



**AGENDA
CITY OF HARRISONVILLE
BOARD OF ALDERMEN
WORK SESSION
CITY HALL
APRIL 21, 2014
6:00 PM**

I. Call to Order

II. Discussion Items

A. WATER TREATMENT DISCUSSION

Posted on City Hall Bulletin Board this 17th day of April 2014

Kim Hubbard, City Clerk

The Board of Aldermen meeting is an open meeting but is not a meeting of the public. There is a place on the agenda for comments of citizens under PUBLIC PARTICIPATION. Our rule is that comments by any individual or group shall not exceed (4) minutes. The Board of Aldermen request that concerns be initially addressed at the appropriate action level before coming to the Board of Alderman



STAFF REPORT

TO: Board of Aldermen
FROM: Jerry Gibbs, Director
DATE: March 28, 2014
SUBJECT: WATER TREATMENT DISCUSSION

Type of Item: *Presentation*

Introduction: It is standard practice for communities like Harrisonville to provide safe-reliable drinking water. Safe drinking water is recognized as a basic human right and a cost effective measure of reducing disease (i.e., preventative medicine). Drinking water quality guidelines and regulations are based on current, published-scientific research related to health effects, aesthetic effects, and operational considerations. All these important parameters aim at providing potable and palatable drinking water to reduce water borne diseases and foster healthy living. The purpose of having drinking water quality guidelines and regulations is to ensure that there is access to safe drinking water.

The Safe Drinking Water Act of 1974 is the guiding framework that maintains and directs drinking water quality standards. The SDWA gives the Environmental Protection Agency and in Missouri the Department of Natural Resources, the responsibility to set and enforce standards for drinking water. The National Primary Drinking Water Regulations (NPDWRs or primary standards) are legally enforceable standards that apply to public water systems. The primary standards ensure drinking water is safe for human consumption. To complement the primary standards, non-enforceable Secondary Drinking Water Regulations that address the cosmetic and aesthetic attributes of drinking water (e.g., color, taste, tooth discoloration, etc.). These standards coupled with stringent enforcement, produce high quality potable drinking water.

Drinking water standards from the EPA specify the levels of contaminants, disinfection agents, and disinfection by-products that are allowed in drinking water. Under the SDWA, water utilities are required to monitor the drinking water and more importantly, results MUST be reported to the state or the EPA. Further, the EPA currently requires drinking water to be monitored for 90 contaminants. The EPA develops a list every five years of unregulated contaminants that may pose health implications and hence, be added to the primary or secondary standards. (Excerpts from safewater .org)

Discussion: Harrisonville has been experiencing taste and odor issues for many years. Unfortunately the frequency and duration of those events are becoming more frequent. Our

drinking water is in compliance with primary drinking water standards, however, the perception if the water taste or smells, raises concern if the water is safe to drink. The city entered into a contract with Burns and McDonnell to assist us in improving our water quality.

The project had four goals, 1) Solve Taste and Odor, 2) Optimize current treatment process, 3) Determine the remaining life of the major components of our raw water infrastructure (major components (Lake Harrisonville, Raw Water Pump station, Transmission Line, Water Treatment Equipment, and Finished Water (Distribution) Pump Station) and Develop a facilities plan to take the City the next 20 to 30 years.

At the end of each task, the findings were included in a technical memo. Burns and McDonnell, city staff and Alderman Dickerson and Colburn discussed the results and next steps. The latest efforts undertaken were the evaluation of our filters to determine if they could be expanded in capacity to treat 3 MGD, develop a capital facilities plan to lay out a work plan for improvements and the evaluation of the overflow at Lake Harrisonville. The filter evaluation has been completed. The filter evaluation identified critical issues coupled with findings of our chemical process not performing properly in a previous task raises questions if the barriers the treatment process provides to protect public health could become compromised at some point in the not too distant future.

Burns and McDonnell will be present their findings to the Board of Alderman in this work session. Alternatives and costs will be available to discuss. Preferred alternatives will require different funding approaches. The Board should be prepared to discuss their priorities and preference in solving our water quality issues.

- What is your primary project goal -taste and odor, cost, minimal to assure safe drinking water, impacts to water rates, delivering higher quality water
- Funding (How can the goal be achieved?) - pay as you go, raise rates (pay as you go/SRF Funding). SRF funding will require a vote
- Ozone - taste and odor/ disinfection (original goal solve taste and odor)

Current Expense -

KC Water Agreement	\$234,500 annually.
Water Engineering	\$200,000
Water Main Repair	\$100,000

Estimated project cost-

Optimize Treatment process	\$6.9 M
SRF loan debt service	\$425-\$455,000 annually

Taste and Odor elimination	+\$1.5 to \$2.0 M
Disinfection byproducts	++\$1.5 to \$2.0 M

A. Discussion Item (ID # 1350)

WATER TREATMENT DISCUSSION

Attachments:

Harrisonville Commission 042114 updated 041714 (PDF)

Commission Workshop Water Facility Plan Harrisonville, MO

APRIL 21, 2014



Water System Facility Plan Background

- Moving away from KCMO supply (5 MGD contract)
 - PWSDs surround City
 - MD demand of 3.0 MGD
- Lake supply is adequate
- Develop capital facility plan for water system improvements
 - Potential phasing
 - Small Projects yield limited results
- Critical WTP issues
- Enhance public health protection

Agenda

- WFP Goals
- Current Conditions
- Filter Evaluation
- WTP Improvements
- Implementation
- Q/A



Water Facility Plan

Primary Goals

1. Protect Public Health
2. Avoid Critical Failure of the WTP
3. Improve Treatment Process & Assure Future Regulatory Compliance
4. Increase Capacity to 3 MGD
5. Extend WTP Life 20+ years
6. Eliminate Taste & Odor Complaints

Public Health

- City staff has inherited a poorly designed WTP
- Operators have done well to comply with current regulations
- Future regulations and public health concerns
- Significant improvements are required
- Filter improvements are critical
- WTP can be rehabilitated and meet all goals

Current Condition Summary

Process	MDNR Design Standards Compliance	Comments
Rapid Mix	No	Oversized; wastes chemical
Basin 1	No	Poorly designed internals resulting in low removal
Basin 2	Yes	Compliant but have carryover into filters
Filters	No	Usually the guardian of the WTP
Disinfection	Yes	Chloramines used as a result of poor pre-treatment
Chem Feed / Building	NA	Patchwork of chemicals added over the years for regulatory compliance; Does not meet current building codes; Old electrical equipment

“Domino Effect” of poor process design must be corrected to improve WTP performance and avoid a critical failure

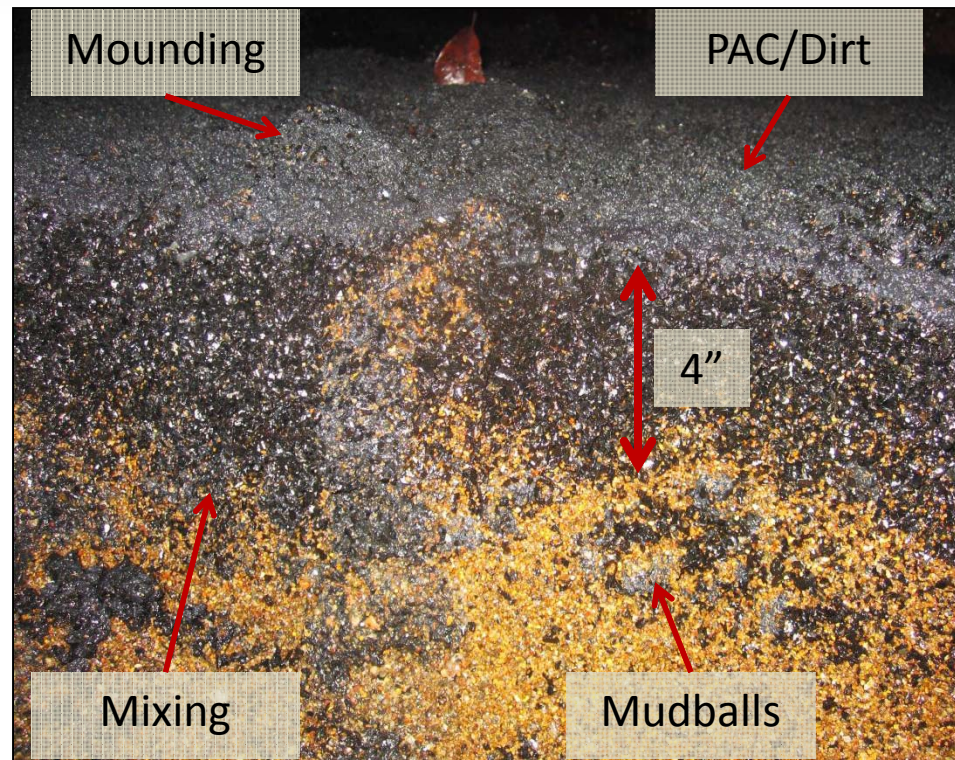
Filter Evaluation

- Filtration is an important WTP process
 - Strong barrier for viruses and contaminants
 - Must be robust to compensate for upstream variations
- Evaluation included:
 - Physical observations
 - Media condition (size, depth, mixing, mudballs)
 - Underdrain condition
 - Backwash efficiency

Findings

Critical Failure is Pending

- Poorly designed
- PAC and particle carryover
- Inadequate backwash
- Limited capacity
- Uneven flow distribution
- Significant media loss
- Intermixing of media
- Mudballs



Media Condition

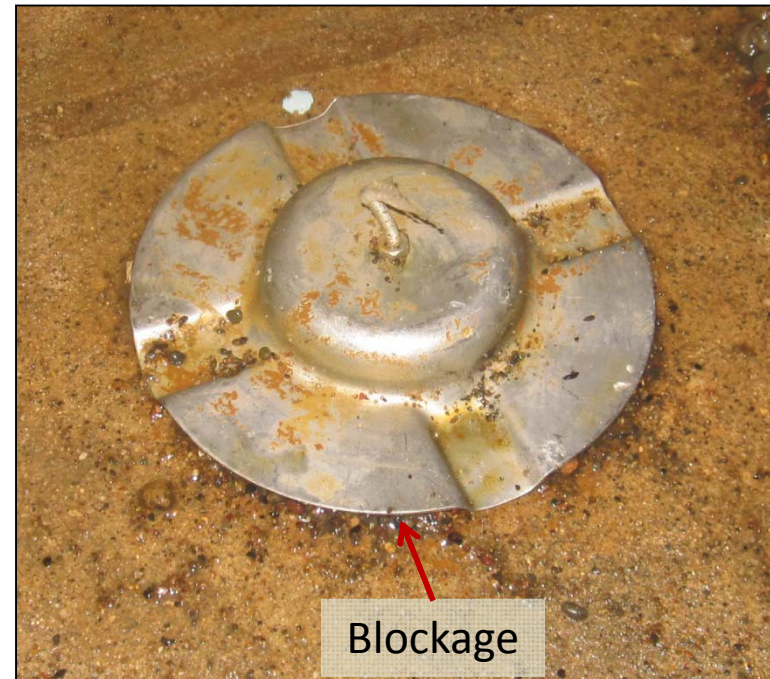
- Extreme media loss:
 - Only 6” total filter media (anthracite and sand)
 - MDNR requires minimum of 24”

Layer	Depth (inches)			
	Filter #1	Filter #4	MDNR Standard	BMcD Recommendation
Anthracite	4	3.5	≥12	25
Blend	2	2.5	0	0
Filter Sand	0	0	≥12	12
Support Sand	4.5	5	3	IMS Cap
Gravel	15	15	15-24	IMS Cap

- Poor sizing design:
 - Large sand ($d_{10} = 0.8$ to 0.95)
 - High UCs (1.4 to 1.7 for sand and anthracite)

Underdrain Evaluation

- Exposed concrete in good condition
- Some blockage underneath baffle plates
- Poor flow distribution
- Inadequate hydraulic capacity



Filter Recommendations

- Reuse filter box
- Remove and replace media
- Install new underdrains
- Add air scour
- Install new backwash pumps

Improvements

Results

- Meet regulatory requirements
- Extend life 20+ years
- Ability to produce 3 MGD
- Protect public health

WFP - Major Project Components

Process

- Ozone replaces Chlorine Dioxide & PAC – minimize/eliminate T&O
- CalFlow replaces Soda Ash for stability – save \$; improve WQ
- New rapid mix on raw waterline – provide proper mixing
- Replace Basin 1 SCB equipment – improve flocculation & settling
- Replace filter underdrains, media & backwash pump(s) & add air scour – correct major issues & improve WQ
- Chlorine for primary disinfection – improve WQ

Structural

- Demolish existing rapid mix
- Basin concrete repair / improvement
- Potential to repurpose part or all of existing chemical building
- New chemical storage & feed & electrical room
- New transformer, ATS, etc. for new loads
- Modify yard piping/conduit
- Reuse basins - swap, Basin 2 equipment, filter building, clearwell, lagoons

WTP Alternative Cost Opinion Summary

	Baseline (Optimize Process)	PAC (Sunk Cost Alt)	Ozone	NEW WTP
Common Improvements:				
Site Improvement	225,000	225,000	225,000	
Chemical Building	1,170,000	1,170,000	1,170,000	
Filter Building	140,000	140,000	140,000	
Basins	860,000	860,000	860,000	
Filters	670,000	670,000	670,000	
High Service Pump Station	770,000	770,000	770,000	
EIC / SCADA	770,000	770,000	770,000	
Subtotal	4,605,000	4,605,000	4,605,000	9,000,000
T&O Alternative with EIC	NA	520,000	1,710,000	1,710,000
Construction	4,605,000	5,125,000	6,315,000	10,710,000
Contingency	1,150,000	1,280,000	1,580,000	2,680,000
Other Costs	1,150,000	1,280,000	1,580,000	2,680,000
WTP Alternate Total	6,905,000	7,685,000	9,475,000	16,070,000
Annual Costs (\$2015):				
Chemical (Avg 1.0 MGD)	50,000	110,000	30,000	30,000
General Maintenance	120,000	130,000	130,000	130,000
Energy	77,000	77,000	91,000	91,000
WTP Alternate PV	11,410,000	13,600,000	13,890,000	21,750,000
Debt Service + Annual Cost (2015)	690,000	810,000	850,000	1,360,000

Implementation

Multi-
Phase vs.
Single

Funding
Alternatives

Emergency
Status DB

Lake Harrisonville Spillway

Preliminary Conclusions

Project Schedule

Multi-Project Option

Projects	Cost (\$MM)	Subtotal (\$MM)	Raw Water (\$MM)	WTP (\$MM)	Distribution (\$MM)
Previous Priorities:					
Intake Power Supply	0.4		0.4		
Spillway Improvement	0.5		0.5		
PWSD#9 Emergency Connection(s)	0.3	1.2			0.3
Baseline WTP - Optimization (includes EIC):					
Site Work	0.4			0.4	
Chemical Building	2.1			2.1	
Filter Building Improvements (optional)	0.3			0.3	
Basins	1.5	5.7		1.5	
WTP - HSPS	1.4			1.4	
Filter Improvements - Condition Issue	1.2	1.2		1.2	
Ozone - minimize/eliminate T&O	2.6	2.6		2.6	
Intake Pump & Raw WM BPS	1.3	1.3	1.3		
Total	11.9	11.9	2.2	9.5	0.3

Priority 1 - Single vs. Multiple Phased Projects

Single Priority 1 Project

Economy of scale
construction costs

Avoids “Domino Effect” on
potable water quality

Single bond

Optimal water quality

Multiple Priority 1 Projects

Smaller more expensive
projects

Additional inflation cost -
3% to 6% annually

Construction at WTP for
years

Lesser water quality until
all improvements installed

Implementation – Time is Critical

Funding

- SRF (2.09%):
 - Reimbursables:
 - Engineering ...
 - \$62,000/year/\$1MM borrowed

Schedule

- Dictates path forward on Critical issues
- Bond Issue?

Questions

