

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

Taylor - WWTP (Taylor, AZ)



Testing Date(s): April 26th – April 27th, 2016

**PRIME
SOLUTION**

DEWATERING PERFORMANCE SIMPLIFIED

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Key Information:

Plant Site:	Taylor - WWTP 425 Paper Mill Rd. Taylor, AZ 85939
Plant Contact:	Mr. Jeff Foster (928) 536-7366
Prime Solution Sales Representative:	Western Environmental Equipment Mr. Dennis Gamache (480) 607-2884 dgamache@weeci.com
Testing Date(s):	April 26 th – 27 th , 2015
Prime Solution Pilot Equipment:	RFP36 Rotary Fan Press 2.0
Application Type:	Municipal
Plant MGD:	300,000 GPD
Sludge Type:	Aerated / Aerobic
Process Type:	Extended Aeration
Sludge Age:	~20 Days
Feed Solids Range:	0.56 – 0.78% TS
Volatile Solids Range:	60 - 75% TVS
Dry Cake Solids Range:	16.8 – 19.9% TS
Averaged Dry Cake Solids:	18% TS
Averaged Capture Rate:	99.7% TSS
Averaged Active Polymer Usage:	20.85 lbs/dry ton
Press Energy Usage:	1.29 kW
Lab(s):	Prime Solution, Inc.
Prime Solution Regional Sales Manager:	Mr. Joe Dendel (616) 540-0500 joe@psirotary.com
Report Prepared By:	Mrs. Randi Yeaman (269) 694-6666 ryeaman@psirotary.com
Report #:	PR160504-1

Summary:

On-site pilot testing was performed by Prime Solution, Inc. on April 26th – 27th, 2016 for Taylor - WWTP in Taylor, AZ. The purpose of the pilot test was to determine the dewaterability of the Industrial Extended Aerated Sludge that is produced at the Plant. The results listed in this report confirm that the Rotary Fan Press 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 fifteen (15) samples pulled at various sludge flow rates. All samples were collected and tested by Prime Solution. The cake solids ranged in dryness from 16.8 – 19.9% TS during the testing period with excellent capture rates averaging 99.7% TSS.

A formal proposal for capital purchase of a unit can be provided upon request.

Equipment Description:

The mobile pilot unit that was used for the testing is a full-scale Prime Rotary Fan Press® Model #RFP36-2.0 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.

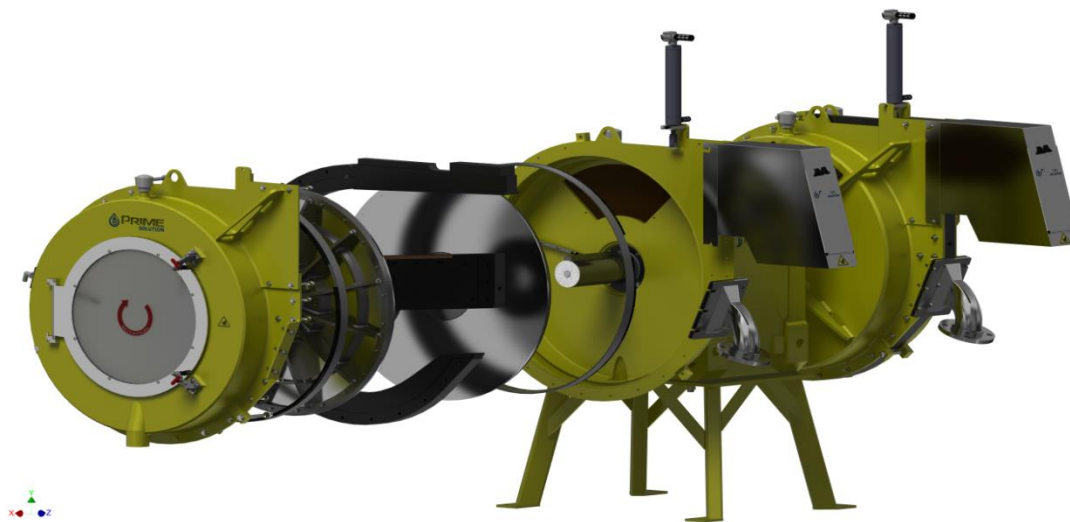
➤ RFP36 Rotary Fan Press (2.0)	➤ In-Line Grinder
➤ PrimeBlend Emulsion Polymer System	➤ Flocculator Assembly
➤ Rotary Lobe Sludge Feed Pump	➤ Folding Sludge Cake Conveyor
➤ Wash Water Booster Pump	➤ Central Operator Control Panel
➤ Filtrate Pump w/ Float Control	➤ Chemical Feed System

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.



Equipment Description Continued:

The totally enclosed, slow moving (<1 rpm), small footprint design with the lowest maintenance of any mechanical dewatering technology provides for long sustainable dewatering.



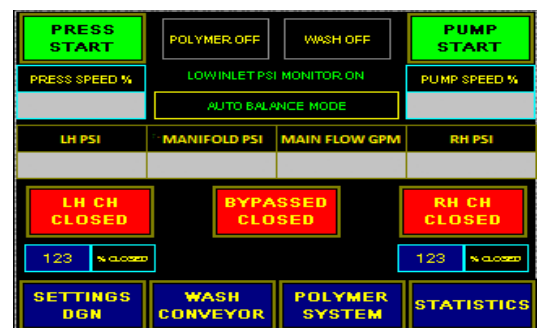
Basic construction of the Prime Rotary Fan Press®

The Rotary Fan Press has very few mechanical parts as illustrated above. The simple slow moving dewatering channel assembly provides for a clean enclosed working environment, long service life and with standard tools any adjustments and/or repairs can be completed simply and quickly.

The dewatering rate is scalable by multiplying the throughputs (sludge flow & solids loading) listed in the pilot test data table on page 7 by the square foot of filtration area/channel of each of the Base Model Rotary Fan Press sizes listed below.

Base Model RFP	Filtration Area
RFP24"	4.5 ft ² /channel
RFP36"	10.9 ft ² /channel
RFP48"	20.0 ft ² /channel

The unit is controlled by a PLC touch screen which provides fine adjustments of the system. This system gives infinite control of the unit and allows for accurate detailed refinement of the operating parameters. From the touch screen the operator has the option to control the dewatering process from the sludge feed all the way through to the sludge cake transfer, thus interlocking the entire system for semi-automatic operation.



Pilot Testing Results:

The Rotary Fan Press was on-site at Taylor - WWTP for 2 days (April 26th – 27th, 2016) and operated at varying flow rates, polymer types and polymer dosages. Day one April 26th was used as set up, then that day and the following day several samples were taken of the sludge cake/filtrate and split with the plant 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 1.4 – 4.0 gpm/ft², Averaged feed solids were 0.66% TS, Solids loading ranged 4.2 – 11.7 lbs/hr/ft², Averaged cake solids were 18% TS, Capture rates averaged 99.7% TSS, Averaged press energy was 1.29 kW for the testing period.

Polymer Consumption:

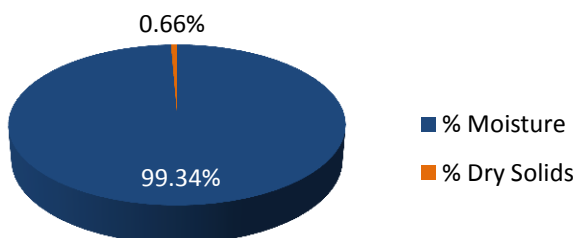
Drawing the sludge into the Rotary Fan Press system and at the suction side of the pump, the diluted/blended polymer was added to the incoming sludge where it was mixed in-line to form a stable floc before entering the dewatering channel(s) of the Rotary Fan Press. The averaged polymer dosage for the pilot testing was 20.85 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).

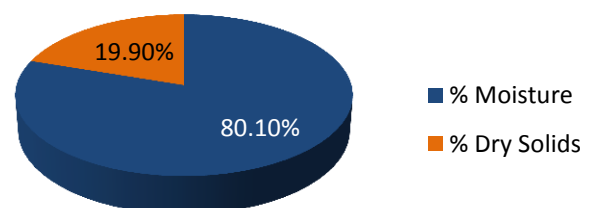
Averaged Feed Solids

% Moisture vs. % Dry Solids



Maximum Cake Solids

% Moisture vs. % Dry Solids



Pilot Testing Results Continued:



Plant: Taylor - WWTP

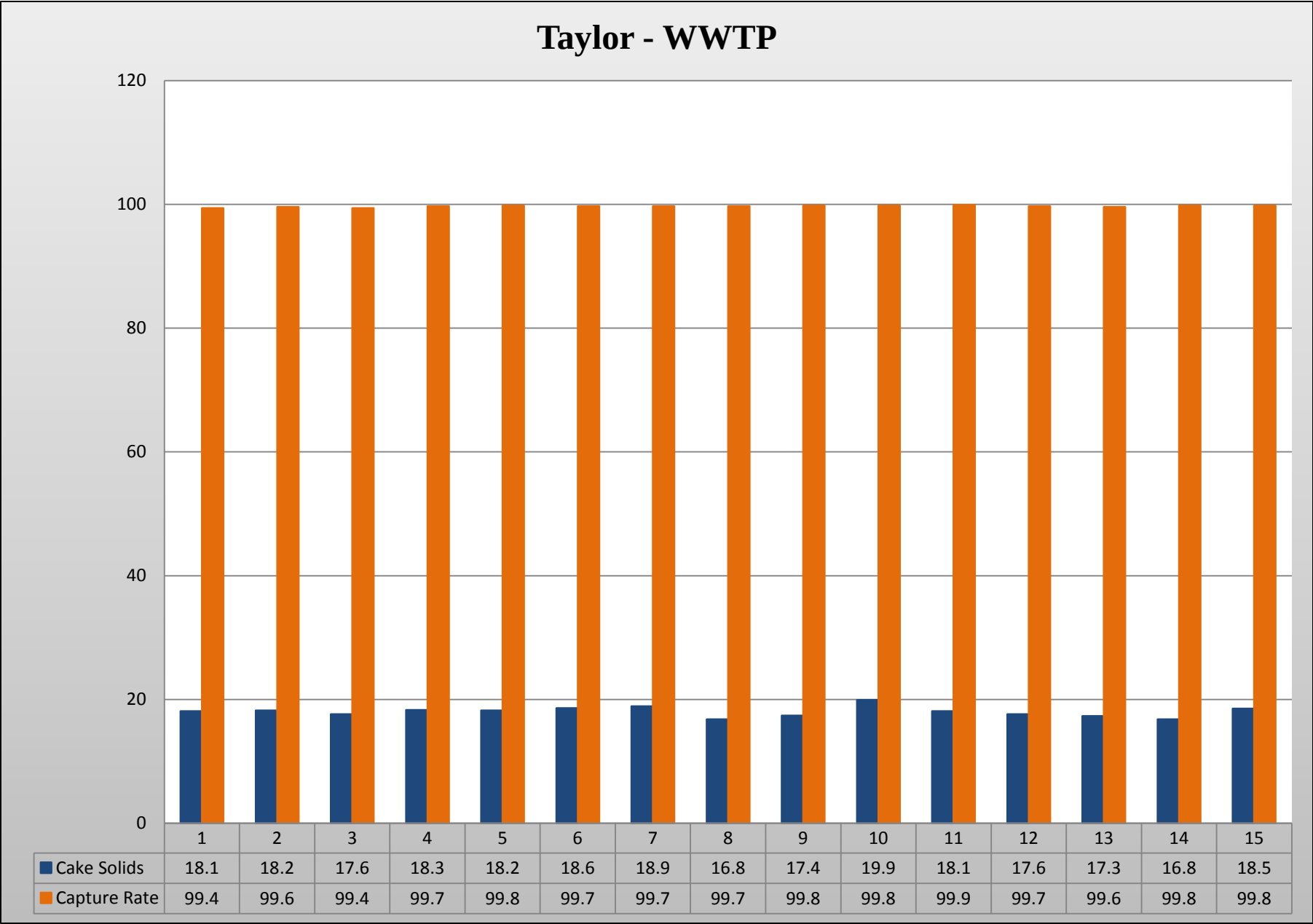
Sludge Type: Municipal

Process: Extended Aeration

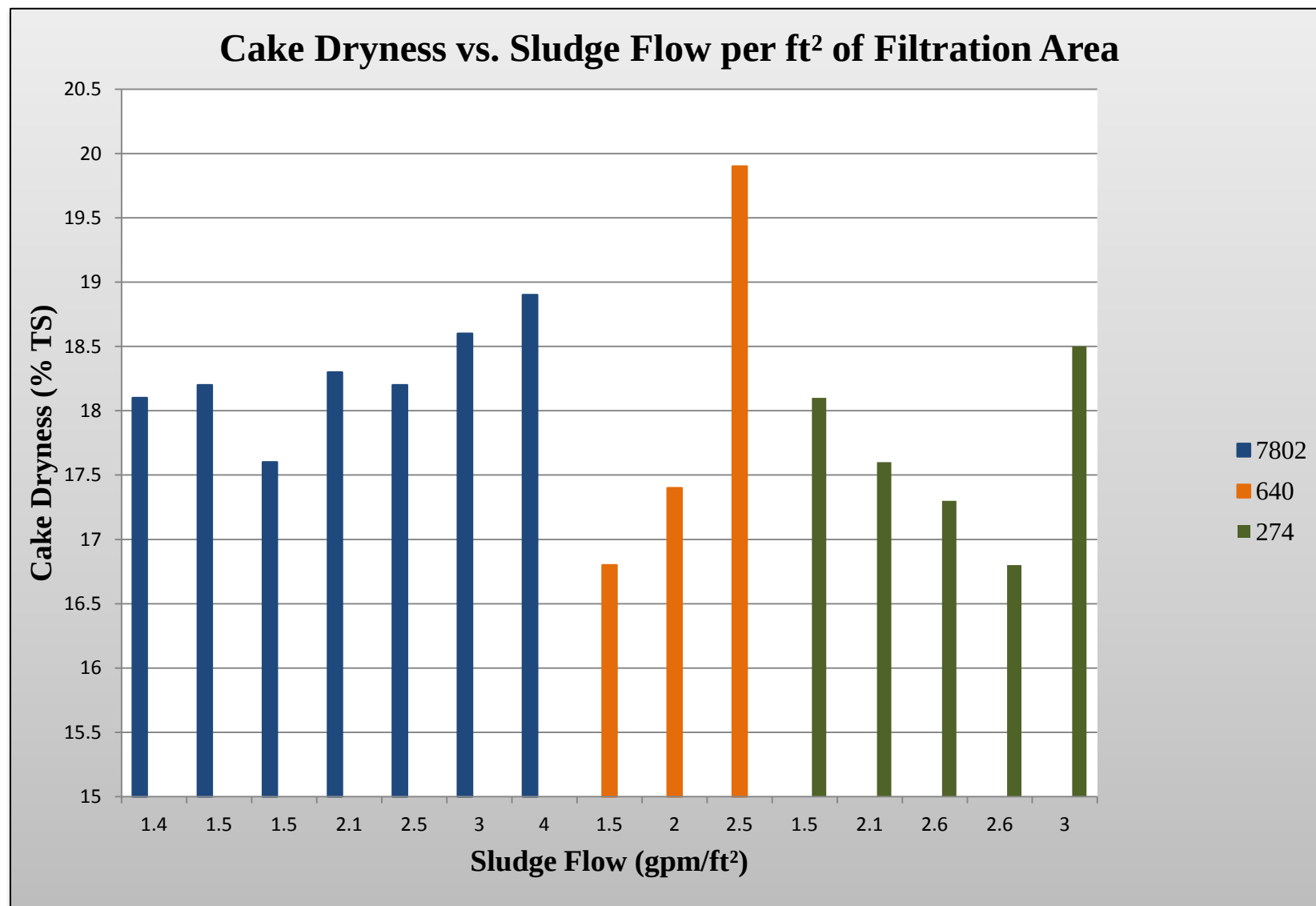
Base Model Pilot Equipment: RFP36 – Rotary Fan Press 2.0

Sampling			Rotary Fan Press						Polymer						Results					
Run #	Date	Time	Model Type	Filt. Area	Press Speed	Press Energy	Inlet PSI	Gate PSI	Type	Neat Flow	Dil. Water	Conc. %	Act. %	Active lbs/d.t.	Sludge Flow	Feed Solids	Solids Loading	Cake Solids	Capture Rate	
				ft²	%	kW				gph	gpm				gpm/ft²	%TS	lbs/hr/ft²	%TS	mg/L	%TSS
1	4/26	9:29	RFP36-2.0	10.9	50	0.42	1.45	30	7802	0.110	1.5	0.12	40	17.3	1.4	0.63	4.4	18.1	356	99.4
2	4/26	9:40	RFP36-2.0	10.9	50	0.42	1.56	30	7802	0.110	1.4	0.13	40	16.2	1.5	0.63	4.7	18.2	238	99.6
3	4/26	9:52	RFP36-2.0	10.9	50	0.42	1.8	30	7802	0.110	1.4	0.13	40	16.2	1.5	0.63	4.7	17.6	372	99.4
4	4/26	1:20	RFP36-2.0	10.9	60	0.45	1.4	30	7802	0.248	1.4	0.29	40	26.1	2.1	0.63	6.6	18.3	158	99.7
5	4/26	1:47	RFP36-2.0	10.9	60	0.46	1.5	30	7802	0.165	1.5	0.18	40	14.6	2.5	0.63	7.9	18.2	154	99.8
6	4/26	2:05	RFP36-2.0	10.9	60	0.47	2.4	30	7802	0.468	1.6	0.49	40	34.4	3.0	0.63	9.5	18.6	180	99.7
7	4/26	2:30	RFP36-2.0	10.9	60	0.44	2.1	30	7802	0.441	1.8	0.41	40	27.4	4.0	0.56	11.2	18.9	154	99.7
8	4/26	2:46	RFP36-2.0	10.9	60	0.44	1.55	30	640	0.110	1.8	0.10	40	18.2	1.5	0.56	4.2	16.8	182	99.7
9	4/26	3:05	RFP36-2.0	10.9	55	0.46	1.03	30	640	0.193	1.8	0.18	40	24	2.0	0.56	5.6	17.4	116	99.8
10	4/26	3:30	RFP36-2.0	10.9	75	0.50	1.6	30	640	0.482	1.8	0.44	40	47.9	2.5	0.56	7	19.9	136	99.8
11	4/27	8:55	RFP36-2.0	10.9	75	0.50	1.02	30	274	0.110	1.7	0.11	40	13.1	1.5	0.78	5.9	18.1	102	99.9
12	4/27	9:10	RFP36-2.0	10.9	60	0.47	1.3	30	274	0.165	1.7	0.16	40	14	2.1	0.78	8.2	17.6	232	99.7
13	4/27	9:25	RFP36-2.0	10.9	60	0.47	1.8	30	274	0.220	1.7	0.22	40	15.1	2.6	0.78	10.1	17.3	300	99.6
14	4/27	9:40	RFP36-2.0	10.9	40	0.45	1.5	40	274	0.220	1.7	0.22	40	15.1	2.6	0.78	10.1	16.8	190	99.8
15	4/26	9:50	RFP36-2.0	10.9	40	0.45	1.5	40	274	0.220	1.7	0.22	40	13.1	3.0	0.78	11.7	18.5	138	99.8

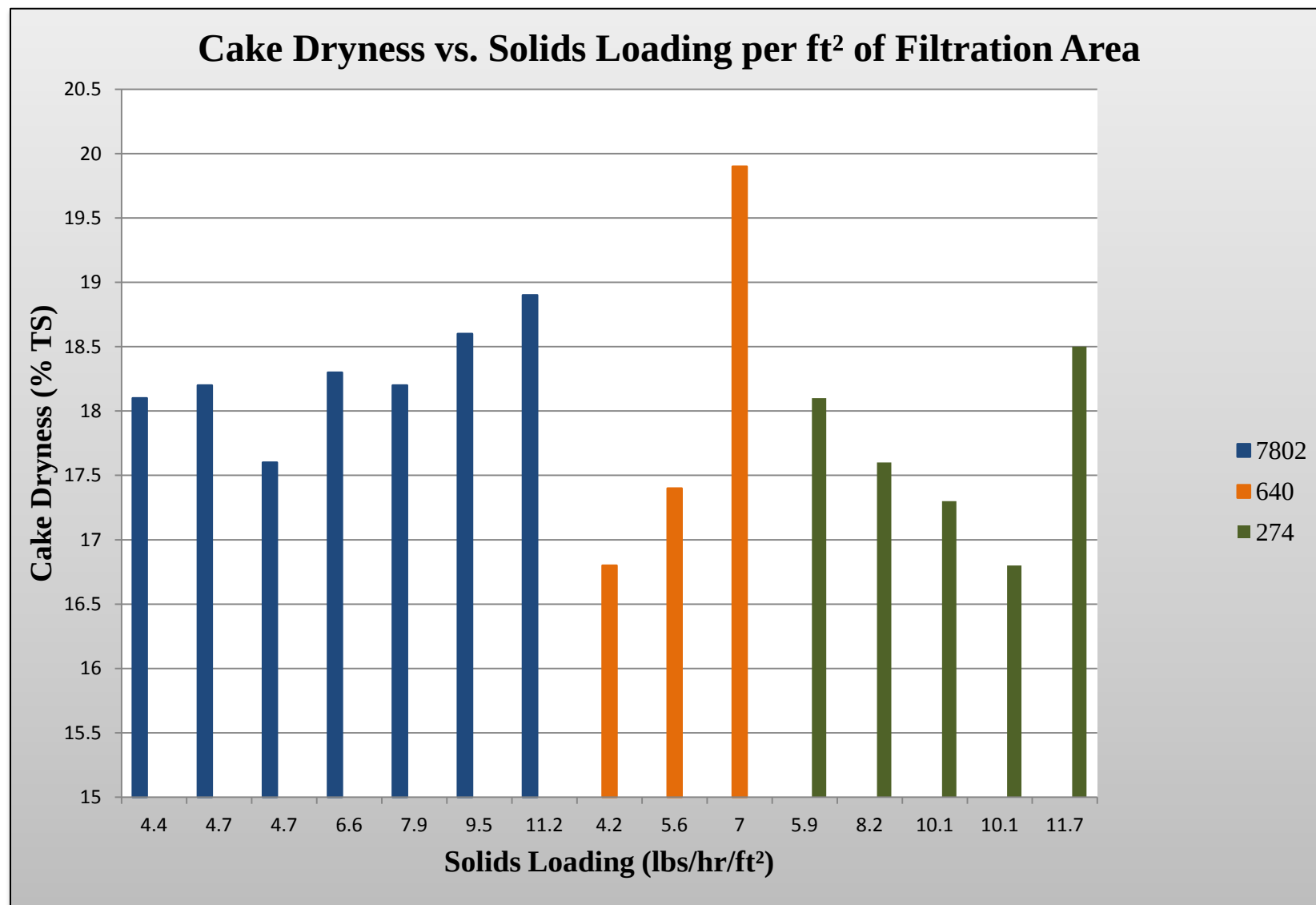
Pilot Testing Results Continued:



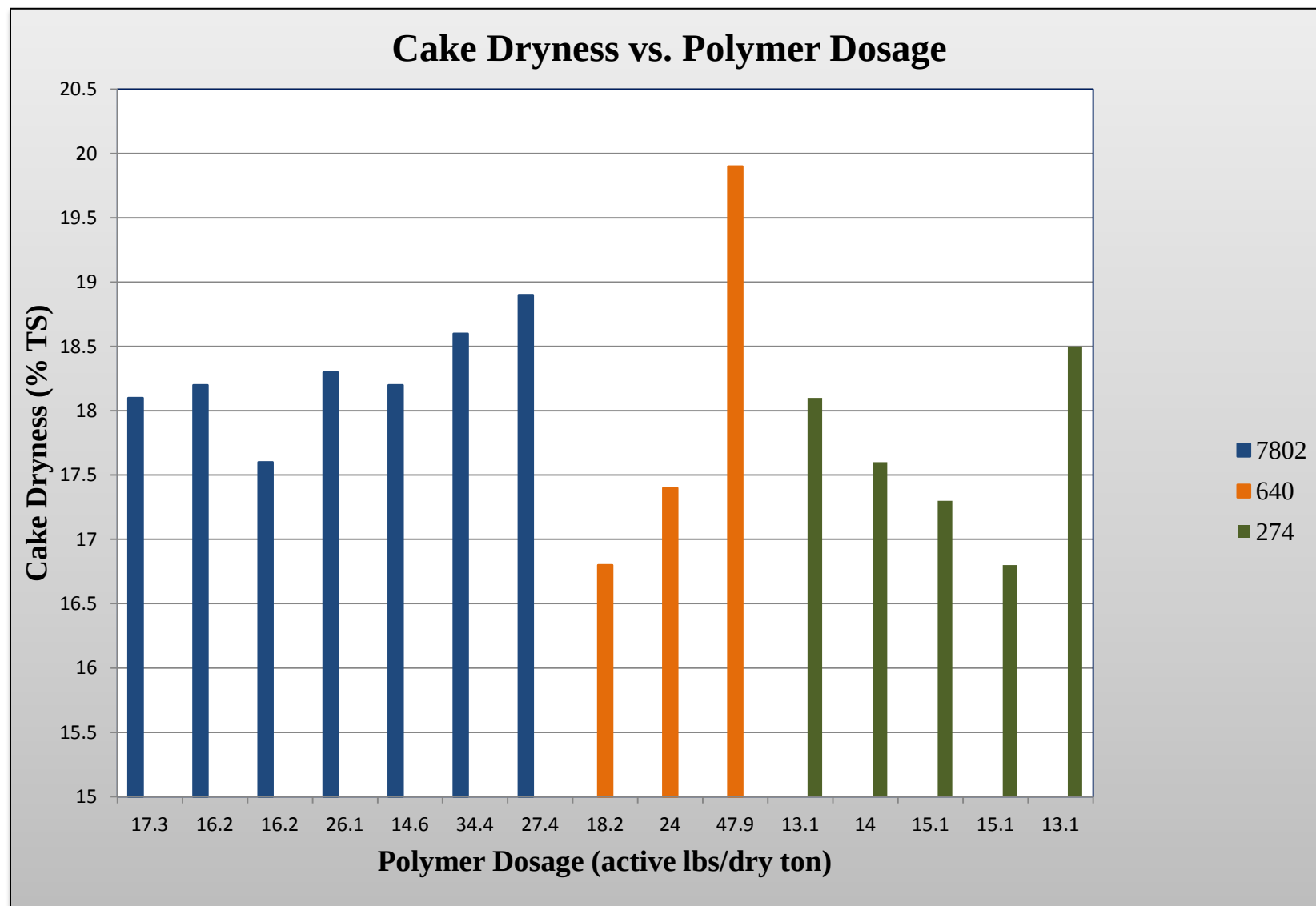
Pilot Testing Results Continued:



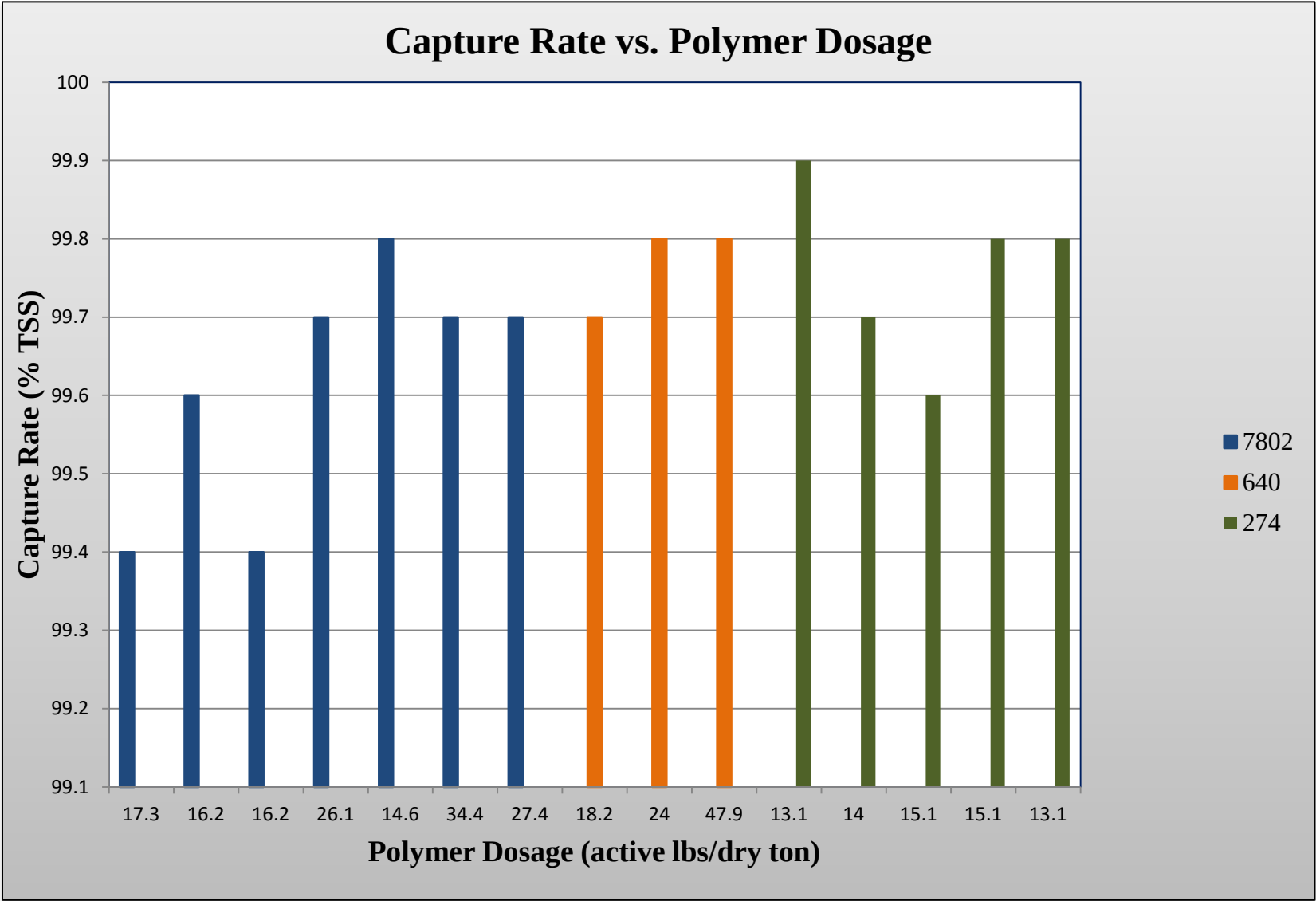
Pilot Testing Results Continued:



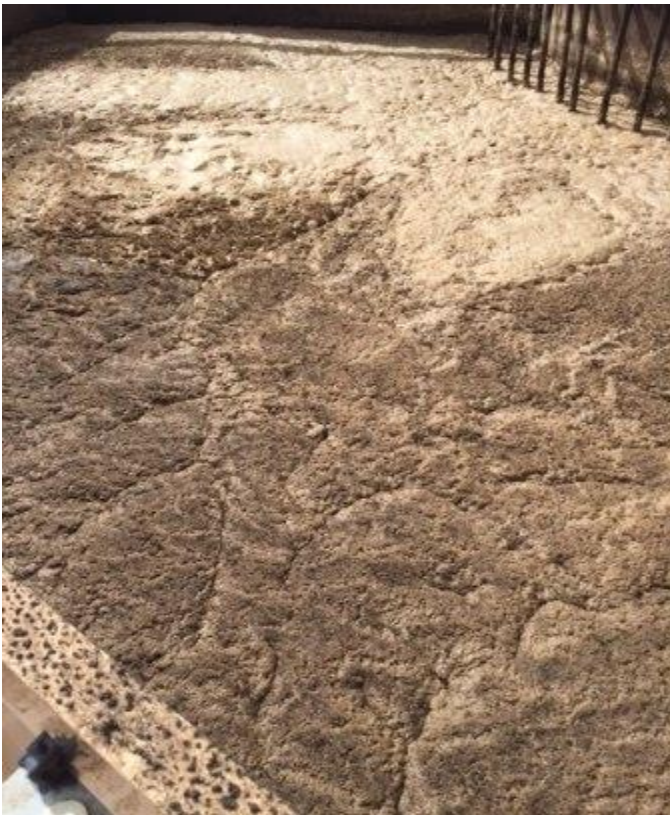
Pilot Testing Results Continued:



Pilot Testing Results Continued:



On-Site Pictures:



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 Western Environmental Equipment would like to express their gratitude to the Taylor – WWTP in Taylor, AZ, 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.

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