DIRECTOR'S REPORT FOR THE HAILEY PUBLIC LIBRARY
FOR THE MONTH OF OCTOBER 2013

Statistics Report	Current Month	Last Year 2012	% change	Notes
Patron visits	9072	8563	5.94	Patrons enjoy our warm, friendly space.
Circulation checkout	5838	6555	-10.94	
Circulation checkin	6124	6734	-9.06	
Total new patrons	56	73	-23.29	
Computer Users	1214	1070	13.46	
Total Patrons	4884	5178	-5.68	
Items added	295	401	-26.43	
Items deleted	375	59	535.59	Weeding of the juvenile nonfiction area.
Ebook circulation	127	64	98.44	This continues to be popular.
Email contacts	1859	1576	17.96	Patrons like the pre-overdue notices.
Website hits	1255	935	34.22	Our website is constantly updated. Patrons rely on the current information.
TumbleBooks	51	n/a		
Mallory website hits	2,912	15,779		
Facebook 'Likes'	221	n/a		
Money Collected				
Book Fines	$ 679.65	$ 843.40		
Debt Collections Fees	40.00	55.00		
Lost Books	220.43	83.00		
Paid Memberships	646.24	594.33		
Computer (printing)	301.30	307.37		
Over/Under	1.25	-2.20		
Lost card replacement	1.00	8.00		
Total Income	**$1,889.87**	**$1,888.90**		

Programs:

A busy month of programs!

- 10/8-**FALCONRY**, presented by David Skinner, US Forest Service in Fairfield, accompanied by two trained hunting falcons, Gabriel and Rohri. This was well-attended by both adults and families totaling 44 attendees. After attendee requests, David has volunteered to come back again in April, 2014 to speak again (third time), this time about the flora and fauna of the Wood River Valley and Camas Prairie.

- 10/15-**PALEO,** presented by Kyl Samway, Blaine Cross Fit Training and Carrie Morgridge, owner/operator of Hailey Coffee Company, who jointly presented on Paleo Lifestyle benefits. Fifteen adult attendees total. Staff provided some handouts and Carrie Morgridge brought some paleo "treats" from Hailey Coffee Company
- 10/22-**SUSHI 101**-presented by Bob Dix, a Hailey Elementary School Math and Art teacher who is of Japanese descent and learned sushi making from his Mother and Grandmother. Bob was an animated, well-informed presenter, engaging the 30 attendees in questions, participation, some hands-on preparation and as many samples as attendees could eat. This class was attended by primarily adults who were eager to learn sushi making techniques, but a few families with very involved children.
- October 2-Story Mania! Theme: Fall; Participation for this story time was 19 total, with 11 children.
- October 9-Story Mania! Theme: Sheep; Participation for this story time was 10 total, with 5 children. The theme tied in with the Trailing of the Sheep Festival that was taking place that weekend. The craft was cotton ball sheep.
- October 16- Story Mania! Theme: Leaves; Participation for this story time was 10 total, with 6 children.
- October 23- Story Mania! Theme: Monsters; Participation for this story time was 16 total, with 10 children.
- October 29-School Visit Theme: Monsters; This special story time was offered to the Community School after care program. The children were aged 4-5 and there were 9 present with 4 adults, including a mom.
- October 30-Halloween Story Mania! Theme: Halloween/Safety presented by special guest Sergeant Brad Gelskey of the Blaine County Sheriff's Department; Participation for this story time was lower than expected. 4 children and 4 adults attended.
- Four tween/teen programs were offered with a total of 27 kids in attendance. Four participated in a book club discussion of *A Seer of Shadows* by Avi.

ICfL:

- Jeanie Johnston and Lindsay Kavanagh attended an all-day conference in Boise sponsored by the Idaho Commission for Libraries. The topic was youth services and outreach. Both are excited to put their training into action.

City:

- I spoke with two fire chiefs regarding the Hailey.Recovers.org site and our experience during the Beaver Creek Fire. One chief was from Colorado Springs and the other from Cape Cod, Massachusetts. Both are interested in starting a Recovers site for their areas.

Staff:

- All library staff reviews have been completed and current job descriptions have been distributed. The updated job descriptions are also included in each individual personnel folder at the city.

Technology:

- A new barcode scanner has been purchased for staff to be used for cataloging purposes. The old pen style reader stopped working after many years of usage. The newer version is much more user friendly.

LYNX:

- Four staff members attended the HUG (Horizon User Group) conference in Eagle. I stayed an extra day for the director's meeting. Topics included technology, collection development, cataloging and library systems. It was very interesting and staff appreciated the opportunity to hear about advancements within the profession.

Development:

- Approximately 600 books were removed from the juvenile nonfiction section. Most of the books were worn and in bad shape. The collection needs to be updated. I am also evaluating the current weeding calendar and process to make improvements within each collection. Again, the shelf capacity of the current layout is maxed.

Building:

- I have been working with Tom Hellen and Heather Dawson to complete a library maintenance plan. I included revolving projects such as light bulb replacement, capital improvements and special projects.
- Volunteer Jack Dailey, has been working to install the holiday lights in the library windows. He will also put up the Christmas tree in the Sun Room. The exterior of the windows will be painted in November since the window painter will be out of the area until January. He will do some sort of 'Season's Greetings' theme. Of course books will be included.

LeAnn Gelskey
Director
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City of Hailey

MEMORANDUM

TO: Mayor and City Council

FROM: Mariel Platt, Sustainability Coordinator *MP*

RE: Blaine County Regional Bike/Ped Plan Update

DATE: December 2, 2013

In October, a selection committee chose Harmony Design and Engineering (Harmony), from Driggs Idaho, to create the regional bike/ped plan. Harmony has extensive experience with trail and pathway planning in other Idaho towns, particularly in McCall and Driggs, Idaho. Harmony was also the chosen contractor for the initial design of the 2010 River Street project in Hailey.

In November, the working group (BCRD, Mt Rides, Cities of Ketchum and Hailey, St. Luke's, Blaine County, and others) met with Harmony for a kick off meeting. Harmony is still in the information gathering phase and expects a draft to be available in January. Harmony will be conducting public outreach events with elected officials and the general public in January. Staff will be coordinating with the Mayor and Council to schedule the specific dates in the coming weeks.

As a reminder, Hailey agreed to fund a portion of contract using EPA grant match money. $2000 is planned to pay for Hailey's portion of this effort. (EPA granted approval as an eligible expense of the Hailey Community Climate Challenge.)

As an added benefit to the plan, Harmony informed the working group that they will be partnering with Boise based Vitruvian Planning to also conduct a health impact assessment (HIA). The HIA takes into consideration how decisions on policy and planning (especially infrastructure) impact the health of a community. For the Blaine County Regional Bike/Ped Plan, the HIA will give us an idea of the impacts of implementation of the plan and what benefits it will have on our community health. Among other things, it will evaluate how building bike lanes and additional bike/ped connections will improve obesity rates. This portion of the plan will be funded by a state-wide grant received by Vitruvian Planning.

The plan will meet the following objectives and desired outcomes:

- A picture of where we are in the evolution of biking and walking in Blaine County including identifying the needs and giving context to how bicycle and walking improves the overall community ethos, health and safety
- Easy to understand, adoption and implementation standards for bicycle and pedestrian infrastructure
- A roadmap for the future development of biking and walking infrastructure that identifies short-term, mid-term and long-term opportunities that can be implemented as funding allows
- Tools for making existing and future infrastructure safer for users

- Flexibility to allow both cohesion among the communities and the ability for each community to have their own identity
- Policies that can help guide all the communities of Blaine County to make biking and walking safer, more accessible, and more desirable with improved connectivity
- Milestones that help us celebrate successes and mark progress
- Strategies that inform the public and elected officials on results, benefits and economic value

The plan is expected to include:

I. Overview and intro.
II. Inventory of existing infrastructure.
III. Assessment of needs and opportunities, using existing data, for improving biking and walking in Blaine County.
IV. Aggregation of bicycling and walking data from existing sources and basic data analysis.
V. Design standards for street treatments, sidewalks, bicycle lanes, pathways, way-finding and amenities.
VI. Prioritized project plan.
VII. Implementation strategies.
VIII. *Policies and procedures.
IX. *Education and safety programs.
X. *Funding plan.

*NOTE – these items VIII through X are not funded at this point and would only be part of an extended plan if additional funding were to be made available to the project.

City of Hailey

Solids Processing Improvements

Pilot Summary Report

Draft
November 2013

HDR Engineering, Inc.
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Boise, ID 83706
(208)387-7000

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Executive Summary

The City of Hailey operates the Woodside Boulevard Wastewater Treatment Plant, a sequencing batch reactor (SBR) with an aerated sludge storage tank for storage and stabilization. The aerated sludge storage tank is located in a former packaged wastewater treatment plant, which was built in 1974. The packed plant was not designed to serve as a solids handling facility, although the City has been able to utilize the infrastructure for an additional 13 years after the sequencing batch reactor facility was constructed in 2000. The 2012 Wastewater Facility Plan recommended replacement of the existing packaged plant with a new sludge storage tank (sized for approximately 6 days of storage at projected 20 year design flows), improved sludge thickening, and continued hauling of liquid sludge to the Ohio Gulch Landfill drying beds. Based on additional project drivers identified by the City after completion of the Wastewater Facility Plan, including operations staff safety and elimination of hauling to and use of the drying beds, the City expressed a desire to construct a treatment process with improved sludge stabilization capable of meeting CFR 503(d) Class B biosolids requirements at the wastewater treatment plant (WWTP).

The Solids Handling Improvements Preliminary Engineering Report (PER) recommended a new aerobic digester with recuperative thickening followed by dewatering with a screw press to produce Class B biosolids. Additionally, the PER recommended the City conduct pilot testing of several municipal sludge dewatering screw presses.

The benefits to the City and the goals of the pilot testing are as follows:

- Provide the operations staff with exposure to the new equipment;
- Assess operational requirements and parameters including equipment complexity, labor, polymer consumption, and power consumption;
- Assess maintenance requirements labor;
- Determine equipment performance based upon liquid and solids throughput capacities, cake solids, polymer usage, and capture rate;
- Identify any full-scale design implications and confirm design criteria and assumptions prior to proceeding with detailed design; and
- Allow a present-worth cost comparison to be conducted.

Based on discussions with operations staff and recommendations from HDR Engineering (HDR), four manufacturers were identified for testing:

- FKC Co., Ltd.
- Huber Technology, Inc.
- Schwing Bioset, Inc.
- Process Wastewater Technologies LLC

A fifth manufacturer, Prime Solutions, Inc., (makers of a rotary press) was allowed to pilot test their equipment concurrent with the scheduled pilot testing; however, their testing was limited to one day on-site, the testing did not meet the minimum requirements, and the manufacturer's representative did not adhere to the pilot testing protocol which prevented development of data that would allow for direct comparison to the other manufacturers. Overall, the consensus between operations staff and HDR was that this manufacturer should not be considered for inclusion in the project and as such, further information about their pilot testing is excluded from this report.

Prior to the pilot testing, HDR developed a pilot testing protocol so that each pilot test would be performed under similar conditions testing similar parameters and the results could be compared. The criteria used to develop the protocol included:

- Dewatered solids cake should be between 15 to greater than 20 percent.
- Polymer (coagulating chemical) usage should be minimized.
- Operational complexity and maintenance effort should be minimized.

In advance of the pilot testing, HDR provided a copy of the draft protocol to the manufacturers and requested information about their pilot unit so utility and disposal requirements could be coordinated with the City.

The City worked with a local polymer vendor to conduct onsite jar testing in advance of the pilot testing to find one or two viable polymers that could work well with each pilot unit. Two emulsion polymers were ultimately selected: a cationic structured polymer (WEP 984) and a cationic linear polymer (WEP 991). Both of these polymers were tested for at least one trial for each pilot unit to provide a basis for comparison between the manufacturers. The manufacturers also completed their own jar testing in advance of the pilot testing and provided their preferred polymer for pilot testing.

The pilot units were set up on the north side of the existing sludge storage tank. Power and water were available nearby and were connected by the manufacturers with help from the City. Sludge was pumped from the aerated sludge storage tank to each of the pilot units utilizing transfer pumps provided by the manufacturers. The pressate (water pressed out of the sludge) was returned to the headworks through an existing plant drain. The dewatered cake was stored onsite to be hauled to the landfill for ultimate disposal.

The manufacturers conducted field analysis for screw press inlet solids, cake solids, and pressate solids while the City conducted independent, duplicate analyses of the same samples in the laboratory. While the field analyses were adequate for process control, the laboratory results are more accurate and are used for reporting in this document.

To understand the impact of changing operational parameters, typically only one parameter was modified for each trial run so that the resulting impact on performance parameters could be documented. A summary of the pilot testing results is provided in Table 1 and shows the range of results for all of the trial runs for each manufacturer.

Table 1: Summary of Pilot Testing Results[1]

Manufacturer	Number of Trials	Screw Speed (rpm)	Active Polymer Dose (active lb/dry ton)	Sludge Flow (gpm)	Influent TS (%)	Cake TS (%)	Dry Solids Throughput (lb/hr)
FKC-Class B	9	0.30-0.75	10.6 to 18.6	2.60-4.41	1.13-1.16	14.7-19.3	11.4-25.8
FKC- Class A	1	0.30	23.8	3.45	1.79	32.6[2]	19.0
Huber	28	0.40-0.70	24.0 to 30.7	8.0-18.0	1.06-1.18	13.8-20.7	6.4-19.4
PW Tech	22	0.60-1.50	3.3 to 23.2	10-12	1.02-1.12	16.1-23.9	8.9-12.1
Schwing	9	0.17	12.5 to 31.3	15.0	1.3-1.9	15.1-20.7	82.2-118

[1]Multiple polymers were used throughout the pilot testing for each manufacturer. This summary does not separate results by polymer type as the purpose of the pilot testing was not to test polymer, rather the function of the screw presses.

[2]Class A pilot test trial included lime addition.

Each pilot unit produced acceptable cake solids, generally between 15 to 20 percent solids, which are typical for aerobically digested solids. The following charts (Figure 1 through Figure 4) show the pilot performance for each manufacturer. Each chart shows the cake solids and the polymer dose (as active polymer). The different polymers that were tested by each manufacturer are noted on each graph. The WEP 984 structured polymer was tested with each manufacturer. The FKC pilot unit required 15 to 18 active pounds of polymer per dry ton of solids to produce cake solids of 13 to 17 percent. The Huber pilot unit required 26 to 35 active pounds of polymer per dry ton of solids to produce cake solids of 17 to 21 percent. The WEP 984 was only tested one time on the Schwing pilot unit. The result from this test indicate that the Schwing pilot unit required 21active pounds of polymer per dry ton of solids to produce cake solids of 19 percent solids. The PW Tech pilot unit required 18 to 23 active pounds of polymer per dry ton of solids to produce cake solids of approximately 23 percent. While there were other polymers tested that performed better on each of the units, this polymer allowed a direct performance comparison between the units. Huber required the highest polymer dose, but achieved similar percent cake solids. FKC used the lowest amount of polymer, but achieved the lowest percent cake solids. These results are similar to results from other dewatering pilot testing completed recently in the northwest.

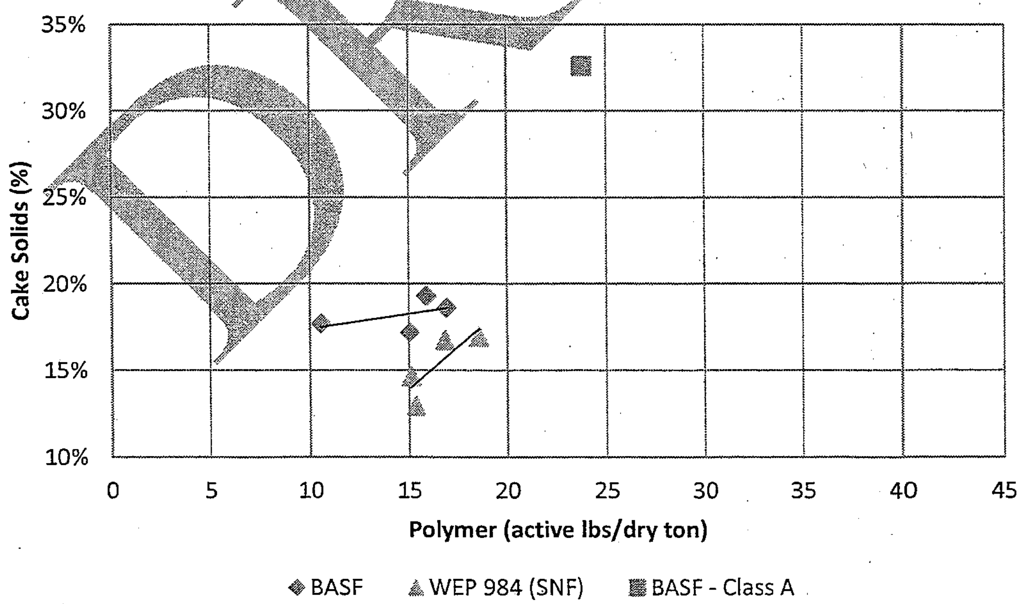

Figure 1: FKC Pilot Results - Polymer Dose vs. Cake Solids

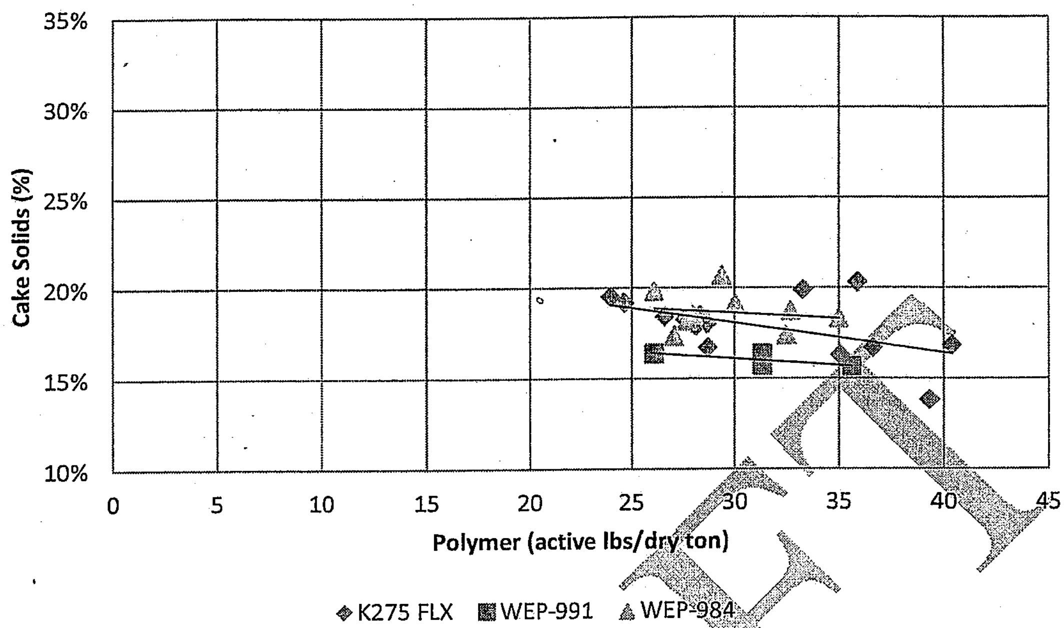

Figure 2: Huber Pilot Results - Polymer Dose vs. Cake Solids

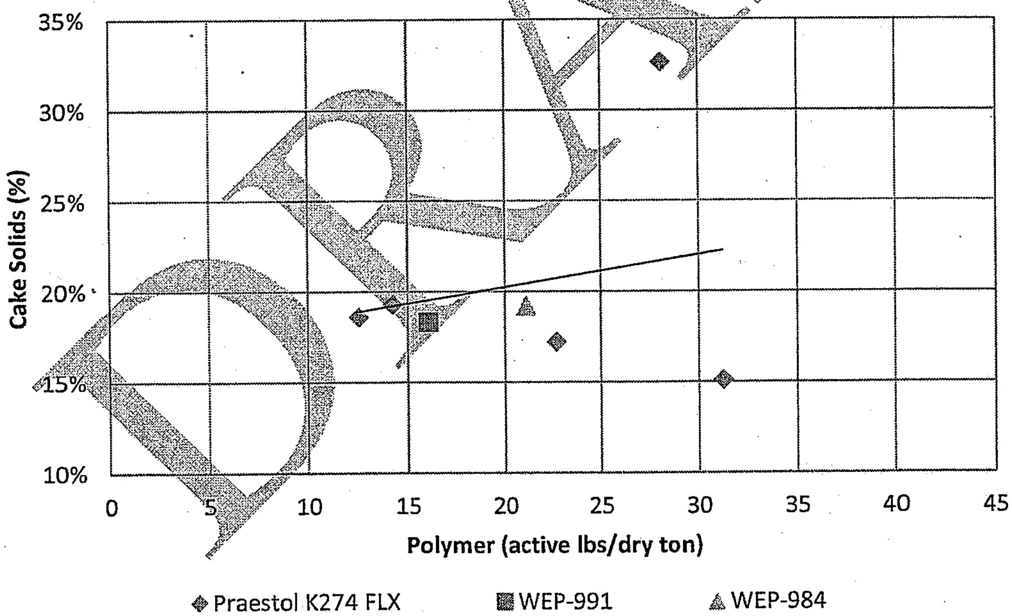

Figure 3: Schwing Pilot Results - Polymer Dose vs. Cake Solids

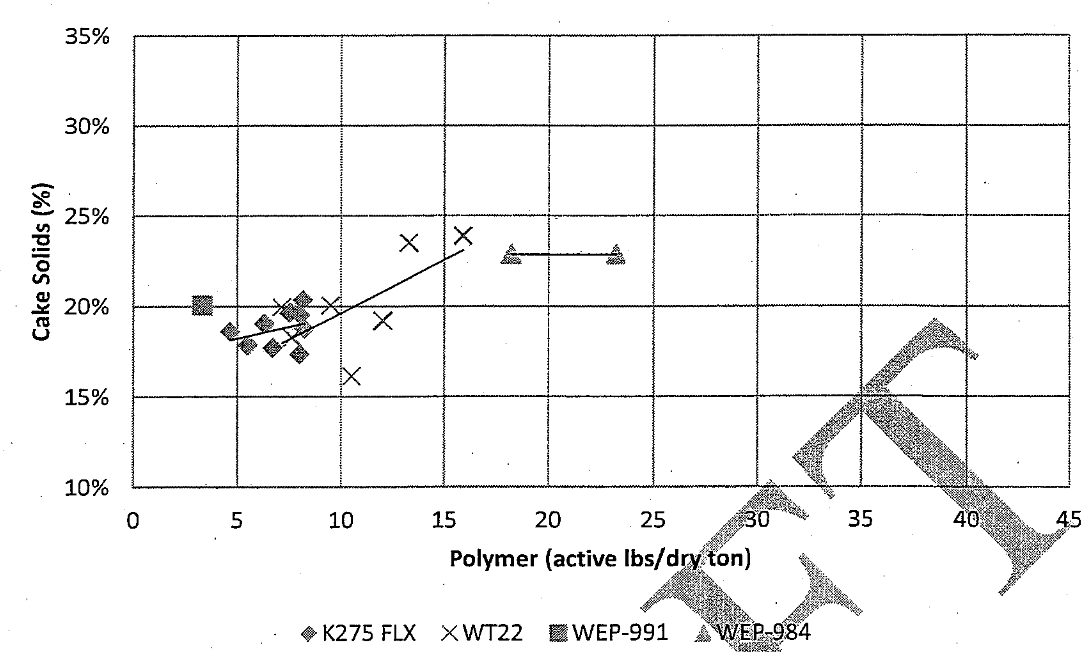

Figure 4: PW Tech Pilot Results - Polymer Dose vs. Cake Solids

The results from each pilot test are compared in Figure 5 and Figure 6. Figure 5 shows the cake solids and active polymer dose for each manufacturer. The results for each polymer that was tested for each manufacturer were averaged and shown as separate points on the figure. Figure 6 compares the two polymers that were selected based on polymer testing completed by the City. The average cake and active polymer dose are shown for each manufacturer.

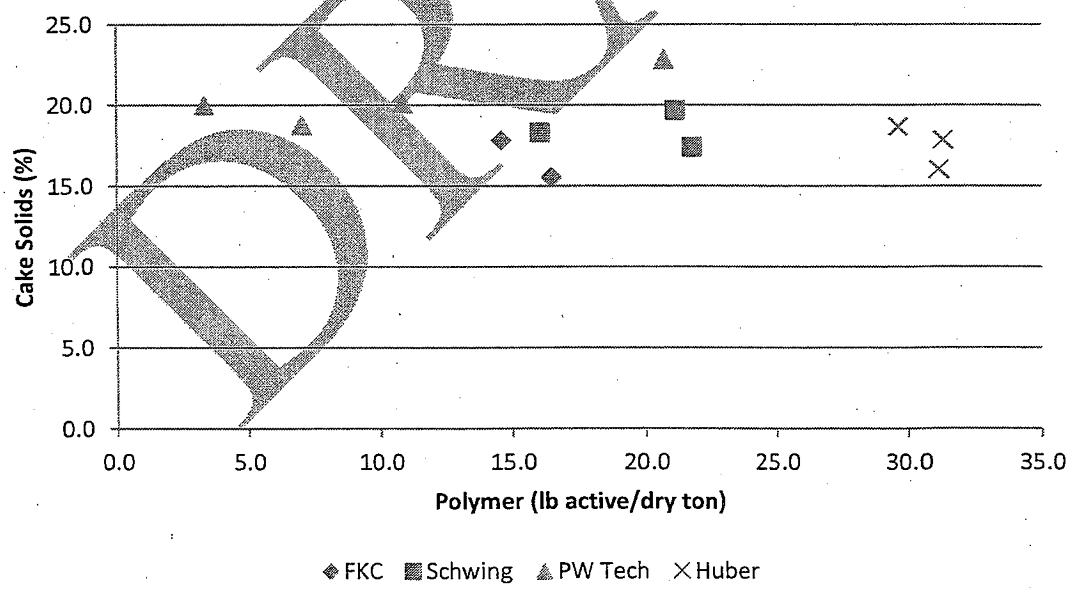

Figure 5: Results Comparison for Four Manufacturers

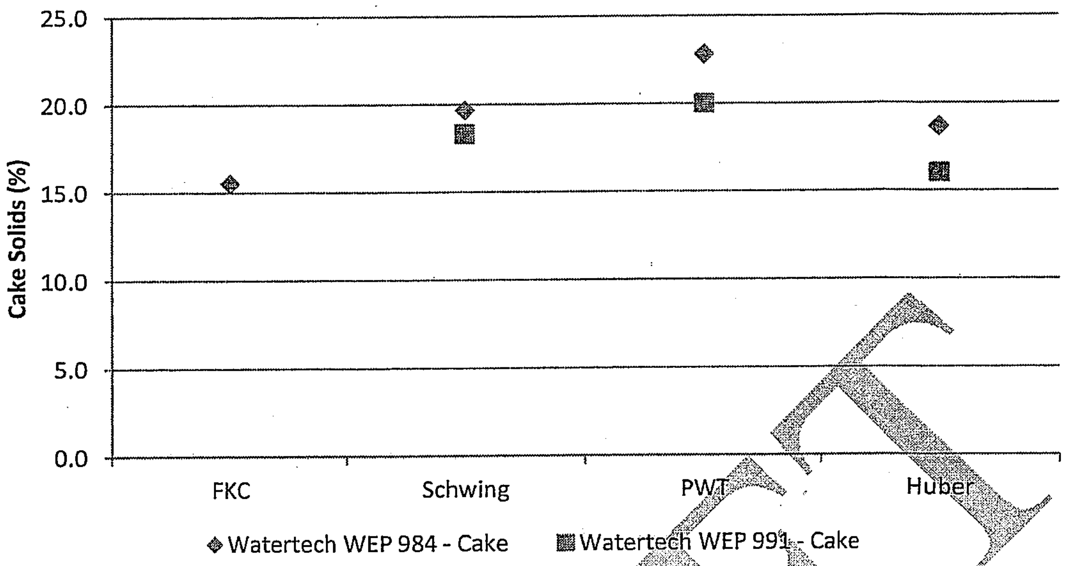

Figure 6: Cake Solids Results Comparison for Two City-Selected Polymers

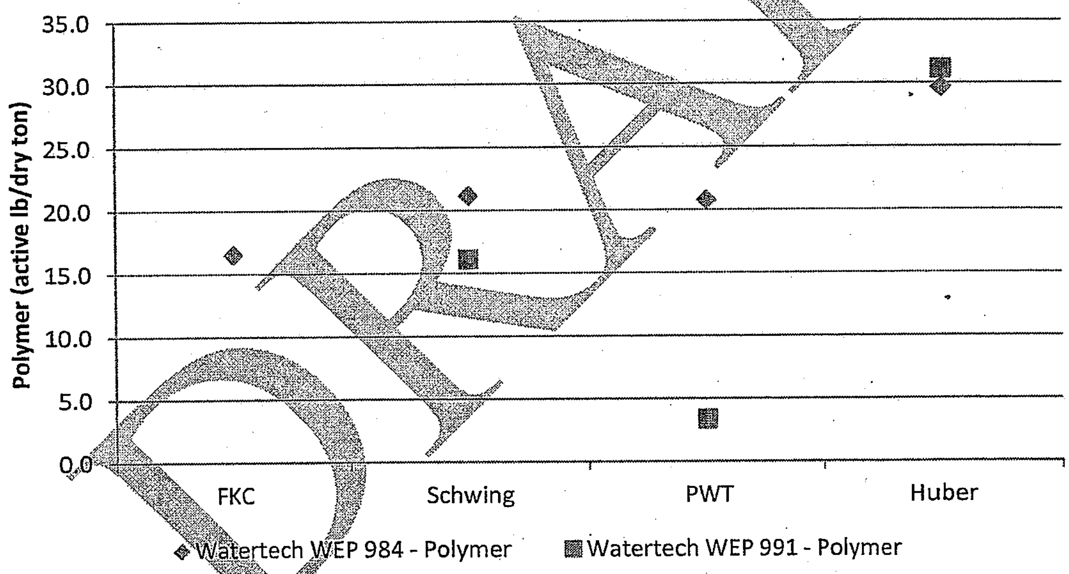

Figure 7: Polymer Dose Results Comparison for Two City-Selected Polymers

Based on the results presented in the previous figures, it appears that the cake solids are independent of the polymer dose if the minimum flocculation is attained. The Huber results were fairly flat, indicating that a lower polymer dose can achieve the same or similar cake solids percentages with the same unit.

After completing the pilot testing and discussing the unique features of each unit with the City operations staff, it is not anticipated that there will be a significant difference in maintenance costs between the four manufacturers; however, the costs will still be based upon estimated labor and maintenance materials. The estimated operations costs are based on power requirements, chemical addition, cake transportation, and labor. Detailed operations and maintenance cost estimates are provided in Section 8.1.2 The WEP 984 polymer was used to calculate the estimated chemical costs since it was used for testing with each manufacturer. The most substantial difference in operations costs between the manufacturers is for chemicals and transportation. A summary of the capital, operations, and net present value costs are provided in Table 2.

Table 2: Summary of Capital, Operations, and Net Present Value Costs

Manufacturer	Budgetary Price for Screw Press[1]	Estimated Annual Operations Cost[2]
FKC		$167,000
Huber		$169,000
PW Tech		$169,000
Schwing		$166,000

[1]Cost of the dewatering unit and controls only. Does not include costs for polymer system, pumps, installation or other solids handling improvement project costs.
[2]Detailed O&M costs are presented in Section 8.1.2.

The pilot testing confirmed that each of the screw press units can achieve the 18 percent cake solids goal for dewatering under varying conditions and with different polymers. The pilot testing provided the City of Hailey operations staff with an opportunity to learn how the machines are operated and maintained. Huber and FKC have a substantial number of United States installations including a number with aerobic digestion. PW Tech is relatively new to the United States market but they have a proven installation list across the United States. These three manufacturers performed comparably regarding polymer use and cake solids percentage. After power costs, which are similar for all manufacturers, the tipping fees, and then polymer cost will have the largest impact on the annual operations costs. Because of this, it is recommended that the City develop a performance requirement included in the dewatering specification. The procurement strategy is an important part of implementing dewatering into the final design. Procurement strategy options are discussed in Section 8.3.

- All manufacturers demonstrated their ability to achieve a minimum of 18 percent cake solids.
- The required polymer dosage greatly varied depending upon polymer type.
- The equipment procurement process needs to be selected immediately.
- The operations staff gain hand on experience with operations and an understanding of the maintenance requirements for each unit.

1 Introduction

The City of Hailey operates and maintains the Woodside Boulevard Wastewater Treatment Plant (WWTP), which treats wastewater from the City of Hailey service area. The facility consists of screening and grit removal, secondary treatment in a sequencing batch reactor, filtration through cloth media filters, and ultraviolet disinfection. Solids handling includes aerated solids storage and gravity thickening prior to hauling. The City of Hailey hauls liquid sludge (approximately 1 percent solids) to the Ohio Gulch Landfill, operated by Blaine County, for further treatment in the drying beds to produce Class B biosolids that are disposed of in the landfill. The current treatment plants flow is approximately 0.6 million gallons per day (mgd) with a design capacity of approximately 1.6 mgd.

Liquid digested solids (approximately 1 percent solids) are currently hauled approximately 8.5 miles to drying beds at the Ohio Gulch Landfill under a contract that extends through 2019. The drying beds are shared with the City of Ketchum, City of Bellevue, and the Meadows. Under the agreement, Hailey provides the labor and equipment to maintain the drying beds and transfer the dried biosolids to the landfill for use in re-vegetation and cover. As Hailey moves forward with their biosolids management program, they are considering biosolids handling alternatives that decrease hauling costs, eliminate drying bed use, and provide beneficial biosolids reuse through land application practices.

The recommended dewatering alternative presented in the *Solids Handling Improvements Preliminary Engineering Report* is a screw press. To provide additional information to support equipment selection, HDR Engineering, Inc. is assisting the City of Hailey with conducting pilot testing of municipal sludge dewatering equipment. In advance of on-site pilot testing, the City requested information from select screw press manufacturers and provided a pilot testing protocol so that each pilot test was performed under similar conditions and the results could be compared.

The criteria used to develop the protocol and to compare the pilot testing results for ultimate screw press selection for the City of Hailey WWTP include the following:

- Dewatered solids cake between 15 to 20 percent,
- Minimal polymer usage,
- High solids capture, and
- Simple operation and low maintenance.

2 Pilot Testing Goals

The goals of the pilot testing were to determine the effectiveness of various screw presses under similar operating conditions. The results will be used to identify any full-scale design implications; obtain operational parameters, including polymer and power use; and provide the plant staff an opportunity to familiarize themselves with the operation and maintenance of the specific equipment. The performance requirements included percent solids cake, polymer usage, solids capture, operation and maintenance, cleaning requirements, and utility requirements. Additional pilot testing goals included the following:

- Determine the effectiveness of the screw presses to dewater sludge.
- Collect operational data (i.e. screw speed, polymer dose, cake dryness, etc.) to anticipate full-scale design parameters.
- Familiarize plant staff with screw press equipment operation and maintenance.

Based on the recommendation in the pilot report, the City planned to design a system that is capable of producing Class B biosolids but has the potential to produce Class A biosolids in the future. One of the

Class A treatment options that was considered was the FKC Co. Ltd patented Class A process. During pilot testing, the option of producing Class A biosolids using the FKC Class A process was discussed. With this process, it is possible to treat the WAS through pasteurization by adding lime upstream of the screw press, then dewatering using the heated screw press to achieve Class A biosolids . The City was interested in seeing how this process works and pilot tested the FKC Co. Ltd patented Class A process during the on-site pilot testing.

3 Pilot Testing Setup

The pilot units were located north of the existing sludge storage tank. The site was selected due to the close proximity of the digested sludge source, power, and washwater. The location was also flat and provided access for the pilot trailers. A summary of the specific space, power, sludge feed, water, and filtration disposal requirements associated with each pilot unit is included in Appendix A.

3.1 Source Sludge

Digested sludge was fed to the pilot units by a temporary hose that was placed in the aerated sludge storage tank. A submersible pump was used to pump the sludge up to the pilot unit, and most of the pilot units had individual pilot feed pumps to supply the screw press. The City of Hailey was dosing PAX-14 to the influent wastewater for phosphorus precipitation at a constant rate throughout the pilot testing period. The feed sludge total solids concentration was consistent between each pilot test, reducing variability due to feed sludge characteristics.

3.2 Power

Power was supplied from a 480 volt (V),three-phase panel within the sludge storage dome. Power was available within approximately 100 feet of the trailer. The City of Hailey identified a spare electrical breaker for power supply. The vendor was responsible for safely wiring between the motor control center and the trailer unit.

3.3 Water

The pilot units all required a water source for the automated cleaning systems. Water was also required for polymer activation systems. Potable water was available from several hose bibs within the domed sludge digestion tank area. The vendor was responsible for supplying hoses to bring water from the domed structure to the pilot trailer.

3.4 Polymer

The initial polymer used for dewatering testing was determined and provided by the manufacturers. The City of Hailey performed separate polymer testing and two polymers were tested on each of the screw presses following testing with the manufacturer-provided polymer.

3.5 Cake Disposal

Dewatered cake produced by the pilot units was collected in a loader bucket. Cake disposal was completed by the City of Hailey.

3.6 Pressate Disposal

The pressate from the dewatering pilot equipment was disposed of through a manhole connected to the influent pipeline, which feeds the influent wet well, approximately 50 feet from the trailer location.

3.7 Understanding Results

Both the equipment manufacturers and the City of Hailey completed laboratory testing for each of the sample runs for each pilot test. The results discussed in this report used the City of Hailey's lab testing results for solids to provide a standard comparison between each pilot test and each manufacturer. A comparison of City of Hailey and manufacturer feed and cake solids data is provided in Figure 5 and Figure 6. The majority of the testing is comparable; however, there are a few sample points that do not align. Because the City of Hailey performs their testing using standard methods, and the same methods were used for each pilot test, these data were used as the basis of comparison in this report.

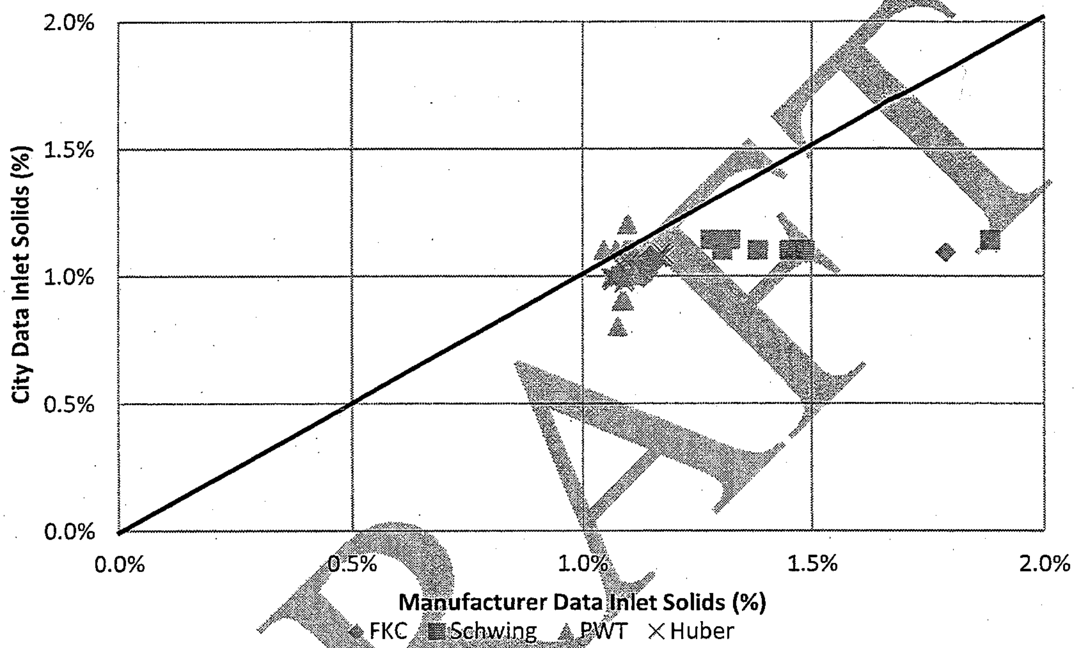

Figure 8: Inlet solids testing comparison of City and equipment manufacturer data

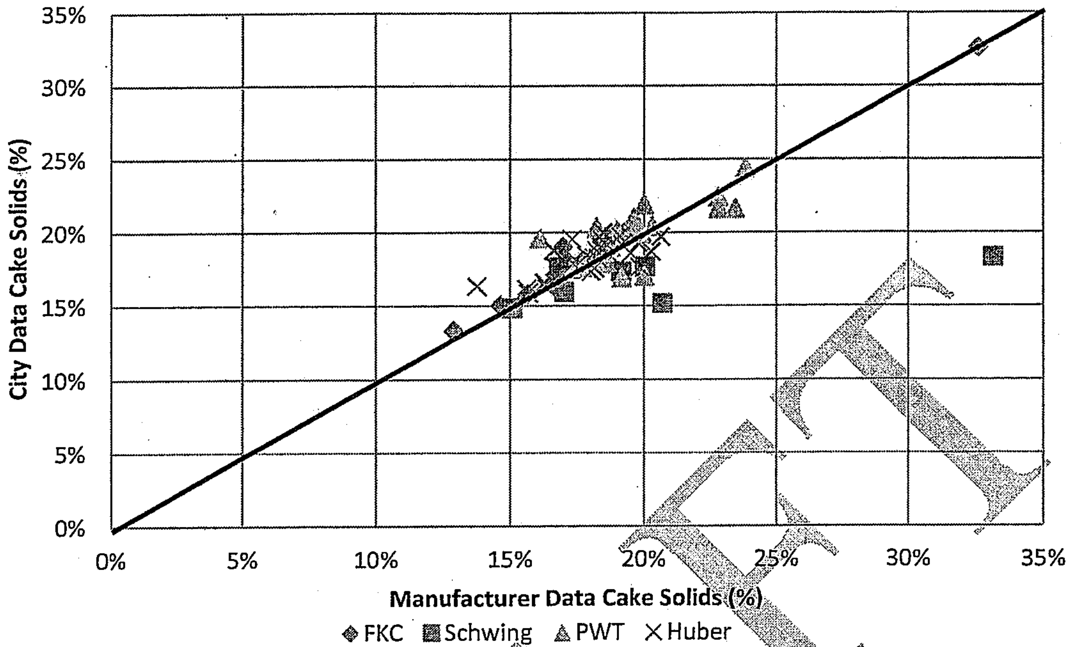

Figure 9: Cake solids testing comparison of City and equipment manufacturer data

4 FKC Screw Press

4.1 Unit Description

The FKC Ltd. Pilot is a trailer-mounted, self-contained screw press, including sludge feed pump, polymer activation system, flocculation tank, and sludge storage tanks. Figure 7 shows a schematic of the FKC pilot arrangement. For most of the tests, the boiler and steam addition were not used. For one test, the Class A unit was tested, which included the steam and lime addition. The Class A unit was tested to determine what performance could be expected if the City decided to pursue Class A biosolids in the future.

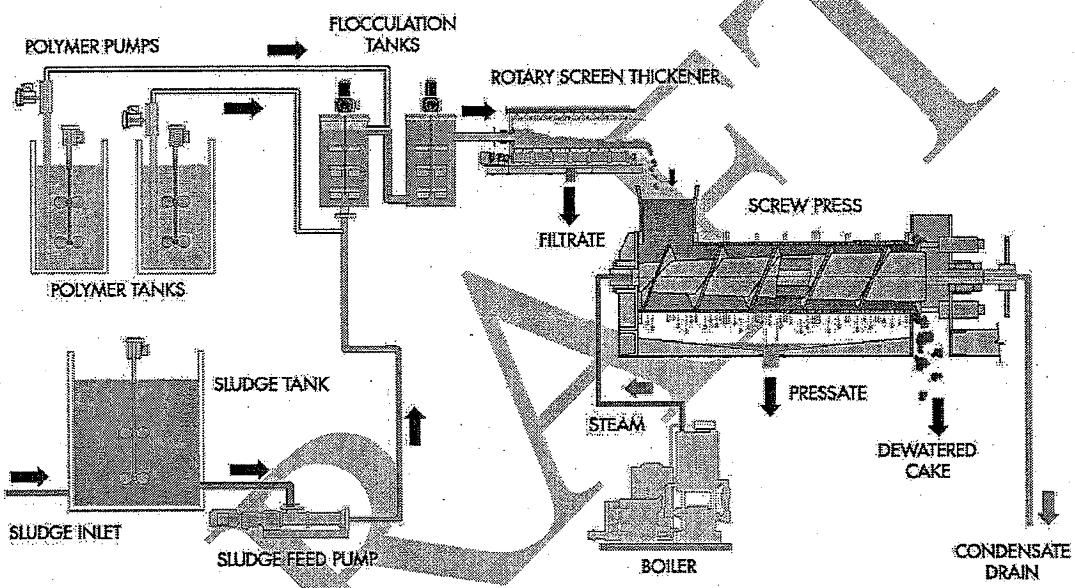

Figure 10: FKC Pilot System Schematic (From FKC Website)

Pilot testing was operated in batches, not continuously fed. The duration of each pilot test run was approximately one hour. This allowed 30 minutes to empty the screw and then 30 minutes to perform the test under new operating conditions. The sludge tank was filled from the gravity thickened zone of the aerobic digester. Polymer was made up by hand in the polymer storage tank and diluted to approximately a 0.5 percent solution. The polymer tank was equipped with a mixer to maintain a consistent solution. The polymer was pumped from the polymer tank to the flocculation tank. The polymer dose was preset for each pilot run and remained constant throughout each pilot test.

The sludge and the polymer were combined at the inlet of the flocculation tank. The flocculator operated at a continuous speed and no adjustments were made to the flocculator speed throughout the pilot testing. The flocculated sludge overflowed by gravity to the screw press headbox. The level in the headbox controlled the sludge feed pump, polymer feed, and flocculator based on a level switch operated between two points.

Cake was collected in pre-weighed buckets. The cake solids were weighed to calculate solids throughput by FKC. FKC conducted separate total suspended solids (TSS) sampling and analysis (Appendix B).

Duplicate samples were analyzed in the City of Hailey's wastewater laboratory. The City's results are reported in the summary below.

4.2 Screw Press Pilot Testing Setup

There are three operating parameters that control the performance of the FKC screw press: screw speed, screw design, and polymer addition. One of these parameters was adjusted for each pilot run to determine the resulting press performance. Three primary characteristics were measured to determine the pilot performance: throughput, polymer usage, and cake solids content.

Preliminary laboratory testing was conducted by FKC prior to onsite pilot testing. The laboratory testing was used to gain preliminary knowledge regarding polymer type and dosage for use during pilot testing. The testing allowed the onsite technician to optimize the performance of the screw press based on a smaller range of variables.

4.2.1 Screw Design

The FKC screw press consists of a screw surrounded by a stainless steel screen, discharge points for filtrate and cake, and an automated cleaning system. The first third of the screw length provides gravity drainage to eliminate the majority of the water that will be removed. The last two thirds of the screw press is the compression zone. A schematic of the screw press is shown in Figure 8. The pilot testing was performed with the FKC 1004 and 1003 screw design, both of which are specifically designed for municipal biosolids dewatering.

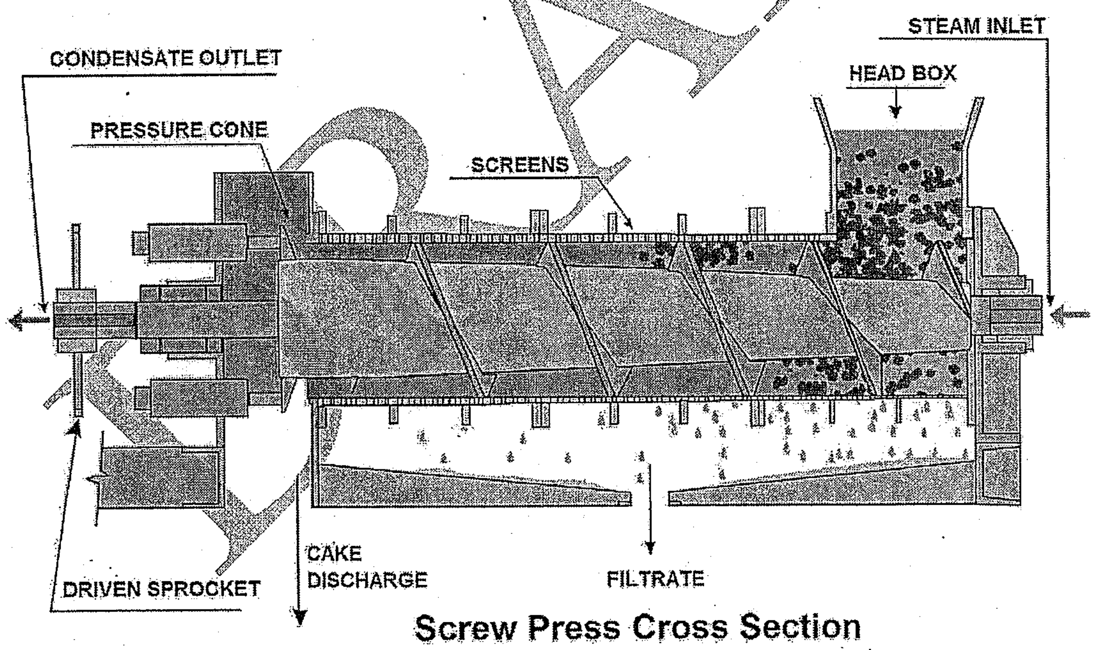

Figure 11:Cross Section of FKC Screw Press (From FKC Website)

4.2.2 Polymer Type and Dosage

Two polymers were selected in advance of pilot testing. FKC completed jar testing and determined that the BASF ZETAG 7878 FS40 (50 percent active) was an optimal polymer. FKC also provided a secondary polymer for testing, SNF C-9530. The City of Hailey had a polymer vendor do independent jar testing, which identified WEP-984 as a structured polymer to test. The WEP-984 (35 percent active) is the same as the SNF C-9530 that FKC provide. The SNF polymer was tested as well. Both polymers are liquid emulsion polymers that are structured, as opposed to linear. The polymer was mixed in a batch process using 850 milliliters (mL) of polymer in a 170-liter (L) tank.

4.2.3 Screw Speed

This operating factor has a substantial affect on the pilot results. Screw speed is adjustable and controls the throughput on the machine. Lower speed allows for better dewatering (higher cake solids) and a higher speed allows for higher throughput, but lower cake solids. The equipment can be optimized at startup to operate at a slow speed and lower polymer to achieve the consistent dewatering. At higher future throughput rates, the machine speed and polymer dose would have to be increased to maintain dewatering. The system has flexibility to change the capacity. Throughput was measured by collecting the cake solids for a specified period of time and weighing the volume of solids generated in that time. Three screw speeds were used during the pilot testing: 0.30, 0.50 and 0.75 rpm.

4.3 FKC Pilot Results

A total of ten trials were conducted during pilot testing. Six tests were conducted using the BASF polymer and four were conducted with the SNF polymer. Visually, all trials produced cake with no free-draining water. The solids were well-flocculated and produced large flocs that could be dewatered. Trial 10 was performed using the Class A screw with lime and heat addition to test the possibility of producing Class A biosolids. The maximum cake solids content without lime addition was 19.3 percent. The dry solids throughput was based on manufacturer's data of actual weight of solids produced during each trial run and the City of Hailey's cake percent solids data. A summary of the screw press pilot results for the FKC unit is provided in Table 3. The FKC pilot report is provided in Appendix B.

Table 3: FKC Summary of Pilot Testing Results

Trial	Screw Speed (rpm)	Polymer Type	Active Polymer Dose (active lb/dry ton)	Sludge Flow (gpm)	Influent TSS (%)	Cake TSS (%)	Dry Solids Throughput (lbs/hr)
1	0.30	BASF[1]	15.9	3.51	1.15	19.3	15.5
2	0.30	BASF[1]	16.9	3.25	1.13	18.6	14.5
3	0.50	BASF[1]	15.1	4.41	1.13	17.2	20.7
4	0.75	BASF[1]	No Data	No Data	1.13	15.7	25.8
5	0.30	BASF[1]	10.6	2.60	1.13	17.7	13.1
6	0.30	SNF[2]	16.9	2.87	1.16	16.7	11.4
7	0.50	SNF[2]	15.1	3.21	1.16	14.7	15.3
8	0.75	SNF[2]	15.4	3.65	1.13	12.9	17.8
9	0.30	SNF[2]	18.6	3.21	1.15	17.0	13.3
10[3]	0.30	BASF[1]	23.8	3.45	1.79	32.6	19.0

[1]BASF ZETAG 7878FS40, 50% active

[2]SNF C9530,35% active (Watertech WEP-984)

[3]Class A trial – One Class A trial was conducted to understand the Class A performance with the specific sludge characteristics.

Figure 9 provides a graphic depiction of the screw press parameters and results of pilot testing.

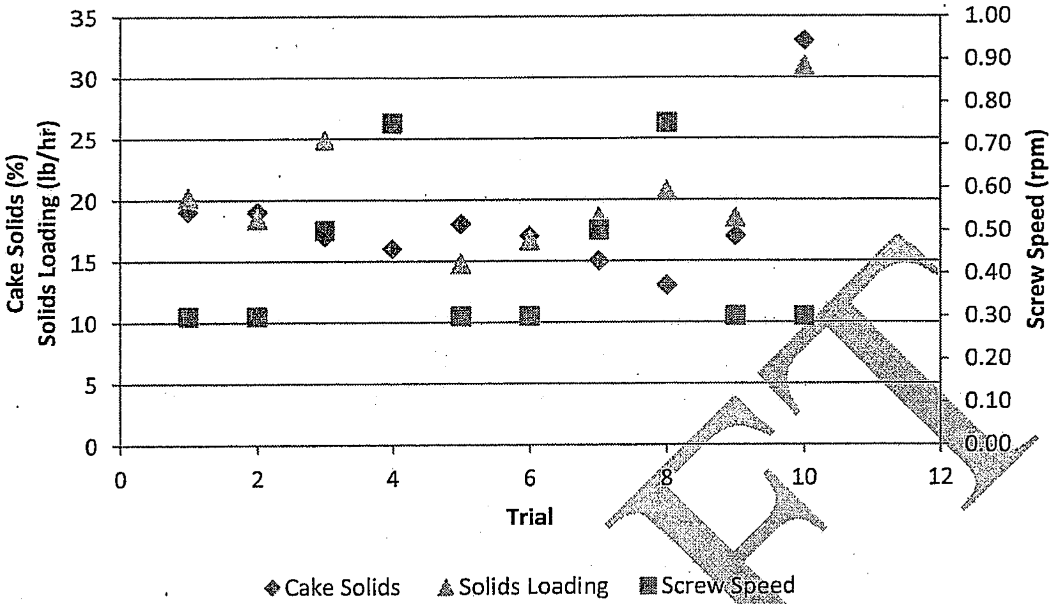

Figure 12: Summary of FKC Pilot Testing Parameters and Cake Solids

The screw press was operated with multiple polymers and various dosing rates. The polymer dose ranged from 10.6 to 18.6 active pounds of polymer per dry ton of solids (active lb/dry ton). Figure 12 summarizes the polymer dose and associated cake solids TSS for the two different polymers that were tested. The BASF polymer performed the best, indicating that the polymer dose can be optimized to reduce the overall polymer addition while maintaining adequate cake solids.

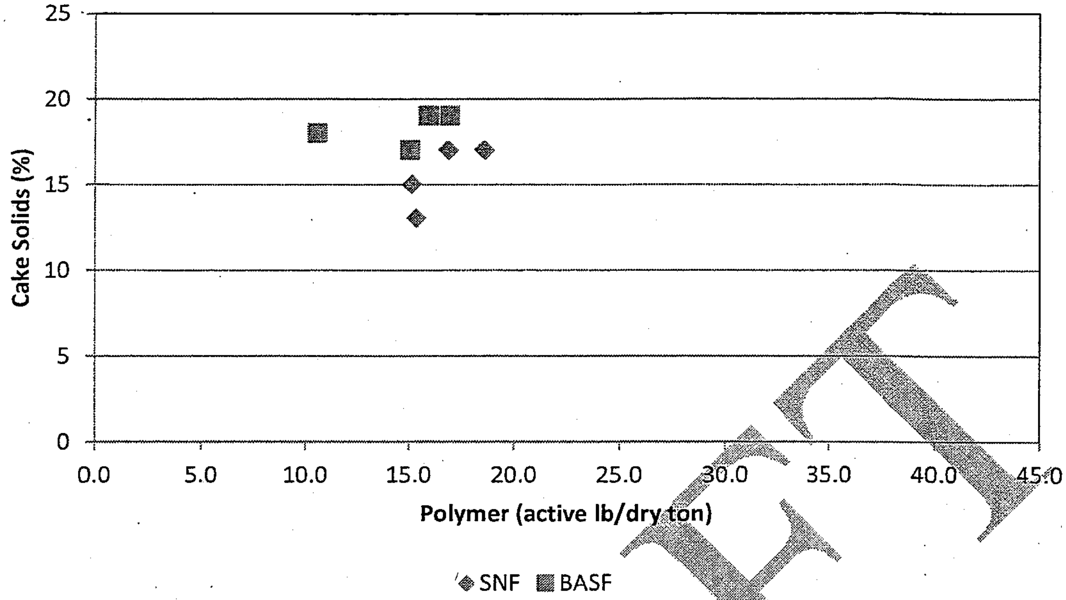

Figure 13:FKC Polymer Dosing Summary

The solids loading results are shown in Figure 11. There is a dramatic decline in cake solids performance at increased solids loading rates, with the SNF polymer. The cake solids were consistent with the BASF polymer.

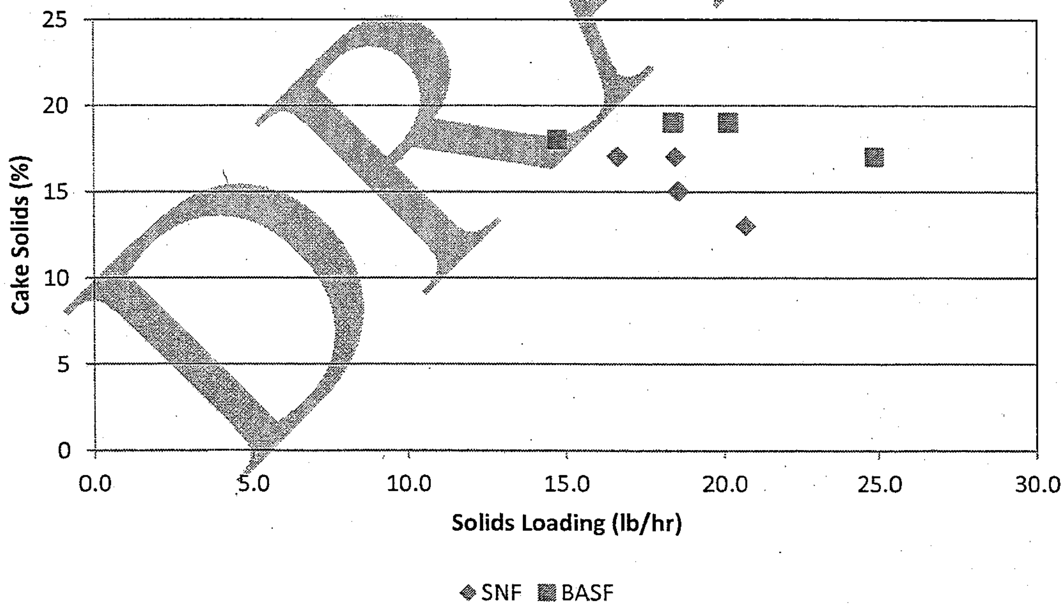

Figure 14:FKC Solids Loading Summary

The screw speed results are shown in Figure 12. As the screw speed increased, the cake solids percentage decreased, similar to the solids loading rate.

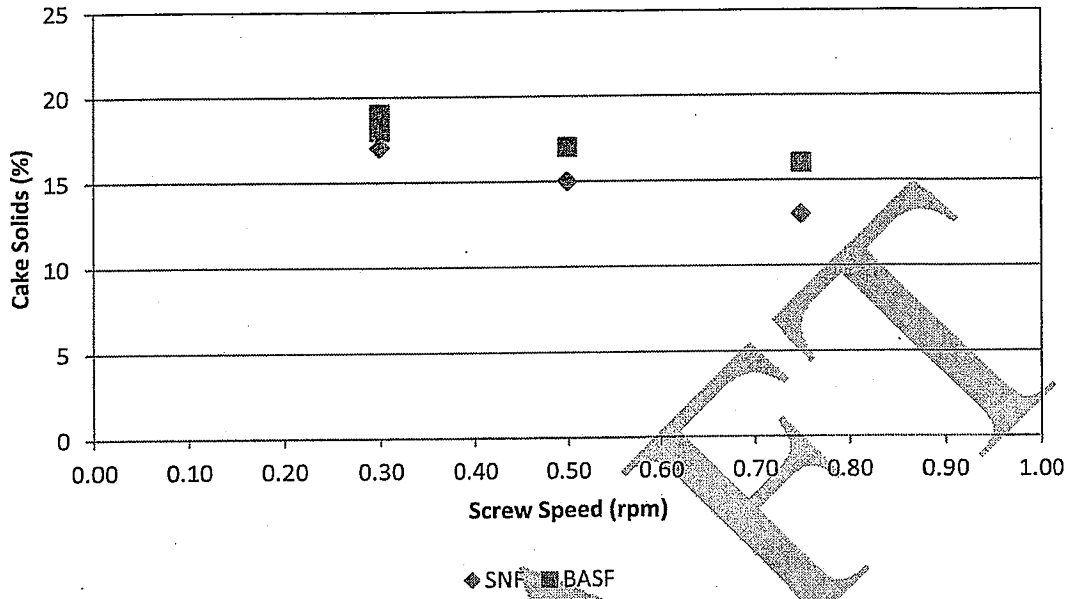

Figure 15:FKC Screw Speed Summary

5 Huber Screw Press

5.1 Unit Description

The Huber Technology, Inc. (Huber) pilot unit is a trailer-mounted, self-contained screw press (RoS3Q 280). The pilot unit includes a progressive cavity sludge feed pump, a Velodyne inline polymer mixing system, and 29 feet of reactor pipe for polymer mixing and flocculation. Figure 13 shows a photograph of the Huber pilot arrangement during the onsite pilot testing.

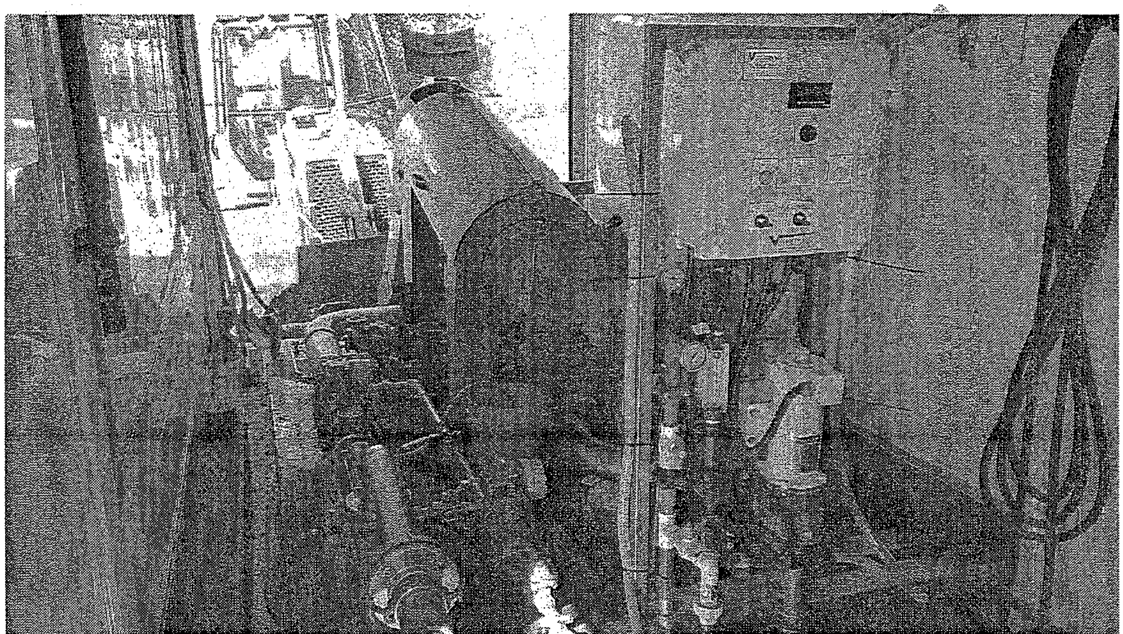

Figure 16: Huber Pilot System Photograph during Onsite Pilot Testing

The pilot testing unit was continuously fed. The duration of each pilot test run was approximately 45 minutes which allowed sufficient time to empty the screw from previous test runs and re-establish a consistent operating condition. The sludge tank was filled from the gravity-thickened zone of the aerobic digester. Polymer was injected into the influent pipe upstream of the feed pump and then through a mixing valve to provide rapid mixing. Flocculation contact time is provided in the remaining pipe volume. It is not possible to observe the floc without withdrawing a sample (no open tank or clear pipe). The polymer dose was preset for each pilot run and remained constant throughout each pilot test.

Cake was collected in pre-weighed buckets for a predetermined amount of time (typically 5 minutes). The cake solids were weighed to calculate solids throughput. Huber conducted separate TSS sampling and analysis (Appendix C). Duplicate samples were analyzed in the City of Hailey's wastewater laboratory.. The City's results are presented in the summary below.

5.2 Screw Press Pilot Testing Setup

There are two primary operating parameters that control the performance of the Huber screw press: screw speed and pressure at the cone (backpressure on the sludge). One of these parameters was adjusted for each pilot run to determine the resulting press performance. Three primary characteristics were measured to determine the pilot performance: solids throughput, polymer usage, and cake solids content.

Preliminary bench scale polymer testing was conducted by Huber prior to onsite pilot testing. The jar testing results were used to gain preliminary knowledge regarding polymer type and dosage for use during pilot testing. The testing allowed the onsite technician to optimize the performance of the screw press based on a smaller range of variables.

5.2.1 Screw Design

The screw press consists of a screw which is surrounded by a stainless steel basket, discharge points for filtrate and cake, and an automated cleaning system. The shaft is shaped like a cone with an increasing diameter toward the end. The screw blades are closer together at the discharge end. The first part of the press is a thickening zone followed by a pressure zone for dewatering. The pressure on the sludge is adjustable using a pressure cone at the discharge point. A spray bar provides automatic cleaning of the basket. Every 30 minutes, the feed pump and polymer pumps shut off and the basket turns one revolution in reverse while the spray bar cleans the exterior of the basket. The pilot testing was performed with the Huber RoS 3Q 280, which is the smallest full size unit.

5.2.2 Polymer Type and Dosage

One polymer (Ashland K274) was selected in advance of pilot testing based on jar testing performed by Huber. The City of Hailey also had a polymer vendor do independent jar testing which identified WEP-984 as a structured polymer to test. The WEP-984 (35 percent active) is the same as the SNF C-9530 that FKC tested. Both polymers are liquid emulsion polymers that are structured, as opposed to linear.

5.2.3 Screw Speed

Screw speed is adjustable and controls the solids throughput on the machine. The screw speed is linked to a pressure gauge at the end of the screw. As the pressure increases, the screw accelerates. Lower speed allows for better dewatering (higher cake solids) and a higher speed allows for higher throughput, but lower cake solids. In a full-scale installation, the City of Hailey could optimize the unit at startup to operate at a slow speed and lower polymer to achieve the same dewatering. At higher future throughput, the machine speed and polymer dose would have to be increased to maintain dewatering production. The system has flexibility to change the capacity. Throughput was measured by collecting the cake solids for a specified period of time and weighing the volume of solids generated in that time. The screw speed ranged from 0.4 to 0.7 rpm.

5.3 Huber Pilot Results

A total of 28 trials were conducted during pilot testing. Fourteen tests were conducted using the Huber-selected Ashland K275 FLX polymer, ten were conducted with the Watertech WEP-984 polymer, and four were conducted with the Watertech WEP-991 polymer. Visually, all trials produced cake with no free-draining water. The maximum cake solids content was 20.7 percent. The dry solids throughput was based on manufacturer's data of actual weight of solids produced during each trial run and the City of Hailey's cake percent solids data. A summary of the screw press pilot results for the Huber pilot test unit is provided in Table 4. The Huber pilot report is provided in Appendix C.

Table 4: Huber Summary of Pilot Testing Results

Trial	Screw Speed (rpm)	Polymer Type	Active Polymer Dose (active lb/dry ton)	Sludge Flow (gpm)	Influent TSS (%)	Cake TSS (%)	Dry Solids Throughput (lbs/hr)
1	0.50	Praestol K275[1]	39.4	10.00	1.09	13.8	6.8
2	0.50	Praestol K275[1]	40.4	10.00	1.06	16.8	8.4
3	0.40	Praestol K275[1]	36.7	10.00	1.07	16.6	8.3
4	0.40	Praestol K275[1]	35.9	10.00	1.09	20.3	10.1
5	0.40	Praestol K275[1]	33.3	10.00	1.07	19.8	9.9
6	0.40	Praestol K275[1]	28.7	10.00	1.07	18.0	9.0
7	0.40	Praestol K275[1]	28.7	8.00	1.07	16.7	6.5
8	0.40	Praestol K275[1]	35.1	8.00	1.09	16.3	6.4
9	0.50	Praestol K275[1]	24.0	12.00	1.07	19.5	11.5
10	0.50	Praestol K275[1]	27.6	12.00	1.07	18.2	10.8
11	0.50	Praestol K275[1]	28.4	14.00	1.08	18.4	12.7
12	0.50	Praestol K275[1]	28.1	14.00	1.09	17.8	12.8
13	0.60	Praestol K275[1]	24.7	16.00	1.09	19.2	15.7
14	0.60	Praestol K275[1]	26.6	16.00	1.09	18.4	15.6
15	0.50	WEP-984[3]	27.7	16.00	1.11	18.2	15.4
16	0.60	WEP-984[3]	28.0	16.00	1.09	18.5	15.7
17	0.50	WEP-984[3]	28.0	14.00	1.09	18.4	13.1
18	0.40	WEP-984[3]	27.1	12.00	1.09	17.3	10.6
19	0.50	WEP-984[3]	32.7	12.00	1.09	18.7	11.4
20	0.40	WEP-984[3]	32.5	10.00	1.09	17.4	9.2
21	0.40	WEP-984[3]	35.0	8.00	1.09	18.3	7.7
22	0.50	WEP-984[3]	30.0	14.00	1.17	19.1	14.3
23	0.60	WEP-984[3]	29.4	16.00	1.17	20.7	17.8
24	0.70	WEP-984[3]	26.1	18.00	1.17	19.8	19.4
25	0.70	WEP-991[2]	26.1	18.00	1.17	16.4	16.0
26	0.70	WEP-991[2]	31.3	16.00	1.17	16.3	14.0
27	0.70	WEP-991[2]	31.3	16.00	1.17	15.7	13.5
28	0.60	WEP-991[2]	35.6	14.00	1.18	15.6	11.9

[1]Ashland Praestol K275 FLX, 46% active
[2]Watertech WEP-991, 34% active
[3]Watertech WEP-984, 36% active

Figure 14 provides a graphic depiction of the screw press parameters and results of pilot testing.

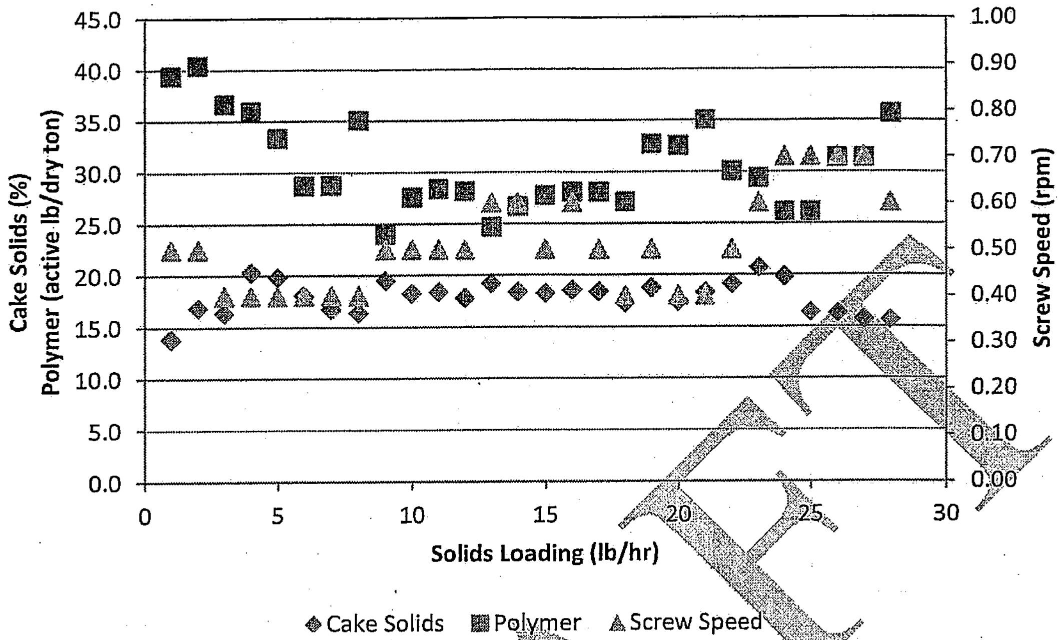

Figure 17: Summary of Huber Pilot Testing Parameters and Cake Solids

The screw press was operated with multiple polymers and various dosing rates. The polymer dose ranged from 24 to 40 active lb/dry ton. Figure 15 summarizes the polymer dose and associated cake solids TSS for the two different polymers that were tested. The Watertech WEP-984 polymer performed the best and the WEP-991 polymer had the lowest performance. Based on the results shown in Figure 18, cake solids TSS appears to be independent of polymer dose.

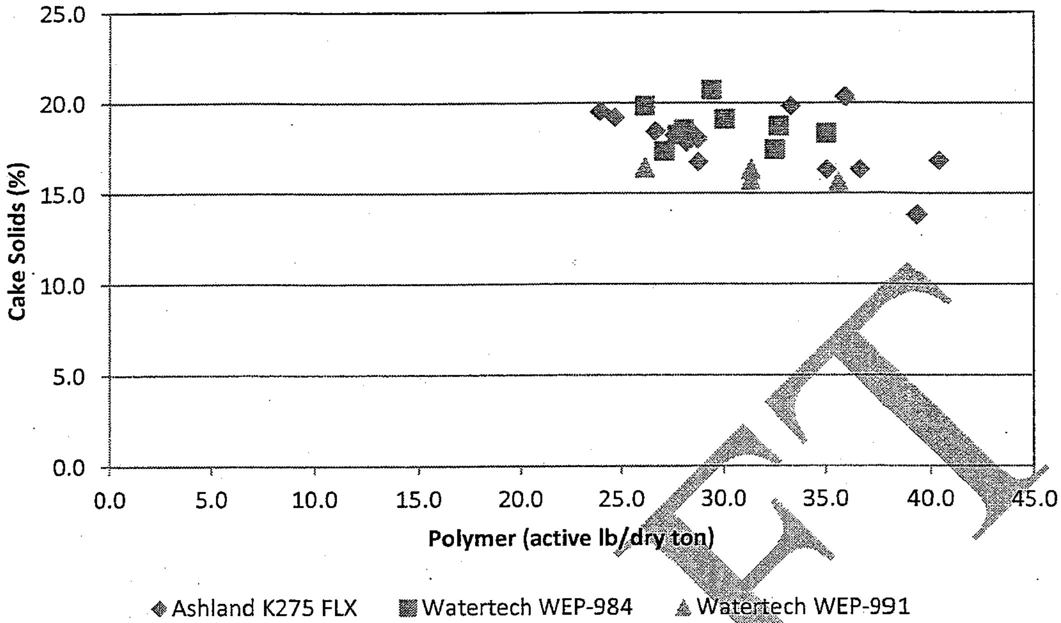

Figure 18: Huber Polymer Dosing Summary

The solids loading results are shown in Figure 16. The cake solids performance increased with all three polymers at higher solids loading rates indicating that there is opportunity to optimize the solids loading rate.

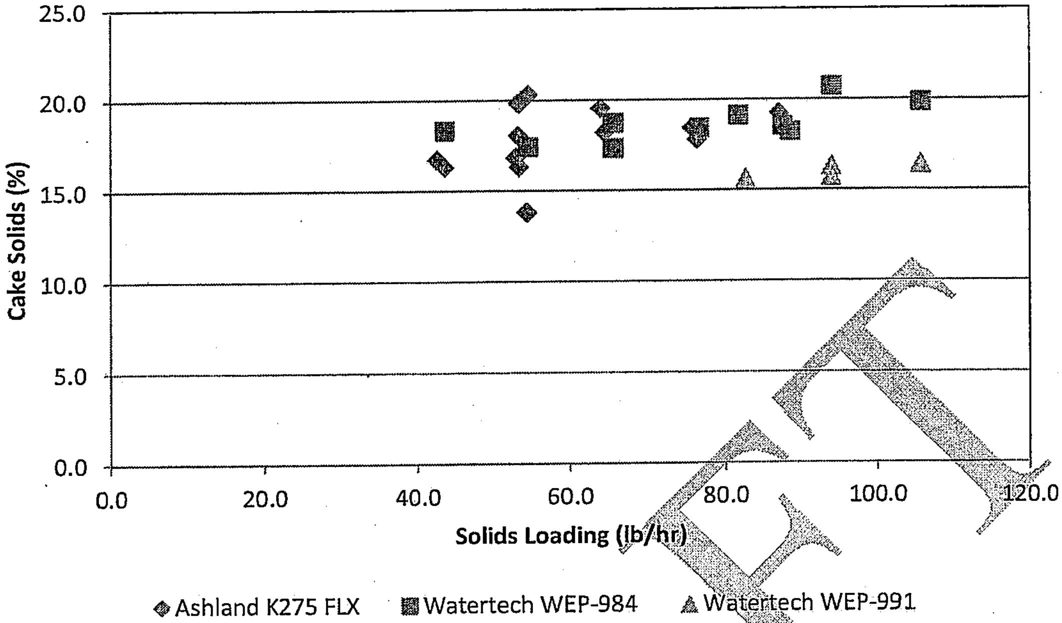

Figure 19: Huber Solids Loading Summary

The screw speed results are shown in Figure 17. The cake solids percentage increased with increasing screw speeds for all three polymer types, contrary to the other manufacturer pilot testing.

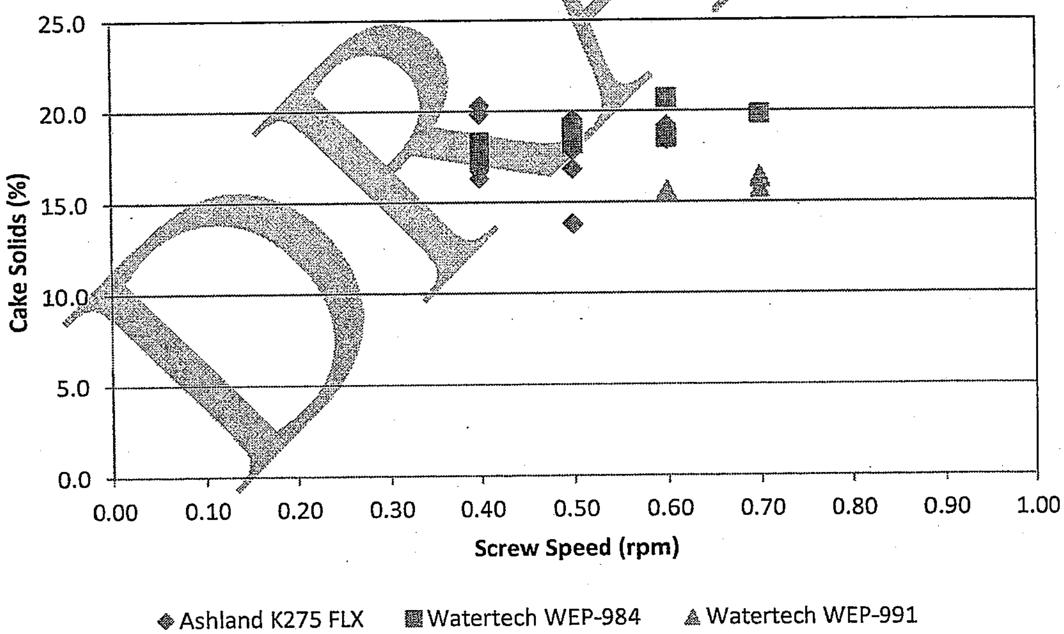

Figure 20: Huber Screw Speed Summary

6 Schwing Screw Press

6.1 Unit Description

The Schwing Bioset, Inc. (Schwing) pilot unit is a trailer mounted, self-contained screw press. The pilot unit includes a progressive cavity feed pump, a polymer system, the screw press and controls. Figure 18 shows a photograph of the Schwing pilot set up from the onsite pilot testing.

The pilot testing was continuously fed. Due to the higher capacity of the pilot unit that Schwing used, it took approximately three hours to initially fill the screw with sludge. The retention time in the screw is approximately 75 minutes so each test was about 90 minutes to make the process change and allow time for the sludge to travel through the screw. Using a pump with a variable frequency drive, sludge was transferred from the gravity thickened zone of the aerobic digester to the sludge tank. Flow to the screw press system was controlled by a flow meter and pressure sensor in the flocculation tank. The polymer blend was manually controlled using a hand valve (this would be automated in a full scale installation). Polymer is injected upstream of the flocculation tank. The flocculation tank is pressurized and contains a viewing window to observe the floc characteristics.

Cake was collected in pre-weighed buckets for a predetermined amount of time (typically 5 minutes). The cake solids were weighed to calculate solids throughput. Schwing conducted separate TSS sampling and analysis (Appendix D). Duplicate samples were analyzed in the City's wastewater laboratory; these are used in the results below.

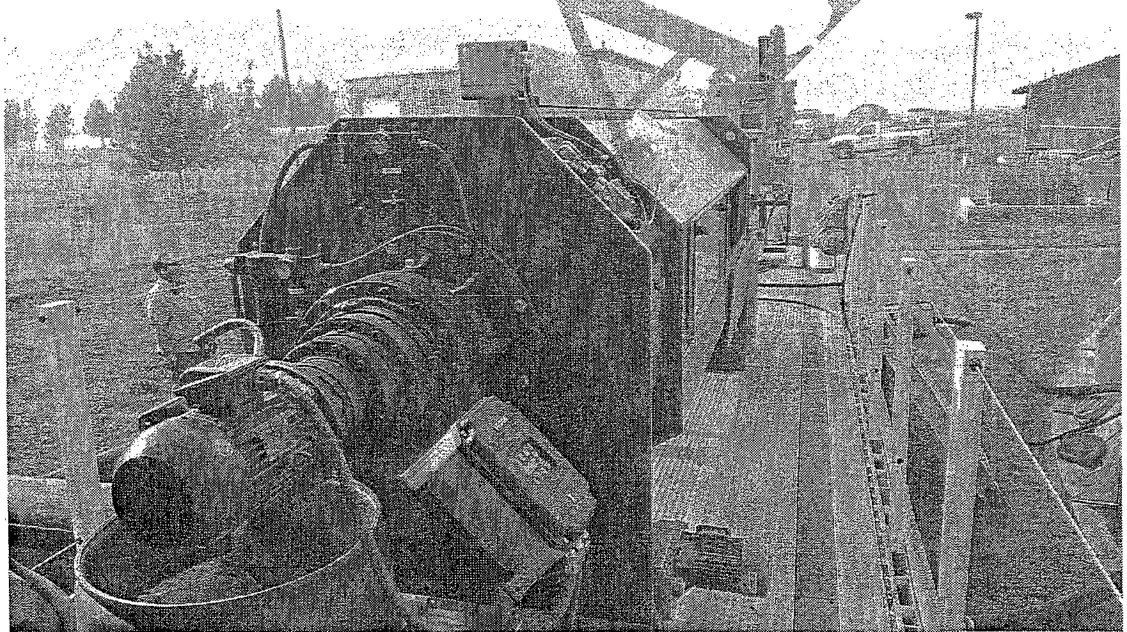

Figure 21: Schwing Pilot System Photograph during Onsite Pilot Testing

6.2 Screw Press Pilot Testing Setup

There are three operating parameters that control the performance of the Schwing screw press: screw speed, polymer addition, and pressure. Screw speed was not adjusted during the pilot testing. One of these parameters was adjusted for each pilot run to determine the resulting press performance. Three primary characteristics were measured to determine the pilot performance: solids throughput, polymer usage, and cake solids content. Due to the delayed arrival of the pilot unit as well as the large size of the screw press only a limited number of trial runs were possible with the Schwing pilot unit.

Preliminary bench scale polymer testing was conducted by Schwing prior to onsite pilot testing. The jar testing results were used to gain preliminary knowledge regarding polymer type and dosage for use during pilot testing. The testing allowed the onsite technician to optimize the performance of the screw press based on a smaller range of variables.

6.2.1 Screw Design

The screw press consists of a screw which is surrounded by a stainless steel basket, discharge points for filtrate and cake, and an automated cleaning system. The first part of the press is a thickening zone followed by a dewatering zone. The screen consists of two pieces providing access to the brushes and seal around the screw flights. A spray bar travels back and forth along the length of the screw press to clean the screen. The spray bar is connected to an air cylinder that is mounted on top of the machine and pneumatically actuated. The back pressure plate is also pneumatically driven. Once a pressure is set, the pneumatic system maintains the pressure. The flocculation tank is sealed and the flocculated slurry is pumped through a low pressure (1-2 psi) system that includes a high pressure alarm. There are access doors on the side of the screw to provide viewing of the operation without removing a large panel.

6.2.2 Polymer Type and Dosage

One polymer (Ashland K274) was selected in advance of pilot testing based on jar testing performed by Schwing. The City also had a polymer vendor do independent jar testing which identified WEP-984 as a structured polymer to test. The WEP-984 (35 percent active) is the same as the SNF C-9530 that FKC tested. Both polymers are liquid emulsion polymers that are structured, as opposed to linear.

6.2.3 Screw Speed

Screw speed is adjustable and controls the machine solids throughput. Lower speed allows for better dewatering (higher cake solids) and a higher speed allows for higher throughput, but lower cake solids. The screw speed remained constant during the pilot testing at 0.17 gpm.

6.3 Schwing Pilot Results

A total of 9 trials were conducted during pilot testing. Six tests were conducted using the Schwing-selected Ashland K274 FLX polymer, one was conducted with the Watertech WEP-991 polymer, and two were conducted with the Watertech WEP-984 polymer. Visually, all trials produced cake with no free-draining water. The solids were well-flocculated and produced flocs that could be dewatered. The maximum cake solids content was 20.7 percent. The dry solids throughput was based on manufacturer's data of actual weight of solids produced during each trial run and the City of Hailey's cake percent solids data. The solids throughput was much higher for the Schwing unit due to the size of the actual screw press. This unit was much larger than the pilot units tested by other manufacturers. A summary of the screw press pilot results for the Schwing pilot test unit are provided in Table 5. The Schwing pilot report is provided in Appendix D.

Table 5: Schwing Summary of Pilot Testing

Trial	Screw Speed (rpm)	Polymer Type	Active Polymer Dose (active lb/dry ton)	Sludge Flow (gpm)	Influent TSS (%)	Cake TSS (%)	Dry Solids Throughput (lbs/hr)
1	0.17	Praestol K274[11]	14.3	15.0	1.28	15.1	87.5
2	0.17	Praestol K274[1]	12.5	15.0	1.88	17.0	91.9
3	0.17	Praestol K274[1]	22.7	15.0	1.32	17.3	84.9
4	0.17	Praestol K274[1]	No data	15.0	No data	No data	No data
5	0.17	Praestol K274[1]	28.1	15.0	1.45	15.1	117.5
6	0.17	Praestol K274[1]	31.3	15.0	1.31	20.7	82.2
8	0.17	WEP-991[2]	16.1	15.0	1.38	18.3[4]	150.4
9	0.17	WEP-984[3]	21.1	15.0	1.48	19.2	91.8
10	0.17	WEP-984[3]	No data	15.0	No data	20.1	94.3

[1]Ashland Praestol K274 FLX, 46% active
[2]Watertech WEP-991, 34% active
[3]Watertech WEP-984, 36% active
[4]Manufacturer data used for this trial due to laboratory error in the City's data.
[5]Solids throughput calculated based on the calculated cake flow through the machine since the cake solids could not be weighed for each trial.

Figure 19 provides a graphic depiction of the screw press parameters and results of pilot testing. The screw speed for all of the Schwing trial tests remained constant.

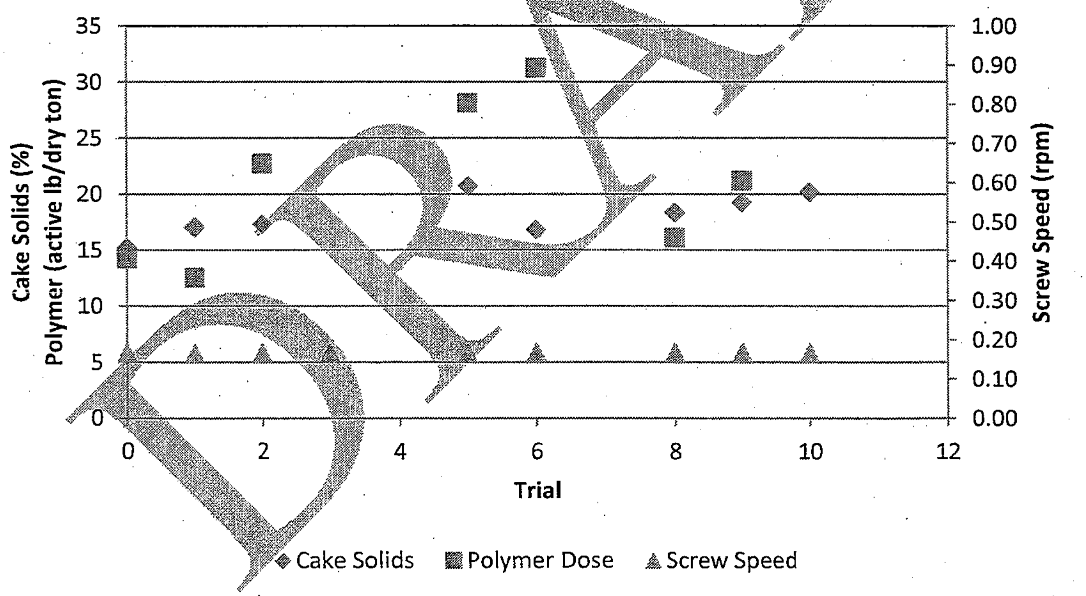

Figure 22: Summary of Schwing Pilot Testing Parameters and Cake Solids

The screw press was operated with multiple polymers and various dosing rates. The polymer dose ranged from 12.5 to 31.3 active lb/dry ton. Figure 20 summarizes the polymer dose and associated cake solids TSS for the three different polymers that were tested. The Watertech polymers performed in the same range as the Ashland polymer, but there is not sufficient data to draw a separate conclusion for this polymer performance.

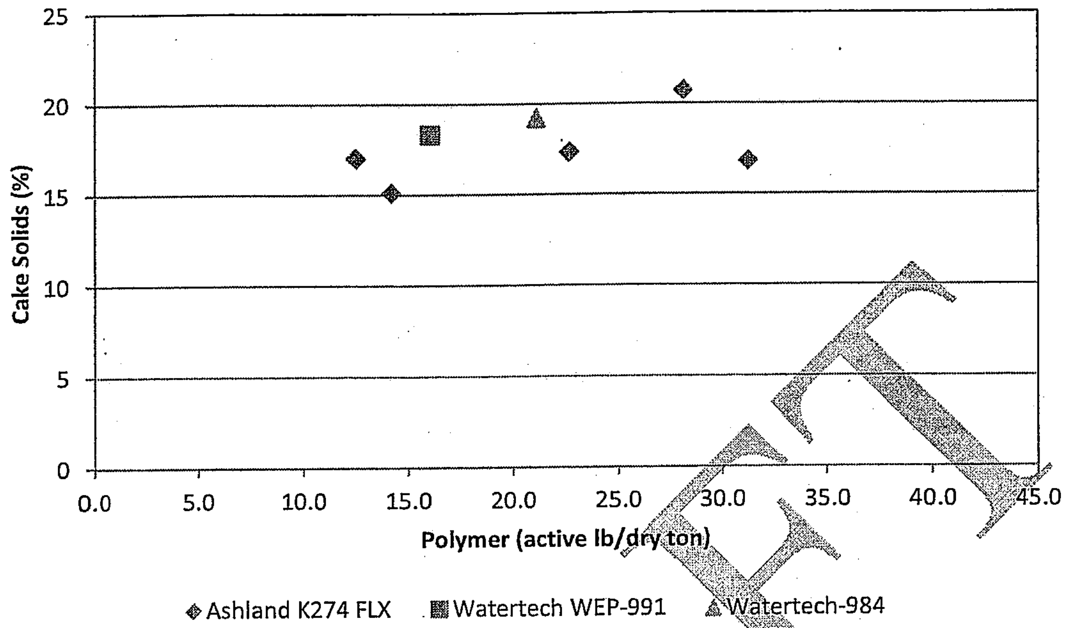

Figure 23: Schwing Polymer Dosing Summary

The solids loading results are shown in Figure 21. As the solids loading rate increased, the cake solids also increased.

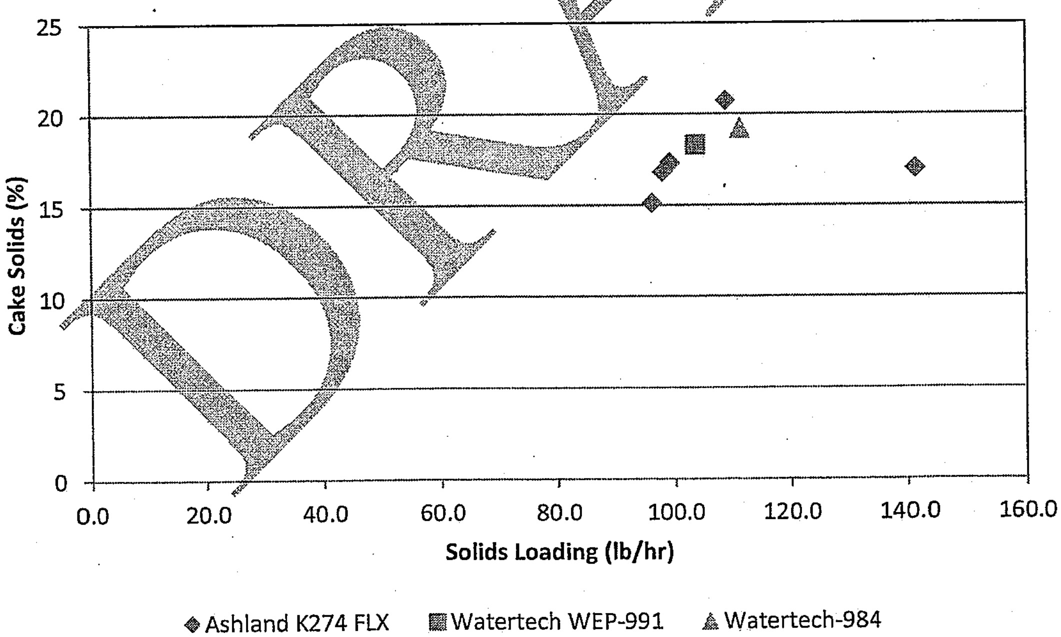

Figure 24: Schwing Solids Loading Summary

7 Volute Dewatering Press

7.1 Unit Description

The volute dewatering press pilot tested at the City of Hailey was a trailer-mounted unit manufactured by PW Tech (ES201). The unit was self-contained, with a dewatering press, sludge feed pump, chemical dosing system, mixing and flocculation tanks. The volute dewatering system was controlled by a single control panel.

The pilot test unit was continuously fed. The sludge tank was pumped from the gravity thickened zone of the aerobic digester to the pilot unit's progressive cavity feed pump. The feed pump controlled the feed flow rate through the press. Polymer was added upstream of the flash mixing tank (high speed mixing). The flocculated flow was flash mixed and then flocculated (slow speed mixing) in a flocculation tank prior to entering the press. The flash mixing tank has an opening along the bottom to fill the flocculation tank. The flocculation tank overflows to fill the press.

Cake was collected in pre-weighed buckets for a predetermined amount of time (typically 15 minutes). The cake solids were weighed to calculate solids throughput. PW Tech conducted separate TSS sampling and analysis (Appendix E). Duplicate samples were analyzed in the City's wastewater laboratory; these are used in the results below

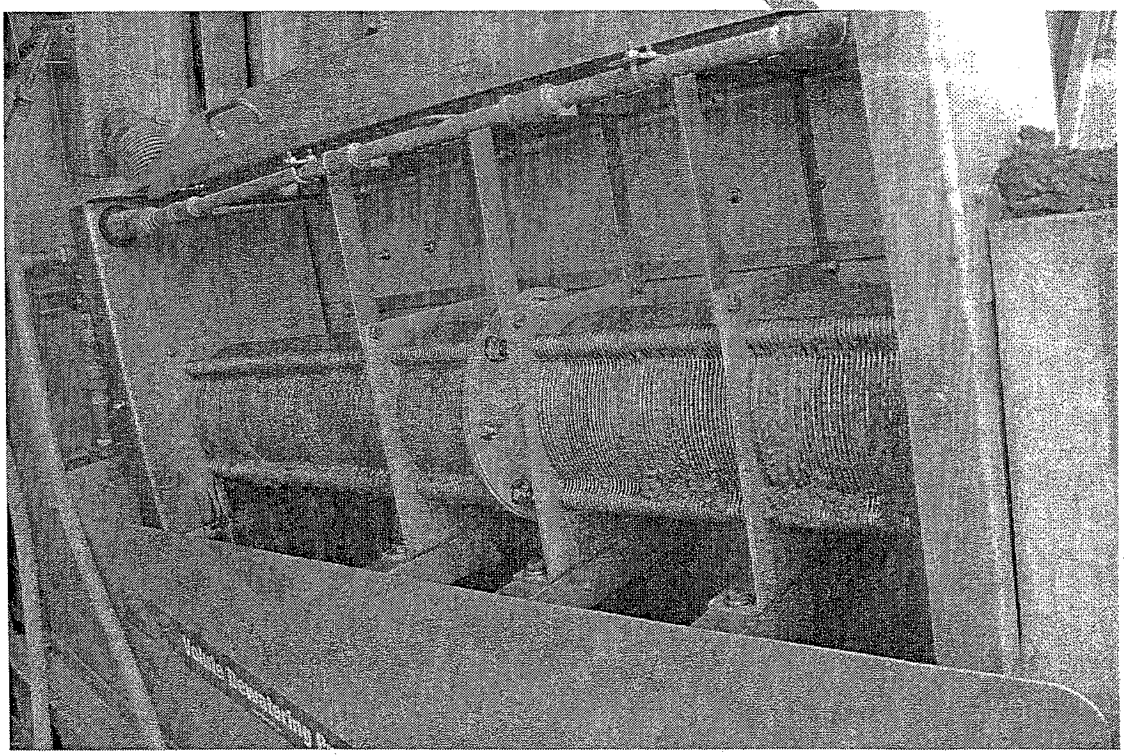

Figure 25: PW Tech Pilot System Photograph during Onsite Pilot Testing

7.2 Volute Pilot Testing Setup

Similar to the screw press, screw speed and polymer addition are operating parameters that have a direct impact on the press performance. The volute dewatering press has an additional operational parameter: the endplate gap, which can be adjusted to modify the performance. The endplate gap is the distance between the rotating plate and the end of the drum. Adjusting the distance can increase or decrease the pressure on the sludge, thereby changing the cake solids content and throughput. As the endplate gap distance is increased, the pressure on the sludge decreases, reducing the amount of water that is squeezed out of the sludge while increasing the overall throughput.

7.2.1 Screw Design

The volute press works similarly to a standard screw press, which has a perforated drum to allow pressate out of the drum. The volute press has a series of interlocking rings that make up the "drum." Half of the rings are fixed to several rods in the machine and their internal diameter is large enough to pass the screw. The other half of rings are placed in between the fixed rings and are allowed to move as the screw spins. The movable ring's internal diameter is too small to pass the entire screw and move as the blades on the screw move past. Figure 23 is a schematic showing how the rings interact. Figure 24 shows the rings and plates on the pilot unit that was tested in Hailey.

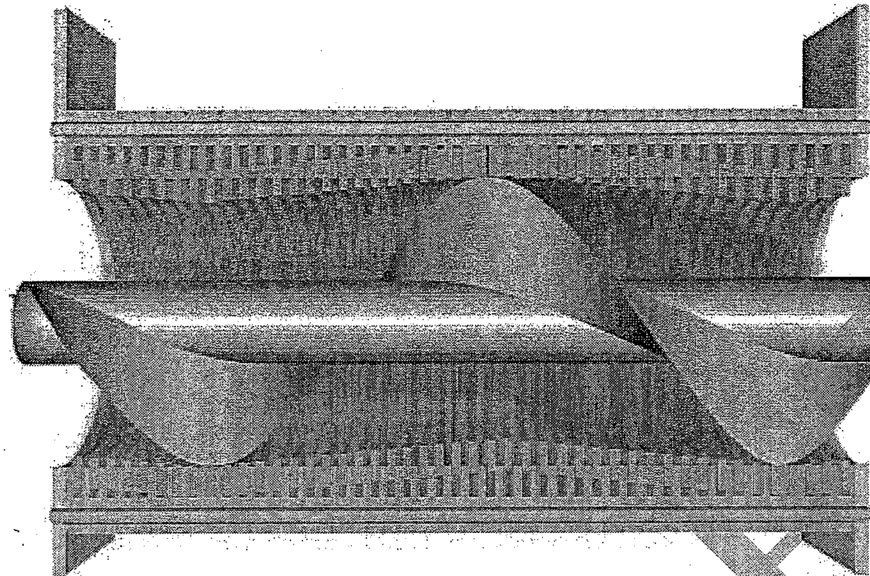

Figure 26: PW Tech Volute screw design (from PW Tech website)

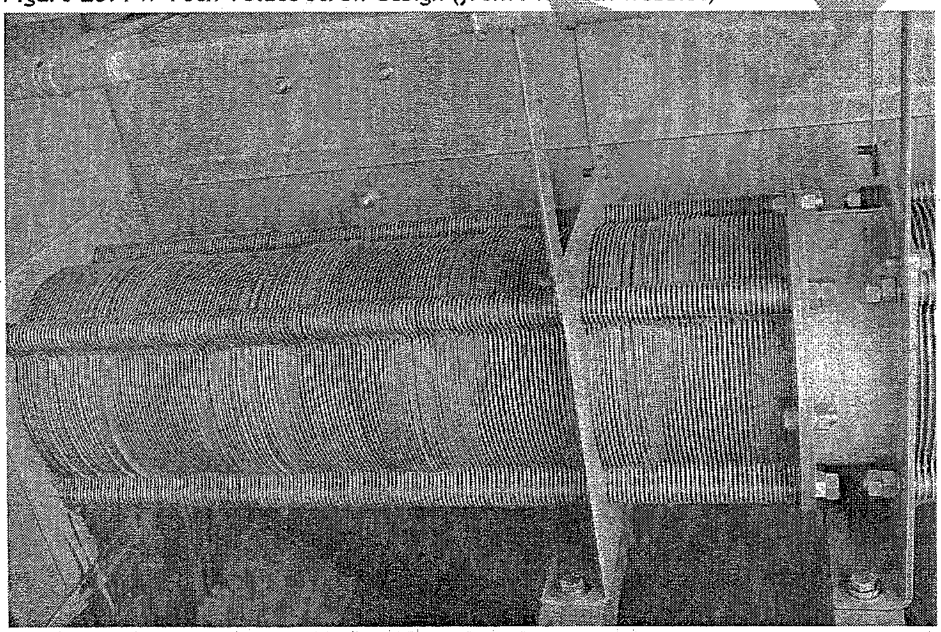

Figure 27:PW Tech Volute Dewatering Press photograph showing screw, rings, and plates

The red rings represent the movable rings and blue represent the rigidly mounted rings. As the blades pass across the movable rings, they slide into the gaps between the rigid rings and pressate exits through the gaps, leaving dewatered cake around the screw. The screw blades are closer at the discharge end.

7.2.2 Polymer Type and Dosage

Two polymers were selected in advance of pilot testing based on jar testing performed by PW Tech, Ashland K275 FLX and WesChem WT22. The City also had a polymer vendor do independent jar testing which identified WEP-984 as a structured polymer to test. Both polymers are liquid emulsion polymers that are structured, as opposed to linear.

7.2.3 End Gap Distance and Screw Speed

Screw speed is adjustable and controls the machine solids throughput. Four different screw speeds were tested, ranging from 0.6 to 1.5 rpm. Additionally, the end gap distance can be adjusted on the PW Tech unit to change the backpressure on the sludge. Three different end gap distances were tested, 1.5 mm, 2.5 mm, and 3.0 mm. Throughput was measured by collecting the cake solids for a specified period of time and weighing the volume of solids generated in that time

7.3 PW Tech Pilot Results

A total of 19 trials were conducted during pilot testing. Twelve tests were conducted using the PW Tech-selected Ashland K275 FLX polymer, seven were conducted with the PW Tech-selected WesChem WT22 polymer, one was conducted with the Watertech WEP-991 polymer, and two were conducted with the Watertech WEP-984 polymer. The polymer doses for the PW Tech pilot testing were lower than typical polymer doses provided in literature of 15 to 20 active pounds per dry ton (MOP 8, 2010 and EPA 2000). The PW Tech polymer doses have not been confirmed. Coordination with the manufacturer is underway to confirm and further explain the calculations that cannot be replicated. If the polymer dose values cannot be confirmed, it could impact the overall polymer dose and ultimately the operations costs.

Visually, all trials produced cake with no free-draining water. The solids were well-flocculated and produced flocs that could be dewatered. The maximum cake solids content was 23.9 percent. The dry solids throughput was based on manufacturer's data of actual weight of solids produced during each trial run and the City of Hailey's cake percent solids data. A summary of the screw press pilot results for the PW Tech pilot test unit are provided in Table 6. The PW Tech pilot report is provided in Appendix E.

PW Tech completed pilot testing at the City of Hailey's wastewater treatment plant in 2012. During the previous pilot testing, the cake solids performance was comparable to the 2013 pilot test however the polymer doses were higher, more typical of the expected polymer dose ranges. Additionally, the pilot performance on Day 1 of 2013 pilot testing required more than double the polymer that was used during the remaining pilot testing to achieve the same results. The manufacturer has not been able to fully explain the variability in the performance between these tests. The manufacturer stated that the flash mixing of the polymer provides the added benefit.

Table 6: PW Tech Summary of Pilot Testing

Trial	End Gap Distance (mm)	Screw Speed (rpm)	Polymer Type	Active Polymer Dose (active lb/dry ton)	Sludge Flow (gpm)	Influent TSS (%)	Cake TSS (%)	Dry Solids Throughput (lbs/hr)
1	1.5	0.9	Praestol K275 FLX[1]	No Data	10	No Data	No Data	No Data
2	1.5	0.9	Praestol K275 FLX[1]	No Data	10	No Data	No Data	No Data
3	1.5	0.9	Praestol K275 FLX[1]	No Data	10	No Data	No Data	No Data
4	1.5	0.6	Praestol K275 FLX[1]	8.2	10	1.08	20.3	No Data
5	1.5	0.6	Praestol K275 FLX[1]	8.1	10	1.07	19.5	8.9
6	1.5	0.9	Praestol K275 FLX[1]	7.5	10	1.07	19.6	9.7
7	1.5	0.9	Praestol K275 FLX[1]	8.2	10	1.07	18.8	9.9
8	1.5	1.2	Praestol K275 FLX[1]	8.1	10	1.10	17.3	9.9
9	1.5	1.5	Praestol K275 FLX[1]	6.7	12	1.10	17.7	11.8
10	1.5	0.9	Praestol K275 FLX[1]	6.3	12	1.10	19.0	11.2
11	1.5	0.9	Praestol K275 FLX[1]	5.5	10	1.10	17.8	10.0
12	1.5	0.6	Praestol K275 FLX[1]	4.7	12	1.09	18.6	No Data
13	1.5	0.6	WT22[2]	15.9	10	1.08	23.9	No Data
14	3.0	0.6	WT22[2]	13.3	10	1.09	23.5	No Data
15	3.0	0.6	WT22[2]	9.5	10	1.11	20.0	9.6
16	3.0	0.6	WT22[2]	7.2	10	1.10	19.9	9.7
17	3.0	0.9	WT22[2]	7.7	10	1.10	18.2	10.8
18	3.0	0.9	WT22[2]	12.0	10	1.10	19.2	10.4
19	3.0	1.5	WT22[2]	10.5	12	1.05	16.1	12.1
20	2.5	0.9	WEP-991[3]	3.3	10	1.11	20.0	10.3
21	2.5	0.9	WEP-984[4]	23.2	10	1.12	22.8	9.5
22	2.5	0.9	WEP-984[4]	18.3	10	1.11	22.8	10.1

[1]Ashland Praestol K275 FLX, 46% active
[2]WesChem WT22, 50% active
[3]Watertech WEP-991, 35% active
[4]Watertech WEP-984, 35 % active
[5]Polymer dose calculations from the manufacturer have not been confirmed.

During Trial 13, the pilot unit shut down due to an overheated motor. The low sludge flow and small end gap produced a dry sludge that caused difficulty turning the screw, causing the motor to overheat. The end plate gap was increased for the next trial and the operation continued without any issues.

Figure 25 provides a graphic depiction of the screw press parameters and results of pilot testing.

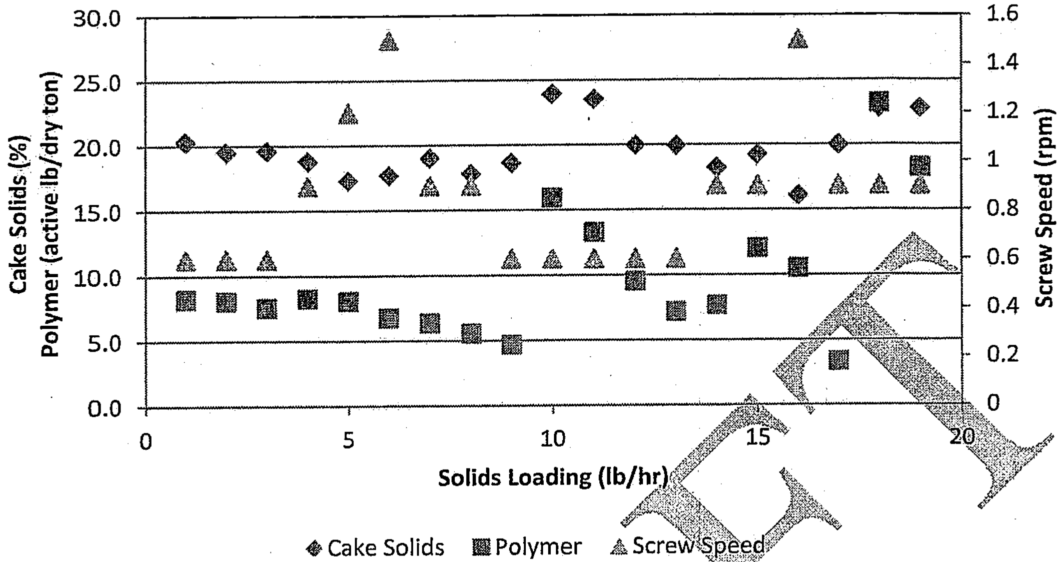

Figure 28: Summary of PW Tech Pilot Testing Parameters and Cake Solids

The screw press was operated with multiple polymers and various dosing rates. The polymer dose ranged from 3.3 to 23.2 active lb/dry ton. Figure 20 summarizes the polymer dose and associated cake solids TSS for the two different polymers that were tested. The WesChem WT22 polymer performed the best. The Watertech polymers performed in the same range as the Ashland polymer, but there is not sufficient data to draw a separate conclusion for this polymer performance.

AGENDA OF THE
HAILEY CITY COUNCIL MEETING
Monday DECEMBER 16, 2013 * Hailey City Hall Meeting Room

5:30 p.m. CALL TO ORDER - Open Session for Public Concerns

CONSENT AGENDA:

CA 000 Grant Applications
CA 000 Grant Agreements
CA 000 Contracts & Bids
CA 000 Special Events
CA 000 Motion to approve Taxi business license renewals..
CA 000 Findings of Fact and Ordinance Summaries
CA 000 Motion to approve minutes of December 12, 2013 and to suspend reading of them.......................................
CA 000 Motion to approve claims for expenses incurred during the month of November, 2013, and claims for expenses due by contract in December, 2013 ....
CA 000 Motion to approve Treasurer's reports from November 2013..

MAYOR'S REMARKS:

MR 000

PROCLAMATIONS & PRESENTATIONS:

PP 000 Presentation from Blaine County Housing Authority – Annual Report...

APPOINTMENTS & AWARDS

AA 000 Appointment to Air Service Board ....
AA 000 Appointment to Hailey Planning and Zoning Commission ....

PUBLIC HEARING:

PH 000 Amendment to Municipal Code Title 9 – Noise Ordinance – full reconsideration of noise ordinance adopted last summer. The amended ordinance proposes to allow amplified sound later than 10:00 p.m. only as an exception for certain Arena events.

PH 000 Public Hearing and consideration of a City of Hailey initiated text amendment, amending Hailey's Zoning Ordinance, Ordinance No. 532, by amending Section 8.2.2 to amend the definition of animated sign and to add the definition of electronic message display by amending section 8.2.6 of the Zoning Ordinance to delete animated signs as a prohibited use, and by amending 8.2.11(I) of the zoning code to provide for standards for electronic message displays and animated signs(**Continued from October 7, 2013 meeting** and **November 18, 2013** meeting)

PH 452 Public Hearing and Consideration of a City of Hailey initiated text amendment, amending Hailey's Zoning Ordinance, Ordinance No. 532, by adding a new Section 4.15 which creates an Information Overlay District, by amending Section 5.4 to add electronic message displays and animated signs as permitted or conditionally permitted signs in the Information Overlay District and by amending the Official Zoning Map for the City of Hailey to include the Information Overlay District (**Continued from October 7, 2013 meeting** and **November 18, 2013** meeting)

PH 000
PH 000

NEW BUSINESS:

NB 000 Sale of Meter Vaults to City of Bellevue

NB 000

OLD BUSINESS:

OB 000 3rd Reading of LOT 1% Air Ordinance 1133 & summary..

OB 000 2nd Reading Building Code Adoption Ordinance

OB 000 2nd Reading Fire Code Adoption Ordinance

WORKSHOP:

Staff Reports Council Reports Mayor's Reports

SR 000

EXECUTIVE SESSION: Real Property Acquisition (IC 67-2345(1)(c)), Pending & Imminently Likely Litigation (IC 67-2345(1)(f))

Matters & Motions from Executive Session or Workshop

Next Ordinance Number - _____ Next Resolution Number- 2013-01

AGENDA OF THE
HAILEY CITY COUNCIL MEETING
Monday January 6, 2014 * Hailey City Hall Meeting Room

5:30 p.m. CALL TO ORDER - Open Session for Public Concerns

CONSENT AGENDA:

CA 000 Grant Applications
CA 000 Grant Agreements
CA 000 Contracts & Bids
CA 000 Special Events
CA 000 Findings of Fact and Ordinance Summaries
CA 000 Motion to approve minutes of December 16, 2013 and to suspend reading of them..........
CA 000 Motion to approve claims for expenses incurred during the month of December, 2013, and claims for expenses due by contract in January, 2014 ....

MAYOR'S REMARKS:

MR 000

OATH OF OFFICE TO COUNCIL MEMBERS: Martha Burke and Don Keirn

PROCLAMATIONS & PRESENTATIONS:

PP 000 Presentation of FYE 2013 financial audit..........

APPOINTMENTS & AWARDS

AA 000

PUBLIC HEARING:

PH 000 Airport discussion..........

PH 000
PH 000
PH 000

NEW BUSINESS:

NB 000 Biosolids update – Tom..........
NB 000

OLD BUSINESS:

OB 000
OB 000
OB 000

WORKSHOP:

Staff Reports Council Reports Mayor's Reports
SR 000

EXECUTIVE SESSION:

Matters & Motions from Executive Session or Workshop

Next Ordinance Number - _____ Next Resolution Number- 2014-01