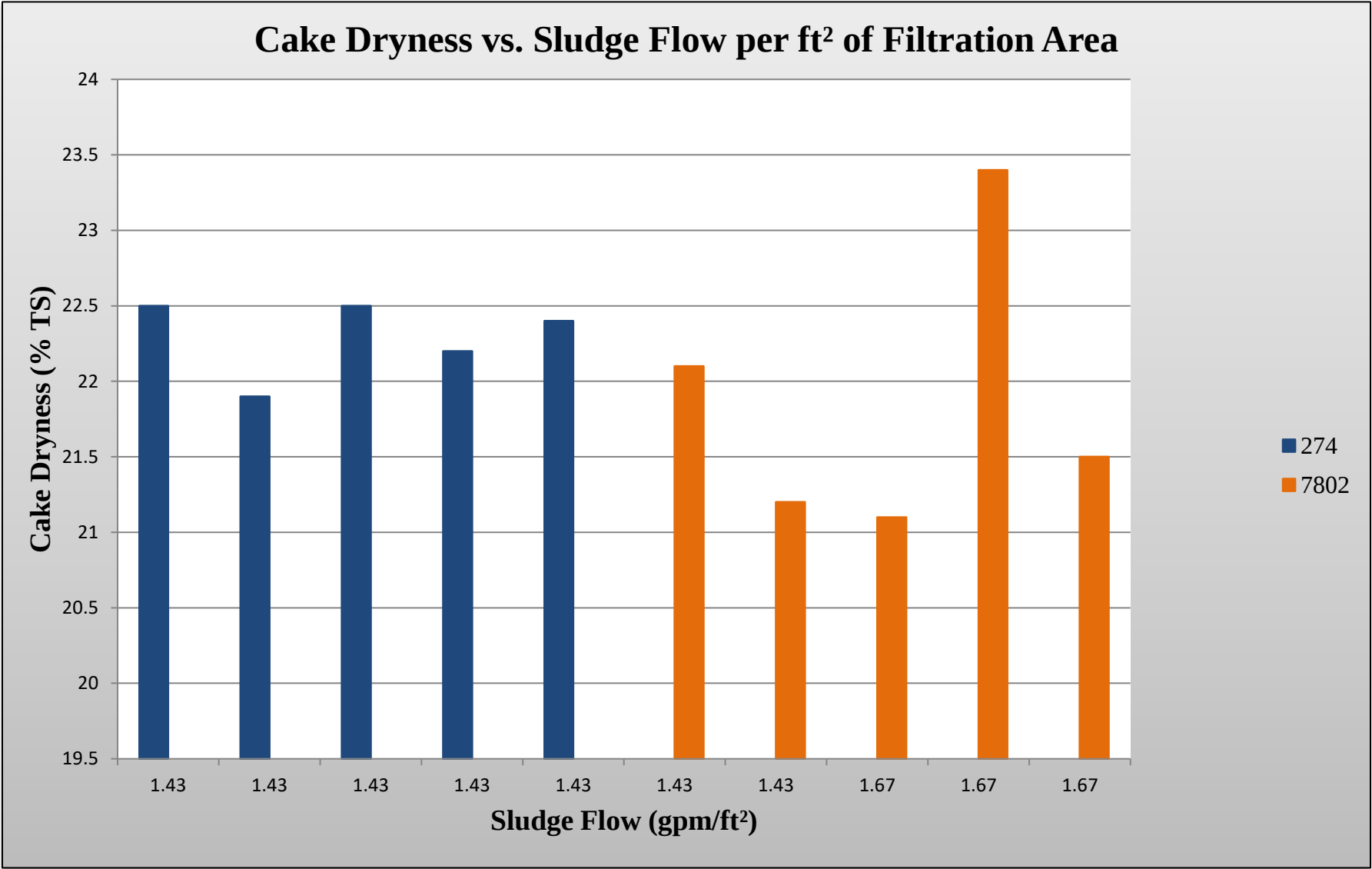
Base Model Pilot Equipment: RFP2.0-24S – Rotary Fan Press (2.0)

Sampling			Rotary Fan Press						Polymer						Results					
Run #	Date	Time	Model Type	Filt. Area ft²	Press Speed %	Press Energy kW	Inlet PSI	Gate PSI	Type	Neat Flow gph	Dil. Water gpm	Conc. %	Act. %	Active lbs/d.t.	Sludge Flow gpm/ft²	Feed Solids %TS	Solids Loading lbs/hr/ft²	Cake Solids %TS	Capture Rate	
																			mg/L	%TSS
1	6/3	10:30	RFP2.0-24S	4.2	20	0.44	1.9	36	274	0.193	1	0.32	40	37	1.43	1.21	3.03	22.5	196	98.4
2	6/3	11:36	RFP2.0-24S	4.2	18	0.42	2.4	37	274	0.179	1	0.30	40	34.3	1.43	1.21	3.03	21.9	300	97.5
3	6/3	12:36	RFP2.0-24S	4.2	25	0.43	3.1	34	274	0.207	1	0.34	40	39.7	1.43	1.21	3.03	22.5	244	98.0
4	6/3	1:52	RFP2.0-24S	4.2	15	0.45	1.9	44	274	0.165	1	0.27	40	31.6	1.43	1.21	3.03	22.2	298	97.5
5	6/3	3:04	RFP2.0-24S	4.2	30	0.42	2.9	44	7802	0.138	1	0.23	40	26.4	1.43	1.21	3.03	22.4	368	97.0
6	6/4	8:35	RFP2.0-24S	4.2	30	0.42	2.4	46	7802	0.138	1	0.23	40	28.1	1.43	1.14	2.85	22.1	328	97.5
7	6/4	9:20	RFP2.0-24S	4.2	25	0.40	1.5	44	7802	0.138	1	0.23	40	28.1	1.43	1.14	2.85	21.2	304	97.7
8	6/4	10:10	RFP2.0-24S	4.2	25	0.41	2.4	44	7802	0.138	1	0.23	40	20.9	1.67	1.31	3.83	21.1	464	96.5
9	6/4	11:34	RFP2.0-24S	4.2	20	0.41	2.6	43	274	0.069	1	0.11	40	10.5	1.67	1.31	3.83	23.4	228	98.0
10	6/4	1:55	RFP2.0-24S	4.2	18	0.42	1.9	46	274	0.138	1	0.23	40	20.9	1.67	1.31	3.83	21.5	418	96.3

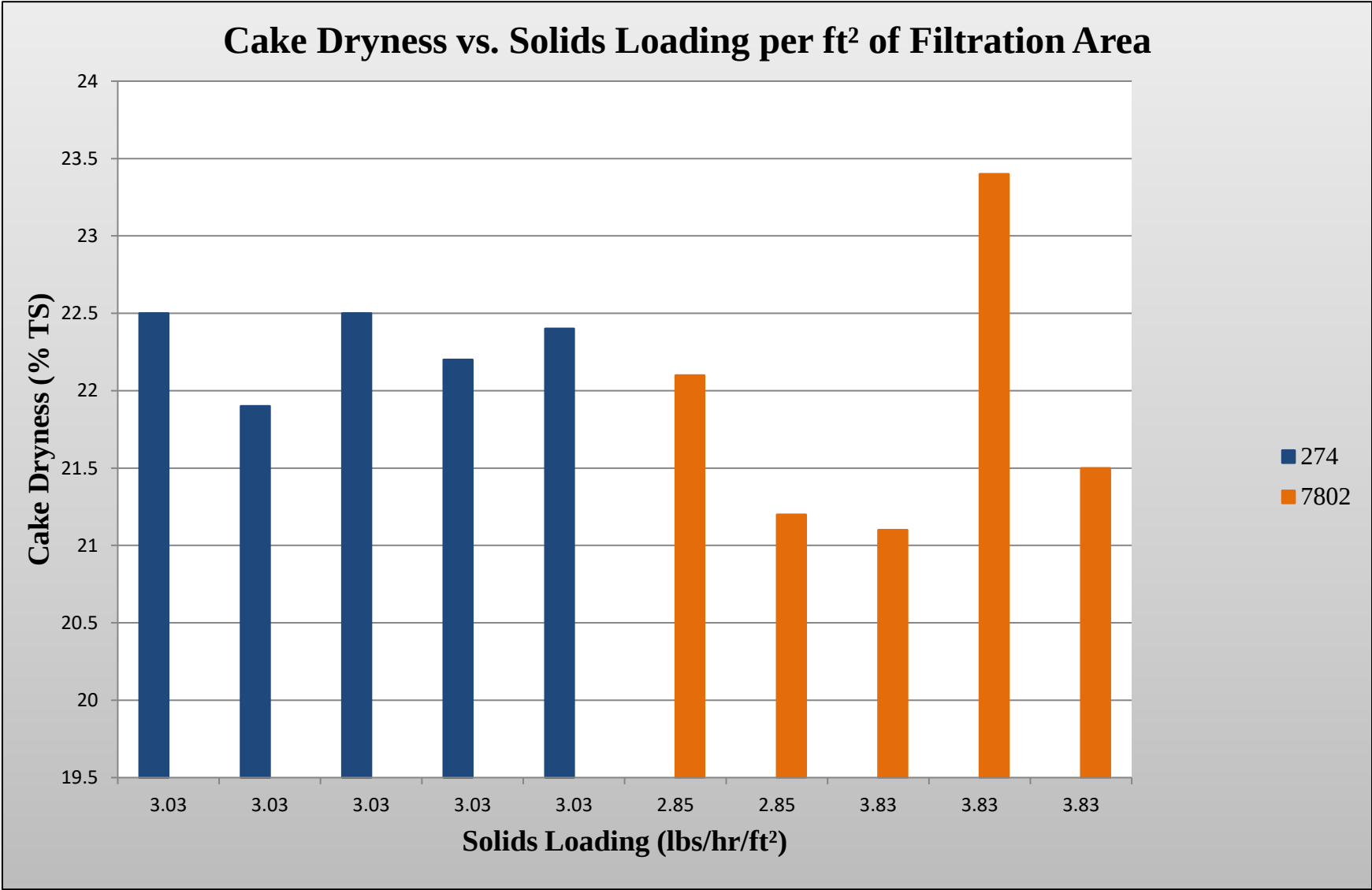
Pilot Testing Results Continued:



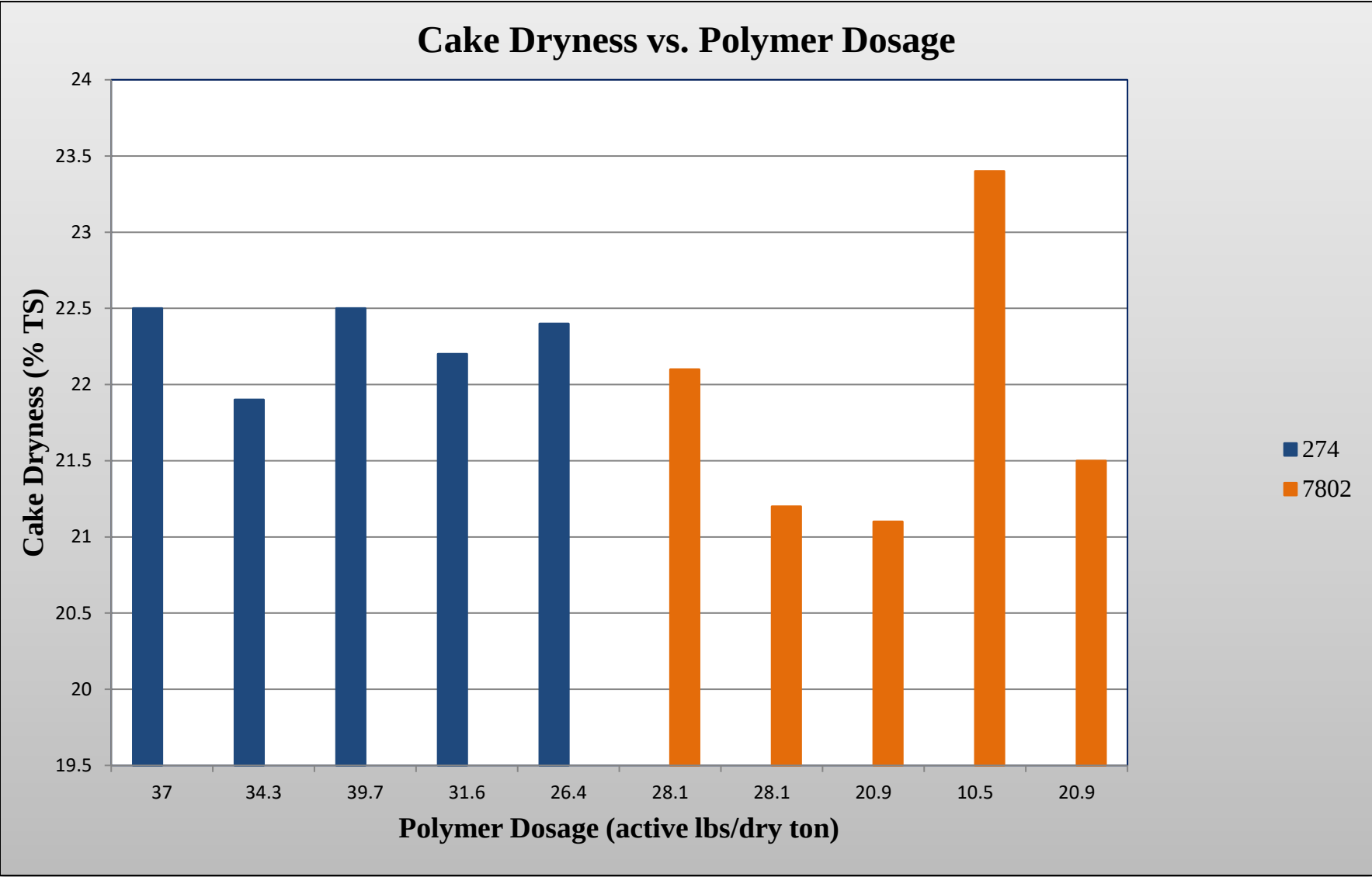
Pilot Testing Results Continued:



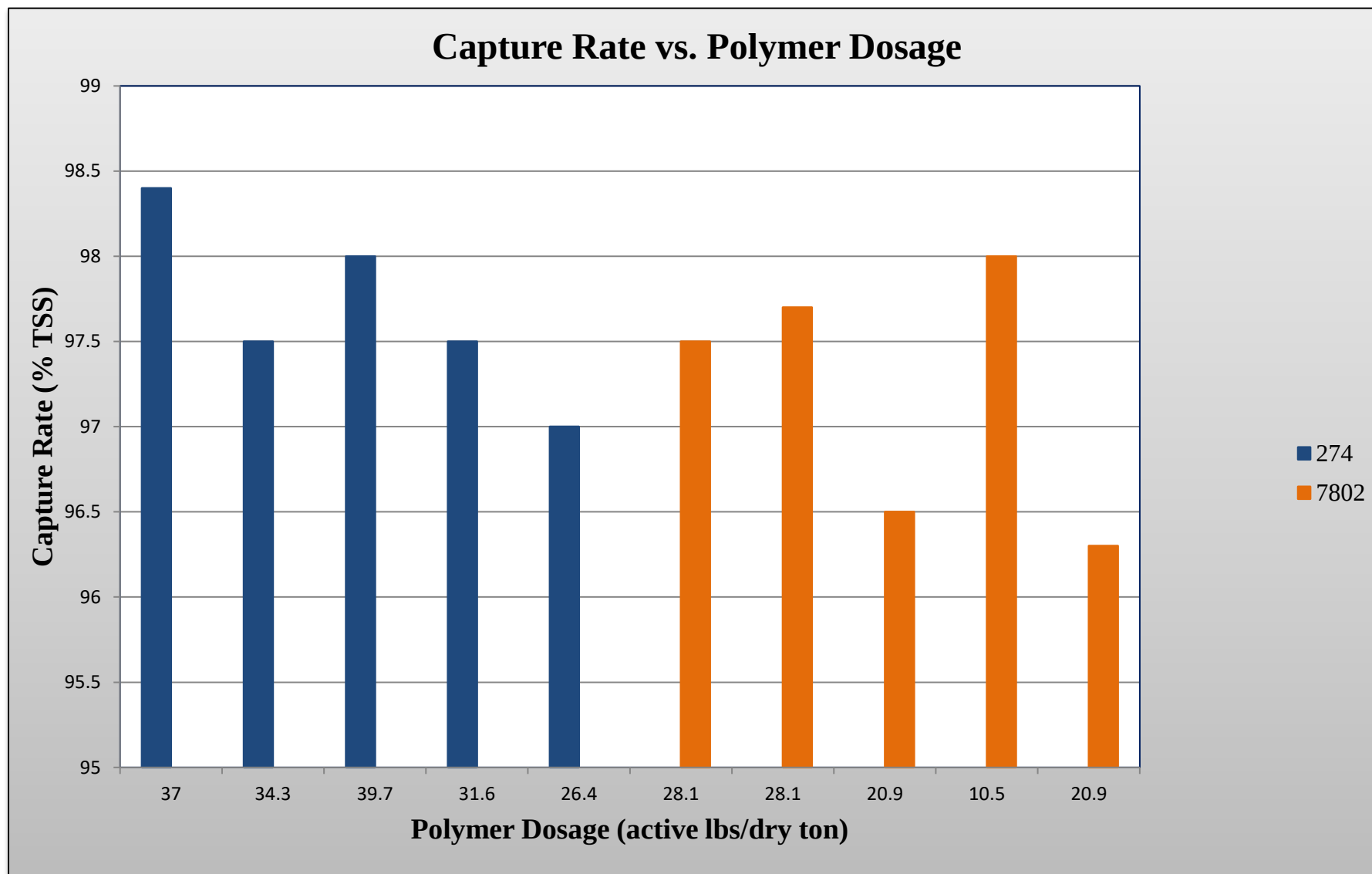
Pilot Testing Results Continued:



Pilot Testing Results Continued:



Pilot Testing Results Continued:



On-Site Pictures:



Pilot Conclusion:

This demonstration successfully illustrated the simplicity, ease-of-use and semi-automatic operation of the Rotary Fan Press, along with its ability to consistently produce dry cake solids — while using low energy and wash water. The totally enclosed design of the Rotary Fan Press provided a clean and safe work environment that virtually eliminated odors and airborne contaminants. This environment promotes prolonged equipment and building life.

Along with ease-of-operation, low maintenance requirements were demonstrated and discussed with plant operators and engineers — as well as, the RFP's ease of installation into existing facilities. Due to its small footprint, it does not require special building modifications.

Prime Solution, Inc. and BAU/Hopkins would like to express their gratitude to the Winchester WWTP in Winchester, NH, and everyone involved, for the opportunity and support that made this pilot possible. We look forward to providing equipment that will suit the needs of the Plant.

Mr. Michael Stone
Regional Sales Manager
Phone: (325) 430-2531
E-Mail: Mstone@psirotary.com
Web: www.psirotary.com

