



Report: 2008 Water Main Flushing Report and Recommendations for 2009

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Date: January 22, 2009

To: Madison Water Utility Board

From: Doug DeMaster, P.E., Engineering Systems and Mapping

2008 Summary

1. Used UDF in 56% of the system (476 miles).
Used Conventional flushing in about 40% of the system.
(The remaining 4-5% consists mostly of construction areas (flushed by construction crews) and dead-ends that cannot be flushed due to lack of hydrants.)
2. UW study (Ryan Holzem, Brian Scott, Dr. Greg Harrington):
 - a. Correlated pumping rates to turbidity levels to establish optimal flushing frequencies.
 - b. Measured turbidity with online turbidimeter at Birrenkott's Appliance Store at Atwood Ave and Fair Oaks Ave.
3. Reduced water use by 4% over 2007 flushing program.
4. 2008 flushing turbidities and durations were similar to 2007, greater in some areas, less in others.
5. Recorded customer reports of discolored water increased by 40% over 2007.
Possible explanations include improved recordkeeping and a few specific incidents that generated many calls, but overall the reasons for the increase are unclear.

Recommendations

1. Establish a system of 4 flushing methods: UDF (Uni-Directional Flushing), Conventional, Dead-end, and None.
2. 2009 Plan: Use UDF for 550-600 miles, Conventional for 150-200 miles, Dead-end flushing for 100 miles (see attached map). At this time, all areas are scheduled to be flushed with one of these 3 methods, though some areas may be skipped if water quality is determined to be sufficient in those areas without flushing.
3. Continue to minimize use of wells, such as Well 8, with higher levels of iron and manganese.
4. Continue flushing and system turbidity research with UW-Madison team.
5. Pilot test coordination of flushing with sewer cleaning.
6. Research recycling flushing water.

	Pre-2006	2006	2007	2008	2009 est.
Uni-Directional Office		\$100,000	\$119,000	\$ 41,000	\$ 40,000
Uni-Directional Field		204,000	255,000	206,000	225,000
Conventional Field	\$ 65,000	37,000	10,000	3,000	10,000
Ads and Materials		55,000	35,000	25,000	25,000
UW Study		33,000	33,000	33,000	38,000
TOTAL	\$65,000	\$428,000	\$453,000	\$308,000	\$338,000

Attachment Documents and Figures (from 2008 Report)

1. 2008 Flushing Report Worksheet (monthly report of miles and hydrants flushed, gallons pumped, etc)
2. Uni-Directional Flushing Turbidity by Area, 2006 to 2008 (bar graph)
3. Uni-Directional Flushing Duration by Area, 2006 to 2008 (bar graph)
4. Alder District 6 Colored Water Complaints and Well 8 Pumpage and Flushing Days per month (bar-line graph)

Attachment Maps

1. 2008 Flushing Area (UDF v. Conventional flushing)
2. 2009 Flushing Schedule

Additional Documents on Website

1. Map of 2008 Flushing Results and Colored Water Reports: Uni-Directional Flushing Turbidities and Durations and Colored Water Complaints
2. Flushing Water Usage and Miles Flushed (bar-line graph)
3. Water Quality Correspondence by year and type
4. Discolored Water Quality Correspondence by year and cause

Madison Water Utility: 2008 Flushing Report

Total Water Used: 119.0 million gallons

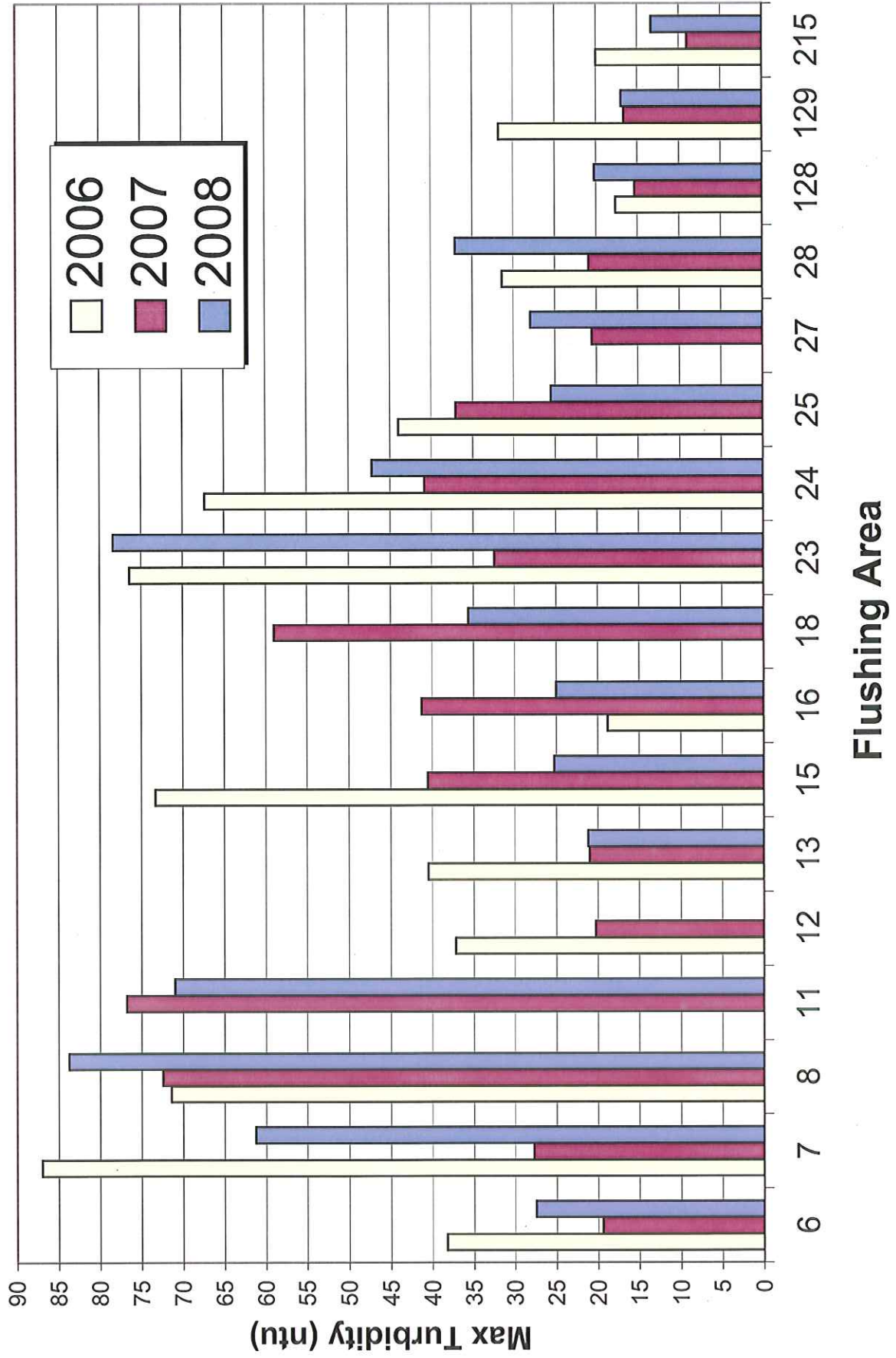
Month	Number of UDF Runs	Number of UDF Running Total	UDF Flow (mil gal)	UDF Flow (mil gal) Running	Miles Flushed	Miles Flushed Running	Running Percent Flushed	Running Percent Goal	Distinct Hydrants Flushed UDF	Hydrants Flushed UDF Running total	Conv Hyd Flushed	Conv Flow (mil gal)	Mil Gal per mi (MGPM)	Miles/ Mil Gal (MMPG)
March	10	10	0.69	0.7	4	4	0	0.0	9	9	0	0	0.197	5.1
April	425	435	18.76	19.5	102	106	12	10	342	351	13	0.327	0.183	5.5
May	357	792	14.98	34.4	82	188	22	20	292	633	16	0.230	0.182	5.5
June	150	932	4.54	38.6	34	222	26	30	127	746	0	0.0	0.136	7.4
July	390	1318	18.86	57.6	88	302	36	40	325	1058	0	0.0	0.214	4.7
August	374	1707	18.86	79.9	89	405	48	50	306	1353	51	1.84	0.21	4.7
September	277	1984	10.64	88.7	61	468	55	60	212	1543	514	11.7	0.17	5.7
October	134	2121	6.42	93.7	16	476	56	60	110	1608	539	9.4	0.41	2.5
November	29	2145	1.16	94.9	0	476	56	60	20	1610	40	0.63		0.0
Year to Date*	2146	2145	94.9	94.9	476	476	56		1743	1610	1166	24.1	0.20	5.0
													0.14	7.1
													0.16	6.1
													0.15	6.8
													0.25	3.9
													0.20	4.9
													0.14	7.3

*Some year-to-date totals are more or less than sum of the months because some hydrants and mains are flushed multiple times. Utility crews flushed 620 miles of main in 2008, including flushing some mains multiple times.

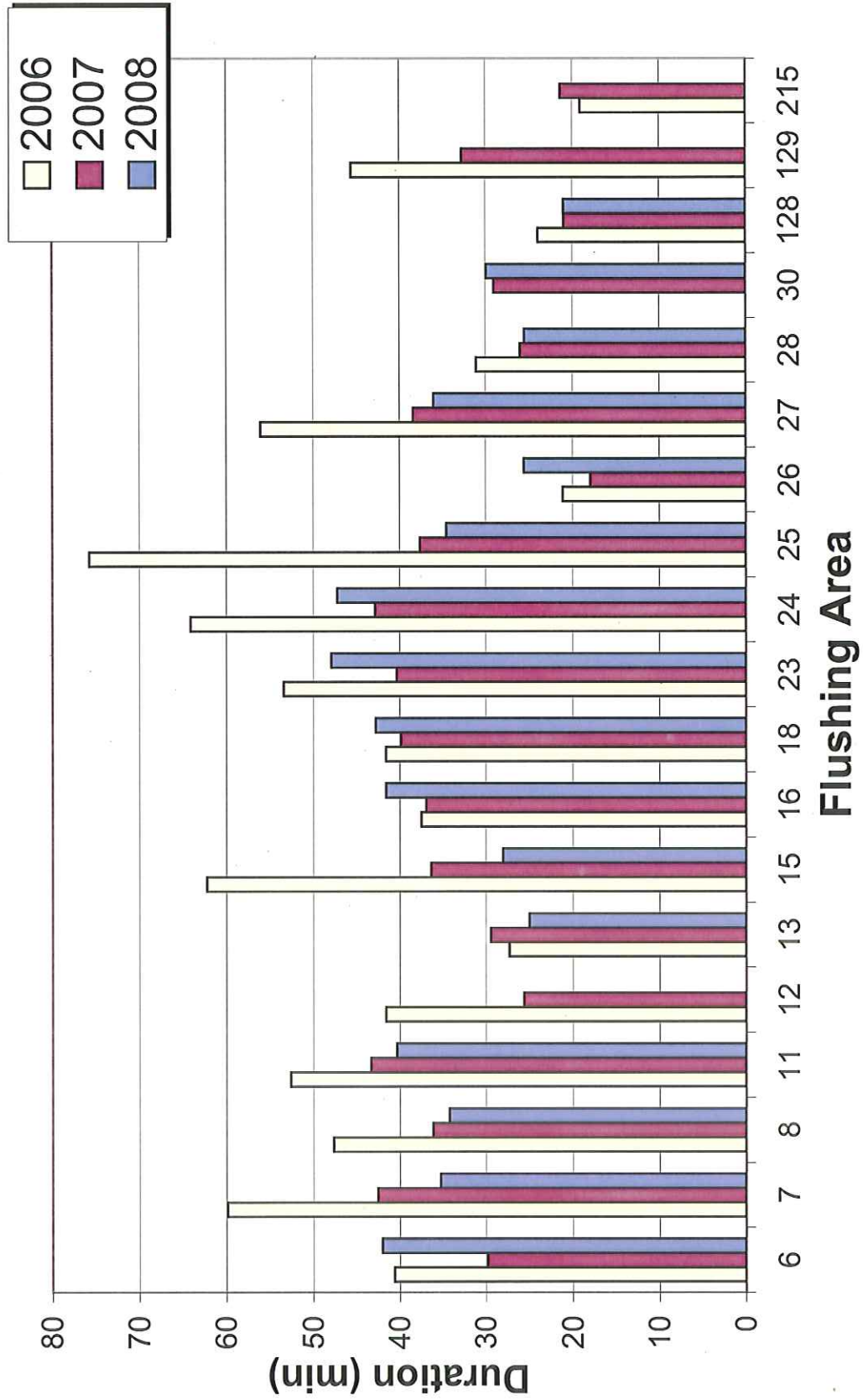
96% 2008 water use / 2007 water use

2008 UDF + Conventional
2007 UDF + Conventional
2006 UDF + Conventional
2005 UDF + Conventional

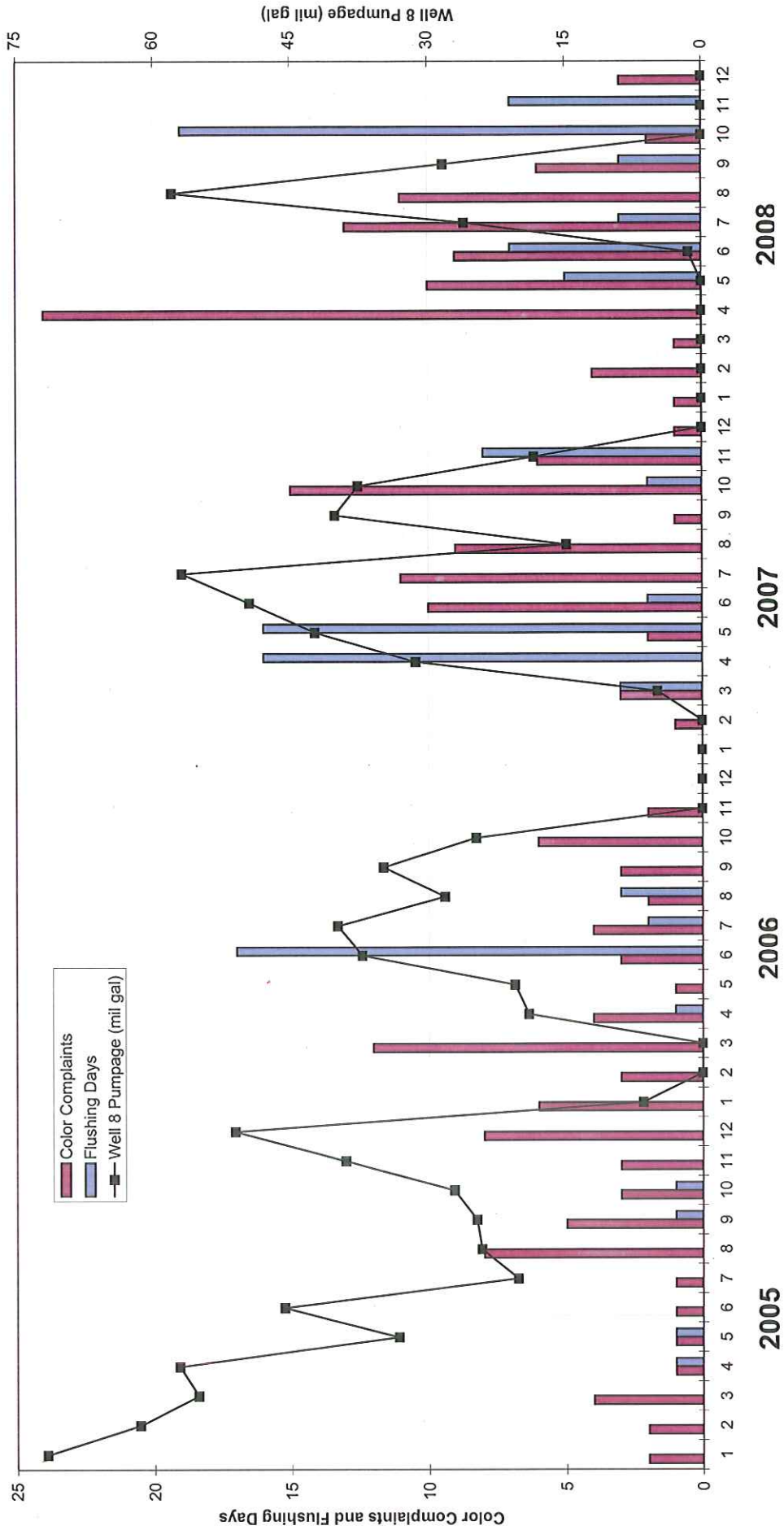
Unidirectional Flushing Maximum Turbidity by Area



Unidirectional Average Flushing Duration by Area



Alder District 6 Colored Water Complaints



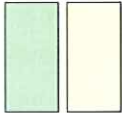
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Madison Water Utility 2008 Flushing

January 14, 2009

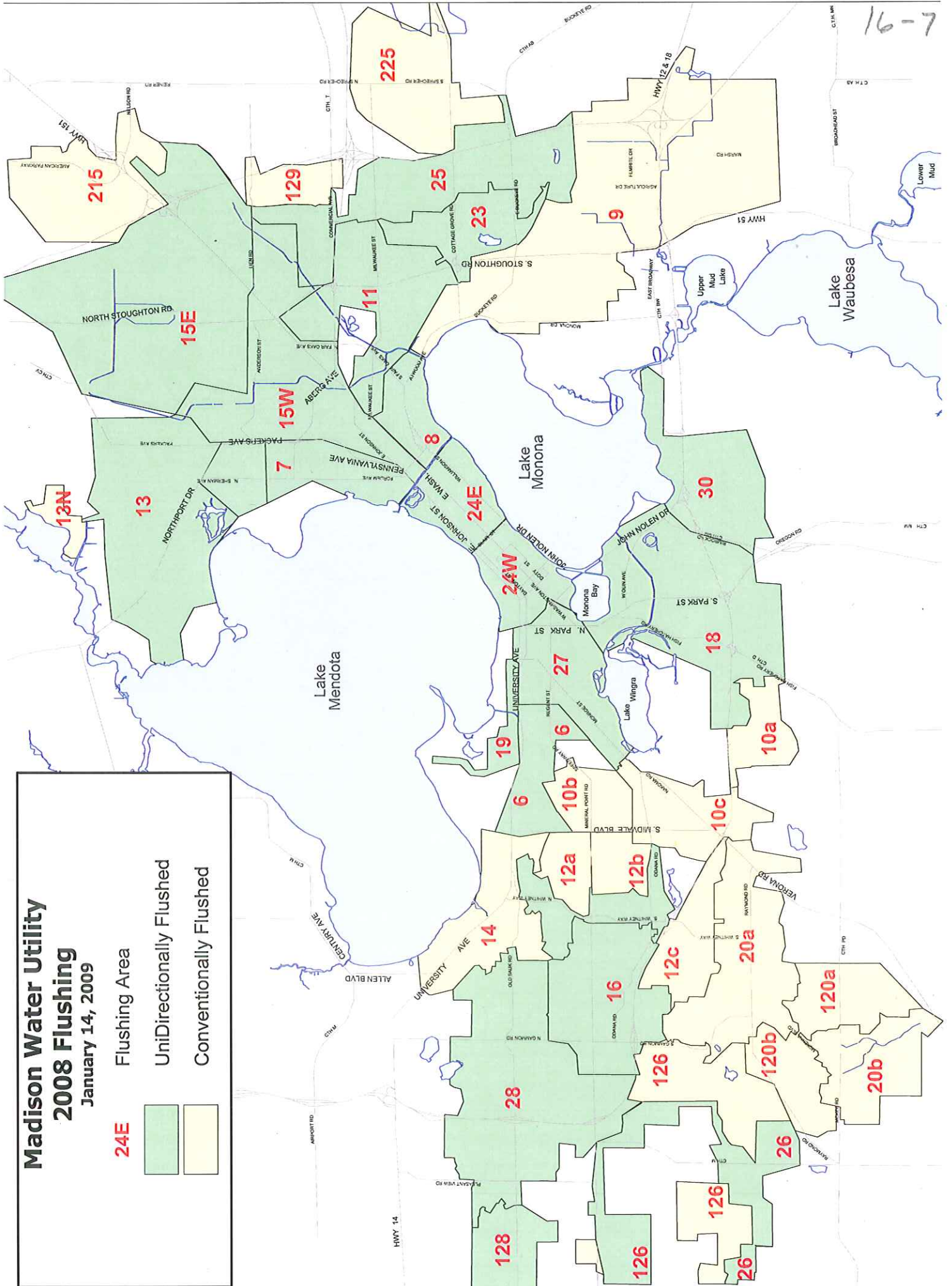
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Flushing Area



UniDirectionally Flushed

Conventionally Flushed



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