Plant Profile
City of Pataskala Water Reclamation Facility

Presented by
Nathan W. Coey
Utility Director
Class IV WW, Class III WS

Introduction

- I have been in the field since 2002. Prior to that I was a tradesman/fire fighter/ youth minister. The “beach” was my first treatment job. I literally fell into this business.

- This is the greatest field and can not imagine doing anything else. This is the greatest show on earth.

Its all about people

- We do what we do, treating the poo, because people matter, and we must account for fecal matter!
- Greatest resource available center around people and strategic relationships. Workshops are vital in communicating our daily mission and objectives as professionals.
- You are all professionals, make it count. Find your passion and apply it daily.

Public Outreach Video

Pataskala Historical Information

- The Village was settled in 1851 after the installation of the rail road. Summit Station in Lima Township was a hub for rail road into Columbus. Lima Township merged with the Village in 1996 to reduce urban sprawl from Columbus. The City merger protected the rural and agricultural characteristic of the area.
  - Pataskala is derived from a native Delaware dialect to mean "bright waters".
  - 28 square miles in the City
- Two Public Water and Sewer Utility Providers, Southwest Licking, Pataskala.
  - SWL has over 5,000 customers accounts while Pataskala is under 3,500.
  - Water Service area is roughly 10,000 people and sewer serves 6,500.

Pataskala Historical Water Information

- Pataskala's first Water Treatment Plant was commissioned in 1939 for fire protection and service to the old village.
- Water Plant 1 was upgraded in 1967, 1985, and 1999.
- Water Treatment Plant 2 was built in 2007.
- System consists of 4 water towers, a booster station, and 56 miles of main line inventory.

Howard M. Hayes - Mayor
D. D. Poyer - Clerk
Frank Headley - Treas.
Council
Frances Robinson
Roy D. Jones
J. F. Krehbiel
J. C. Morrow
E. D. Wollard
C. E. Young

Board of Trustees of Public Affairs
C. B. Bostwick - Pres.
Loren Ramsey   Chas. Voorhees

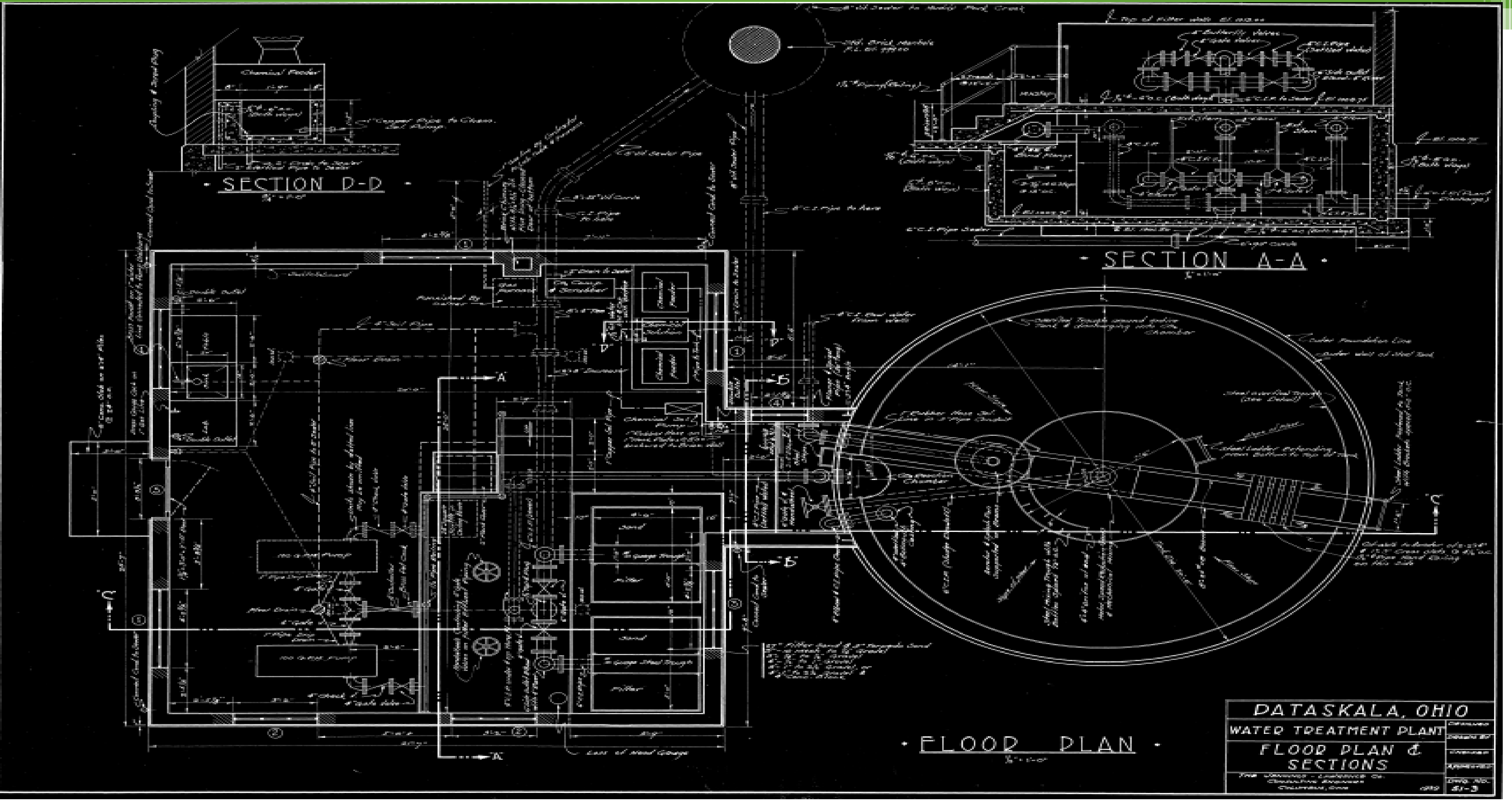
PLANS AND DETAILS
of
WATER TREATMENT PLANT

PATASKALA, OHIO
1939

The Jennings-Lawrence Co.
Civil & Municipal Engineers
Columbus, Ohio

[signature]
Registered Engineer

Dwg. No. 51-1



SECTION D-D
SECTION A-A
FLOOR PLAN
PATASKALA, OHIO
WATER TREATMENT PLANT
FLOOR PLAN & SECTIONS

Pataskala Historical Sewer Information

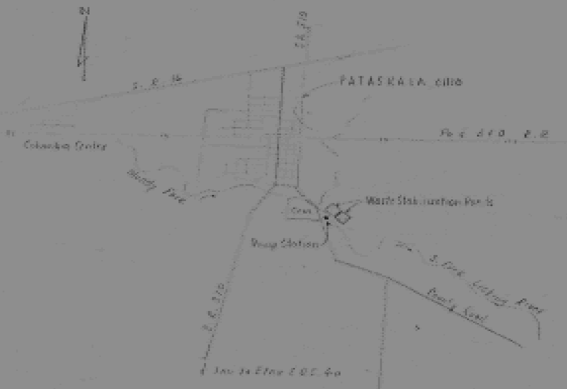
- Wastewater treatment started in 1967 with the installation of 2, 4 acre lagoons. System included lagoon aeration, chlorine disinfection, and flow monitoring.
- The WRF went through a major upgrade in 1989 with the addition of activated sludge treatment via Siemens ‘Orbal’, an oxidation ditch system, secondary clarifiers, 40,000 gallons of digestion, sand drying beds, and UV disinfection.
- The facility was plagued with issues by early 2000 due to growth.

SANITARY·SEWERAGE·SYSTEM

VILLAGE OF PATASKALA
LICKING COUNTY, OHIO

CONTRACT "C"

SEWAGE TREATMENT PLANT
1967



LOCATION MAP
Scale 1" = 2000'

LIST OF DRAWINGS	
1	- Title Sheet -
2	- Waste Stabilization Ponds, General Plan and Details -
3	- Inlet and Pumping Structure -
4	- Pond Inlet, Outlet and Control Structure
5	- Pond Sections

Plans Prepared By
THE JENNINGS LAWRENCE COMPANY
Columbus, Ohio

by Charles D. McJunkin
Registered Engineer · State of Ohio

VILLAGE OFFICIALS

Mayor - Levi Street

Council
Steve Mills - Pres.
Howard Campbell
J. F. Hutchinson
B. Bovard
A. C. Searls, Jr.
Paul S. Shoemaker

Clerk
Marjorie Wilson

Board of Trustees of Public Affairs
R. H. Dixon
Lewis Ramsey, Pres.

Solicitor
H. N. Acker

Approved this 5th day of December 1966
Levi W. Streets
Mayor, Village of Pataskala Ohio

Approved this 5th day of December 1966
Marjorie S. Wilson
Clerk, Village of Pataskala, Ohio

Plant Profile

- The original STP was lagoon treatment system constructed in 1967
- Oxidation Ditch in 1989 which is rated for 1.1 MGD.
- Additional upgrades were constructed in 2010 to add influent screening and solids handling. The existing
- Water Reclamation Facility consists of influent screening, biological treatment (Oxidation Ditch),
- secondary clarifiers, RAS/WAS pumping, and UV disinfection. A wet weather overflow from the screening building sends high flows (above 4.6 MGD) to the lagoons.
- The WAS is pumped to a gravity thickener before going to the aerobic digesters and the digested sludge is pumped to the rotary fan press for dewatering.
- Sludge Cake is conveyed to the adjacent Sludge Storage Building (covered pad). A fabric membrane building was constructed in 2015 for additional sludge cake storage.
- The receiving stream is the South Fork Licking River which is tributary to the Licking River that then discharges into the Dillon Reservoir and eventually the Muskingum River.

Pataskala Historical Information

- Growth issues.
  - Sludge processing was inadequate. No digestion time. Digestion was completed in the orbal with resulted in over oxidized activated sludge and treatment issues.
  - Overflows of the orbal were observed during rain events.
  - Liquid sludge was improperly applied to adjacent farm fields via spray irrigation units.
    - No crop removal and no indication of proper treatment.
    - Liquid application was due to poor operating drying beds.

Influent Screening

The Influent Screens consist of one mechanical fine screen and one manual bar screen with a washer/compactor that discharges to a dumpster. The mechanical screen has traveling bars with 6 mm spacing and was supplied by Andritz.

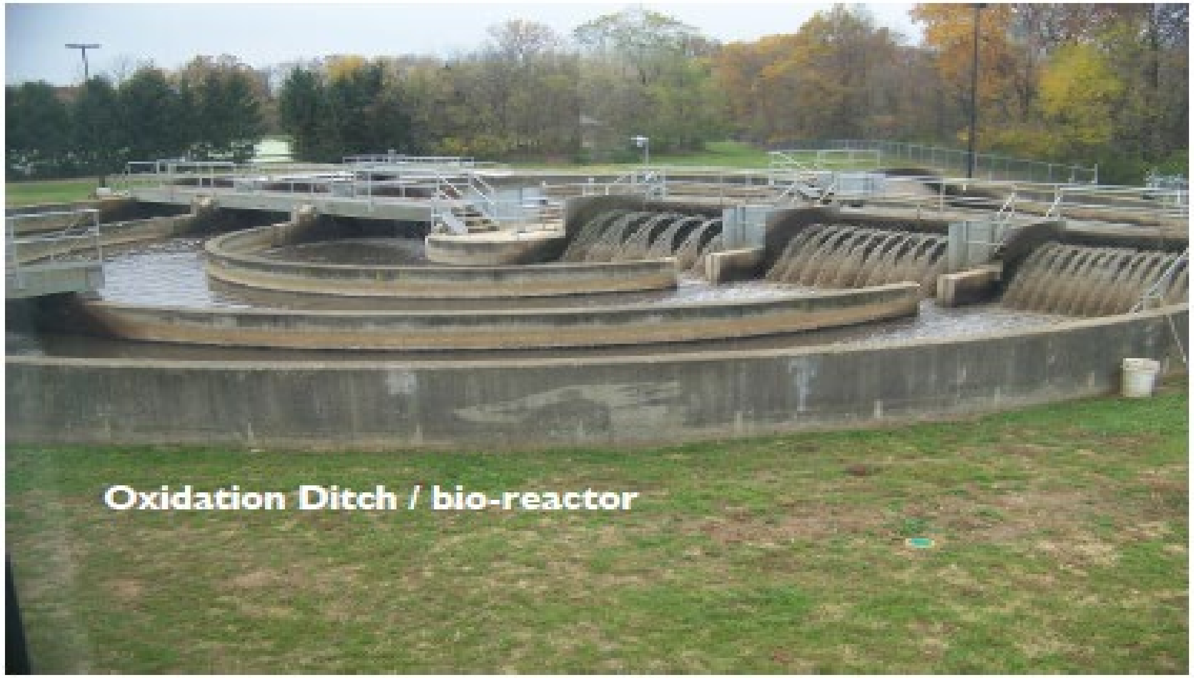
The reclamation process begins with all sewage delivered via pumps to the influent screening building. Here the raw sewage flow is continually monitored by flow meters and an automatic sample collection device for laboratory testing. All sewage is screened to remove all common sewage debris. The debris consist of a wide range of material including building materials, hygiene products, and miscellaneous in-organic sewer debris. These items must be removed to eliminate flow blockages in the treatment process and to prevent premature equipment wear and failure.

Oxidation Ditch / Orbal

There is one Oxidation Ditch that provides biological treatment. It has three (3) channels and eight (8) uncovered disc aerators (4) in the outer channel, 2 in the middle channel, and 2 in the inner channel). The outer channel has a 49’ radius, the middle channel has a 34’ radius, and the inner channel has a radius of 19’. The center island has a radius of 5’.

The total volume in the ditch at a normal side water depth of 8 feet is 502,000 gallons with 50% in the outer channel, 33% in the middle channel and 17% in the inner channel. This volume provides a hydraulic retention time (HRT) of 11 hours.

There are two 30 HP motors that drive 6 of the disc aerators (3 each) in all three channels. In addition, there are two 15 HP disc aerators in the outer channel. Each disc aerator has multiple discs.



After the screening process all sewage is diverted to the Oxidization Ditch which is a version of the conventional extended aeration process. The sewage is introduced in to the tank and mixed with activated sludge, to create a aqueous substance known as mixed liquor suspended solids. Activated sludge is a suspended growth treatment process in which specific aerobic microbiology is cultivated and controlled. A healthy microbiology population thrives in our oxygen, pH, and food controlled environment. The food source for the microbiology are compounds found in raw sewage. This treatment process ensures all organic compound levels are reduced to meet environmental expectations prior to introduction back into the water cycle.

Secondary Clarifiers

The sludge exits the Clarifiers and goes to the RAS/WAS Pump Station through 6” pipes under the Clarifiers. The effluent weir is at elevation 991.185. The Secondary Clarifier Effluent leaves through 12” pipes to a diversion box which can direct the flow to the two existing lagoons but normally flows to the UV Disinfection and Cascade Aeration.

There are two center-feed Envirex (now Evoqua) Tow-Bro Clarifiers with a diameter of 50 feet and a side water depth of approximately 14’-2” and ½ HP center drives. The diameter to the inside effluent launders is 47 feet. The scum baffle is 4 feet long and there is a full-radius scum skimmer (except for inside the center baffle). The Tow-Bro design uses standard bottom scrapers (plows) and a suction header pipe with holes to allow the settled sludge to enter. The sludger scrapers and suction header rotate at 1 revolution every 25 minutes making the tip speed 6.28 fpm.

Once a treatment derived detention time has been met and treatment completed in the oxidation ditch the mixed liquor suspended solids (MLSS) flows by gravity to the two secondary clarifiers. Clarifiers allow for a separation of the clear treated water from the MLSS; in these tanks a physical settling and separation occurs. The solids will settle to the tank bottom, and serve as a gravity filtration process in which the clear, treated water flows out of the tanks for further effluent treatment. As the solids settle in the conical floor of the tank the activated sludge is concentrated and collected. During this process the microbiology in the activated sludge no longer has a free food source and hungry bugs are returned (via pump system) back to the Oxidation Ditch to continue in the activated sludge treatment process. The clarifiers play a pivotal role in the complete water reclamation process. The effluent "Wet Stream" is the clean, clear effluent water from the clarifier that flows to the effluent treatment portion of the process. Additionally the "Solids Stream", collected activated sludge from the clarifiers, requires further treatment of the activated sludge.

RAS/WAS Pumps

The sludge enters the pump station from each clarifier through either 10” or 6” telescoping valves.
There are two 7.5 HP Flygt submersible pumps that discharge to a common 6” forcemain that splits to go to the Oxidation Ditch (RAS) and to the Gravity Thickener (WAS). There is a valve to each channel above the Oxidation Ditch.

Gravity Thickener

There is one Gravity Thickener that is 28-foot diameter with a SWD of 11’ (plus 3.5’ in the bottom
cone). The volume in the upper portion is 65,200 gallons. The volume in the cone is 5,400 gallons ~70,600
Gravity Thickeners are designed to increase the percent solids from 0.2-1.0 to 2-3% at a loading rate of 5-8 lb/SF/d. The current loading rate is 4.75 lb/SF/day (assuming the wasting is done over 6hours). The design loading rate is 7.89 lb/SF/day (assuming the wasting is done over 8 hours).

Currently, the WAS bypasses the Gravity Thickener to Aerobic Digester No. 2 because the dissolved oxygen is too low which causes denitrification in the Gravity Thickener. The operators are using a small submersible pump to transfer sludge from Digester No. 2 to the Gravity Thickener. From the Gravity Thickener, the thickened sludge is sent to Digester No. 1.

Aerobic Digesters

Each of the Aerobic Digesters are 41.25’x40’ with a maximum water level of 14.5’ for a volume of 179,000 gallons ~358,000.

The current operation Digester No. 1 is fed un-thickened sludge which reduces the actual storage time. The current mode of operation could be abandoned if the proposed improvements to the Oxidation Ditch can maintain a higher DO in the WAS. If not, another solution would be to construct a small WAS Reaeration Tank prior to the Gravity Thickener.

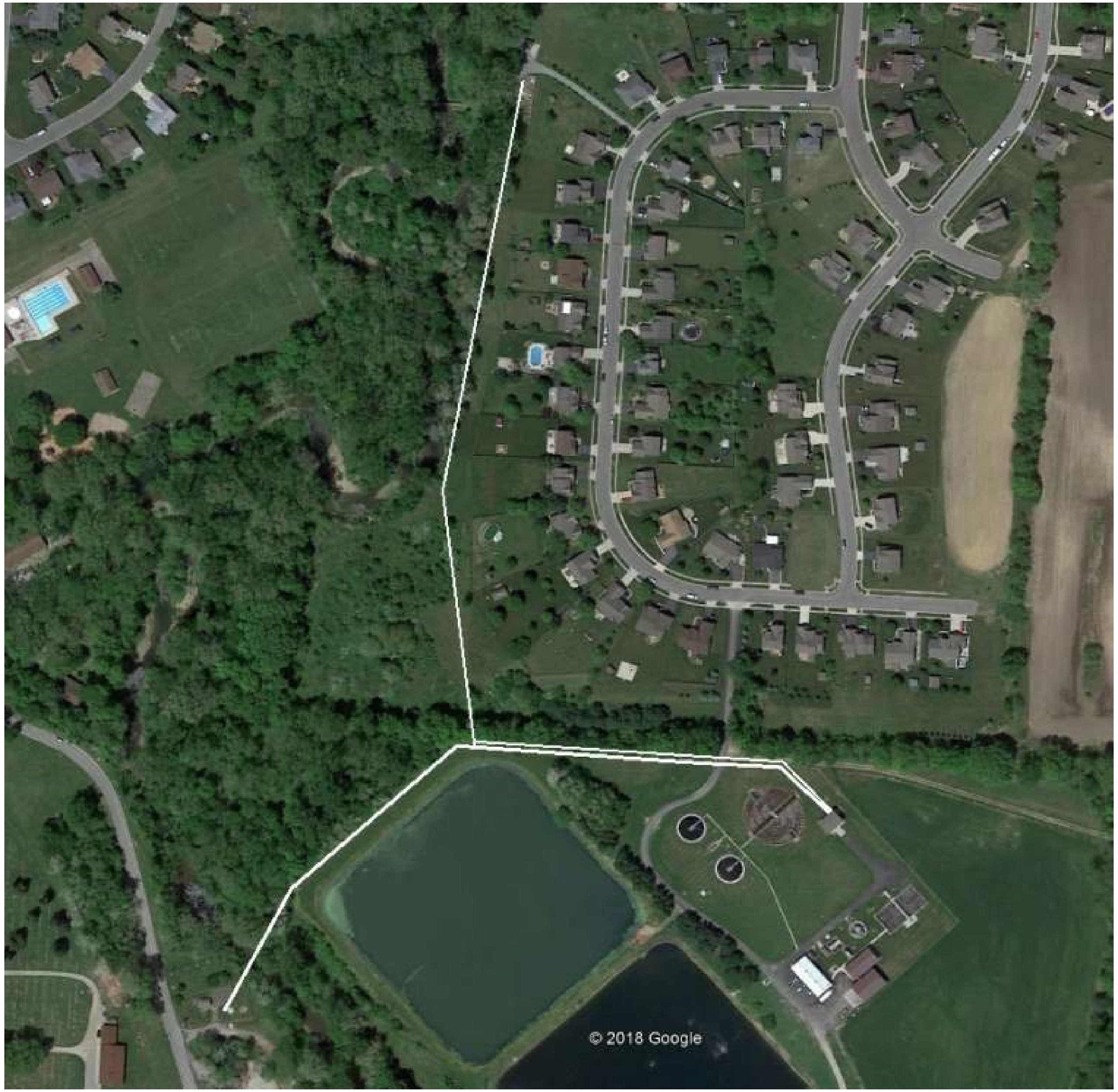
Biosolids

In order to maintain an healthy micro-biology flora activated sludge is removed from the Wet Stream Process. This is referred to Waste Activated Sludge (WAS). The calculated removal rate is conducted to ensure specific predominance of micro-biology to provide sufficient treatment. The WAS is pumped to a Gravity Thickener Tank to allow the waste solids to settle out and concentrate; additionally the separated water is removed from the Solids Stream process. It is pivotal in an Solids Stream Process to increase the solids concentration of the sludge or remove as much bound water as possible from the sludge. The goal of the thickening stage is to increase the solids percent from less than .5% to 2%.

After concentration in the Gravity Thickener the waste activated sludge is pumped to the aerobic digesters. The bacterial digestion process occurs under the presence of supplied oxygen and mixing from positive displacement blowers. The digester creates an environment in which the bacteria consumes organic matter and coverts it to carbon dioxide. Eventually due to a lack of organic matter (bacteria food) bacterial organisms die and become food for other bacteria. Upon digestion the sludge is further concentrated (bound water removal) through a Rotary Fan Press. The press utilizes cationic polymers (to expel bound water) and mechanical equipment to increase the sludge percent content to 14% solids. Dewatered sludge (cake) can be stored for disposal in a landfill, composting, or used as a fertilizer compound for agricultural operations. The higher the percent solids concentration equates to reduced hauling cost by volume.

Influent Pumping

There are two collection system pump stations that tie-into one 12” force main that discharges into the Influent Screening Building. The Eastside Pump Station has two pumps and a 10” force main and the Creekside Pump Station has three pumps and a 12” Force main. The average water level in both pump station wet wells is approximately 970. Having a single 12” forcemain causes a hydraulic bottleneck, limiting the flow to the plant. The image shows the locations of the pump stations and forcemains.



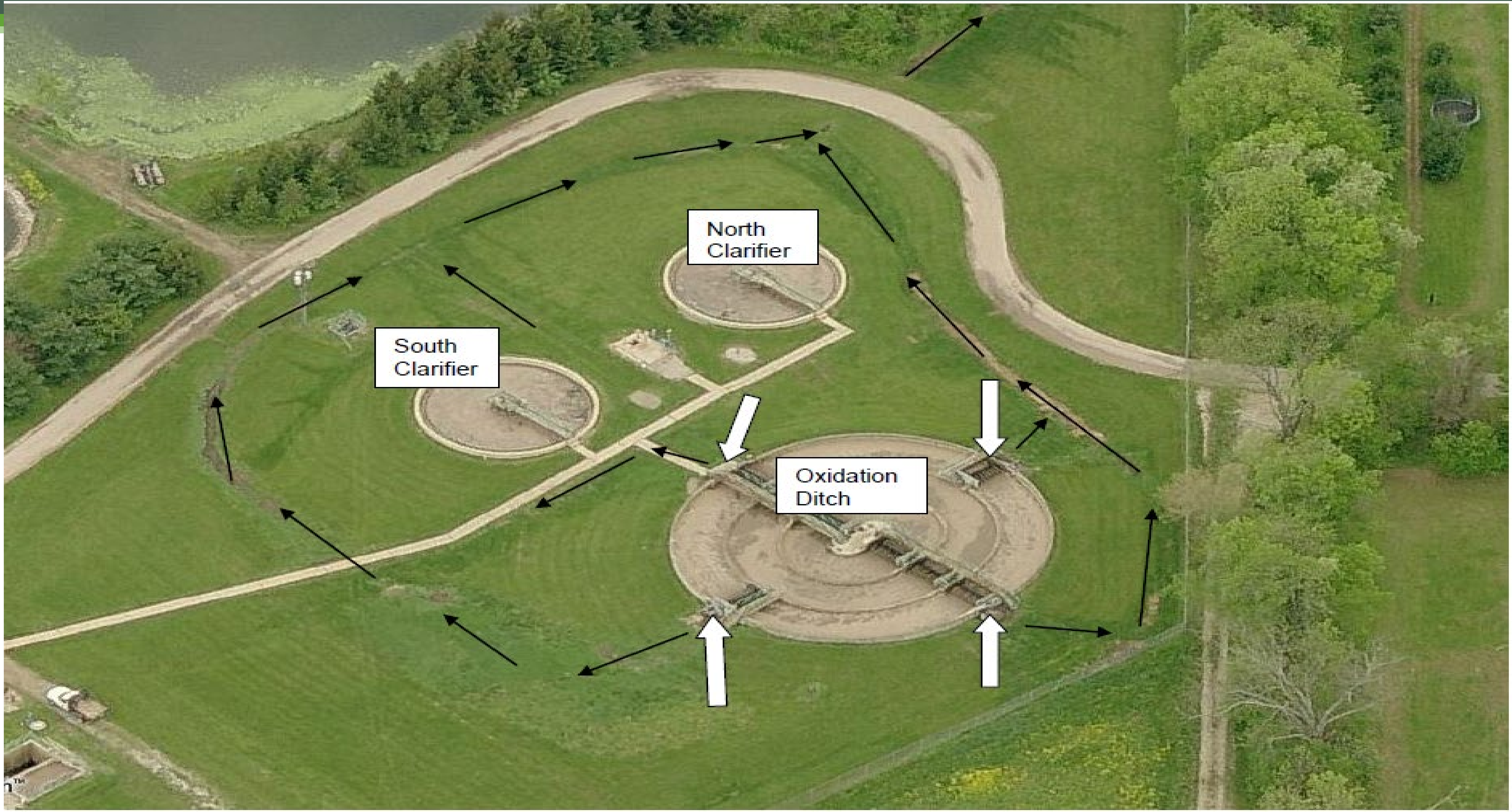


Figure 1. The white arrows in this older aerial photograph point to the location of four notches in the oxidation ditch external wall. Wastewater periodically overflows at these four locations into drainage ditches. The black arrows indicate direction of flow within the drainage ditches.


Manufactured inert materials must be screened from wastewater to prevent discharge to the stream or accumulation in sludge applied to land.

Figure 13. This older aerial photograph shows location of the only two sites used in the city's land application of sludge program.

WRF Historical Information

- As a result of a 2007 OEPA inspection the liquid land application process ceased.
- Pataskala purchased a used 1 meter belt press from SWLWS. Solids were pressed daily and hauled to land fill every few days.
- City purchased a ‘Prime Rotary Fan Press’ in 2009 as an upgrade to the facility. This upgrade resulted in daily 10 yard dumpsters hauled to land fill via WasteManagment.
  - Even under this scenario the facility could only ‘waste’ or remove 29,000 of liquid over oxidized sludge daily. This rate was not sufficient for proper activated sludge treatment.

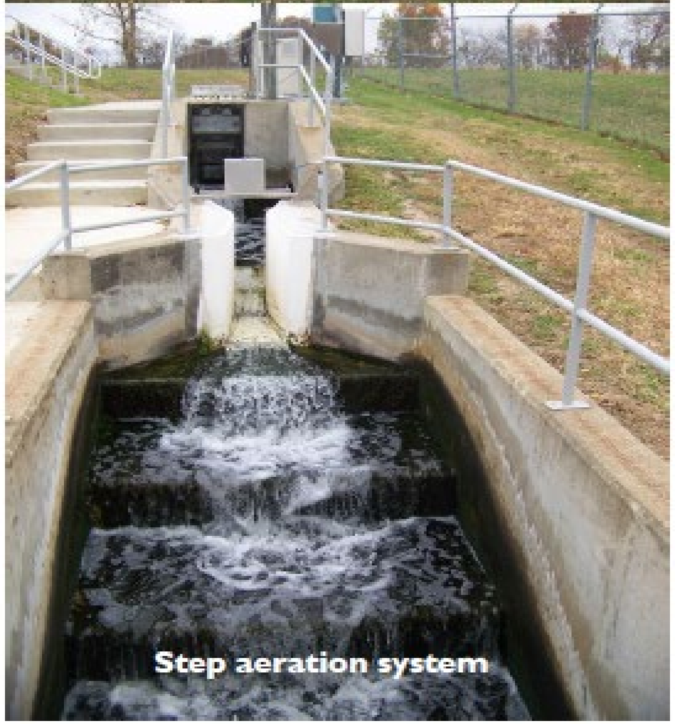
WRF Historical Information

- The City spent nearly $300,000 in hauling and tipping fees from 2009 through 2011.
  - They could not catch up and it was a vicious cycle. They did not have the ability to remove the daily addition of solids.
  - A significant amount of money was spent with poor results.
  - OEPA pushed for an upgrade to the facility in 2010 to address biosolids treatment.
  - 2011 the upgrade started to add digesters, press building, influent screening, pressed sludge storage, and overall improvements to the hydraulic operation of the facility.

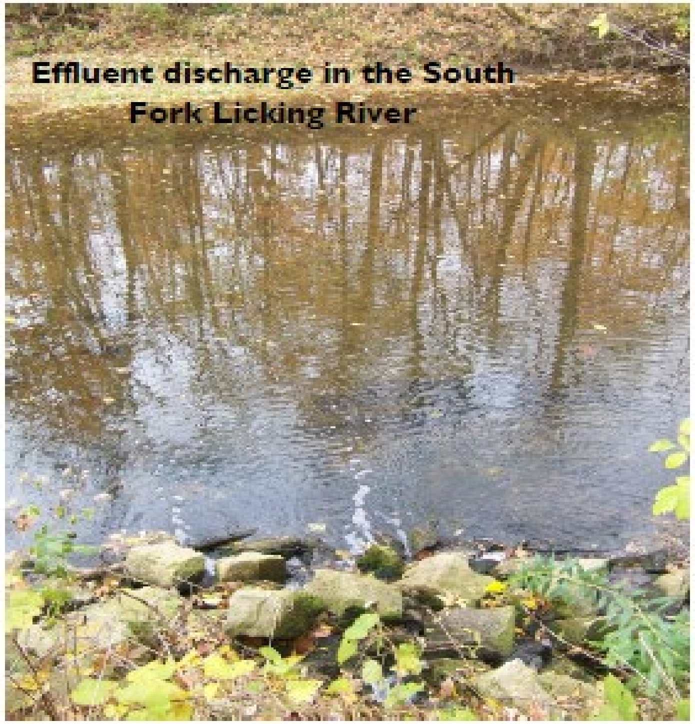

Effluent treatment structure


UV Disinfection Channel

UV lamp module


Step aeration system

Reclaimed (treated) water from the clarifiers flows to the effluent discharge station. The effluent flow is continually monitored by a flow meter and an automatic sample collection device for laboratory testing. During the summer months, May 1st through October 31st the OEPA requires that we disinfect all effluent water. The WRF utilizes the UV (Ultra-Violet) Disinfection Process in which high-intensity UV lamps are submerged into the effluent flow. The UV system effectively sterilizes all pathogenic bacteria, if bacteria like Escherichia coli (E-coli) can not reproduce they die. The effluent water is then treated to increase the Dissolved Oxygen content by a Step Aeration System prior to discharge. The Dissolved Oxygen content of the effluent provides an excellent product to encourage healthy aquatic life in the South Fork Licking River. The WRF is engineered to provide high quality reclaimed water back into to the water cycle.


Effluent discharge in the South Fork Licking River

The upgrade addressed many issues. Plant performance was greatly improved, but it was not enough.

The facility was designed to send all pressed solids (at best 14%) to land fill.

This resulted hauling every few weeks to maintain healthy inventory.

Very little storage.

Facility Data

Flow Data						
Parameter	Effluent	RAS Rate	Waste Rate	Waste Rate	Press Rate	Cake Hauled
Unit	MG	MG	Gallons	Pounds	Gallons	Dry Ton
Year Average	0.7697	0.7043				
Year Total	280.38	139.14	10,931,149	407,943	3,805,592	122.48

Process Control Data						
Parameter	Clarifier Sludge	MCRT	F/M	SVI	Settleability	System lbs.
Unit	Feet	Days	Ratio	Ratio	ml/30 min.	Pounds
Year Average	1.47	10	0.03	189	446	12,202
Parameter	MLSS	MLSS%	MLVSS%	RAS SS	RAS %	RAS VSS%
Unit	mg/l	%	%	mg/l	%	%
Year Average	2,535	0.40	69.28	5,120	0.59	73.41
Parameter	MLSS Spin	Digester %	Digester VSS%	RAS/WAS Spin	Cake %	CakeVSS%
Unit	Vial Reading	%	%	Vial Reading	%	%
Year Average	2.5	1.46	76.70	4.6	13.80	79.34

Operational Data						
Parameter	Effluent Temp.	Dissolved Oxygen	Eff. pH max.	Eff. pH min.	Inf. pH max.	Inf. pH min.
Unit	C	mg/l	S.U.	S.U.	S.U.	S.U.
Year Average	15.87	9.01	8.01	7.83	7.86	7.63
Parameter	Fecal Coliform	E. coli	Oil and Grease	Nitrite Plus Nitrate	Barium, Total	Strontium, Total
Unit	#/100 ml	#/100 ml	mg/l	mg/l	ug/l	ug/l
Year Average	#DIV/0!	14.15	0.23	9.54	67.00	10561.67
Parameter	Zinc, Total	Cyanide, Free	Nickel, Total	Cadmium, Total	Lead, Total	Chromium, Total
Unit	ug/l	mg/l	ug/l	ug/l	ug/l	ug/l
Year Average	40.83	0.00	0.00	0.00	2.98	0.00
Parameter	Copper, Total	Chromium, Hex	Mercury, Total LL			Orthophosphate
Unit	ug/l	ug/l	ng/l			mg/l
Year Average	18.25	0.00	0.44			2.19

Operational Treatment Reductions

	Influent	Effluent	Removal Rate	Influent	Effluent	Removal Rate
Parameter	TSS	TSS	TSS Reduction	CBOD	CBOD	CBOD Reduction
Unit	Average mg/l	Average mg/l	%	Average mg/l	Average mg/l	%
January	127.08	2.72	97.86	163.62	1.9	98.81
February	172.00	4.32	97.49	185.92	2.2	98.83
March	173.36	8.22	95.26	144.43	3.5	97.60
April	204.25	6.87	96.64	189.17	3.5	98.14
May	176.93	0.73	99.59	175.86	1.9	98.95
June	201.54	1.23	99.39	202.31	0.6	99.71
July	161.75	1.47	99.09	204.83	0.3	99.87
August	173.07	0.57	99.67	148.86	0.8	99.46
September	205.91	3.67	98.22	193.00	1.6	99.19
October	196.15	1.74	99.11	197.23	1.4	99.27
November	223.43	0.33	99.85	191.43	0.6	99.71
December	190.92	0.47	99.76	186.08	3.1	98.31
Year Average	183.86	2.69	98.54	181.89	1.8	99.02

	Influent	Effluent	Removal Rate	Influent	Effluent	Removal Rate
Parameter	N., Ammonia	N., Ammonia	NH3N Reduction	TP	TP	TP Reduction
Unit	Average mg/l	Average mg/l	%	Average mg/l	Average mg/l	%
January	21.70	0.12	99.45	2.53	1.96	22.53
February	20.25	0.16	99.21	3.38	1.91	43.41
March	13.61	0.22	98.40	2.55	1.86	27.16
April	18.45	0.27	98.55	3.60	1.99	44.75
May	18.50	0.40	97.84	4.18	1.57	62.37
June	21.00	0.11	99.47	4.24	2.97	29.83
July	10.15	0.34	96.64	3.55	2.12	40.33
August	19.70	0.90	95.42	4.54	2.60	42.75
September	24.00	0.15	99.36	5.39	2.92	45.88
October	26.85	0.11	99.59	4.55	2.02	55.60
November	23.80	0.12	99.48	3.75	1.83	51.14
December	23.90	0.11	99.54	4.23	2.41	43.17
Year Average	20.16	0.2511	98.75	3.87	2.18	43.73

Calculations Based on 2017 Data					Calculations Based on Design Data				
Q inf	0.756				Q inf	1.1			
HRT	15.94	hours			**HRT**	10.95	hours		
HRT w Clarifiers	29.14	hours			**HRT w Clarifiers**	20.03	hours		
Sludge Age (incl. clarifiers)					**Sludge Age (incl. clarifiers)**				
Inf. TSS	184	mg/L			Inf. TSS	184	mg/L		
MLSS	2,535	mg/L			MLSS	3,000	mg/L		
Q inf	0.756	MGD			Q inf	1.1	MGD		
SA =	**16.73**	**days**			**SA =**	**13.61**	**days**		
MCRT					**MCRT**				
Inf. TSS	184	mg/L			Inf. TSS	184	mg/L		
Eff. TSS	7	mg/L			Eff. TSS	7	mg/L		
WAS TSS*	4,600	mg/L			WAS TSS	6,000	mg/L		
MLSS	2,535	mg/L			MLSS	3,500	mg/L		
Q eff	0.7697	MGD			Q eff	1.13	MGD		
Q was	0.019062	MGD	2.52%	of Inf	Q was	0.027736	MGD	2.52%	of Infl
MCRT =	**25.00**	**days**			**MCRT =**	**18.43**	**days**		
F:M Ratio					**F:M Ratio**				
Inf. BOD	182	mg/L			Inf. BOD	182	mg/L		
MLSS	2,535	mg/L			MLSS	2,535	mg/L		
% VSS	69%	mg/L			% VSS	69%	mg/L		
Q inf	0.756	MGD			Q inf	1.1	MGD		
F:M Ratio =	0.16	lbs BOD/lbs bugs			**F:M Ratio =**	0.23	lbs BOD/lbs bugs		
* based on spin test and 1,000 mg/l per %									

WRF Biosolids

- The upgrade did eventually allow for the activated sludge process to be turned around with a healthy wasting and disposal cycle. Daily wasting continues to be in the 45-50,000 gallon mark to maintain a 10-12 MCRT.
- There was a cost savings from spending $100,000 a year to about $40,000 as we worked with Quasar Energy Group.
- I felt we had a decent product that would be beneficial for the many farms in Pataskala.

Accidental Relationship

NRCS Natural Resources Conservation Service

Comprehensive Nutrient Management Plan

- Near the completion of the Facility Upgrade (2012) I met a local agronomist.
- The gentleman needed to serve some community service through Mayors Court.
  - This gentleman helped me study our biosolids though his experience with the USDA through a ‘Comprehensive Nutrient Management Plan’.
  - The agronomist suggested we had excellent solids similar to the ‘coveted turkey manure’.
  - His insistence and public motivation opened the door for land application.
    - He spoke publicly in favor.
    - My interest was piqued knowing I had support to move forward.

The Problem

- We just completed an upgrade (all decided prior to my arrival) that provided merely a few months of storage. The windows were impossible to really provide a benefit to local farmers.
- We looked at liquid application but our shared road way with a subdivision prevented this option.
- We saved cash from development impact fees to build a new storage building that would provide a minimum of 6 months storage.
- Goal was to get this product in the hands of the farmers, handle operation in house, to result in budgetary cost savings. Plus I had a farmer on staff.

The Solution

- Phase I. We engineered and completed a storage building in 2015. Design would allow for covered storage and an outside pad for additional storage.
- We worked off of a cash basis, so if we had more funds the building would have been larger with more roof coverage. I am planning additions to the building in 2018.

The Solution

- Not only did we want to get this great product to the farmers, we wanted to be involved with the process.
- Phase II
  - Purchased a used combination tractor / loader. $75,000
    - Our 1986 loader was falling apart, we were able to budget and pay cash for a new loader. Instead of purchasing just a loader, we looked at a tractor.
      - Mowing ability and ability to spread solids in house.

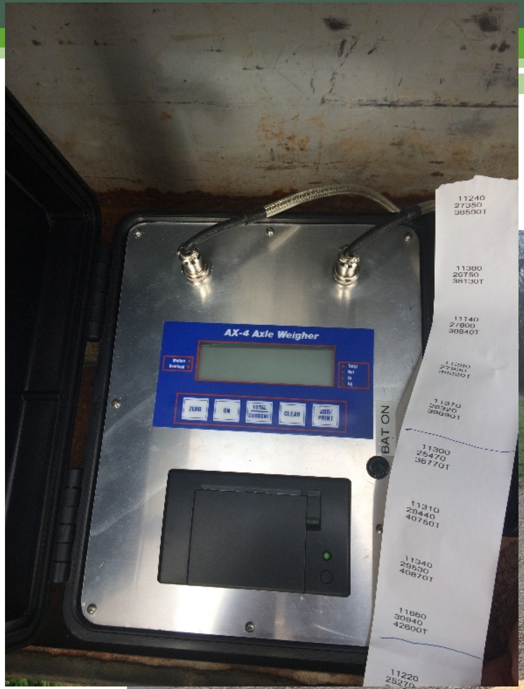

KNIGHT
SLINGER
8018

The Solution

- Phase II
  - Purchased a used spreader. $7,000
    - This would allow us to handle application in house. We would then ask farmers to handle any incorporation.
  - Purchase GPS equipment for the tractor. $5,000
    - We purchased the “Advanced Farming Systems” GPS and software for our work
      - Able to track application for specific runs. An excellent form of documentation to indicate application areas (buffer zones) and to use software and equipment that is easily transferred to farmers.
      - Auto steer for precise application, no more guess work.

Additional Equipment

- Acquired a tandem dump truck from the Service Department that not wanted in the fleet due to standard transmission. $7,000.
- Purchased our own set of scales for weighing each truck load.
  - $5,500 purchase.
  - Hardware store in town provided this service but the strong scent of ammonia on some loads wore out our welcome.




KNIGHT
CASE
ThisWeek
COMMUNITY NEWSPAPERS


ThisWeek
COMMUNITY NEWSPAPERS

BIOSOLIDS MANAGEMENT PROGRAM

- GPS technology is being used in our biosolids management program.
- The GPS unit has been programed and calibrated to our specific equipment to accurately track application rates.
- The tracking ability allows for great reporting documentation supporting compliance.
  - Tons per acre, acres applied, application rates, etc.

An additional feature shows the accuracy and attentiveness to potential water ways and run off areas based on USDA topographic and soil maps. This provides supporting documentation in or efforts to honor the Ohio Administrative Code of a minimum buffer of 30 feet from potential water areas.

Soil Test Pro App

- One of the employees introduced me on to“AG PHD” (podcasts and shows avlible on iTunes and YouTube) and this product.
- One stop shop for soil sample collection and data reporting.
  - Ability to map fields and then set up GPS sample grids for long term testing. No more guess work.
  - Collect samples, results will be posted on line and accessible though an app for IPad.
  - We provide this to our farming partners and pick up the cost.
  - Initially done for approval process then every 2 years after to compare our operations to original data.

SoilTestPro

City of Pataskala

Getting Started | Jobs | Farms/Fields | My Account | Order Tests

« | Job Details | Shipping Sheet | Lab Results | Recommendations

Soil Sample Job Details — 58101

Print Map | Done

Reussner 1/Reussner1/Whole Field

Soil Test ID: 58101
Record Date: 2/18/2016
Area: 97.56 ac
Grid Size: 10.00
# of Samples: 12
Lab: Spectrum Analytic, Inc (OH)
Test Ordered: S1
Status: Results Posted

Mouseover a sample below to see it on the map

	Sample #	Coordinates
1	1-7	40.061587, -82.676866
2	1-8	40.063419, -82.676733
3	1-9	40.065327, -82.676663
4	1-10	40.067088, -82.676761
5	1-11	40.063364, -82.674429
6	1-12	40.061664, -82.674528
7	1-13	40.061712, -82.671941
8	1-14	40.063585, -82.671775
9	1-15	40.065352, -82.671667
10	1-16	40.064211, -82.669864
11	1-17	40.063449, -82.669949
12	1-18	40.061579, -82.670113

Lab Results — 58101

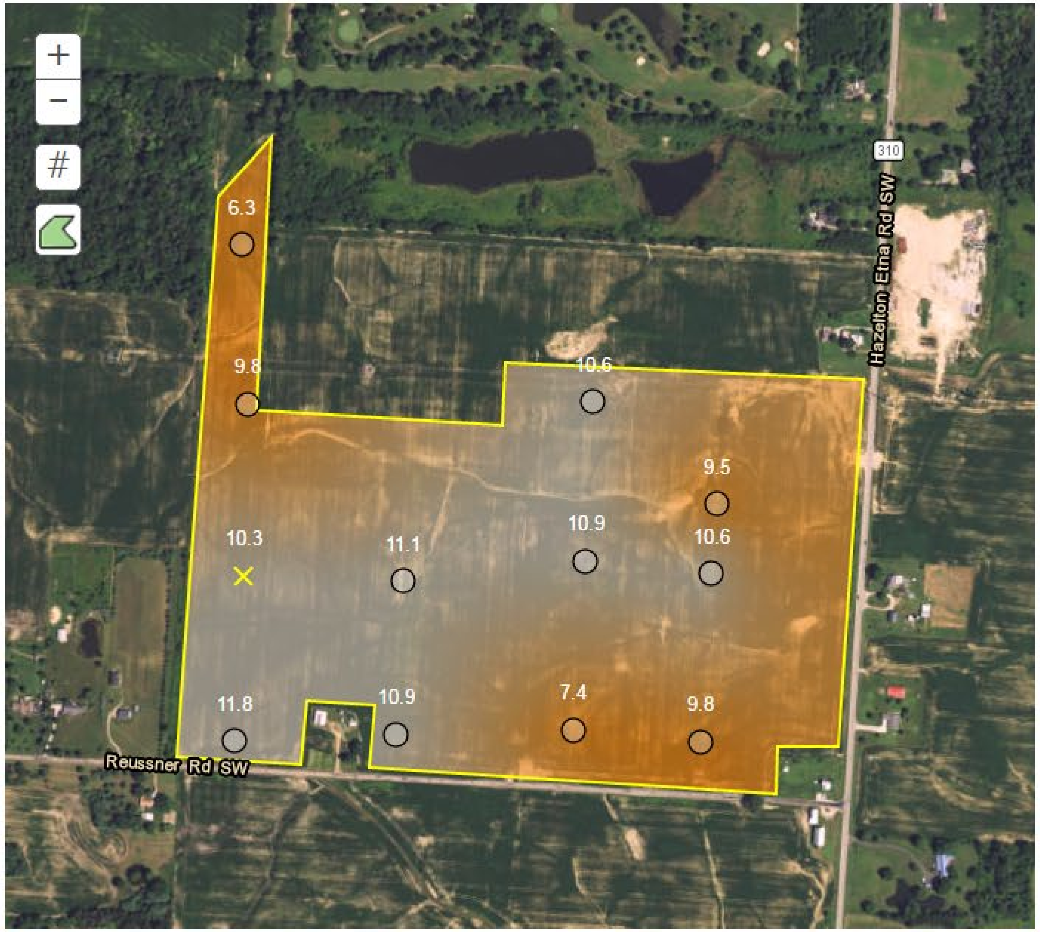
View PDF Results

Reussner 1/Reussner1/Whole Field

Mouseover a sample below or on the map to highlight.

Sample #	CEC	pH	Base Sat (%K)	Base Sat (%Mg)	Base Sat (%Ca)	OM	P (ppm)	K (ppm)	Mg (ppm)	Ca (ppm)	Coordin
1-7	11.8	5.9	1.81%	16.34%	51.64%	2.2	40	99	263	1,625	40.061587, -82.67
1-8	10.3	5	2.32%	5.77%	21.74%	1.9	63	111	81	597	40.063419, -82.67
1-9	9.8	5.6	1.71%	11.60%	37.77%	1.5	29	78	155	987	40.065327, -82.67
1-10	6.3	5.4	2.15%	19.67%	59.88%	1.9	20	63	169	1,006	40.067088, -82.67
1-11	11.1	4.8	1.38%	9.25%	24.80%	1.6	26	71	140	734	40.063364, -82.67
1-12	10.9	6.2	1.96%	22.00%	65.06%	2.2	65	99	327	1,891	40.061664, -82.67
1-13	7.4	6.3	1.78%	24.48%	74.09%	1.2	22	61	247	1,462	40.061712, -82.67
1-14	10.9	6.9	1.74%	19.78%	64.33%	1.7	18	88	294	1,870	40.063585, -82.67
1-15	10.6	6.8	1.42%	11.14%	71.07%	1.6	31	70	161	2,009	40.065352, -82.67
1-16	9.5	5.4	1.16%	9.42%	38.53%	1.2	23	51	122	976	40.064211, -82.66
1-17	10.6	7	1.36%	24.70%	60.92%	1.1	12	67	357	1,722	40.063449, -82.66
1-18	9.8	6.2	1.65%	18.26%	67.88%	1.4	19	75	244	1,774	40.061579, -82.67

Cation Exchange Capacity (CEC)



SoilTestPro

City of Pataskala

Nathan Coey | Logout | Contact Us: 1-855-768-2900

Getting Started | **Jobs** | Farms/Fields | My Account | Order Tests

« | Job Details | Shipping Sheet | Lab Results | Recommendations

View PDF | Done

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1 / 1

Soil Analysis Report

Spectrum Analytic
1087 Jamison Road NW
Washingon Court House, OH 43160-8748
www.spectrumanalytic.com

Report To	*Prepared For*	
FARM LOGIC 90 SPRUCE ST MURRAY, KY 42071	CITY OF PATASKALA REUSSNER 1	Sampled 03-02-2016 Tested 03-04-2016

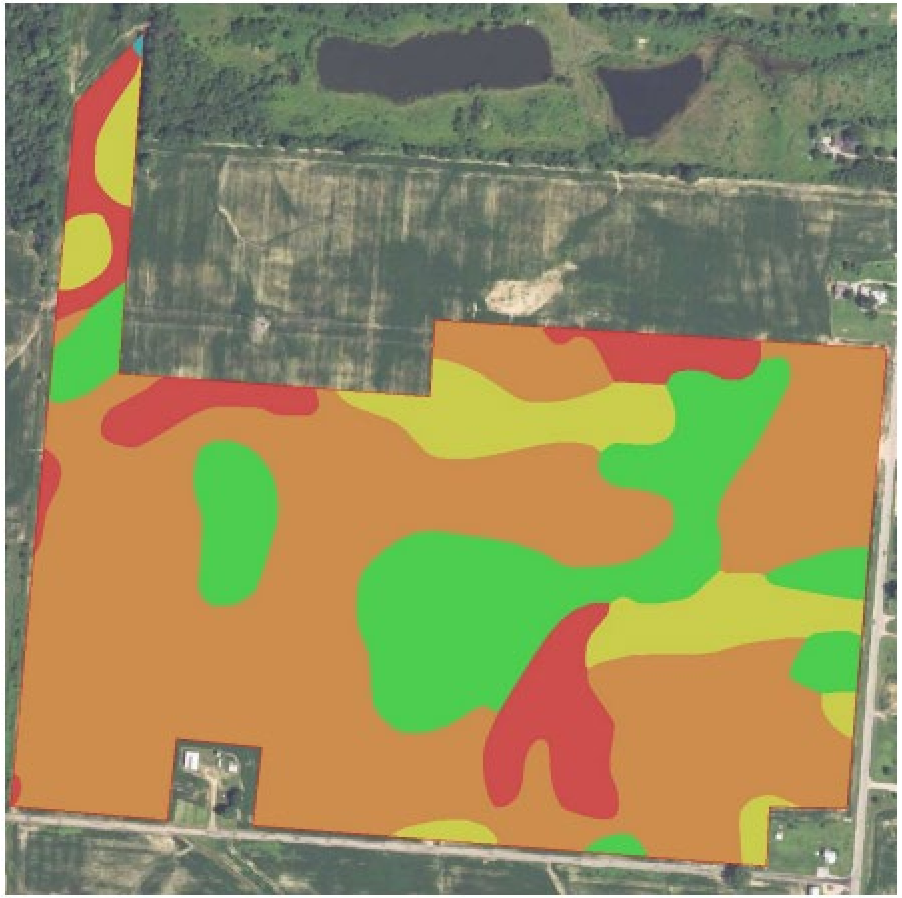
Sample Number	Lab Number	pH		Organic Matter	Analysis Result* and Rating				CEC	Base Saturation			Mehlich-3 PPM and Rating						
		Soil pH	Buffer pH	%	Phosphorus P	Potassium K	Magnesium Mg	Calcium Ca		K %	Mg %	Ca %	Sulfur S	Boron B	Zinc Zn	Iron Fe	Copper Cu	Mang. Mn	Alum. Al
REUSSNER1-1-7	J36848	5.9	6.7	2.2	40 M	99 M	263 G	1625 G	11.8	1.8	16.3	51.5							
REUSSNER1-1-8	J36849	5.0	6.4	1.9	63 G	111 M	81 M	597 L	10.3	2.3	5.8	21.8							
REUSSNER1-1-9	J36850	5.6	6.6	1.5	29 M	78 M	155 M	987 M	9.8	1.7	11.6	37.7							
REUSSNER1-1-10	J36851	5.4	6.9	1.9	20 L	63 M	169 G	1006 G	6.3	2.1	19.5	59.4							
REUSSNER1-1-11	J36852	4.8	6.4	1.6	26 M	71 L	140 M	734 M	11.1	1.4	9.2	24.7							
REUSSNER1-1-12	J36853	6.2	6.9	2.2	65 G	99 M	327 H	1891 G	10.9	2.0	22.0	65.0							
REUSSNER1-1-13	J36854	6.3	7.0	1.2	22 L	61 L	247 G	1462 H	7.4	1.8	24.4	73.8							
REUSSNER1-1-14	J36855	6.9	7.2	1.7	18 L	88 M	294 G	1870 G	10.9	1.7	19.7	64.0							
REUSSNER1-1-15	J36856	6.8	7.0	1.6	31 M	70 L	161 M	2009 H	10.6	1.4	11.1	70.8							
REUSSNER1-1-16	J36857	5.4	6.6	1.2	23 L	51 L	122 M	976 M	9.5	1.2	9.5	38.7							
REUSSNER1-1-17	J36858	7.0	7.3	1.1	12 L	67 L	357 H	1722 G	10.6	1.4	24.7	60.9							
REUSSNER1-1-18	J36859	6.2	6.9	1.4	19 L	75 M	244 G	1774 G	9.8	1.6	18.3	67.9							

* *Results: P, K, Mg and Ca are extracted by Mehlich-3 (ICP) and are reported in ppm*
Ratings: L=Low M=Medium G=Good H=High V=Very High

Data Manager — Soil Type Map

Grower: City of Pataskala   Field(s): Reussner1
Farm: Reussner 1
Acres: 97.47

FarmLogic ppm
90 Spruce Street
Murray, KY 42071
PHONE: 866-761-8001



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90 Spruce Street
Murray, KY 42071
PHONE: 866-761-8001

Label	Acres	Soil Description	Corn	Soy	Oats
BeA	9.82	Bennington silt loam, 0 to 2 percent slopes	106.00	36.00	66.00
BeB	58.14	Bennington silt loam, 2 to 6 percent slopes	102.00	30.00	75.00
CeB	10.56	Centerburg silt loam, 2 to 6 percent slopes	115.00	34.00	75.00
CeC2	18.91	Centerburg silt loam, 6 to 12 percent slopes, eroded	95.00	30.00	70.00
Pe	0.04	Pewamo silty clay loam	125.00	42.00	100.00


SURE-TRAC

Lessons Learned

- The OEPA Agronomic Rate Worksheet is a great tool. It is your friend, and you have to report it with the ASR.

OhioEPA
Ohio Environmental Protection Agency
Division of Surface Water

Biosolids Agronomic Rate Calculation Worksheet

General Information

Ohio EPA #	45-00608	
Field ID #	LI-0302-9, Spencer #3	
Generator Name	Pataskala WRF	

Biosolids Data and Beneficial Use Methods

Ammonia Nitrogen	21.40	mg/kg
Total Kjeldahl Nitrogen	77700.00	mg/kg
Total Phosphorus	14400.00	mg/kg
Organic Nitrogen	155.36	lbs/ton
Available Nitrogen	46.65	lbs/ton
Phosphate (P_2O_5)	32.98	lbs/ton
Will Immediate Incorporation / Injection be performed?	Yes	

Beneficial Use Site Information

Soil Phosphorus	40.00	ppm	Mehlich 3
	35.20	ppm	
Please note that the agronomic rates and phosphorus index have been calculated within the *Calculated Agronomic Rates* section; however, based upon the above provided *Soil Phosphorus* result, you must utilize the most limiting factor or the *Phosphorus Index*:	The nitrogen agronomic rate, a phosphate beneficial use rate of <250 lbs/acre, a phosphate beneficial use rate of 256-500 lbs/acre if injected/incorporated within 24 hours of beneficial use or if there is >50% ground cover, or the Phosphorus Index.		
County	Licking		
Soil Type	Pewamo silty clay loam		
Hydrologic Soil Group	C		
Year 1	Crop 1	Crop 2	
Crop Type(s)	Corn (Grain)	Alfalfa	
Expected Crop Yield(s)(bu/acre or tons/acre)	200		
Year 2	Crop 1	Crop 2	
Crop Type(s)	Corn (Grain)		
Expected Crop Yield(s)(bu/acre or tons/acre)	200		
Year 3	Crop 1	Crop 2	
Crop Type(s)	Soybean		
Expected Crop Yield(s)(bu/acre or tons/acre)	80		
Year 4	Crop 1	Crop 2	
Crop Type(s)	Corn (Grain)		
Expected Crop Yield(s)(bu/acre or tons/acre)	200		
Year 5	Crop 1	Crop 2	
Crop Type(s)	Soybean		
Expected Crop Yield(s)(bu/acre or tons/acre)	80		
Crop Nitrogen Requirements (Year 1)	200	lbs/acre	
Existing Available Nitrogen	100	lbs/acre	
Non-Biosolids Nitrogen Application	50	lbs/acre	
Phosphate (P_2O_5) Fertilizer Application	50	lbs/acre	
Non-Biosolids Organic Phosphate (P_2O_5) Application	20	lbs/acre	
Biosolids Phosphate (P_2O_5) Beneficial Use	0.99	lbs/acre	
Total Organic Phosphate (P_2O_5) Fertilizer Application	20.99	lbs/acre	

Phosphorus Index

Soil Loss	5	tons/acre/ye
Connectivity to "waters of the State"	Concentrated flow does not l not adjacent to an intermitte	
Runoff Class - Slope Range	4-6%	
Soil Phosphorus		2.46

Application - Phosphate (P_2O_5) Fertilizer			2.5
Method - Phosphate (P_2O_5) Fertilizer	None applied.		0
Application - Organic Phosphate (P_2O_5) Fertilizer			1.26
Method - Organic Phosphate (P_2O_5) Fertilizer	None applied.		0
Does runoff flow through a filter strip designed per USDA Ohio-NRCS Field Office Technical Guide Standard 393?	No		0
Total Phosphorus Index			16.22

Calculated Agronomic Rates

Nitrogen Agronomic Rate	0.03	dry tons/acre
i. Calculated Agronomic Rate	1.07	dry tons/acre
Single Year Phosphate Agronomic Rate	2.42	dry tons/acre
Multi-Year Phosphate Agronomic Rate	11.15	dry tons/acre
Phosphorus Index	Medium potential for phosphorus runoff. Use the Nitrogen Agronomic Rate.	

Beneficial Use Site Records

Quantity of Biosolids Beneficially Used	10.64	dry tons		
Phosphate (P_2O_5) Beneficially Used Per Acre	36.23	lbs/acre		
Acreage	19.37			
Date Biosolids Delivered to Beneficial Use Site	4/24/2017			
Dates of Beneficial Use	4/26/2017	to		
Total Days Biosolids Stored at Beneficial Use Site	2.00	Days		
Date Signage Posted at Beneficial Use Site	3/27/2017		☑ Yes	Is a permanent sign posted at the beneficial use site?
Date Signage Removed from Beneficial Use Site			☑ No	

Ohio EPA (10/13)

Lessons Learned

- Familiarize your self with the ins and outs of agronomy. This has been a great part of the journey to me.

Lessons Learned

- Valuable data in terms and results relatable to farmers. Even though we report in mg/kg that matters little to them. What is the pounds per acre, application rates, ratios etc.
- Apply that data and share with an agronomist or fertilizer firm to not 'waste money' on other wise free nutrients provided to the land application site.

City of Pataskala Biosolids Management Program

Biosolids Monitoring Worksheet

Test Results Date:	4/5/2017	Land Application Field	LI-0302-9 / 45-00608 (18.7 ac)		Application(s) Date:	4/26/2017	
Test Parameter	MG/KG	Limit	Below MG/KG limit ?	lbs./ton	lbs/acre limit	lbs/acre	Below lbs/acre limit?
Ammonia (NH3)	21	NO		0.04		0.02	
Total Kjeldahl Nitrogen (TKN)	77,700	NO		155.40		85.34	
Total Phosphorus (P)	14,400	NO		28.80		15.82	
Potassium (K)	3,430	NO		6.86		3.77	
Arsenic (As)	7	**75**	Yes	0.01	**36.6**	0.01	Yes
Cadmium (Cd)	0	**85**	Yes	0.00	**34.8**	0.00	Yes
Copper (Cu)	515	**4300**	Yes	1.03	**1339.9**	0.57	Yes
Lead (Pb)	8	**840**	Yes	0.02	**267.9**	0.01	Yes
Nickel (Ni)	9	**420**	Yes	0.02	**375.1**	0.01	Yes
Zinc (Zn)	366	**7500**	Yes	0.73	**2500.4**	0.40	Yes
Selenium (Se)	5	**100**	Yes	0.01	**89.3**	0.01	Yes
Mercury (Hg)	0	**57**	Yes	0.00	**15.2**	0.00	Yes
Molybdenum (Mo)	26	**75**	Yes	0.05		0.03	
Organic Nitrogen (N)	77,679	NO		155.36	**250**	85.32	Yes
Plant Available Nitrogen (N)	23,325	NO		46.65	**250**	25.62	Yes
Phosphate (P2O5)	32,976	NO		65.95	**250**	36.22	Yes
Potash (K2O)	4,116	NO		8.23		4.52	

	N	P205	K20		N	P205	K20
	67.68	28.73	3.59	NPK Ratio	18.9	8.0	1.0

Nitrate/Nitrite-N 30.2 mg/kg

WT Applied	76.53			Soil Phosphorus Average 40	
DT Applied	10.64				
Total Solids Average	13.9				
GPS Applied Acres	19.37	Legal Acres	21	Travel area covered during operaiton	
WT Per Acre Applied	3.95				
DT Per Acre Applied	0.55	Hauled to site on 4-24 to 4-25-2017			

Mulch used for containment by farmer-spreader loading by farmer

Pathogen Reduction Alternative P-1, Geometric mean of seven samples below 2 million mpn/cfu

Vector Attraction Reduction Option VAR-3, Bench Scale Aerobic Digestion with VSS reduction <15%

incorporation by the farmer after every spreader load applied.

Public Relation Efforts

- The ‘minimum’ requirements often stirs concern.
- Go out of your way to educate, focus on the neighbors to application sites. Gaining allies takes more effort than collecting adversaries.
- Share the data, communicate the product and our regulations.
- Be honest about the product…….it is treated human waste product.
  - You cant hide an odor
  - Consideration of selected sites
    - Incorporate to control odor
    - Mindful of hauling schedules

Public Relations

- I worked with the local newspapers to get the word out.
- Many discussions in public meetings on our plan.
- Sensitive to our neighbors during hauling operations at the facility and field.

Farming is not ‘9 to 5’

- Working with the local farming schedule is key to a successful relationship.
- Frequent communication of planting and harvesting schedules for individual fields.
- Weather conditions is a huge factor.
  - “no person shall beneficially use class B or bulk exceptional quality biosolids during a precipitation event, or when the forecast indicates that there is at least a fifty per cent chance that .5 inch of rain will occur within twenty-four hours after beneficial use.”
  - Use www.weather.gov

Future Projects

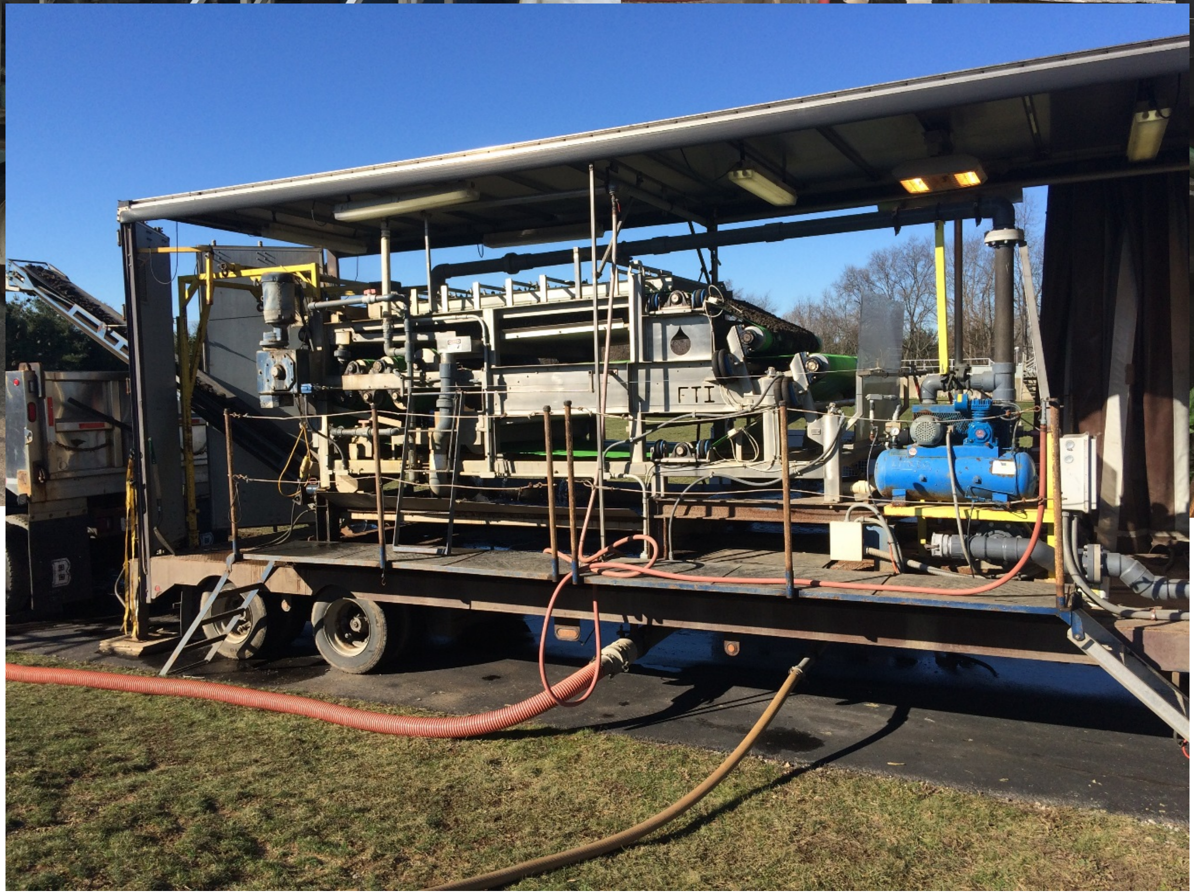
- Design work is under way to modify the aeration system to achieve phosphorus removal.
- New press is needed.
- Process control options for wasting and tank service.
- Additional cake storage.
- Force main addition to remove a bottleneck.
- Grit removal.
- New lab.

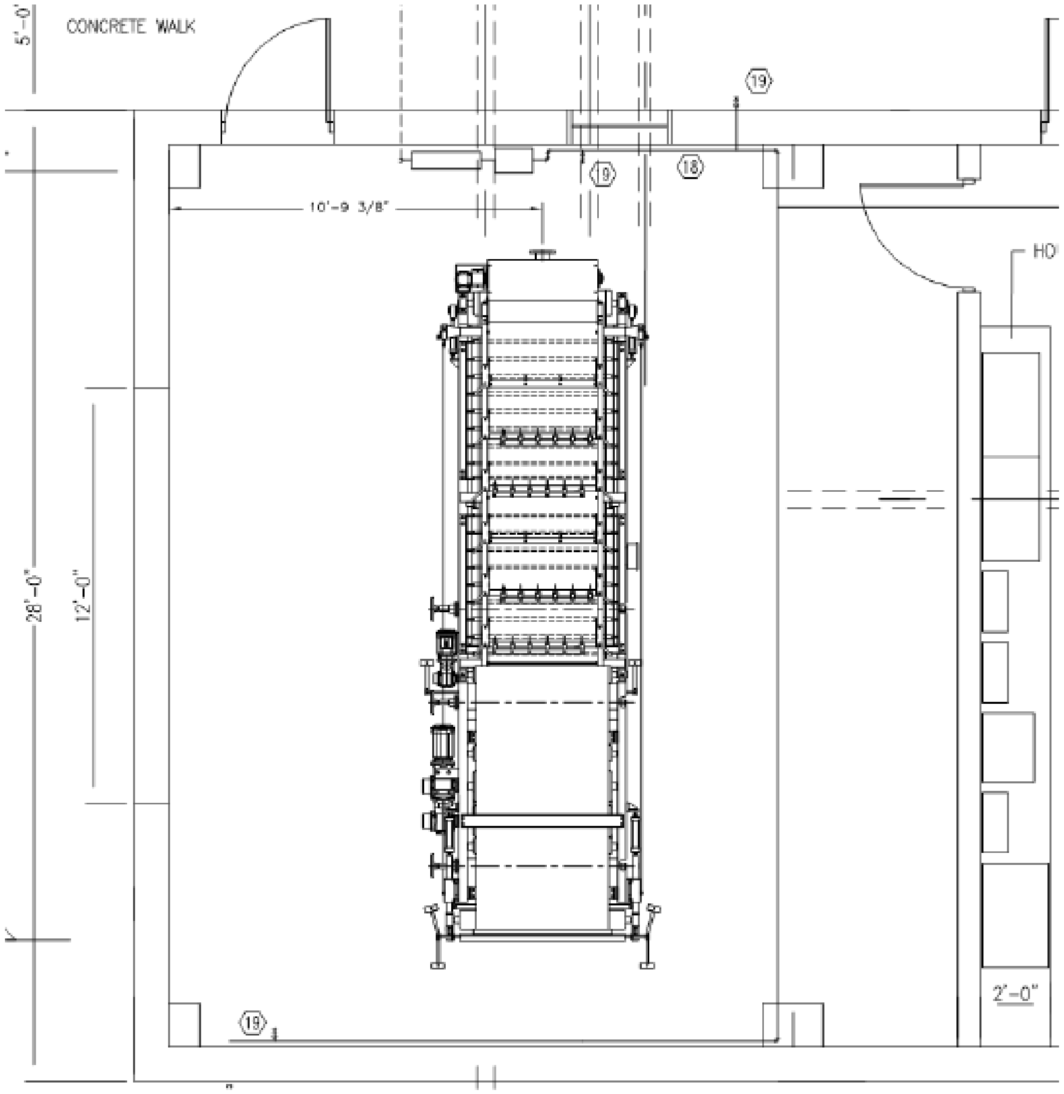
New Press

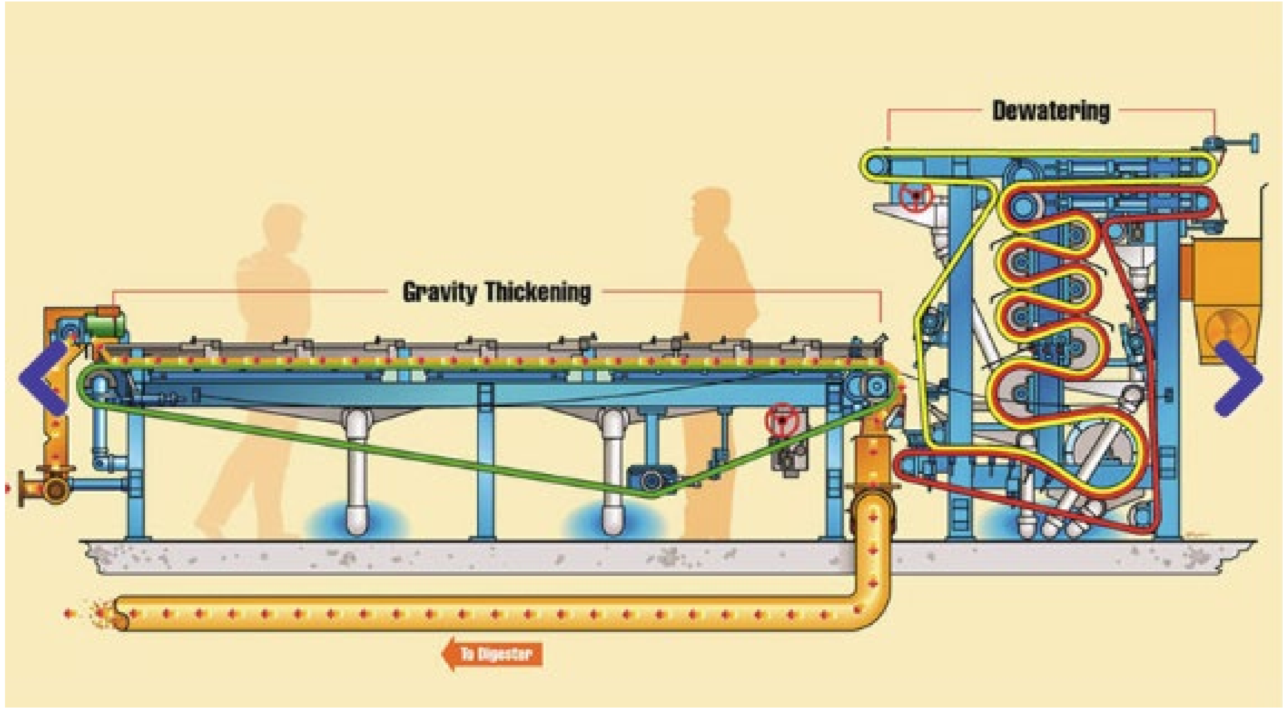
- Trial run on two belt filter units, rotary press, and centrifuge.
- Centrifuge provided the best cake yield.
- BDP filter press was selected due to capital cost and tried and true.


S175
Bobcat
fournier


ANDRITZ
ANDRITZ


FTI


CONCRETE WALK
5'-0"
10'-9 3/8"
28'-0"
12'-0"
2'-0"
19
18


Dewatering
Gravity Thickening
To Digester


INTERNATIONAL
FIRE EXTINGUISHER INSIDE
FIRST AID KIT INSIDE
CAUTION


The Cradle of Civilization


3-4-43
3 Stooges
Moe Larry
Curly