

MEETING NOTICE: PUBLIC WORKS COMMITTEE FOR VILLAGE OF WINNECONNE

Agenda For:

Friday, February 07, 2020 @ 8:00 a.m. at Municipal Building, Annex Room, to consider;

Public Participation

Communications

Approve Minutes from January 13, 2020 meeting

Operations Progress:

Field Supervisor Report – Josh Janikowski/ DPW

MCO Report – Chris Ferguson

DPW Report – Kirk Ruetten

Old Business

Village Projects and Priority

- Update
- Recommendation

Well and Water Quality

- Update
- Discussion
- Recommendation

Storm Water Utility Creation

- Discussion
- Recommendation

New Business

Recommendation to Award Pilot Study

- Discussion
- Recommendation

Approve Posting of Bid N. 6th St.

- Discussion
- Recommendation

Recommendation to Approve Preliminary Assessment Resolution N. 6th St.

- Discussion
- Recommendation

Set next meeting date and adjourn

Kirk Ruetten

Public Works Director

Pursuant to WI State Statute 985.02(1)(b); notice is hereby given that Village Board Members may also be present at this meeting for informational purposes.

MEETING MINUTES: PUBLIC WORKS COMMITTEE FOR VILLAGE OF WINNECONNE

Minutes For:

Monday, January 13, 2020 @ 8:00 a.m. at Municipal Building, Annex Room, to consider;

Meeting called to order at 8:06 am by Trustee Steve Foster with Trustee Chris Ruetten present and Trustee Clifford absent.

Also attending were Brad Werner with McMahon, DPW Ruetten, Chris Ferguson with MCO, and Administrator David Porter.

Public Participation – *None*

Communications – *None*

Approve Minutes from December 09, 2019 meeting – *Motion*
and seconded by Trustee Foster carried by voice vote 2/0.

Chris Ruetten

Operations Progress:

- Field Supervisor Report –DPW Ruetten: *Report Attached*
- MCO Report – Chris Ferguson /DPW: *Report Attached*
- DPW Report – Kirk Ruetten: *Report Attached*

Old Business

Village Projects and Priority

- *Bridge Project – Electrical wiring was all replaced on the West side of the bridge, Lunda has some Spring punch list items, Final DOT right-of-way staking has to be completed, and some Landscaping has to be finished up this spring.*
- *Main Street Project –Currently finishing redline drawings, awaiting updated plans and finalizing bills with closeout in January.*
- *Twin Harbor Drive reconstruction – Punchlist items remain, working on finalizing bills and final assessment figures.*
- *Phase II Environmental – All drums have been removed from the site and still waiting for final report to tell us if additional testing is required. Conversations with the DNR have been leaning towards this.*
- *Asbestos and Demolition – All asbestos has been removed and both buildings are completed with topsoil and seeding remaining until Spring. I have held back \$500 for each site since this was not completed due to weather.*
- *N. 6th St. Reconstruction project – 50% plan and profile has been completed with a let date of February and a start of April remains.*
- Recommendation – None at this time

Well and Water Quality

- Update –DPW Reviewed.
 - *The DPW and McMahon have finalized the RFQ.*
 - *We feel that we have identified all concerns with the testing parameters have been met and the amount of Village involvement is OK'ed.*
 - *The PILOT RFQ went out to seven different vendors on December 30th and are due January 30th.*
 - *Next month the Committee will review the responses to the RFQ.*
 - *The RFQ does identify if pre-filtration will be needed and will be part of the pilot and final report.*
- Recommendation – None at this time

Pursuant to WI State Statute 985.02(1)(b); notice is hereby given that Village Board Members may also be present at this meeting for informational purposes.

MEETING MINUTES:

PUBLIC WORKS COMMITTEE FOR VILLAGE OF WINNECONNE

Storm Water Utility Creation –DPW and Brad Werner reviewed

- Discussion – *Werner reviewed*
 - o *Werner discussed and reviewed the 54 random residential properties that were surveyed to establish the average Equivalent Residential Unit (ERU).*
 - *Discussion on how the ERU impacts non-residential properties and offered several options to include one ERU and non-residential make up the remainder or have different ERU for large residential and average residential ERU's.*
 - *Discussion on residential lot size verses sqft of hard surfaces. This percentage may have an impact on decision.*
 - o *Next month we will have all non-residential hard surfaces measured and look at the budget for the Utility.*
 - o *DPW and Brad discussed project timeline and addressed critical points to include school budget cycle of July 1.*
 - *The educational part need to get to the school by March to meet their budget approval.*
- Recommendation – None at this time

New Business

Request for Hosting WWOA-Lake Michigan District Meeting – DPW Reviewed Request

- Discussion – DPW reviewed concerns and shared how other municipalities had issues with hosting however, this is a new board and they have changed the way they are doing things.
 - o Committee felt that it would be a good idea to host however, put the expectations of the Village and the WWOA in writing.
- Recommendation – Move forward with Hosting for December of 2020.

Review Snow Removal Ordinance – DPW and Administrator reviewed

- Discussion – There was one business owner that is having an issue meeting the times, so do we make an exception for one while the others are complying.
 - o Discussion on current ordinances and how they are different and accommodate for the businesses between 2nd Ave and 3rd St.
 - o Discussion on the parking restriction time and moving it to a different time.
 - o Change the parking ban from 6 am to 7 or 7:30 am so there will not be overtime the following day or give businesses more time to remove snow in the morning. How many businesses us parking prior to the proposed times?
- Recommendation – Administrator will talk with the Chamber to look for input into time change. No recommendation at this time.

Set next meeting date and adjourn

Motion made by Ruetten, second by Foster to adjourn at 9:06 am until Monday February 10th, 2020 at 8:00am; 2-0 approve.

Kirk Ruetten
Public Works Director

Pursuant to WI State Statute 985.02(1)(b); notice is hereby given that Village Board Members may also be present at this meeting for informational purposes.

February 2020 Public Works Operations Report

Operations:

1. 15 Public Works and Zoning permits to date (listing attached);
2. 2 Service Requests to date (listing attached);
3. 8 Building Permits to date (listing attached);
4. Public Works;
 - a. Wing back curbs and cleaned/cleared catch basins
 - b. Annual Boom Truck Inspection
 - c. PD vehicle repairs and PM's
 - d. Four (4) plowing events
 - e. Two (2) salting events
 - f. Water Main Break Birch and N. 7th St.
5. Grounds/Facilities;
 - a. Backfilled gazebo slab in cemetery
 - b. Trimmed trees in Parks and cemetery
 - c. GIS/GPS cemeteries
 - d. Filled holes, painted walls and hung fixtures in Library and Community Room
6. Water Utility (MCO):
 - a. 7 Diggers Hotline Locates to Date (Available at Meeting)
 - b. The new well #2 booster pump electrical starter was replaced at no cost due to premature failure.
 - c. Fourth quarter radioactivity sample results are back from Clean Water Testing.
 - d. Water Main Break on Birch and N. 7th St.
 - e. PW crew and MCO did leak correlation in a couple spots in the Village.
 - f. HydroCorp performed the commercial and industrial cross connection inspections, at the end of January.
 - g. RFQ's for R.O. pilot system
7. Wastewater Treatment Plant (MCO):
 - a. Fine Screens plugged and overflowed, returned to normal operation
 - b. Raw pumps plugged returned to normal operation.
 - c. One (1) call in for rags in pump #1 at the Landings lift station. All residents received public education notifications in their water bills.
 - d. Submitted sludge reports to DNR for 2019. Sludge production was down 33% from 2018. Likely due to Covanta discharge

All work during this period was a combined effort of the entire Public Works Staff.

DPW Report:

- Working with OMNNI Associates and Wis DOT, on Bridge and Main St. Project,
- Working on WDNR and Sigma Group on PDK environmental project
- Working with DNR and McMahon Group on Holtz/Bigger environmental project
- Working with engineers for several Village projects to include Twin Harbor Dr., Well/Water Quality upgrades, N. 6th Street, and Facility Long Term Planning
- Acquiring prices and quotes for FY 2020 projects and equipment
- Preparing for Annual PSC Report
- Preparing PSC Unaccounted Water Loss Report for PSC

Building Permits 2020

2020-01	1/15/20	Joseph Lefebvre	Ryf Heating & A/C Inc	126 N 3rd St	HVAC	\$44.00	10,000.00	\$44.00
2020-02	1/15/20	Larry Deservi	Ryf Heating & A/C Inc	633 Birch	HVAC	\$44.00	3,700.00	\$44.00
2020-03	1/15/20	Thomas Schmude	Ryf Heating & A/C Inc	432 S 2nd Ave	HVAC	\$44.00	7,000.00	\$44.00
2020-04	1/24/20	Dennis Biggar	Dennis Biggar	813 N 9th St	NSFD	\$661.40	75,000.00	\$2,813.91
2020-04p	1/24/20	Dennis Biggar	Pete Kasuboski	813 N 9th St	Plumbing	\$98.00	Included	\$98.00
2020-04e	1/24/20	Dennis Biggar		813 N 9th St	Electrical	\$77.00	Included	\$77.00
2020-04h	1/24/20	Dennis Biggar	Ryf Heating & A/C Inc	813 N 9th St	HVAC	\$71.50	Included	\$71.50
2020-05	1/31/20	Jason Franks	Basement Repair Specialists	214 N 9th Ave	Foundation Repairs	\$44.00	9,467.00	\$44.00

Your Stormwater Utility Fee

The requirements of NR 216 permitting have substantially increased the cost of Stormwater Management. As a result, the Village Board adopted a Stormwater Utility to enable the Village to better meet its stormwater needs. A Utility allows the Village to bill property owners for their fair share of storm water runoff, and to properly and safely manage stormwater. Charges for the Utility began January 2020 and will appear on your quarterly Utility bill starting March 2020.



What Will the Stormwater Fees Be Used For?

Stormwater fees will be used for:

- Compliance with the new DNR stormwater permitting requirements (NR 216), which includes increasing the frequency of cleaning debris accumulating in the storm sewer, cleaning Village streets and construction and maintenance of ponds and other facilities to clean stormwater.
- The reduction of the Village's flooding problems.
- Reconstruction, repair, cleaning and inspection of the Village's inlets, catch basins, manholes, culverts, ditches, outfalls and storm sewers; sweeping of Village streets; and the construction of detention basins, mini-sewers, and storm sewers.

How are Stormwater Fees Determined?

Charges for stormwater are based on an "Equivalent Runoff Unit" (ERU) which represents the cost for dealing with the impact of a single-family home on stormwater quantity (flooding) and quality (pollution). For the Village of Winneconne, an ERU is defined as XXXX square feet - the average impervious area of a single-family home. (Impervious areas are areas that do not allow stormwater to soak into the ground. They include areas paved with concrete, asphalt, compacted soils or gravel, or areas covered by buildings.) A monthly fee of \$XX.XX will be charged per ERU (\$XX per billing cycle). As shown in the table below, the Utility charge for all single-family homes will be 1.0 ERU with duplexes being charged X.X ERU per unit. The charge for a condominium is calculated by dividing the total impervious area of the development by XXXX square feet, then dividing equally by the number of dwelling units in the complex.

The Stormwater Utility Ordinance defines non-residential customers as "any developed lot or parcel not exclusively residential as defined herein, including but not limited to, transient rental (such as hotels and motels), commercial, industrial, institutional, governmental property and parking lots." Non-residential rates will be based on the number of ERUs calculated for each parcel. This is calculated by dividing the customer's total impervious areas by XXXX square feet. The table below shows examples of typical stormwater fees. Undeveloped properties will pay no stormwater user fees until they are developed.

EXAMPLES OF FEE CALCULATIONS				
Property Type	Total Impervious Area (Square Feet)	Total Number of ERU's	Monthly Charge	Quarterly Bill
Single Family Home (Average)	XXXX	1.0	\$X.00	\$XX.00
Duplex (Average Per Unit)				
Condominium (Average per Unit)				
Non-Residential (Typical)				

Where Do I Go for More Information?

Much of the information about the utility is based on the Stormwater Financing Report prepared for the City by Earth Tech, which is available for public review at City Hall.

Information can also be found online at <http://www.winneconne.gov>

For more information about the Stormwater Management Utility or if you have specific concerns about stormwater management issues, please contact the Public Works Department at 920-582-4381.



VILLAGE OF WINNECONNE

The Community of Opportunity

30 South First Street • P.O. Box 488 • Winneconne, Wisconsin 54986-0488 • 920-582-4381

www.winneconnewi.gov

RESOLUTION 2.1-2020

RESOLUTION DECLARING INTENT TO LEVY SPECIAL ASSESSMENTS UNDER MUNICIPAL POLICE POWER PURSUANT TO SS66.0703, WISCONSIN STATUTES

BE IT RESOLVED: By the Village Board of the Village of Winneconne, Wisconsin that:

1. The Village Board declared its intention to exercise police power under SS66.0703, Wis. Stats., to levy special assessment upon property within the following described area for benefits conferred upon said property by certain public improvements consisting of the preparation of a feasibility study to determine the feasibility of constructing and installing water main, water services, sanitary sewer, laterals, storm sewer, laterals, bituminous asphalt street, concrete curb and gutter, and related improvements and installation of said public improvements to properties located on:

North 6th Street (from W. Main St. to Birch St.), all in the Village of Winneconne, Winnebago County, Wisconsin and described more particularly in the Preliminary Assessment Report.

2. The purpose for which the special assessments are being levied is to pay costs incurred to investigate, design, install, and construct water main, water services, sanitary sewer, sanitary laterals, storm sewer, storm laterals, bituminous asphalt street, concrete curb and gutter, driveway approach replacement, and related improvements; including engineering fees, surveyor fees, financial consultant fees, attorney's fees, construction costs other costs incurred in connection with the aforementioned improvements and installation.
3. For consideration of the special assessments being levied, the Village of Winneconne Public Works Director prepared a Preliminary Special Assessment Report consisting of the following:
 - a. Preliminary plans and specifications for said improvements.
 - b. An estimate of the entire cost of the proposed improvements.
 - c. A schedule of the proposed assessments to be levied and a breakdown as to how said assessments affect each parcel in the area being assessed, pursuant to Village Ordinance 3-2-14,15,16.
4. The Village Board determines that such improvements shall be made under the police power of the health, safety and public welfare.
5. The amount assessed against each parcel shall not exceed the actual cost of the project as pro-rated to each parcel. As such, the Village Board directs the Village Administrator or Public Works Director to proceed with finalization of plans and specifications, competitively bid the project in accordance with applicable Wis State Statutes, and compile a Final Special Assessment Report consisting of the following:
 - a. Final plans and specifications for said improvements.
 - b. A summary of the entire final cost of the proposed improvements.
 - c. A schedule of the final assessments to be levied and a breakdown as to how said assessments affect each parcel in the area being assessed.
6. The final special assessment against the parcel may be paid in a lump sum or in a number of annual principal installments plus an annual interest charge to be determined by the Village Board at the Public Hearing on the 17th of March 2020 in the manner established by Assessment Report in accordance with Village Ordinance 3-2-14,15,16.
7. The Village of Winneconne Public Works Director is directed to file the Report in the office of the Village of Winneconne Clerk-Treasurer for public inspection.

8. The Village of Winneconne Public Works Director is directed to arrange for publication of a Class 1 Notice of a Public Hearing on the Report as specified in Section 66.0703(4 and 7), Wis. Stats.
9. Upon receipt of the Report, the Village Public Works Director is further directed to, at least ten (10) days before the hearing, mail a copy of the notice to every interested person whose post office address is known, or can be ascertained with reasonable diligence.
10. The Notice prepared shall state that the Public Hearing on the Preliminary Special Assessments will be held by the Village Board at the Village Board Chambers, 30 South 1st Street, Winneconne, Wisconsin on March 17, 2020 at 5:30 p.m.
11. By action of this resolution, the Preliminary Special Assessment levies are hereby accepted as an estimate for potential Final Special Assessment levies based on preliminary design quantities and assumptions, determined and estimated by the Village Administrator and applied to each specific property within the assessment boundary as specified in Section 66.0703(5) Wis. Stats.

The undersigned, Village President and Village Clerk-Treasurer, hereby certify that the foregoing Resolution was duly adopted by the Village Board on the 18th day of February 2020.

Chris Boucher
Village of Winneconne President

Attest:

Jacquin Stelzner
Village Clerk-Treasurer

RO System Pilot RFQ Overview

	Ham	Tonka	Water Surplus	Pall	West-Tec
Included in Quote	Comments	Comments	Comments	Comments	Comments
Base Price Quote	\$49,500 Well# 2 Identified/Skid Pilot	\$167,000 Trailer Pilot	\$59,180 Well# 2 Identified/Skid Pilot	\$50,000 /Skid Pilot	\$97,300 /Skid Pilot
Weekly Rate for Extension of Study	\$1,500 Weekly rate past 3-months	\$3,500 Weekly rate past 10 weeks	\$2,335 Weekly rate past 3-months	10 week Pilot period	\$7,000
Additional Pre-Treatment if Required (Alternate# 1)	Three Included - acid, scale inhibitor, and sodium bisulfite	\$190,000 Pilot Extension \$4200 Weekly	PH adjustment and antiscalant		Antiscalant and Post PH adjustment and Alkalinity
Pretreatment Chemicals	Included	Weekly Reporting	Included	Included	
Remote Support and monitoring		Included			
Membrane autopsies		Included	Included		Included
Booster Pumps and special equipment					
Additional Set of Membrane Elements (Alternate# 2)		\$11,000			\$2,595
Breakdown of Pricing					
Monthly Lease	\$7,500 3 Months Recommended	Included	Included	Included	\$1,200 Included/ additional days
Installation/Start-up/Training	\$9,500	Included	Not Quoted	Included	Included
Freight to and from	\$6,500 Both Ways	Included	Additional	Included	Included
Membranes and Consumable	\$7,500				
Pilot Report	\$3,500.00				
Excluded from Quote					
Unloading of Equipment	X	X	X	X	X
Site Improvement	X	X	X	X	X
Electrical Hook-up	X	X	460 VAC	230/460V three-phase	60 amps 480V/60Hz three-phase
Permitting	X	X		X	X
Lab Testing	X	X		X	X
Raw water in owner supplied storage tank	X		X		



AMTA Technology Transfer Workshop
**“Membranes Meeting Water Quality Issues
in the Mid-West”**

North Liberty, IA – September 19, 2018

**Membranes in the Mid-West
Pre-Treatment Considerations**

**Julie Nemeth-Harn, PE
Harn R/O Systems, Inc.**

All Membrane Systems Need Pretreatment

- Physical pretreatment –
colloids, sand, oxidized metals
 - MF/UF: sand or multimedia filters, strainers
 - RO/NF: bag filters, cartridge filters
- Chemical Pretreatment
 - Protect membranes (sod. bisulf.)
 - Increase recovery (acid, scale inhibitor)



How Much Pretreatment is Necessary?

- Balance capital and O & M cost
- Reduce membrane cleanings
- Increase membrane life
- Reduce post-treatment expenses
- Increase blend around membrane system (reduces cost)
- Pilot testing
- Consider eliminating bad-acting wells!

Overview

- Midwest groundwaters: iron and manganese
 - Historical perspective: metals must be removed prior to membrane treatment
 - Reality: decades-old membrane plants directly treating high metals
- Assess feasibility of direct treatment
- Design considerations for direct treatment
- Design Considerations if direct treatment is not feasible
- Three brief case studies: Grimes, IA; Toluca, IL and Aledo, IL

Presence of Metals in Groundwater

- Iron and Manganese in soluble state:
 - Ferrous, Fe^{2+} and Mn^{2+}
- After oxidation, convert to particulate state:
 - Ferric, Fe^{3+} and Mn^{3+}
- Metals can also be a biological food source
 - Iron oxidizing bacteria, *Gallionella*

Why Not Aerate and Filter?

- Metal removal in water treatment has been performed for decades
- Process is simple: oxidize and filter
 - Aeration and/or Chlorination, Potassium permanganate
 - Greensand filtration
- What are the potential downfalls before membrane treatment?

Biofouling



Biofouling

Studies going back to 1994 in the Netherlands compared anaerobic treatment versus aerobic treatment with NF – concluded that anaerobic direct treatment operated more successfully, less biofouling

Hiemstra, Peter, et al (2001), Aerobic Versus Anaerobic Nanofiltration: Fouling of Membranes, AWWA Trends in Water Series: Membrane Practices for Water Treatment. pp. 55-82

Biofouling

- Added equipment, piping, detention time
 - increased surface area for biofouling to proliferate
- Chlorination and dechlorination can accelerate biofouling
- Oxidation of organics increases fouling potential

Paul, David (1990), Reverse Osmosis Membrane Fouling – The Final Frontier, Ultra Pure Water, Vol. 7, No. 3 pp. 25-36

Membrane Oxidation

- Oxidant carry-over from pre-treatment can damage membranes
- TFCPA spiral membranes suffer permanent loss of salt rejection when contacted with an oxidant
- Consider ammonia impacts
- Addition of oxygen scavenger required:
 - “Failsafe” controls and alarms required

Results

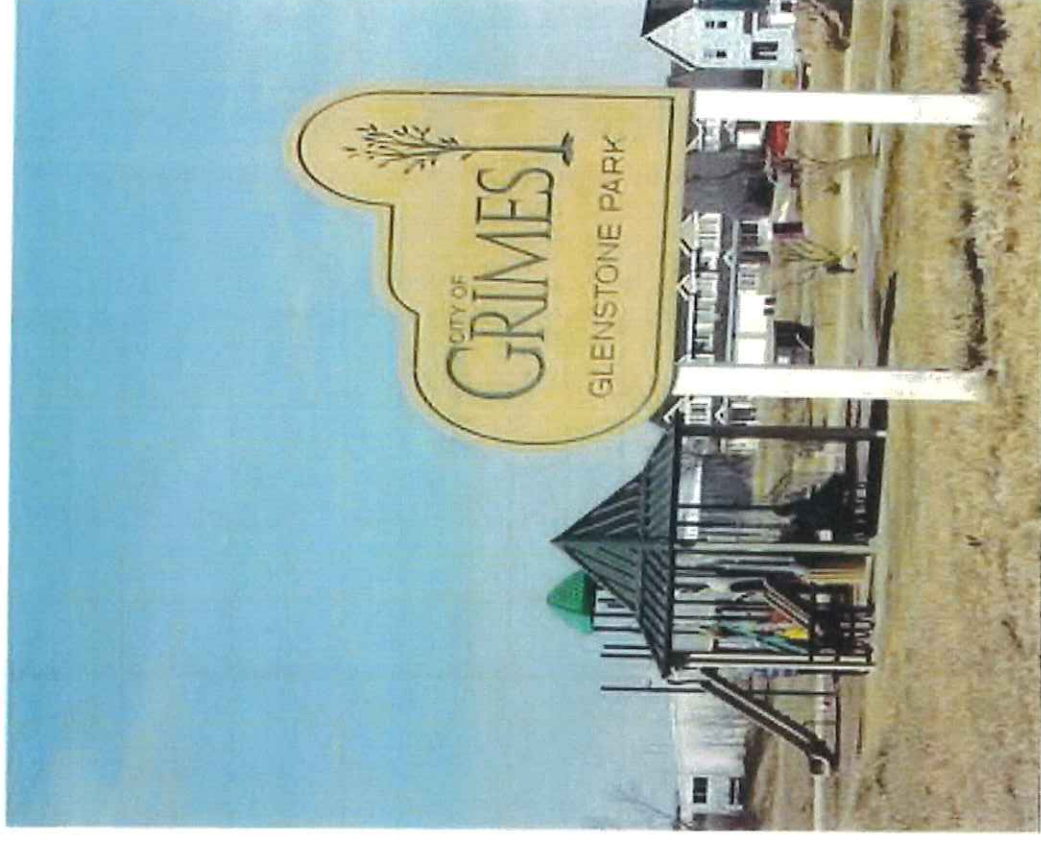
- Metal oxidation and filtration pretreatment can result in:
 - Increased chemical and energy usage
 - Increased biofouling and organic fouling
 - Increased membrane cleaning frequency
 - Decreased membrane life
 - Risk to the salt rejection properties of the membrane
 - Increased system complexity



Increased O & M Costs

Grimes, IA Background

- Rapidly growing community 15 miles NW of Des Moines
- City operates lime softening plant treating shallow wells
- Drilled Jordan well in 2013, 2000' deep
- Shallow wells: iron 12 mg/l
- Jordan well: iron 2.3 mg/l
- Goal: to pilot RO



Grimes, IA Water Quality

Parameter, mg/l	Shallow Wells (Feb. 2015)	Jordan Well (Jan. 2014)
Chloride	16.1	81
Sulfate	326	610
Ammonia -N	0.811	1.4
Total Alkalinity as CaCO ₃	367	260
Total Hardness as CaCO ₃	684	390
Calcium	191	95
Magnesium	50	38
Fluoride	--	2.87
Silica as SiO ₂	--	11
Total Dissolved Solids	912	1280
Sodium	--	270
Iron	12.5	0.38
Dissolved Iron	--	.08
Manganese	0.63	<0.02
Gross Alpha (including Uranium)	--	10.6
Combined Radium	--	8.4
Temp (°C)	--	--
pH	7.04	7.7

Grimes, IA Phase 1 Pilot

- Two-stage, “full-scale” pilot started up August 2015
- Operated for three months at 85% recovery
- No acid feed, scale inhibitor only, direct anaerobic treatment
- Utilized interstage boost pumping
- Obtained desired finished water quality with 58% permeate:42% lime softened blend

Grimes, IA Full-Scale Pilot Unit



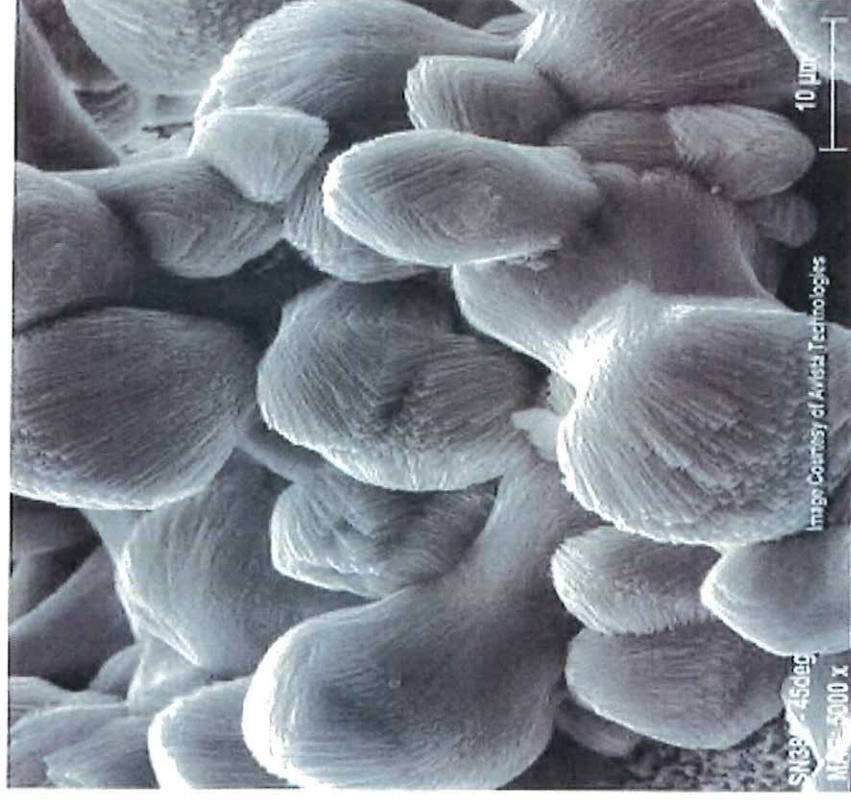
Grimes, IA Phase 1 Pilot Results

		Ammonia, mg/l as N	Chloride, mg/l	Sulfate, mg/l	Alkalinity, mg/l as CaCO ₃	Tot. Hard., mg/s as CaCO ₃	TDS, mg/l	Iron, mg/l (total)
Feed Spec.			81.9	628	253	409	1285	0.81
	Feed	1.46	98.9	619	268	432	1303	2.31
	Permeate	0.08	3.55	<1.00	42.9	<7.00	35.43	<0.100
Averages	Conc.	8.4	529	3811	1517	2430	8282	12.24
	Soft. + Perm.	0.41	24.6	193.3	33.0	145.8	364.8	0.12
	Lime softened	0.78	49.2	463.5	56.2	346.0	832.0	0.19

Grimes, IA Phase 1 Pilot Conclusions

- Pilot operated with no signs of fouling
- Iron removal was excellent
- Scaling event at end of study from loss of scale inhibitor injection
- Autopsy results of pilot membrane indicated calcium carbonate scale, easily cleaned
- Minute amounts of iron on membrane

Grimes, IA Phase 1 Membrane Autopsy Results



Grimes, IA Phase 2 Pilot

- The Jordan well was proven to successfully, directly be treated with RO
- A back-up Jordan well would be cost-prohibitive
- Would the RO be able to operate on a blend of Shallow wells and the Jordan well?
- Phase 2 pilot: same pilot, same membranes

Grimes, IA Phase 2 Pilot

	Ammonia, mg/l as N	Chloride, mg/l	Sulfate, mg/l	Alkalinity, mg/l as CaCO ₃	Tot. Hard., mg/s as CaCO ₃	TDS, mg/l	Iron, mg/l (total)	Iron, mg/l (diss)
Feed Spec.	1.1	46	462	316	560	1080	7.2	
Averages	Feed	1.0	45.0	477.0	287.9	555.6	1046.3	7.0
	Permeate	<0.050	1.66	3.46	11.86	<6.62	50.25	<0.10
	Conc.	3.4	168	1754	1033	2063	4064	26.04
	Soft. + Perm.	0.33	24.3	182.5	36.7	124.5	353.3	<0.10
	Lime softened	0.72	49.8	426.9	55.8	295.1	763.0	<0.10

Grimes, IA Phase 2 Pilot Results

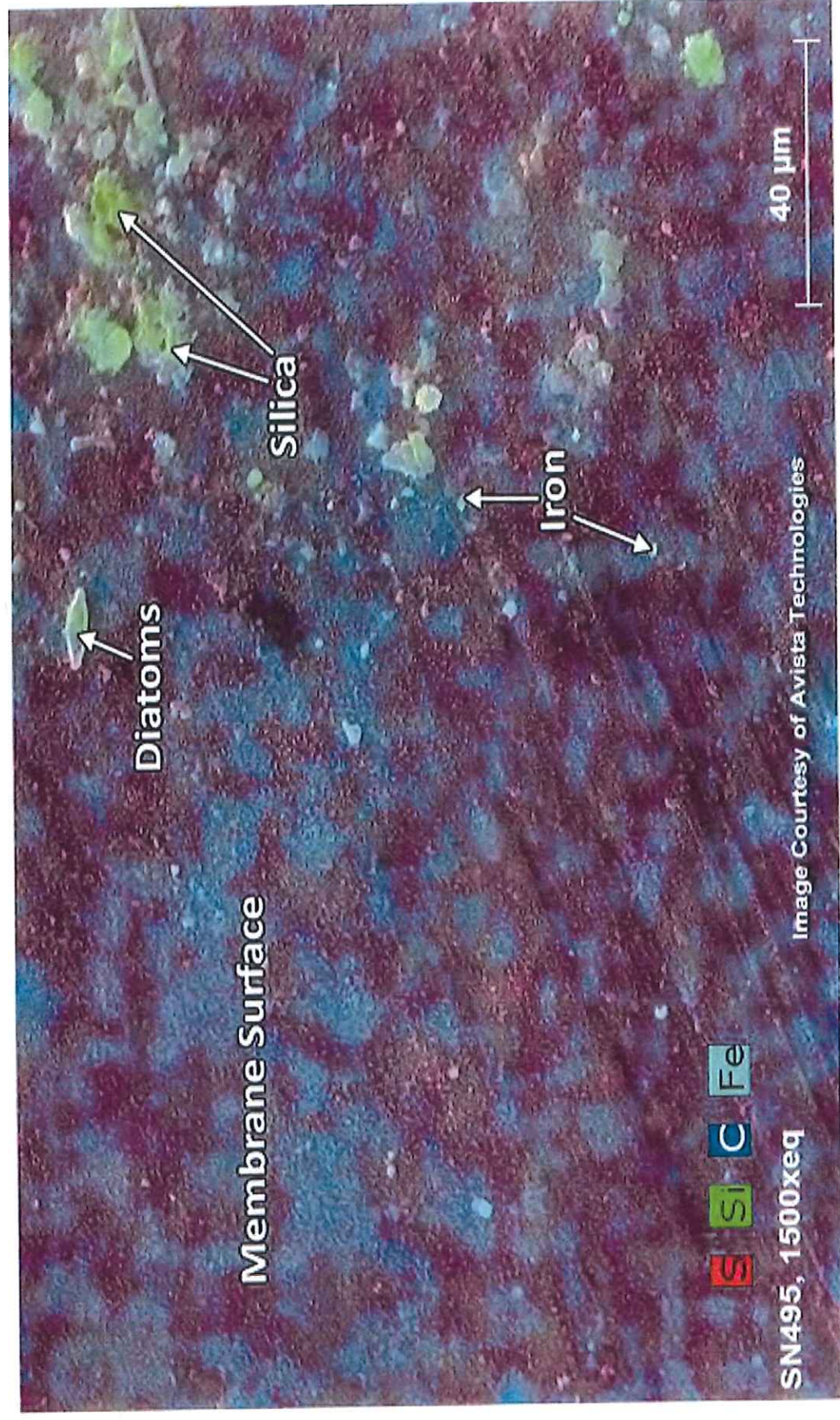
- 2nd stage fouling/scaling was exhibited initially
- Recovery was reduced to 75%
- Added a bag filter upstream of the cartridge filter
- Acid pretreatment feed, lower pH to 6.5
- In-situ and laboratory cleanings effectively restored operation
- Operation was sustainable
- Desired finished/blended water quality was achieved

Grimes, IA Phase 2 Pilot

- Spent cleaning solution
- Spent bag and cartridge filters



Grimes, IA Phase 2 Pilot Autopsy



Grimes, IA Full Scale Plant

- City implemented full-scale plant design
- First Phase: 800,000 gpd skid installed in June 2016
- Brief scaling event remedied with low pH flush
- Second Phase: 2nd 800,000 gpd skid, completed June 2017

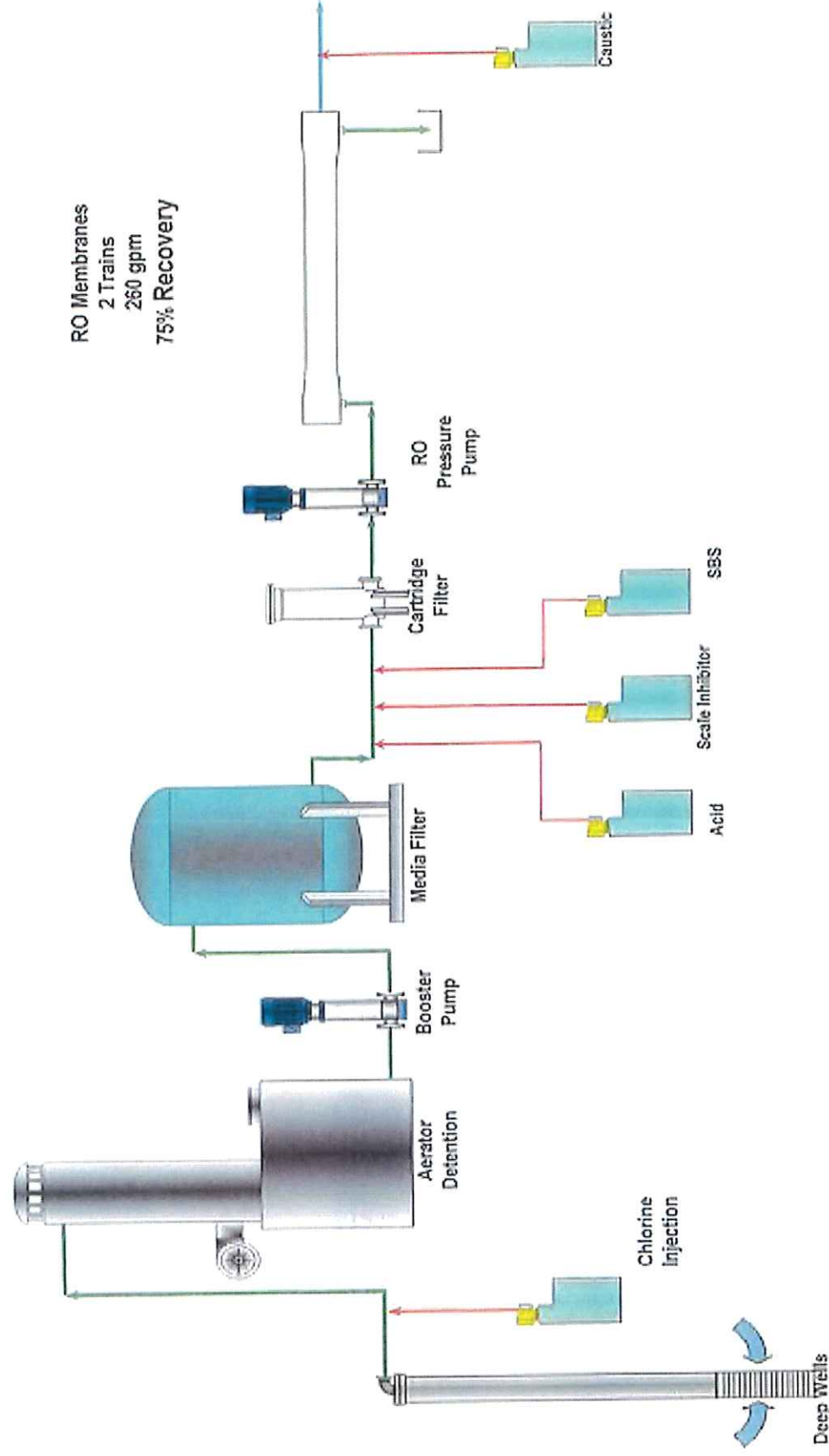
Grimes, IA Skid 1



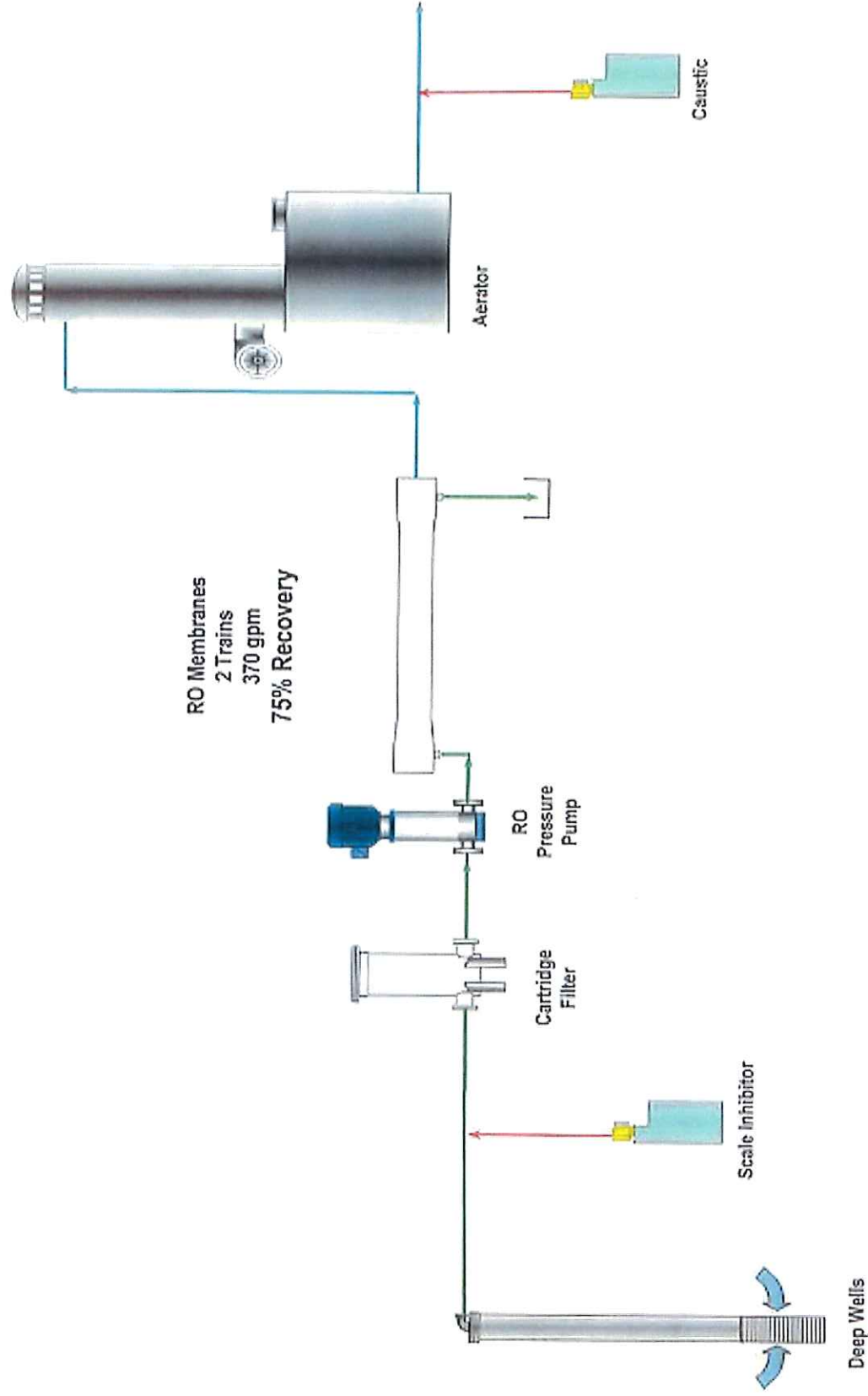
Toluca, IL Case Study

- Toluca RO plant started up in 1992
- Iron, 2.2 mg/l and Mn, 0.025 mg/l
- Originally oxidized with chlorine and filtered prior to RO
- Then acidified RO feed and fed caustic to raise permeate pH
- Cleaning every 3 to 6 months
- Membrane life, approx. two years

Toluca, IL Original Plant Schematic



Toluca, IL New Plant Schematic



Toluca, IL Conversion Benefits

- Converted to direct membrane treatment
- Repurposed aeration pretreatment to permeate degasification
- Reduced chemical usage \$137,000/year
- Have not needed cleaning since start up in 2010

Aledo, IL Case Study

- RO built in 2002 with greensand pretreatment
- Iron, 0.7 mg/l and Mn, 0.4 mg/l
- Manganese difficult to treat, slower oxidation process than iron – also influenced by pH
- Membranes cleaned two-three times/year
- Membranes replaced once, due for replacement again
- Autopsies demonstrate fouling with polymer carryover, biofouling, organics fouling

Aledo, IL Current Situation

- Currently in process of converting to direct treatment
- Experiencing severe plugging of feed lines, cartridge filters from years of precipitated manganese build-up
- Keeping greensand for side-stream treatment



Concentrate Disposal Must Accommodate Iron



How to Keep Well Water Anaerobic

- Use non-metallic materials of construction in wells and raw water supply
- Use submersible well pumps with foot valves
- Minimize elevation variations in raw water piping
- Use manual air relief valves, not automatic
- Have well flush capability at well head and WTP
- Do not oversize raw water piping

Design Considerations if Iron Pretreatment Required

- Incorporate a filter-to-waste process, automated, after every backwash
- Consider hydraulic balance between pretreatment and RO
 - RO should keep running, requiring multiple filters or storage
- Institute protections to make sure no oxidant carries-over
- Make sure oxidant neutralization chemical is injected at all times
- Expect increased biofouling, consider well and pretreatment disinfection protocols

Conclusion

- High groundwater metals levels should not preclude direct membrane treatment
- Perform pilot test to confirm pretreatment needs
- Oxidation/filtration will add capital and operating cost
- And is detrimental to the membrane treatment operation

THANK YOU!

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