

Township of
Langley



Est. 1873

Water Quality Report 2014

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	iv
ACRONYMS	v
1.0 INTRODUCTION	1
2.0 SYSTEM DESCRIPTION	2
2.1 System Inventory	9
2.2 Cross Connection Control Program	11
2.3 System Maintenance	12
2.4 Staff Training and Operation Levels	13
2.5 Emergency Response and Contingency Plan	14
2.6 Operational Highlights for 2014	14
2.7 East Langley Water Supply Project	14
2.8 Planned Works for 2015	15
3.0 Water Sampling and Testing Program	15
3.1 GCDWQ Updates	17
3.2 Fraser Health Updates	17
4.0 Source Water Quality	18
4.1 Quarterly Microbial Testing	18
4.2 Semi-Annual Routine Parameter Testing	19
4.2.1 Manganese	20
4.2.2 Nitrate	20
4.3 Annual Complex Parameter Testing	21
4.4 Source Water Protection	21
5.0 Distribution System Water Quality	21
5.1 Distribution System Microbial Testing	23
5.2 Microbial Results for 2014	23
5.3 Distribution System Physical Parameters Analysis	24
6.0 Conclusion	24

TABLES AND FIGURES

Table 2.0.1 Location for Figures 1.0.1, 1.0.2 and 1.0.3	6
Table 2.0.2 Annual Water Volume by Source (m ³)	7
Table 2.0.3 Municipal Well Data	8
Table 2.1.1 Distribution Pipe Inventory	9
Table 3.0.1 Water Sampling and Testing Schedule	16
Table 4.1.1 Schedule A of the B.C. Drinking Water Protection Regulation	18
Table 4.1.2 2013 Quarterly Microbial Analysis	19
Table 5.0.1 Weekly Water Distribution Test Site Addresses	21
Table 5.1.1 Schedule B of the B.C. Drinking Water Protection Regulation	23
Figure 2.0.1 Northwest Water System	3
Figure 2.0.2 Southwest Water System	4
Figure 2.0.3 East Water System	5
Figure 2.3.1 Township of Langley Operations Section Utility Operations	13
Figure 5.0.1 Weekly Water Distribution Test Site Location Map	22
Figure 5.2.1 Comparison of Total Coliform Positive Results to Total Samples Tested	24

EXECUTIVE SUMMARY

The Township of Langley is home to approximately 116,258 residents. Of these, approximately 94,809 have water supplied by the Township, while the remaining use water from either private wells or from community wells. There are 19 separate municipal water sources within the Township; 18 wells and the Greater Vancouver Water District (GVWD). The BC Drinking Water Protection Regulation (Section 11) requires all water suppliers produce an annual report on water quality and must ensure that the information is made public.

Source water quality met regulatory requirements in 2014, with the exception of aesthetic parameters (non-health parameters related to taste, colour, and odour) manganese, and hardness, and exceeded the maximum acceptable concentration limit for nitrate. Nitrate and Manganese levels were reduced to acceptable levels of less than 10 mg/L prior to public distribution during the treatment process at the Aldergrove Water Treatment Plant (AWTP). Manganese and hardness is reduced to acceptable levels prior to distribution via blending with GVWD sources at other points throughout the system; a manganese treatment feasibility study was completed for the Acadia system.

All sources met the requirements of the British Columbia Drinking Water Protection Regulation and the Guidelines for Canadian Drinking Water Quality. Specifically, there were no confirmed positive *E.coli* test results for any Township source or distribution water. A precautionary, boil water advisory, was issued in July 2014 due to a sample testing positive for *E.coli*; it was later determined that this result was due to lab error and all other subsequent samples were confirmed to be non-detect.

ACRONYMS

AC	Asbestos Cement
AO	Aesthetic Objective
AWTP	Aldergrove Water Treatment Plant
BPMS	Backflow Prevention Monitoring Software
BTEX	Benzene, Toluene, Ethyl benzene, Xylene
CAEAL	Canadian Association for Environmental Laboratories
CCCP	Cross Connection Control Program
CDW	Federal-Provincial-Territorial Committee on Drinking Water
CFU	Colony Forming Unit
CMMS	Computerized Maintenance Management System
CONC	Concrete Pipe
DOC	Dissolved Organic Carbon
ELWS	East Langley Water Supply
EMS	Environmental Monitoring System
EOCP	Environmental Operators Certification Program
GCDWQ	Health Canada (2014). Guidelines for Canadian Drinking Water Quality-Summary Table.
GVRD	Greater Vancouver Regional District
GVWD	Greater Vancouver Water District
HAA	Halo acetic Acid
HDPE	High Density Polyethylene
HPC	Heterotrophic Plate Count
ICI	Industrial/Commercial/Institutional
MAC	Maximum Acceptable Concentration
MDL	Minimum Detectable Level
MF	Membrane Filtration
mg/L	Milligram per Litre (0.001 grams per Litre)
MHO	Medical Health Officer
mL	Millilitre
MPN	Most Probable Number
NTA	Nitritotriacetic Acid
NTU	Nephelometric Turbidity Unit
PAH	Polycyclic Aromatic Hydrocarbon
pH	Measure of water acidity, pH of 7 is neutral
PRV	Pressure of Reducing Valve
SCADA	Supervisory Control and Data Acquisition
SRU	Salmon River Uplands
THM	Trihalomethane
TOC	Total Organic Carbon
TOL	Township of Langley
VOC	Volatile Organic Carbon
WQMRP	Water Quality Monitoring and Reporting Plan (for GVRD and member municipalities)

1.0 INTRODUCTION

The Township of Langley is home to approximately 116,258 residents (based on 2011 census). Of these, approximately 94,809 have water supplied by the Township, while the remaining source water from either private or community wells. There are 19 separate municipal water sources within the Township; 18 wells and the Greater Vancouver Water District. The BC Drinking Water Protection Regulation (Section 11) requires all water suppliers to produce an annual report on water quality and must ensure that the information is made public. This report, along with previous year's reports, is available in hard copy at the Township's Civic Facility (20338 - 65 Avenue, Langley BC) or at www.tol.ca in PDF format. The report provides an overview of the Township's water system, and documents the results of the Township's monitoring program of source well water and distribution water quality in the municipal transmission mains.

2.0 SYSTEM DESCRIPTION

The Township of Langley encompasses an area bounded by the Fraser River to the north, 196 Street to the west, 0 Avenue to the south, and 276 Street to the east. Excluded from this area is the City of Langley, which receives potable water exclusively from the Greater Vancouver Water District (GVWD). Emergency water connections exist between the Township of Langley, Langley City, the City of Abbotsford, and the City of Surrey. The Township currently receives potable water from the GVWD (mainly Coquitlam Lake) and from local groundwater wells. The western communities receive a mixture of GVWD water and groundwater supplied by municipal wells. The eastern communities of Aldergrove, Gloucester, Acadia, and Tall Timbers are supplied with groundwater from municipal wells only.

There are five separate and distinct municipal water systems in the Township; Northwest Langley (Figure 2.0.1), Southwest Langley (Figure 2.0.2) and the East Langley (Salmon River Uplands and Aldergrove) (Figure 2.0.3). Location information for these municipal water systems can be sourced from Table 2.0.1.

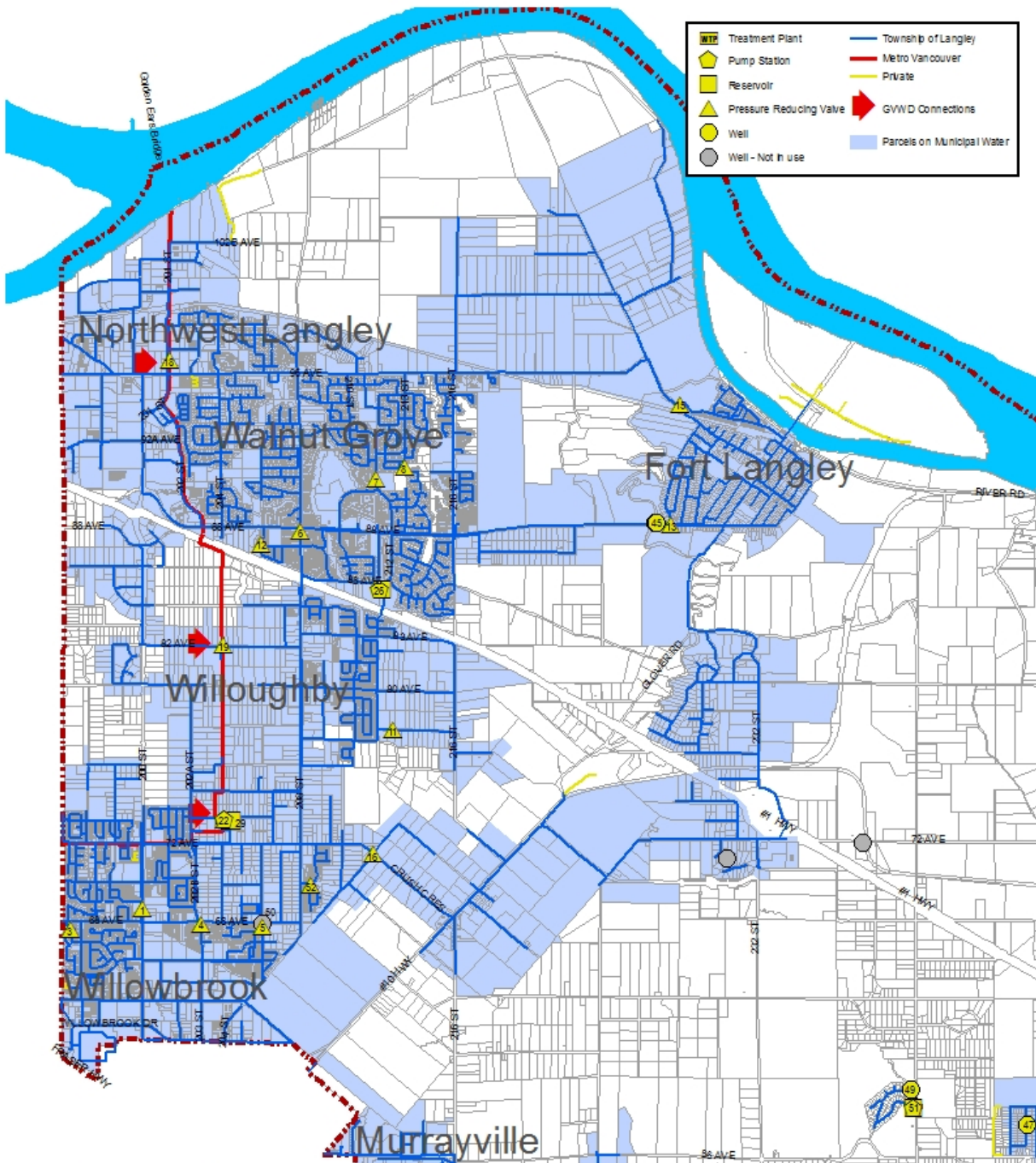
Northwest Langley consists of the communities of Walnut Grove, Fort Langley, Milner, Willoughby, Willowbrook, and Forest Knolls. The GVWD Barnston Island Water Main runs north - south through Northwest Langley, and delivers water through two points in Willoughby and one in northern Walnut Grove. Northwest Langley also receives potable water year round from a municipal well at Fort Langley (Fort Langley Well 2), and during the summer from Willoughby Well 1. Strawberry Reservoir, located in Walnut Grove, receives water directly from the Fort Langley wells and indirectly from the GVWD main. Willoughby Reservoir is fed predominately from the GVWD Barnston Main, and indirectly with water transferred from Strawberry Reservoir. The Willoughby Pump Station, located adjacent to the Willoughby Reservoir, draws from the GVWD main and adjusts pressure to meet system requirements.

The Southwest communities of Brookwood, Fernridge, and Murrayville receive water from the GVWD main near 36 Avenue and 196 Street, and from Township operated wells in Brookwood (Brookwood Wells 7, 9, and 10) and Murrayville (Murrayville Wells 1 and 2). The Brookwood Pump Station, located at the GVWD source, is operated as a booster station when adequate system pressures cannot be maintained directly from the GVWD main. The station also houses pressure reducing valves which reduce distribution system pressures to acceptable limits, and control valves which respond to the Brookwood Reservoir water levels. The distribution system includes above grade reservoirs in Brookwood (2), Murrayville (1), and High Point (1), and one booster station at each end of Murrayville, 19 Avenue and High Point.

The Salmon River Uplands has five separate water systems, plus individual private wells. Tall Timbers and Acadia systems are community systems run by the Township. Tall Timbers consists of 77 homes served by wells 1 or 3 (redundancy well) and by well 2. Acadia alternates between well 1 and 2, servicing 24 homes. Otter Road, Last Chance, and Nectar are private community systems not operated by the municipality.

Production from all sources is summarized in Table 2.0.2. Well depths, rated capacity and rehabilitation schedules are shown in Table 2.0.3.

Figure 2.0.1 Northwest Water System



WTP	Treatment Plant		Township of Langley
	Pump Station		Metro Vancouver
	Reservoir		Private
	Pressure Reducing Valve		GWVD Connections
	Well		Parcels on Municipal Water
	Well - Not in use		

Township of Langley



Est. 1871

Northwest Water System

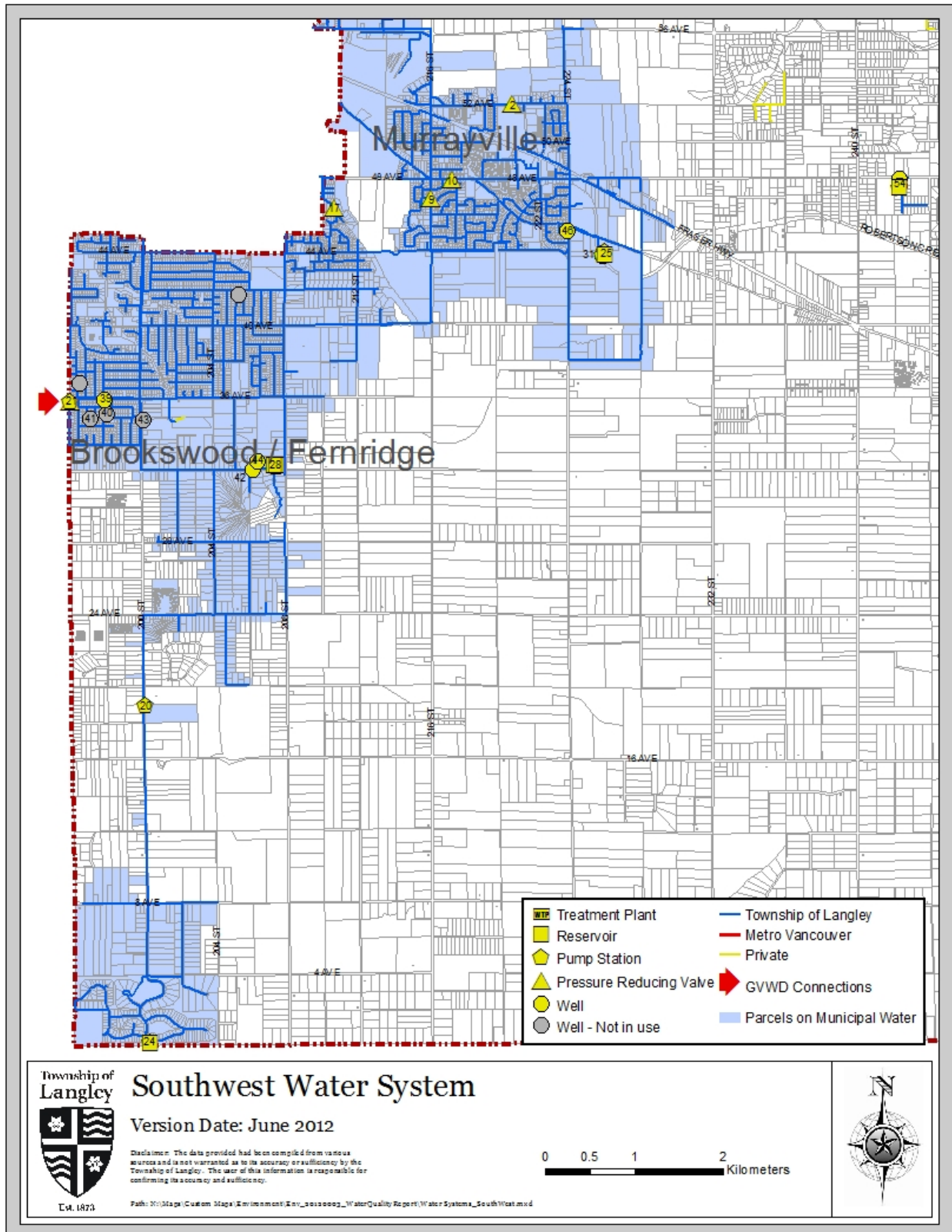
Version Date: June 2012

Disclaimer: The data provided has been compiled from various sources and is not warranted as to its accuracy or sufficiency by the Township of Langley. The user of this information is responsible for confirming its accuracy and sufficiency.

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Figure 2.0.2 Southwest Water System



Township of Langley



Est. 1873

Southwest Water System

Version Date: June 2012

Disclaimer: The data provided had been compiled from various sources and is not warranted as to its accuracy or sufficiency by the Township of Langley. The user of this information is responsible for confirming its accuracy and sufficiency.

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0 0.5 1 2 Kilometers



Figure 2.0.3 East Water System

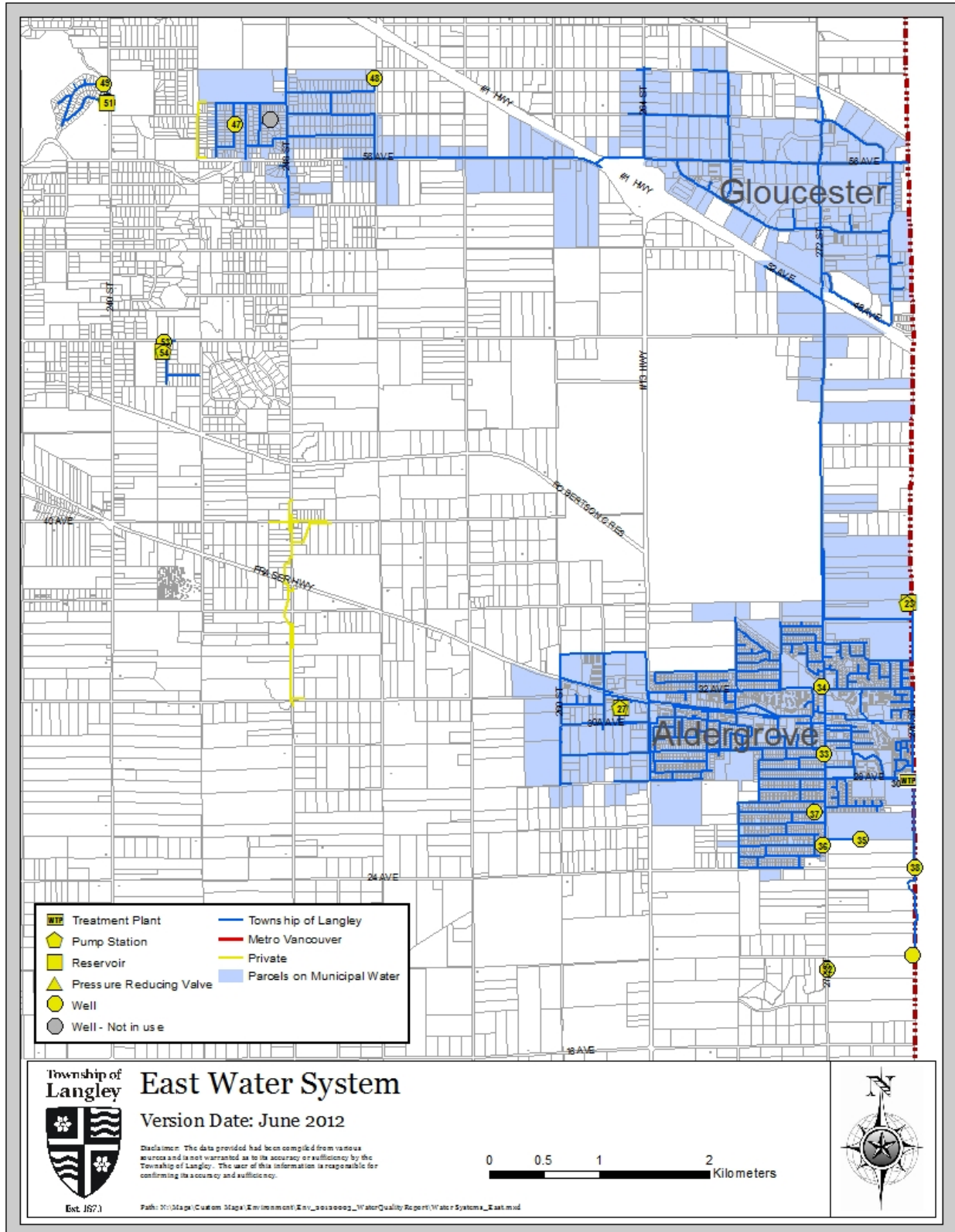


Table 2.0.1 Location for Figures 2.0.1, 2.0.2 and 2.0.3

	Name	Location		Name	Location
1	PRV - 200 St, WB81	6858 200 St	27	Pump Station & Reservoir- W. Aldergrove	3150 262B St
2	PRV - 52 Ave, MV71	22107 52 Ave	28	Reservoir - Brookwood	20679 32 Ave
3	PRV - 196B St, WB81	6739 196B Pl	29	Reservoir - Jericho	20438 73A Ave
4	PRV - 203 St, WB81	20322 68 Ave	30	AWTP	27540 28 Ave
5	PRV - 206 St, WB81	6776 206 St	31	Well - Murrayville 2	22566 Old Yale
6	PRV - 208 St, WG81	8796 208 St		Well - Aldergrove 10	1970 272 St
7	PRV - 212 St, WG81	9081 212 St	33	Well - Aldergrove 3	2879 272 St
8	PRV - 213 St, WG81	9127 213 St	34	Well - Aldergrove 4	27155 32 Ave
9	PRV - 216 St, MV71	4685 216 St	35	Well - Aldergrove 6	2484 272 St
10	PRV - 48 Ave, MV71	21716 48 Ave	36	Well - Aldergrove 7	2510 272 St
11	PRV - 78 Ave, WB111	21277 78 Ave	37	Well - Aldergrove 8	2625 272 St
12	PRV - 87 Ave, WG81	8732 206 St	38	Well - Aldergrove 9	2396 272 St
13	PRV - 88 Ave, FL63	22779 88 Ave	39	Well - Brookwood 10	19810 36 Ave
15	PRV - Billy Brown, FL63	22800 Billy Brown	42	Well - Brookwood 7	20600 32 Ave
16	PRV - Crush Cr, Milner81	21136 Crush Cr	44	Well - Brookwood 9	20679 32 Ave
17	PRV - Maysfield Cr, MV71	4630 Maysfield Cr	45	Well - Fort Langley 2	S.R.&88 Ave
18	PRV(GVRD) - 201 St, WG81	9640 201 St	46	Well - Murrayville 1	4505 244 St
19	PRV(GVRD) - 82Ave, WB111	20440 82 Ave	47	Well - SRU 1 - Not in use	5776 245A St
20	Pump - 19th Ave Booster Stn	1880 200 St	48	Well - SRU 3 - Not in use	5975 252 St
21	Pump - Brookwood B. Stn/PRV	19620 36 Ave	49	Well - Tall Timbers 2	6085 237A St
22	Pump - Willoughby B. Stn	20400 73A Ave	50	Well - Willoughby 1	20650 68 Ave
23	Pump Stn & Res. - E. Aldergrove	27600 Quinton Rd	51	Well & System - Tall Timber	23990 58A Ave
24	Pump Stn & Res. - High Point	50 200 Street	52	PRV - 70 Ave	70 Ave 208A St
25	Pump Stn & Res. - Murrayville	22566 Old Yale	54	Well - Acadia Water System	4745 242A St
26	Pump Stn & Res.-Strawberry Hill	21212 85 Ave	53	Pump - Acadia Water Sys.	4745 242A St

Table 2.0.2 Annual Water Volume by Source (m³)

Source	Yearly Volumes (m ³)					2014
	2009	2010	2011	2012	2013	
Aldergrove 3	182,982	131,320	170,084	183,021	186,397	142,816
Aldergrove 4	148,471	78,406	160,020	147,923	168,373	176,180
Aldergrove 6	425,428	342,069	421,393	431,767	382,190	358,945
Aldergrove 7	327,678	279,627	393,419	432,582	451,836	362,478
Aldergrove 8	461,735	447,133	483,513	494,577	488,368	456,899
Aldergrove 9	143,247	364,135	220,189	329,077	433,048	427,301
Aldergrove 10	809,694	798,070	607,708	421,390	471,019	618,039
AWTP Outflow	2,568,906	2,429,669	2,440,564	2,422,678	2,615,469	2,617,039
Aldergrove Totals	2,568,906	2,429,669	2,440,564	2,422,678	2,560,598	2,520,694
Brookwood 7	467,858	288,477	403,983	465,520	374,890	421,539
Brookwood 9	501,409	402,618	372,509	528,055	479,224	474,229
Brookwood 10	419,642	415,285	431,669	304,613	386,124	364,691
36 Ave & 196 St GVWD	728,193	809,980	870,680	787,950	996,050	825,140
Brookwood Total	2,117,102	1,916,360	2,078,841	2,086,138	2,236,288	2,085,599
Murrayville 1	201,611	153,748	160,697	170,227	127,312	199,547
Murrayville 2	588,361	511,138	451,314	507,156	549,660	642,730
Murrayville Total	789,972	664,886	612,011	677,383	676,972	842,277
Willoughby 1	131,016	85,165	184	105,393	101,154	0
Fort Langley 2	2,648,378	2,876,010	2,836,462	3,069,192	3,180,859	3,482,268
201 St GVWD	1,327,430	1,070,260	1,022,200	955,534	1,594,969	1,446,516
82 Ave GVWD	2,215,514	1,322,460	1,359,602	1,836,225	2,020,588	2,084,316
73 A Ave GVWD	857,658	1,643,510	1,819,610	1,511,730	1,062,250	1,243,400
Willoughby Pumped GVWD	1,089,983	898,471	622,398	296,854	563,272	552,328
West Langley Total	8,269,979	7,879,946	7,660,456	7,774,928	8,523,092	8,808,828
Tall Timber 1	5,136	12,128	10,629	5,578	9,499	54,718
Tall Timber 2	12,179	8,351	9,536	12,441	9,829	75,105
Tall Timber 3	10,853	7,161	6,445	6,218	5,106	5,424
Tall Timber Total	34,317	27,640	26,610	24,237	24,434	135,247
Acadia Total	14,080	10,079	9,271	9,134	9,218	8,338
<i>Total Langley Well Production</i>	<i>7,575,578</i>	<i>7,199,829</i>	<i>7,133,264</i>	<i>7,606,205</i>	<i>7,793,473</i>	<i>8,139,525</i>
<i>Total GVWD</i>	<i>6,218,778</i>	<i>5,744,681</i>	<i>5,694,490</i>	<i>5,388,293</i>	<i>6,237,129</i>	<i>6,151,700</i>
Overall Total	13,794,355	12,944,510	12,827,754	12,994,498	14,030,602	14,291,225

Table 2.0.3 Municipal Well Data

Well Name	EMS #	Year Drilled	Rated Capacity (l/s)	Depth (m)	Year Redeveloped
Acadia Well 1	E218073	1973	4.5	49	2001/2011
Acadia Well 2	Pending	2008	3.5	43	
Aldergrove Well 3	E218080	1972	19	39	
Aldergrove Well 4	E218079	1977	13	31	2000/2010
Aldergrove Well 6	E244334	1995	44	34	2007/2010/2013
Aldergrove Well 7	E218082	1978	44	34	2004/2010/2014
Aldergrove Well 8	E218081	1985	57	44	2002/2003/2009
Aldergrove Well 9	E259837	2004	30	41	2009
Aldergrove Well 10	E259838	2005	45	50	2012
Brookwood Well 7	E218071	1977	32	59	2001/2003/2011
Brookwood Well 9	E218072	1988	30	43	2001/2003/2010/2013
Brookwood Well 10	E244194	1960	22	31	1998/2008/2012
Murrayville Well 1	E218084	1978	15	117	2006
Murrayville Well 2	E218085	1978	26	68	2007
SRU Well 1	E218076	1980	12	170	Not in use
SRU Well 3	EMS # unavailable	1989	-		Not in use
Willoughby Well 1	EMS # unavailable	1978	19	120	
Tall Timber Well 1	E218074	1980	3.8	72	2009
Tall Timber Well 2	E218075	1983	2.0	60	
Tall Timber Well 3	Pending	2008	4.1	73	
Fort Langley Well 1					Not in use
Fort Langley Well 2	E218066	1976	136	21	2005

2.1 System Inventory

Table 2.1.1 Distribution Pipe Inventory

Size (mm)	Age (years)	Length (m)								
		AC	CONC	Ductile Iron	HDPE	Perma*	PVC	Steel	Un-Known	Total
Unknown	Unknown							7,110	573	7,683
	1960's									0
	1970's						2			2
	1980's						304			304
	1990's						12		8,869	8,881
	2000's									0
	2010's								61	61
<100	Unknown			5						5
	1960's						198			198
	1970's	76		2			3,813			3,891
	1980's						2,353			2,353
	1990's				202		154			356
	2000's						143			143
	2010's									0
100	Unknown						73			73
	1960's	1,357					262			1,619
	1970's	2,778					771			3,549
	1980's			256			3,213			3,469
	1990's			391			3,109			3,500
	2000's			48			2,088		187	2,323
	2010's						714			714
150	Unknown						18		271	289
	1960's	2,869					175			3,044
	1970's	50,065		9,054			24,912			84,031
	1980's	6,148		8,844	17	62	45,717			60,788
	1990's	260		1			24,768			25,029
	2000's			54	1,045		4,913		3,325	9,337
	2010's	2		4			688			694
200	Unknown		>1				4,244		464	4,708
	1960's						7			7
	1970's	8,263		7,631		105	6,097			22,096
	1980's	107		1,879			23,689			25,675
	1990's	225			10		32,762			32,997
	2000's	12		543	412		33,613		2,079	36,659
	2010's			5			12,311			12,316

Table 2.1.1 Distribution Pipe Inventory Continued

Size (mm)	Age (years)	Length (m)								
		AC	CONC	Ductile Iron	HDPE	Perma*	PVC	Steel	Un-Known	Total
250	Unknown						466		423	889
	1960's	134								134
	1970's	5,891		5,595			3,689			15,175
	1980's	538		2,494			16,876			19,908
	1990's			3,058			21,070		22	24,150
	2000's			156			13,936	6		14,098
	2010's						2,266			2,266
300	Unknown		194	34			676		21	925
	1960's									0
	1970's	2,625		7,902			3,142			13,669
	1980's	3		1,374			5,483			6,860
	1990's	136		3,098			15,077			18,311
	2000's			575	779		12,595		1,106	15,055
	2010's			63			211			274
350	Unknown			815						815
	1960's									0
	1970's	451		4,048						4,499
	1980's			2,320			638			2,958
	1990's			311			1,159			1,470
	2000's				920		1,265			2,185
	2010's			17						17
400	Unknown			31			412			443
	1960's									0
	1970's	2,898		2,906			266			6,070
	1980's	1,820		1,183			402			3,405
	1990's	79		3,360			6,875			10,314
	2000's			86			5,014		35	5,135
	2010's			292						292
450	Unknown			121						121
	1960's									0
	1970's	17					237			254
	1980's	2,070								2,070
	1990's			381			1,720			2,101
	2000's			279						279
	2010's									0
500	Unknown									0
	1960's									0
	1970's			3,258						3,258
	1980's			4,259						4,259
	1990's			120						120
	2000's									0
	2010's			147						147

Table 2.1.1 Distribution Pipe Inventory Continued

Size (mm)	Age (years)	Length (m)								Total
		AC	CONC	Ductile Iron	HDPE	Perma*	PVC	Steel	Un-Known	
600	Unknown			86						86
	1960's									0
	1970's									0
	1980's			632				796		1,428
	1990's			2				880		882
	2000's									0
	2010's									0
750	Unknown									0
	1960's									0
	1970's									0
	1980's									0
	1990's							21		21
	2000's									0
	2010's									0
Total		88,824	194	77,720	3,385	167	344,598	8,813	17,436	541,137

*Fiberglass reinforced

2.2 Cross Connection Control Program

A cross connection control program (CCCP) is required to mitigate the risk of introducing potentially contaminated water into the drinking water system, through either excessive pressures in the private water system or a loss of pressure in the municipal system. Many solutions exist to protecting the Township's safe drinking water including wide spread education, assessing backflow risks, and installing backflow preventers. The Township has successfully implemented the first stage of its CCCP and is transitioning into the implementation of an effective and leading edge program.

As of the end of 2014, a total of 3108 backflow preventers were tracked in BPMS software, with 205 new backflow preventers installed and 49 replaced. New backflow preventers are installed in new Industrial/Commercial/Institutional (ICI) works as well as facility upgrades. For compliance and tracking purposes, test reports are submitted by the owner or Certified Backflow Preventer Tester.

The Township staff annually tests all backflow assemblies located in the utility department facilities and Township parks. Fire hydrants are also routinely protected by backflow assemblies when utilized as a water supply. Backflow assemblies located in various civic facilities are tested annually by a private contractor.

The Drinking Water Protection Regulation (Section 15) states "For the purpose of section 22(3) of the Act, an assessment response plan must include provisions to identify, eliminate and prevent cross connections with non-potable water sources". The Township's CCCP derives its authority from the Waterworks Bylaw. As an evolving field, developing a CCCP includes

examination of the bylaws and policies of other municipalities, both locally and across Canada. Conjointly with this review is the development of a CCCP policy, with the Township observing recommendations by the B.C. Water and Waste “Cross Connection Control Committee”.

Next steps in implementing a leading edge CCCP include:

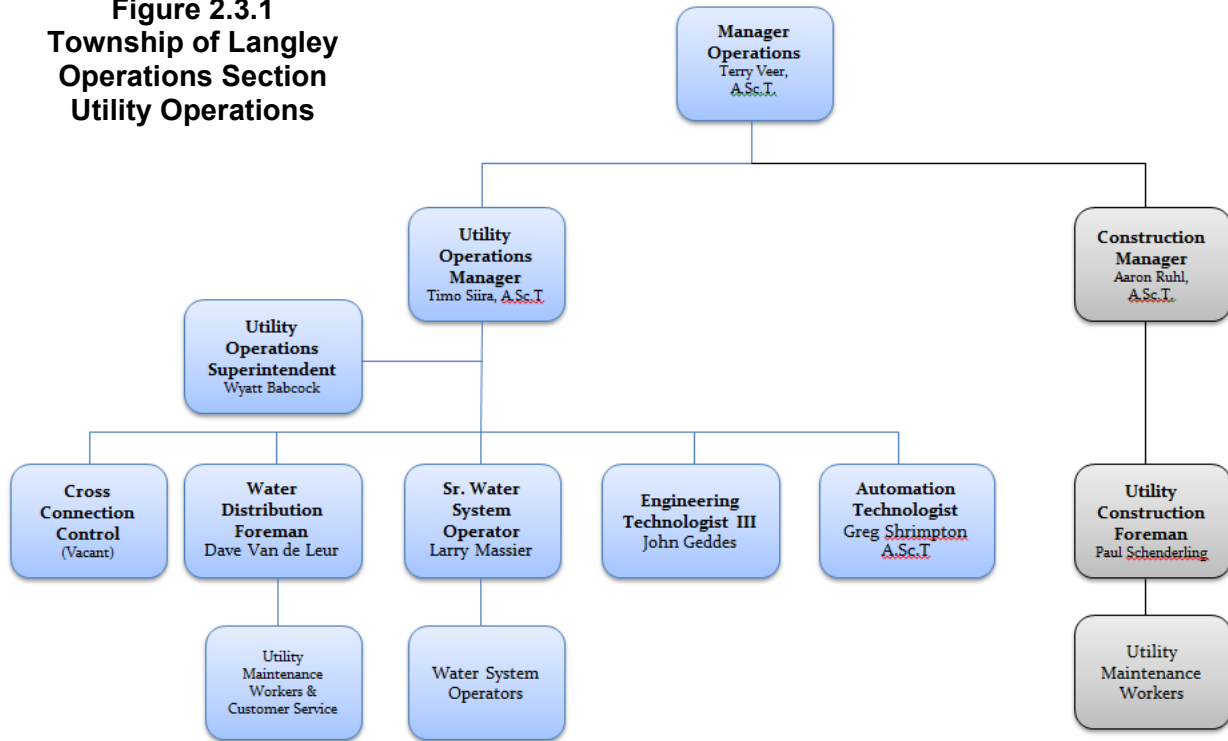
- A Cross Connection Control Coordinator position was created with the successful applicant being hired in early 2015.
- Township knowledge transfers for proper cross connection identification, reporting, and elimination.
- Updating Policies and Bylaws as well as an Incident Response Reporting Form in parallel with industry standard operating procedures
- Create Cross Connection webpage establishing general information on reducing the risk of contaminating the potable water
- Site visits of municipal facilities and parks to update BPMS database with backflow preventer locations, and details.
- An inspection of participating properties to ensure complete compliance.
- A survey of properties with older construction which may not have assemblies.

2.3 System Maintenance

The Township has a team of just over 20 full time personnel assigned to the municipal water system. The 2014 staff complement was 13 regular full time (RFT) field staff, 5 temporary full time (TFT) field staff, 2 RFT technical staff and 2 TFT technical staff (excluding the Operations Manager, Utility Operations Manager, and Utility Operations Superintendent) assigned to the operations management, maintenance and repair of the water utility system. The operations organization structure is outlined on the next page in Figure 2.3.1.

To maintain water quality throughout the distribution system, the Township makes use of an annual flushing program and promotes water pipe looping in all new construction. Regular flushing is an important component of a comprehensive water management program to prevent bacterial re-growth and stagnation in low circulation areas of the distribution system. The program aims to flush all mains at least once every year, with known problem areas receiving a higher flushing frequency, as needed. Looping reduces the amount of low circulation areas, which lends to less bacterial re-growth and areas of stagnant water. Township operations staff conducts both regular pump maintenance and system inspections on an on-going basis.

Figure 2.3.1
Township of Langley
Operations Section
Utility Operations



2.4 Staff Training and Operation Levels

The Environmental Operators Certification Program (EOCP) has currently rated the Township’s water distribution systems as Levels I through IV and the treatment as Level II. Our permit requires us to have a water system operator with a similar certification level to the level of the system. The Township is continuously training existing staff in order to raise the level of certifications achieved. Our team currently includes 2 operators with Level IV, 1 operator with Level III, 10 operators with Level II, and 3 operators with Level I Water Distribution certification; 5 seasonal staff with Level I. We have 3 operators with Level II Treatment, and 1 operator with Level I Treatment

2.5 Emergency Response and Contingency Plan

A working draft of the Township's Water System Emergency Plan has been prepared based on a Water System Vulnerability Assessment completed in the summer of 2003. This plan is expected to be completed in 2015. This plan was developed as part of an overall Engineering Department Emergency Plan, and addresses potential hazards such as earthquakes, floods, severe storms, volcanic eruption, and terrorism. Outlined in the plan are procedures dealing with the effects of various hazards: loss of water supply, loss of power, contamination, turbidity in the water system, or damage to any pipelines. Currently this is a standalone plan to deal with a water emergency that is managed by water utility staff.

Activation of the plan occurs when information is received that an emergency exists, either through staff, external agencies, public, media, police, or fire communications. Staff is directed to determine the event location and nature, eliminate the hazard, and ultimately restore normal water service. The plan contains checklists to prioritize risks and responses, problem indicators, and restoration plans.

In the event of a positive test for contaminated water, or in the case of field evidence indicating that water system quality may be compromised, the Township isolates the affected section of the system to reduce the impact and then advises Fraser Health of the situation. All necessary steps are taken by staff to determine cause and to rectify the problem. The Township and the Medical Health Officer (MHO) then evaluate the need for a "Boil Water" or "Stop Water Use" advisory. It is the responsibility of the Township to notify the public if any advisory is issued; the MHO determines when an advisory can be lifted.

2.6 Operational Highlights for 2014

In 2014 the Township achieved the following operational milestones:

- Completion of installation of the East Langley Water Supply Project Phase I.
- Construction began for East Langley Water Supply Project Phase II and Phase III.
- Re-development, pump repairs and motor replacement of Aldergrove Well 7.
- Motor replacement for Acadia Well 1.

2.7 East Langley Water Supply Project

The East Langley Water Supply Project has been identified as the top infrastructure priority for the Township of Langley. Studies completed in 2005 showed the best way to provide increased capacity and increased security of supply (multiple points of connection) is with the installation of a water supply from Greater Vancouver Water District (Metro Vancouver) to Aldergrove via Murrayville. The budget for this project was approved in 2012. The installation of a pipeline between Willoughby and Murrayville was completed, and construction of a new pump station and pipeline between Murrayville and East Langley began in 2014.

Sustainable water supply to Aldergrove is identified as a requirement to meet an updated Aldergrove Community Plan and construction of the project will allow the Township to reduce the amount of groundwater extracted from the Aldergrove aquifer to sustainable levels. This

project is expected to also reduce water extraction from the Hopington Aquifer through municipal water services to properties in the Salmon River Uplands.

The project includes 14km of trunk water main, and a large booster pump station. It will provide security of water supply with additional connections at Milner, Murrayville, and Gloucester; and allowances for future connections into Salmon River Uplands, including the small municipal Tall Timbers and Acadia water systems.

2.8 Planned Works for 2015

Water system improvements scheduled for 2015 include the following:

- Completion of the Water Emergency Plan.
- Completion of East Langley Water Supply Project
- Commissioning of Brawn Pump Station and East Langley Water Supply
- Update the Water Master Plan.
- Watermain project to connect pressure zones: Willowbrook Connector at 210 Street.
- Design of an additional Fort Langley well.
- Completion of the Review of Well Operation, Performance Monitoring and Rehabilitation Programs.
- Development of a Long Term Groundwater Source Supply Plan
- Metering and SCADA retrofit installations at PRV stations

3.0 WATER SAMPLING AND TESTING PROGRAM

The Township utilizes a regular sampling and testing program in order to maintain delivery of safe, high quality drinking water to its users. Testing is performed at both the local supply sources and in the water distribution system. The GVWD also samples water prior to it entering the Township's distribution system. A summary of GVWD 2014 results is included in Appendix B.

Water sampling and testing, as described in Table 3.0.1, meets regulatory requirements as set by the Guidelines for Canadian Drinking Water Quality and the Water Quality Monitoring and Reporting Plan (WQMRP)(September 2008) for municipalities in the GVWD.

Table 3.0.1 Water Sampling and Testing Schedule

Water Type	Parameter	Frequency
Township Source Water	E.coli, Total Coliforms	Quarterly
	Alkalinity, Colour, Chloride, Fluoride, Hardness, Nitrite, Nitrate, pH, Sulfate, Turbidity	Semi-Annually
	Aluminum, Antimony, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Potassium, Silicon, Sodium, Uranium, Zinc	
	Nitritotriacetic Acid (NTA)	Annually
	BTEXs, MCPA, PAHs, Phenols, VOCs	
	Ammonia, Chlorate, Cyanide, Dissolved Organic Carbon, Sulphide, Total Dissolved Solids, Total Organic Carbon	
	Beryllium, Bismuth, Cobalt, Mercury, Molybdenum, Nickel, Phosphorous, Selenium, Silver, Strontium, Sulphur, Thallium, Tin, Titanium, Vanadium, Zirconium	
	Pesticide and Herbicide Scan, Radionuclides	
Township Distribution	E.coli, Total Coliforms, HPC	Weekly
	Free Chlorine	
	Turbidity	
	pH, Temperature	
	THM, HAAs, pH, Vinyl Chloride	Quarterly at selected sites (by GVWD)

3.1 GCDWQ Updates

Health Canada publishes the Guidelines for Canadian Drinking Water Quality on behalf of the Federal-Provincial-Territorial Committee on Drinking Water (CDW). Guidelines are systematically reviewed to assess the need for updates; several chemical, physical and microbiological parameters are new or have been revised since the publication of the Sixth Edition of the Guidelines for Canadian Drinking Water Quality in 1996.

In 2014 there were four items for drinking water reviewed through public consultation; 1,2-Dichlorethane, Ethylbenzene, Selenium, Toluene, and Xylene.

3.2 Fraser Health Updates

Fraser Health requests that the following message be included in the 2014 Annual Water Quality Report:

Anytime the water in a particular faucet has not been used for six hours or longer, "flush" your cold-water pipes by running the water until you notice a change in temperature. (This could take as little as five to thirty seconds if there has been recent heavy water use such as showering or toilet flushing. Otherwise, it could take two minutes or longer.) The more time water has been sitting in your home's pipes, the more lead it may contain.

Use only water from the cold-tap for drinking, cooking, and especially making baby formula. Hot water is likely to contain higher levels of lead.

The two actions recommended above are very important to the health of your family. They will probably be effective in reducing lead levels because most of the lead in household water usually comes from the plumbing in your house, not from the local water supply.

Conserving water is still important. Rather than just running the water down the drain you could use the water for things such as watering your plants.

4.0 Source Water Quality

The quality of the source water affects the level of treatment, if any, required in order to produce a water supply that is safe for consumption and aesthetically pleasing. Having a monitoring program in place helps to ensure that the quality of the Township's source water remains high, and provides analytical data required by the GCDWQ for ongoing proof of quality.

As detailed in Table 3.0.1, Township source water is sampled quarterly for microbial parameters, semi-annually for routine parameters and annually for detailed parameters. Source samples were collected from well heads in March, June, August, and December of 2014 for microbial testing. Each sample collected in August and December was additionally analyzed for routine parameters; the August samples were also analyzed for complex parameters.

The 2014 source water sampling program is detailed in sub-sections 4.1, 4.2 and 4.3. Maximum acceptable concentrations (MAC) represent health related guidelines. Aesthetic objectives (AO) apply to certain substances that may affect acceptance by consumers but are not a direct health concern

4.1 Quarterly Microbial Testing

Microbial quality of source water is an important indicator of the degree of contamination and the treatment required to ensure a safe, potable water supply. Table 4.1.1 outlines Schedule A of the B.C. Drinking Water Protection Regulation, which provides quality standards for potable water. At this time there is no regulation concerning the microbial monitoring frequency of well water. Since all the Township water supply points originate from wells, quarterly microbiological testing has been carried out. If problems were to develop it is expected that they would appear in the distribution system weekly testing.

Table 4.1.2 shows results for the 2014 quarterly microbiological analysis of the source water for total coliforms and *E.coli*. Township source water did test positive for total coliform at one site: Willoughby Well 1. Willoughby Well 1 was not in operation at the time the sample was taken.

Table 4.1.1 Schedule A of the B.C. Drinking Water Protection Regulation

Parameter	Standard
Escherichia coli	No detectable Escherichia coli per 100 ml
Total coliform bacteria:	
(a) 1 sample in a 30 day period	No detectable total coliform bacteria per 100 ml
(b) more than 1 sample in a 30 day period	At least 90% of samples have no detectable total coliform bacteria per 100 ml and no sample has more than 10 total coliform bacteria per 100 ml

Table 4.1.2 2014 Quarterly Microbial Analysis

Source	March 2014 Total/ <i>E.coli</i> Coliform (CFU/100mL)	June 2014 Total/ <i>E.coli</i> Coliform (CFU/100mL)	August 2014 Total/ <i>E.coli</i> Coliform (CFU/100mL)	December 2014 Total/ <i>E.coli</i> Coliform (CFU/100mL)
Acadia 1	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Acadia 2	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Aldergrove 3	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Aldergrove 4	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Aldergrove 6	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Aldergrove 7	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Aldergrove 8	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Aldergrove 9	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Aldergrove 10	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Brookwood 7	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Brookwood 9	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Brookwood 10	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Murrayville 1	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Murrayville 2	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Tall Timber 1	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Tall Timber 2	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Tall Timber 3	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Fort Langley 2	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Willoughby 1	<1 / <1	<1 / <1	<1 / <1	2 / <1

4.2 Semi-Annual Routine Parameter Testing

Source water sampling for routine parameters provides the Township with valuable information on water quality and enables water operators to plan treatment options based on historical trends. Parameters highlighted in this section have exceeded the GCDWQ for MAC or AO. Presented in Appendix A are parameters that have health-based or aesthetic guidelines for chemical and physical parameters in the GCDWQ, and show detectable levels greater than 5 times laboratory MDL.

4.2.1 Manganese

The aesthetic objectives for manganese were not met in 2014 for several Township water sources, including Acadia, Aldergrove, Brookwood, Murrayville, and Willoughby wells. Acadia services a very small community of 24 homes; options to reduce manganese concentrations, and meet the aesthetic objective of 0.05 mg/L at point of distribution, were reviewed in 2011. Polyphosphate sequestration was determined to be the best treatment option; however changing to Metro Vancouver supplied water from the ELWS was determined to be a better long term solution. Manganese levels at five of the seven Aldergrove wells were above the aesthetic objective, but were reduced to an acceptable level during the treatment process at the AWTP prior to distribution. Brookwood and Murrayville ground water sources are mixed with GVWD water, decreasing manganese levels to acceptable levels prior to distribution.

4.2.2 Nitrate

Nitrate was above the allowable level of 10 mg/L at Aldergrove Well 10. With the approval of Fraser Health, prior to distribution, the Township blends high and low nitrate content water at the AWTP. The blending results in an acceptable nitrate level of less than 10 mg/L, measured weekly to ensure regulatory compliance.

4.3 Annual Complex Parameter Testing

Source water sampling for complex parameters complies with the GCDWQ and provides the Township with information on water quality for a given well. All annually tested parameters (refer to Table 3.0.1) in 2014 were within acceptable limits of the GCDWQ.

4.4 Source Water Protection

A water demand management strategy to assist with long term management of municipal water supplies was completed in 2007. Since completing this strategy, Township staff has been working to implement its recommendations. The Township also completed work with the Province to develop a water management plan in 2009, which aims to provide safe and sustainable groundwater for our community. Implementation of recommendations from the Water Management Plan has included a contaminant inventory of potential threats to municipal well capture zones, and a pesticide awareness campaign. The Water Wise program is in its tenth year and continues to provide education and incentives to the public to protect groundwater from contamination and to conserve water.

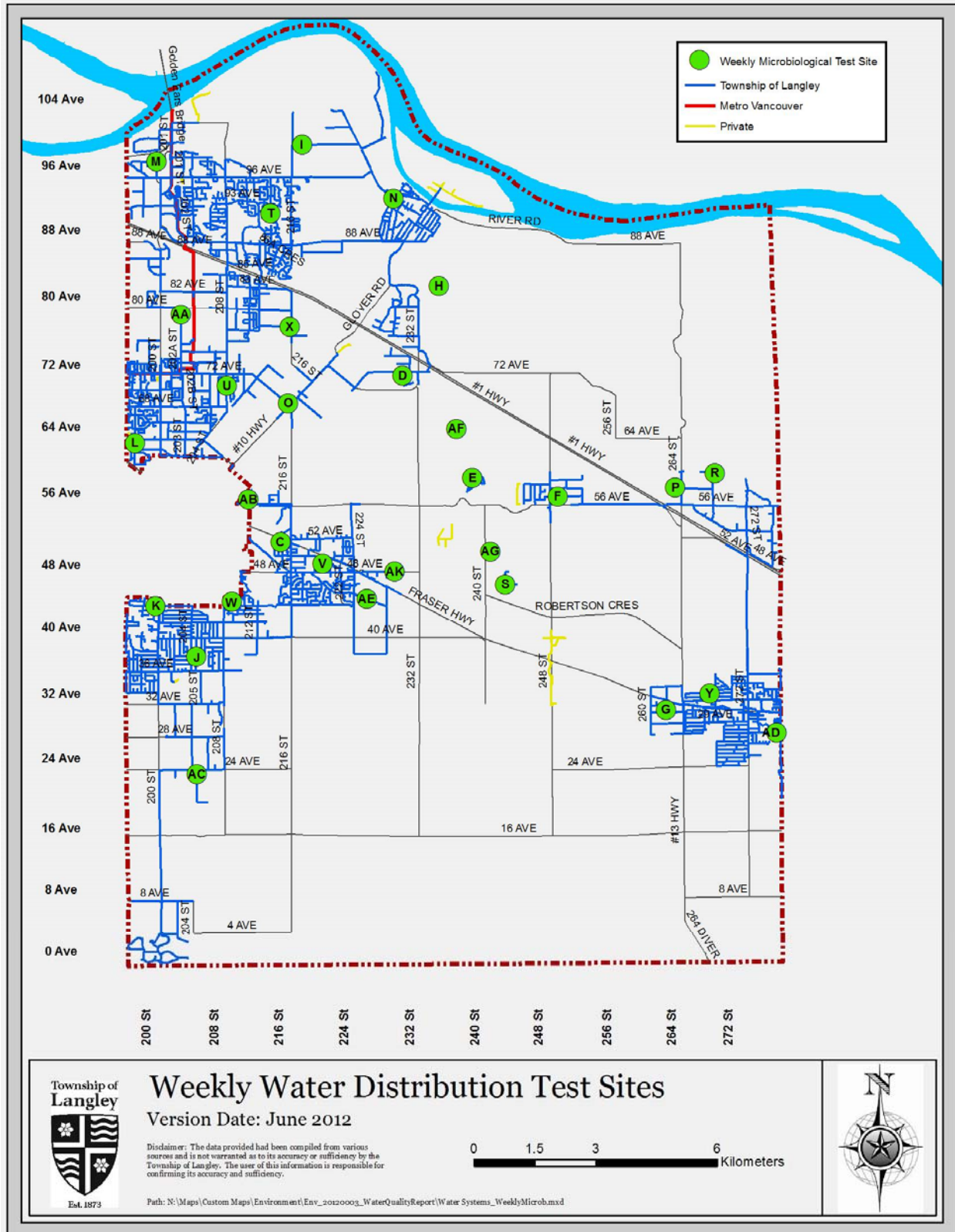
5.0 Distribution System Water Quality

As outlined in Table 3.0.1 the Township of Langley's distribution system is tested weekly. A map of the weekly sampling sites and list of the map labels by location can be seen in Table 5.0.1 and Figure 5.0.1, respectively.

Table 5.0.1 Weekly Water Distribution Test Site Addresses

Map Label	Location	Map Label	Location
AA	7950 202A St	J	3781 204A St
AB	5679 211 St	K	19966 44 Ave
AC	2340 204A St	L	6350 197 St
AD	AWTP	M	9844 199A St
AE	Murrayville Reservoir	N	22870 96 Ave
AF	Williams Park	O	21575 Crush Cr
AG	Brown Park	P	26342 58 Ave
AJ	19620 3A Ave	R	26829 60 Ave
AK	22930 48 Ave	S	4649 242A St
C	21484 51B Ave	T	9163 213 St
D	7175 230 St	U	7025 208 St
E	23740 60 Ave	V	22020 49 Ave
F	24919 57 Ave	W	4257 209 St
G	3133 262 St	X	21584 78 Ave
H	23000 Rawlison Cr	Y	26736 33 Ave
I	21736 100 Ave		

Figure 5.0.1 Weekly Water Distribution Test Site Location Map



5.1 Distribution System Microbial Testing

Total coliforms and *E.coli* testing is used to monitor the effectiveness of system disinfection and to ensure that the water supply system meets the microbial guidelines. HPCs are naturally occurring and their presence in drinking water is not indicative of a public health risk. No MAC is specified for HPC bacteria in drinking water, but increases in HPC concentration above site baseline levels are considered undesirable.

As previously explained in section 4.1, Table 4.1.1, Schedule A of the B.C. Drinking Water Protection Regulation provides water quality standards for potable water.

Bacterial re-growth, as measured by detection of coliform bacteria, can occur in municipal distribution systems in periods of increasing water temperature. Although coliform re-growth is not caused by direct contamination of the water system, Health Canada advises that corrective action is required in order to maintain the usefulness of total coliforms as an indicator of the overall quality of the water.

Health Canada sets the guideline for water sampling frequency of microbiological contaminants as follows:

Table 5.1.1 Schedule B of the B.C. Drinking Water Protection Regulation

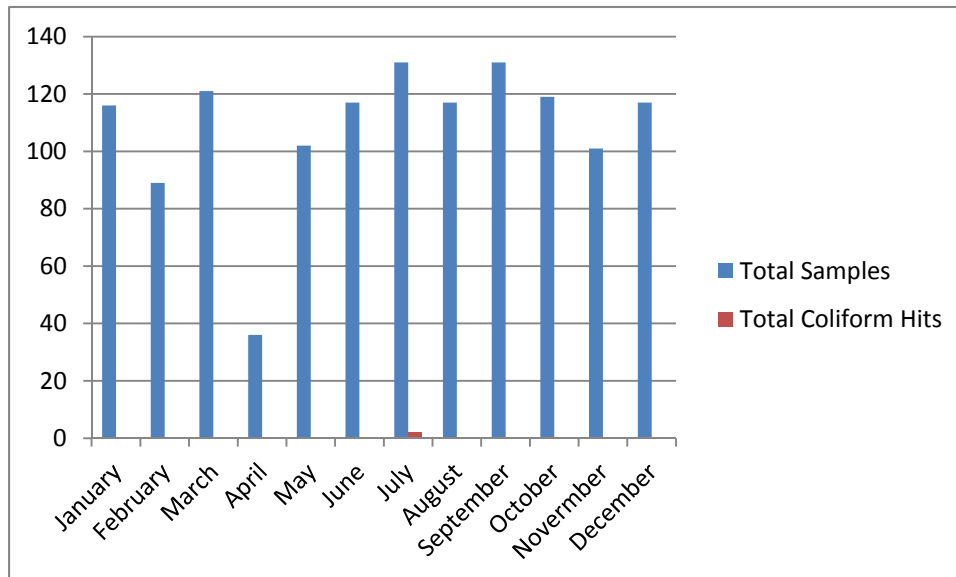
Population Served	No. of Samples per Month
Up to 5,000	4
5,000 to 90,000	1 per 1,000 population
90,000+	90 + 1 per 10,000 population

For a population of approximately 94,809 being served by Township water supplies, the required number of samples should be on the order of 91 per month. Currently the Township exceeds the requirement by testing an average of 144 samples per month.

5.2 Microbial Results for 2014

The MAC for total coliform is 10% of samples taken; in 2014 only .2% of samples tested were positive for total coliform. Weekly testing of distribution water resulted in 2 total coliform hits out of the 1153 samples tested. All sites showing a positive result were re-sampled and re-run by a CAEAL approved laboratory, with the re-run results showing non-detect (<1 CFU).

The cause of the original positives can be attributed to contamination of the sample bottles, equipment, or laboratory error. Sampling and equipment handling methods are reviewed by samplers annually to help maintain sterility.

Figure 5.2.1 Comparison of Total Coliform Positive Results to Total Samples Tested

5.3 Distribution System Physical Parameters Analysis

Weekly evaluation of the pH, turbidity and free chlorine levels of the distribution system provides an indication of baseline levels for each distribution point, as well as ensuring system compliance with provincial and federal guidelines. Although some degree of fluctuation in a system is standard, all distribution points maintained, on average, the following: 3.9% of samples exceeded 1 NTU, pH in the range of 6.61– 8.31, and an average chlorine level of 0.33 mg/L.

6.0 Conclusion

It can be concluded from the 2014 water testing programs that the Township of Langley's drinking water is in good condition. Results of the 2014 semi-annual microbial analysis confirm that the Township source water meets the bacteria standard for non-filtration treatment. Semi-annual routine parameter testing yielded some source water results that exceeded maximum acceptable concentration limits for nitrates, and that exceeded aesthetic objectives for iron, manganese, and hardness. Exceeding sources were reduced to acceptable parameter levels either through filtration during treatment, or dilution via blending with other water sources, prior to distribution.

Township's operations and engineering staff continue to seek water system improvements to provide a continuous source of potable and aesthetically pleasing water to consumers. Our maintenance and monitoring programs are designed to meet the challenges of distributing water in a way that does not compromise the health of the public. Working closely with both the Fraser Health Authority and the public, the Township continues to provide a quality source of drinking water for all to enjoy.

Township of
Langley



Est. 1873

Water Quality Report 2014

Appendix A Water Test Results

List of Figures

Figure A.1: Arsenic.....	1
Figure A.2: Barium.....	2
Figure A.3: Chloride.....	3
Figure A.4: Copper.....	4
Figure A.5: Fluoride.....	5
Figure A.6: Hardness.....	6
Figure A.7: Iron.....	7
Figure A.8: Lead.....	8
Figure A.9: Manganese.....	9
Figure A.10: Nitrate.....	10
Figure A.11: pH.....	11
Figure A.12: Sodium.....	12
Figure A.13: Sulphate.....	13
Figure A.14: Total Dissolved Solids.....	14
Figure A.15: Turbidity.....	15

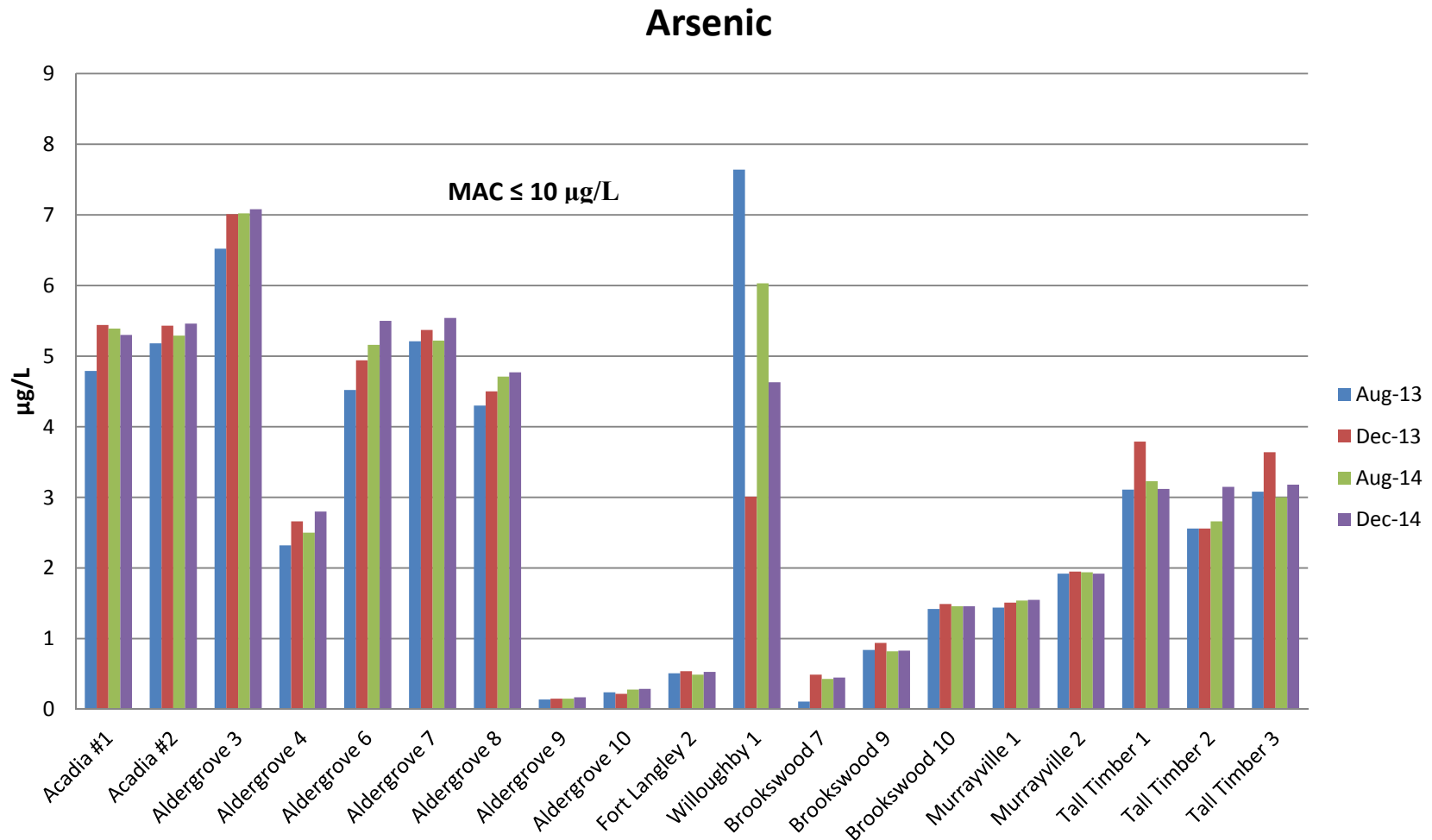


Figure A.1: Arsenic

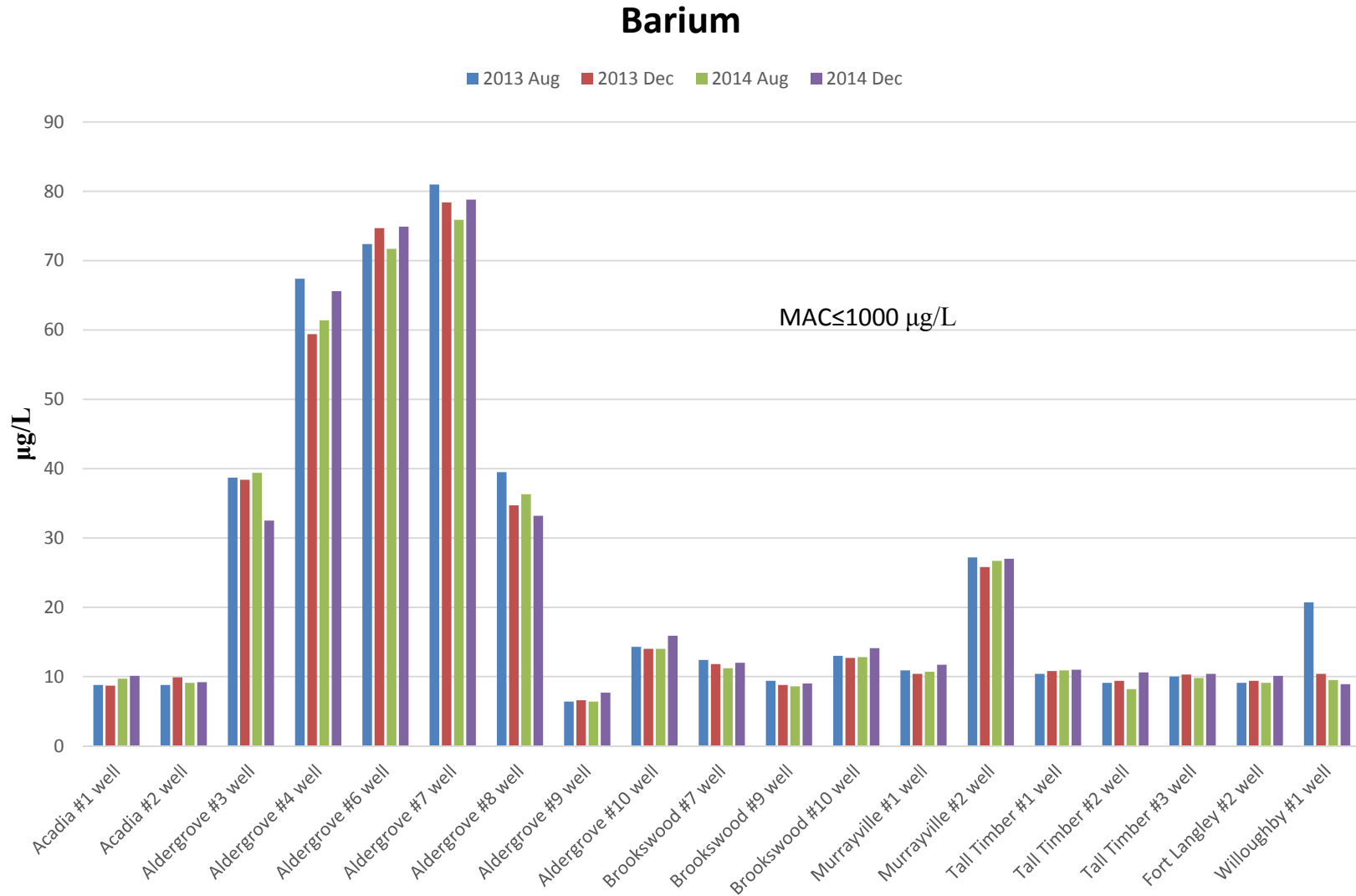


Figure A.2: Barium

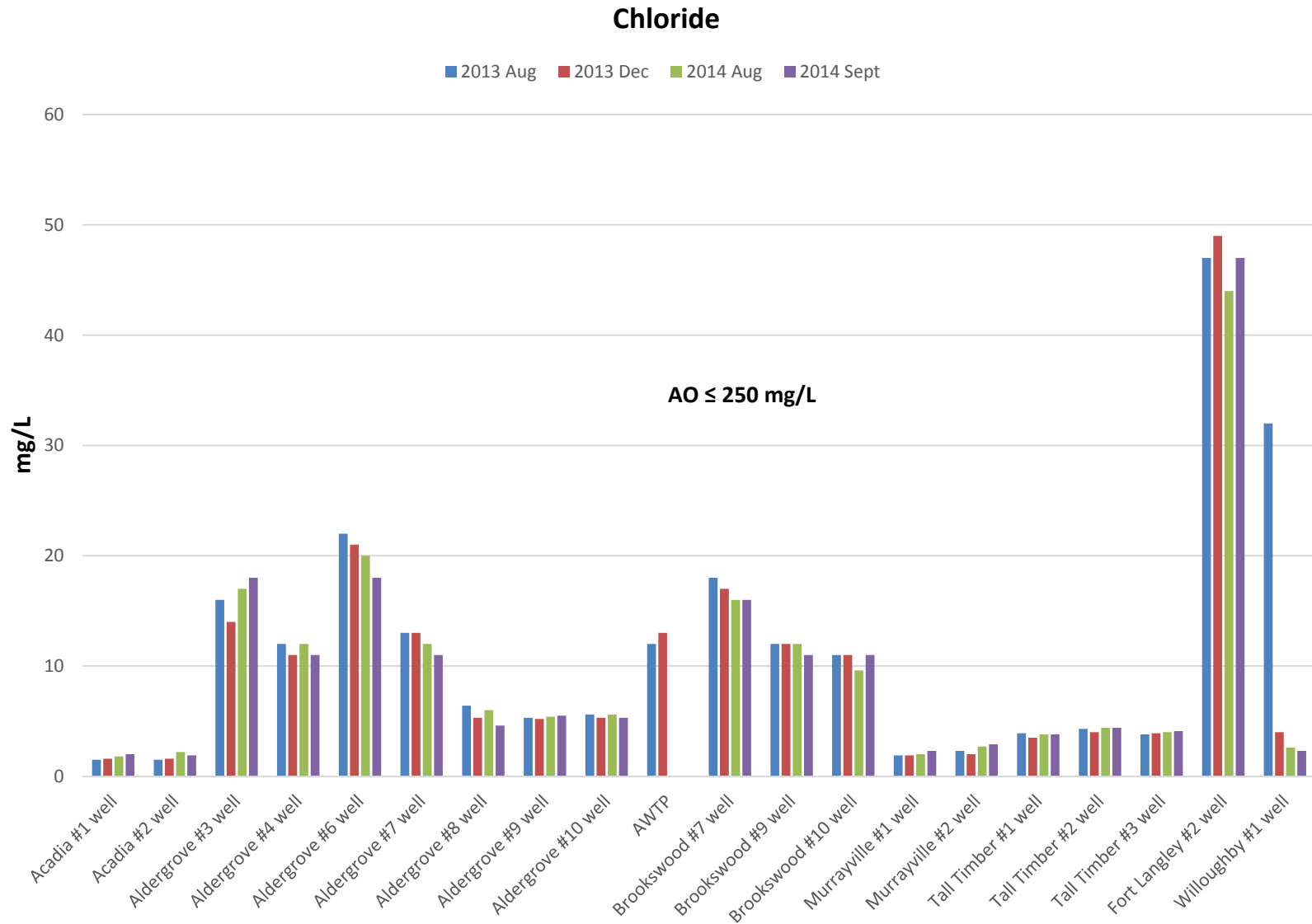


Figure A.3: Chloride

Copper

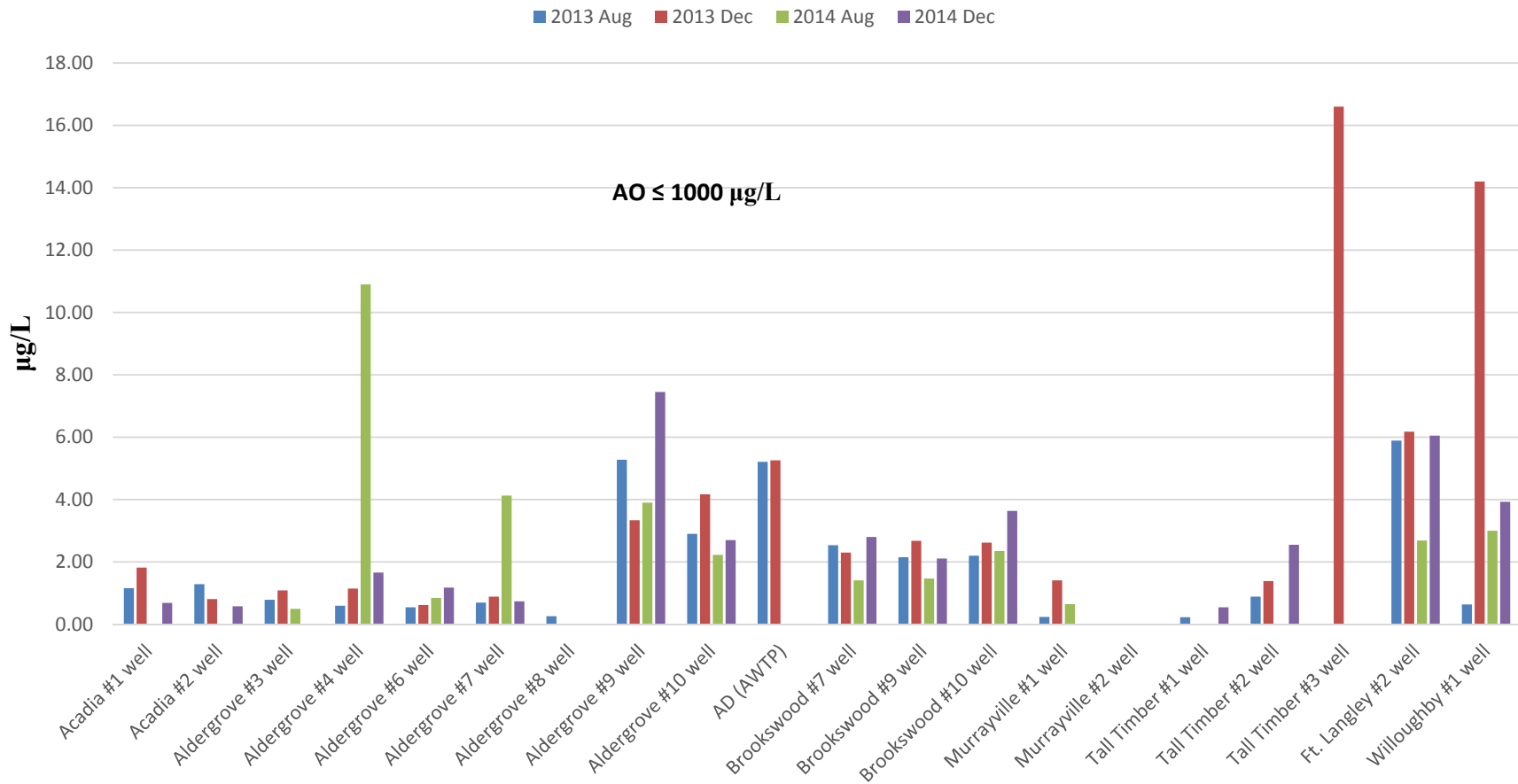


Figure A.4: Copper

Fluoride

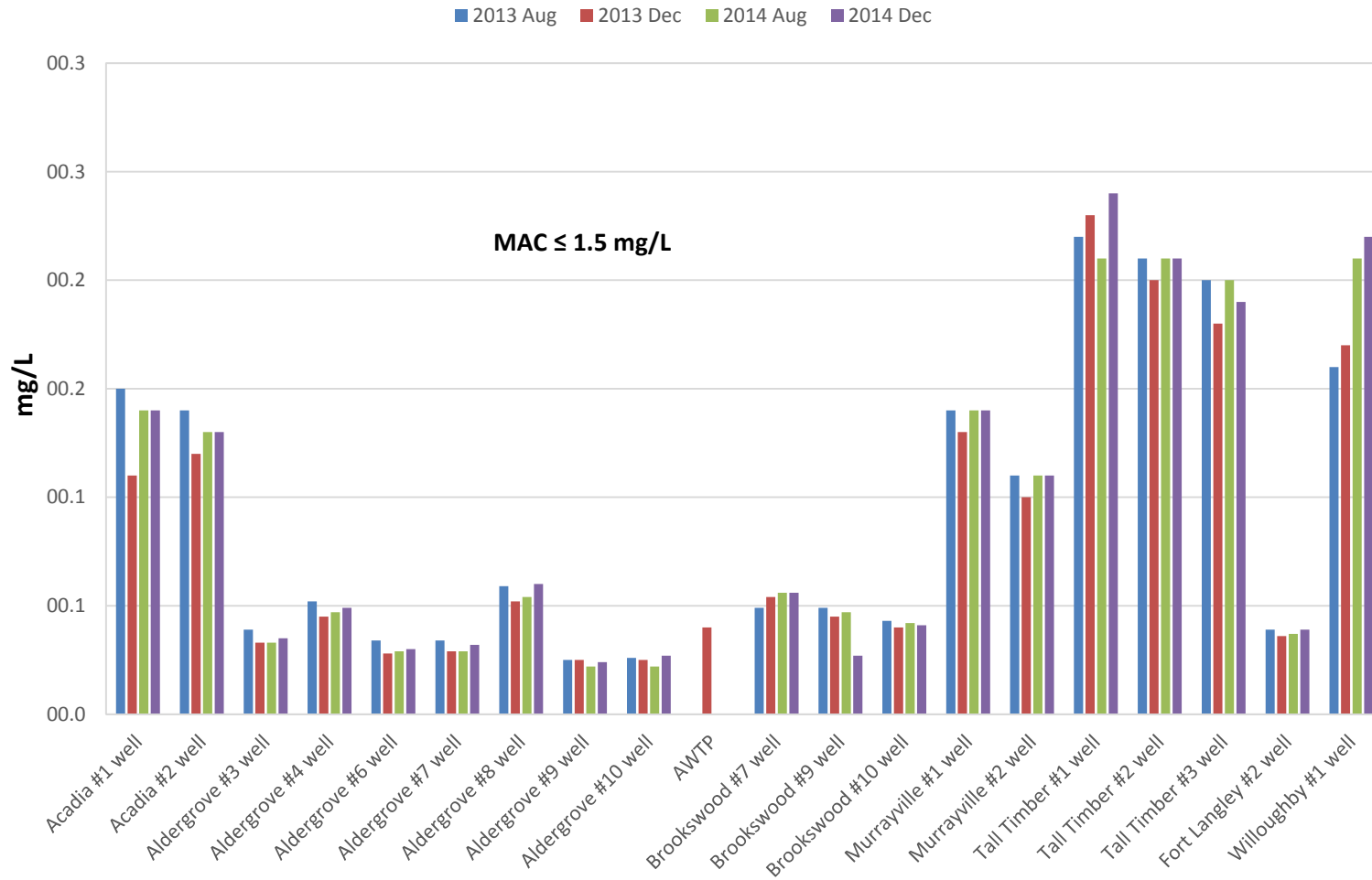


Figure A.5: Fluoride

Hardness (as CaCO₃)

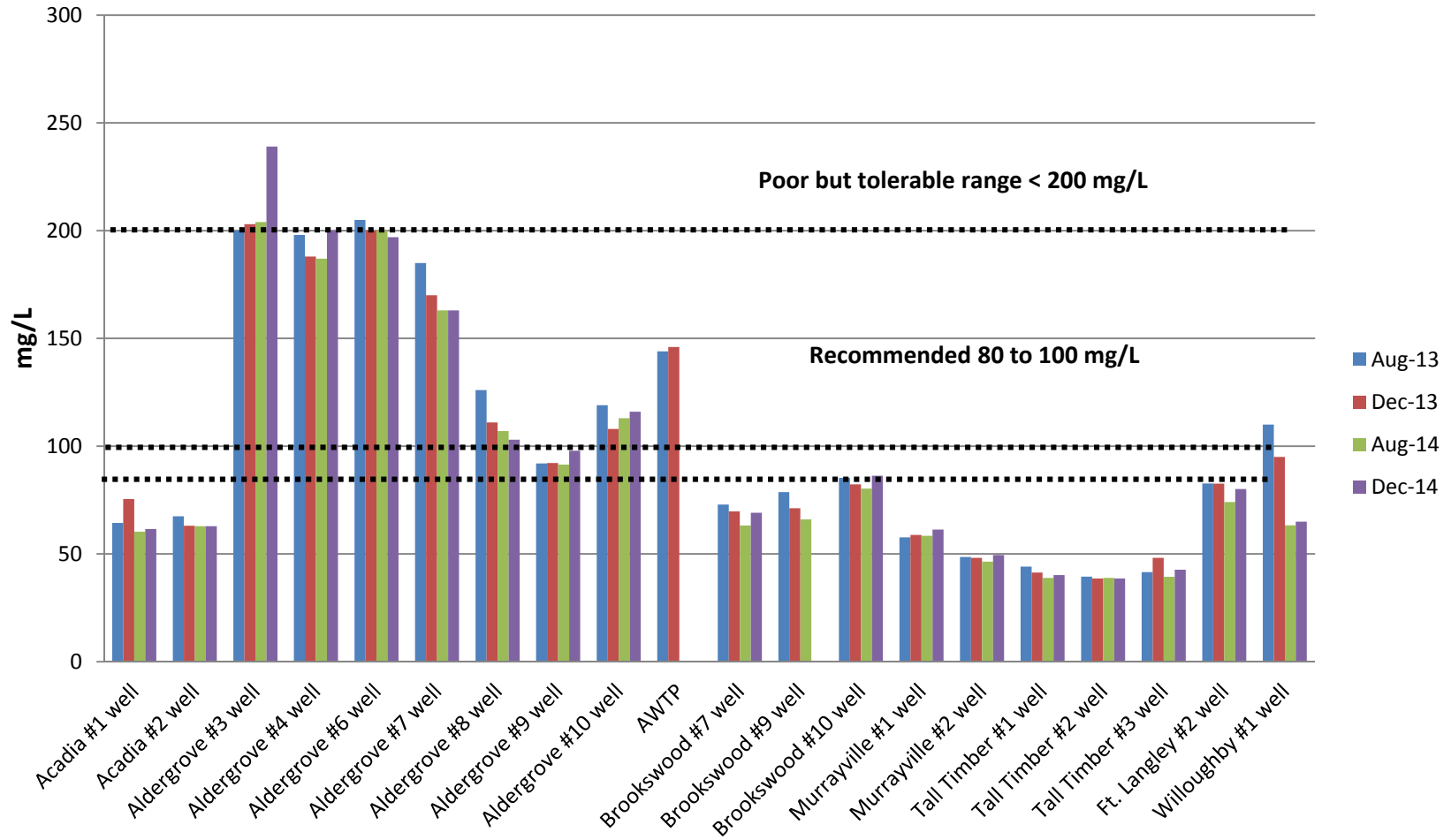


Figure A.6: Hardness

Iron

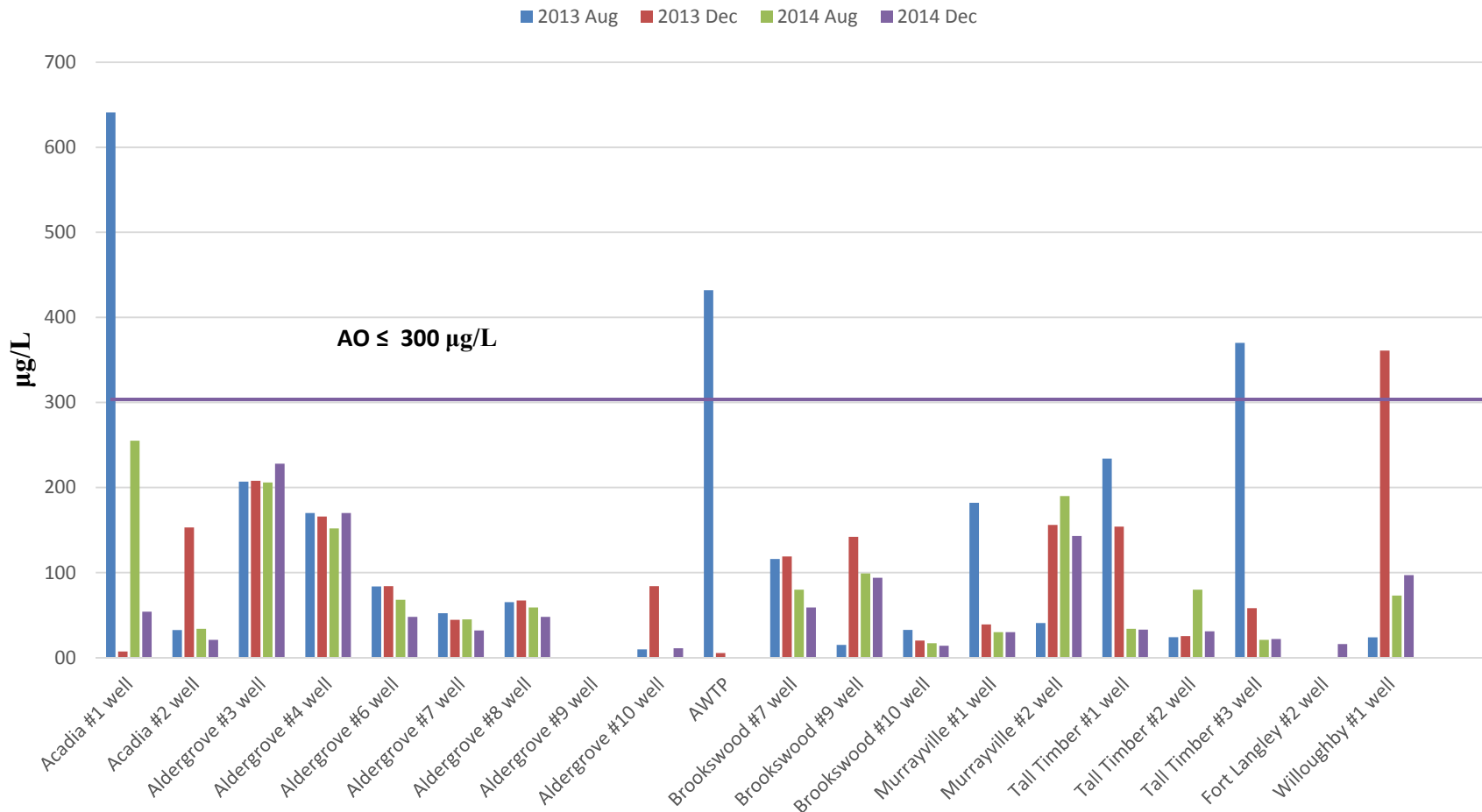


Figure A.7: Iron

Lead

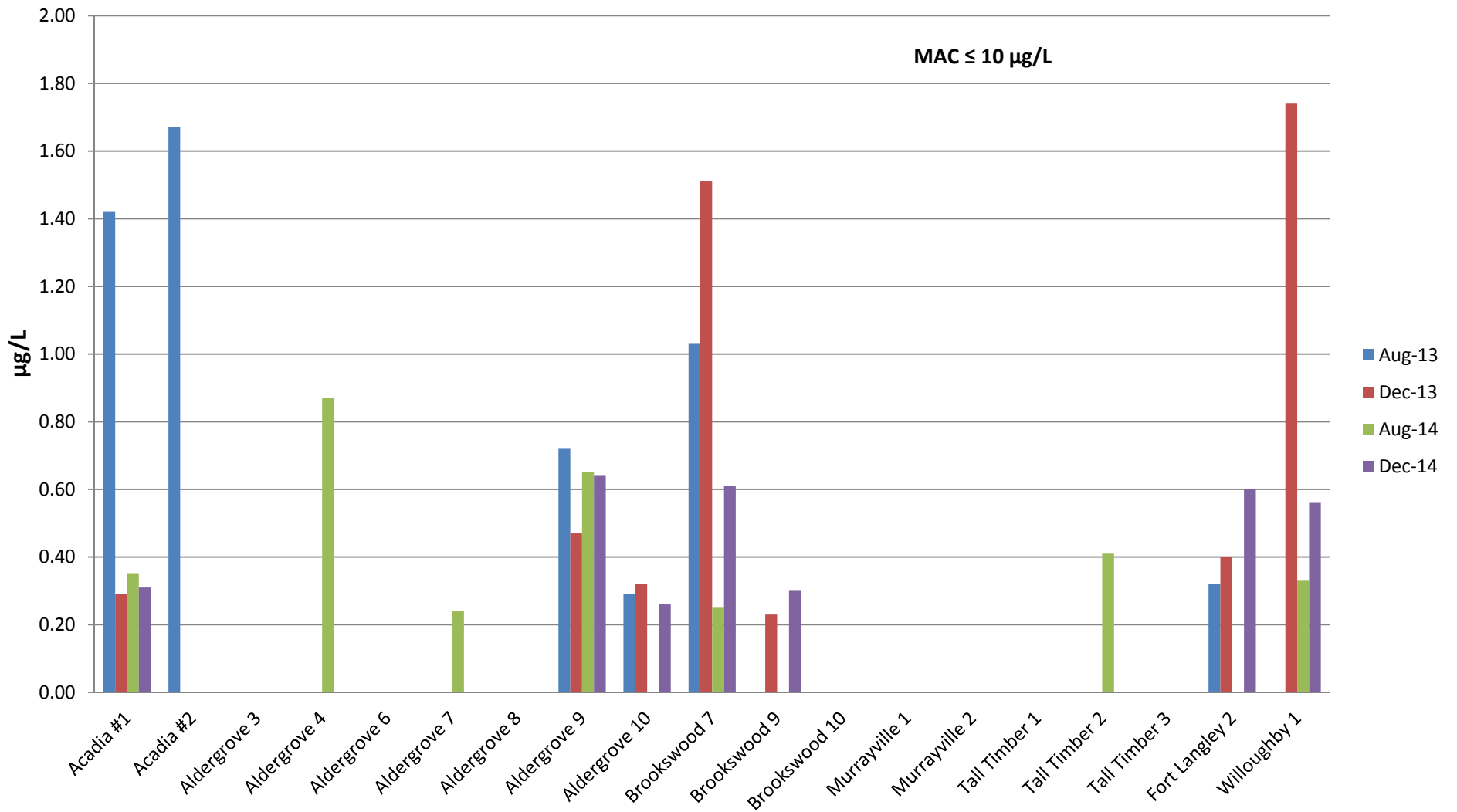


Figure A.8: Lead

Manganese

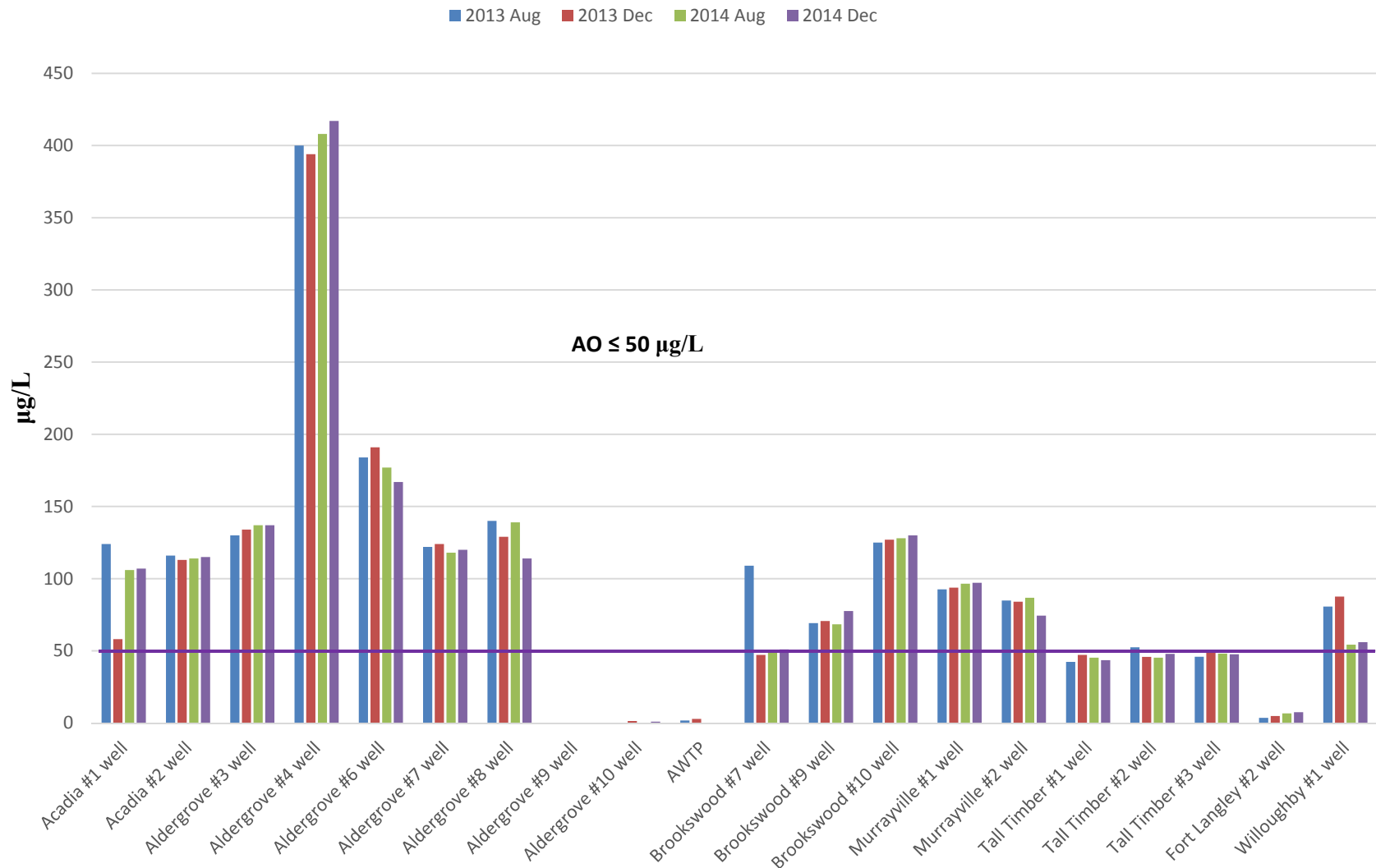


Figure A.9: Manganese

Nitrate

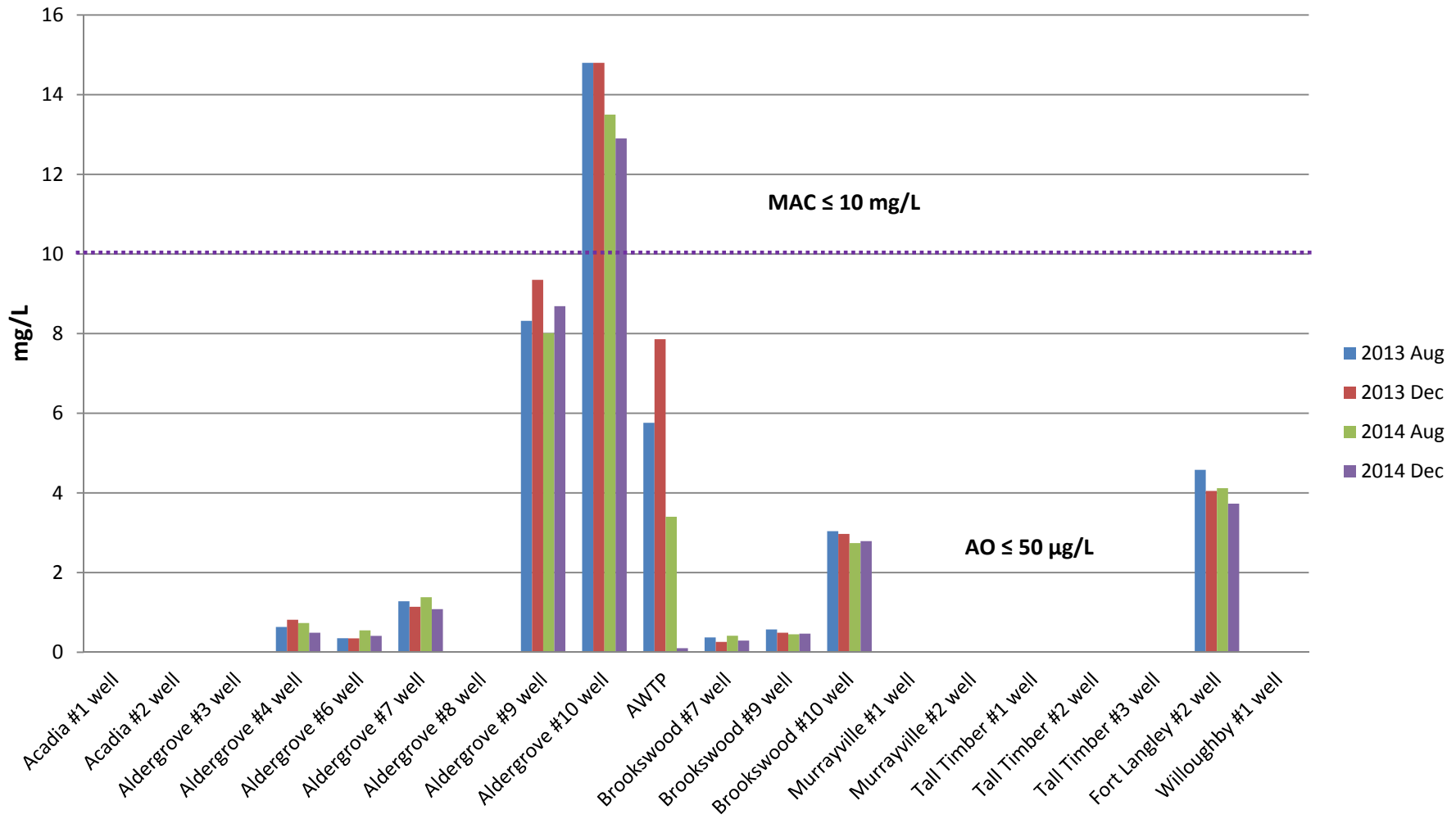


Figure A.10: Nitrate

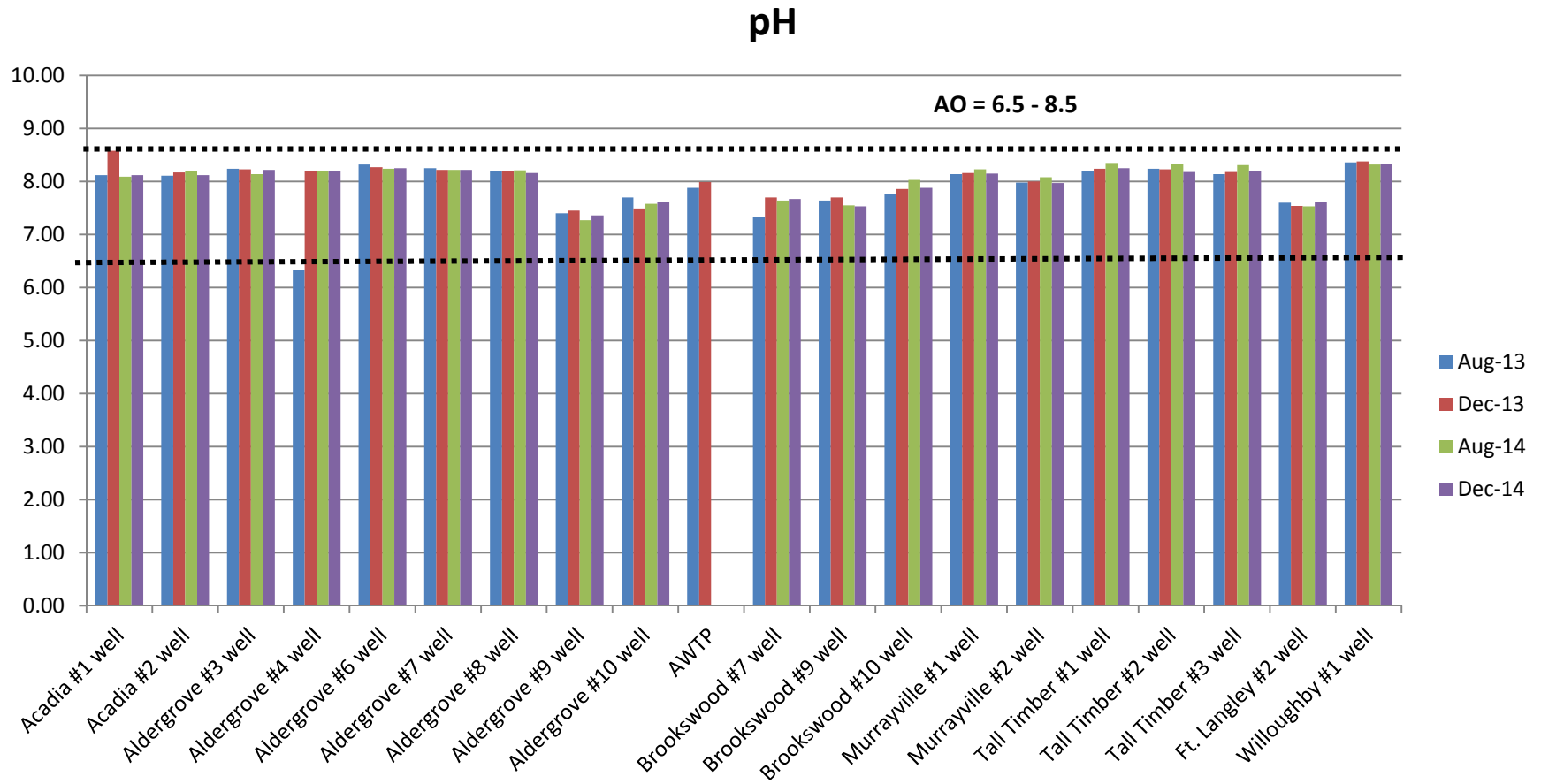


Figure A.11: pH

Sodium

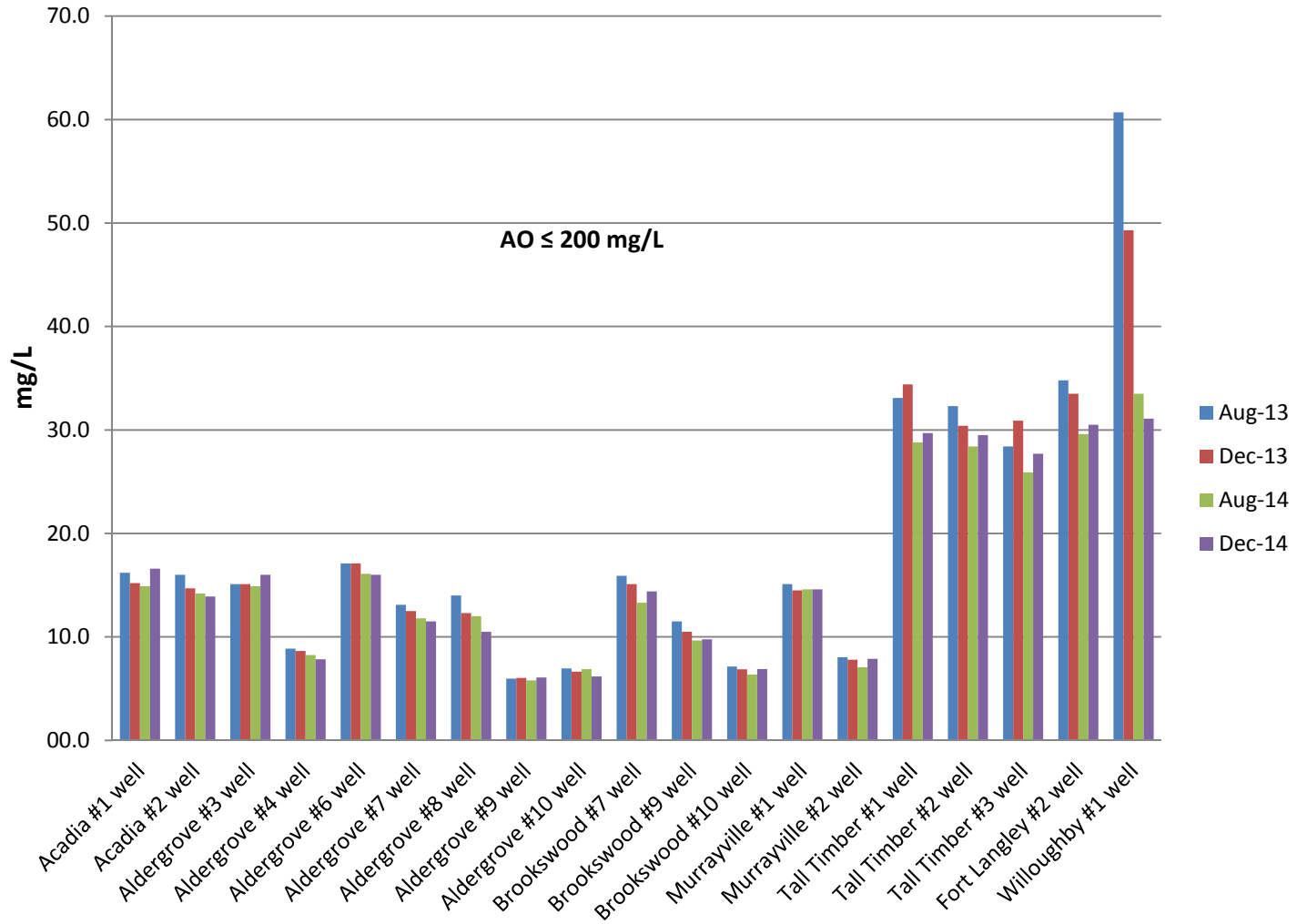


Figure A.11: Sodium

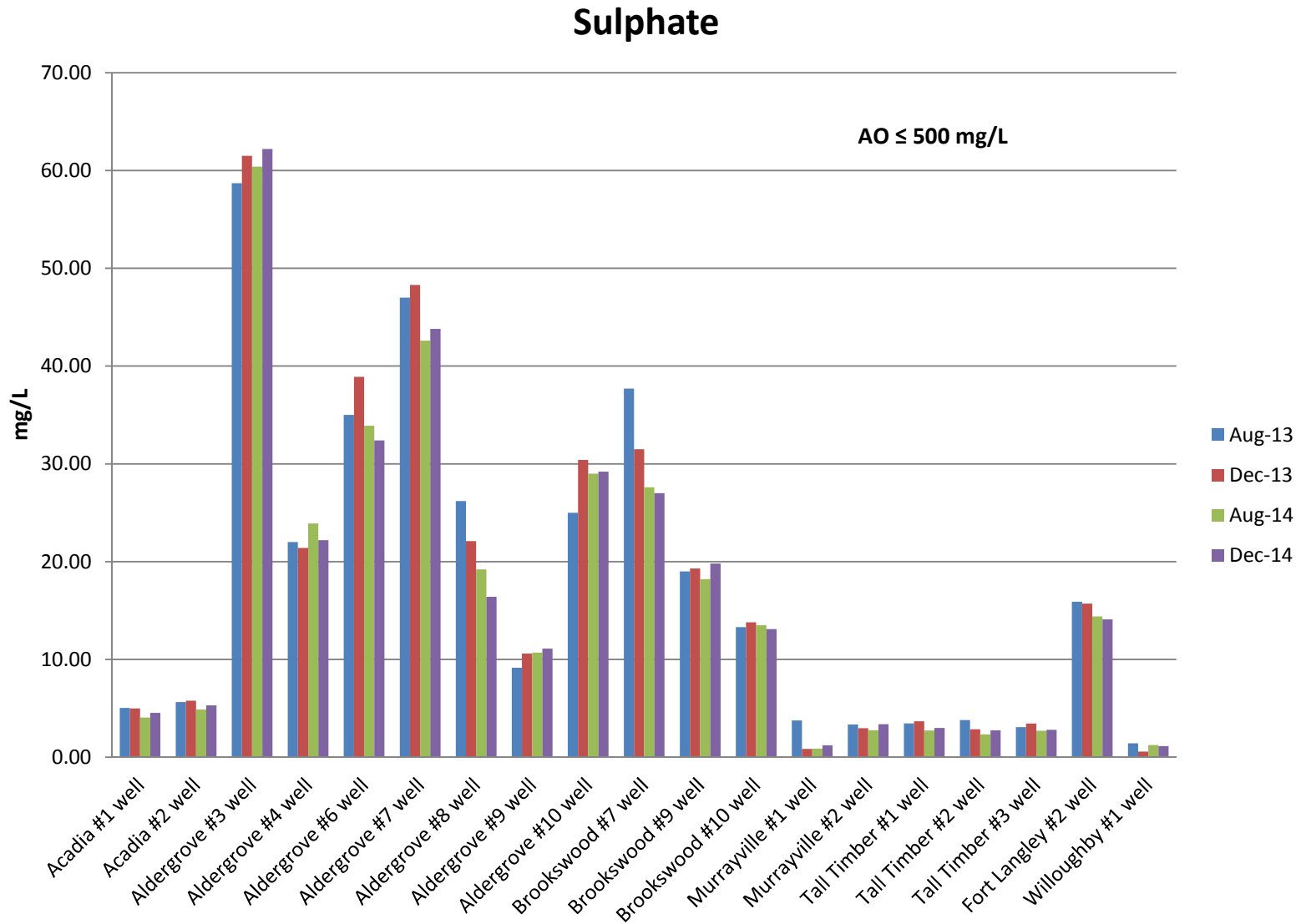


Figure A.12: Sulphate

Total Dissolved Solids

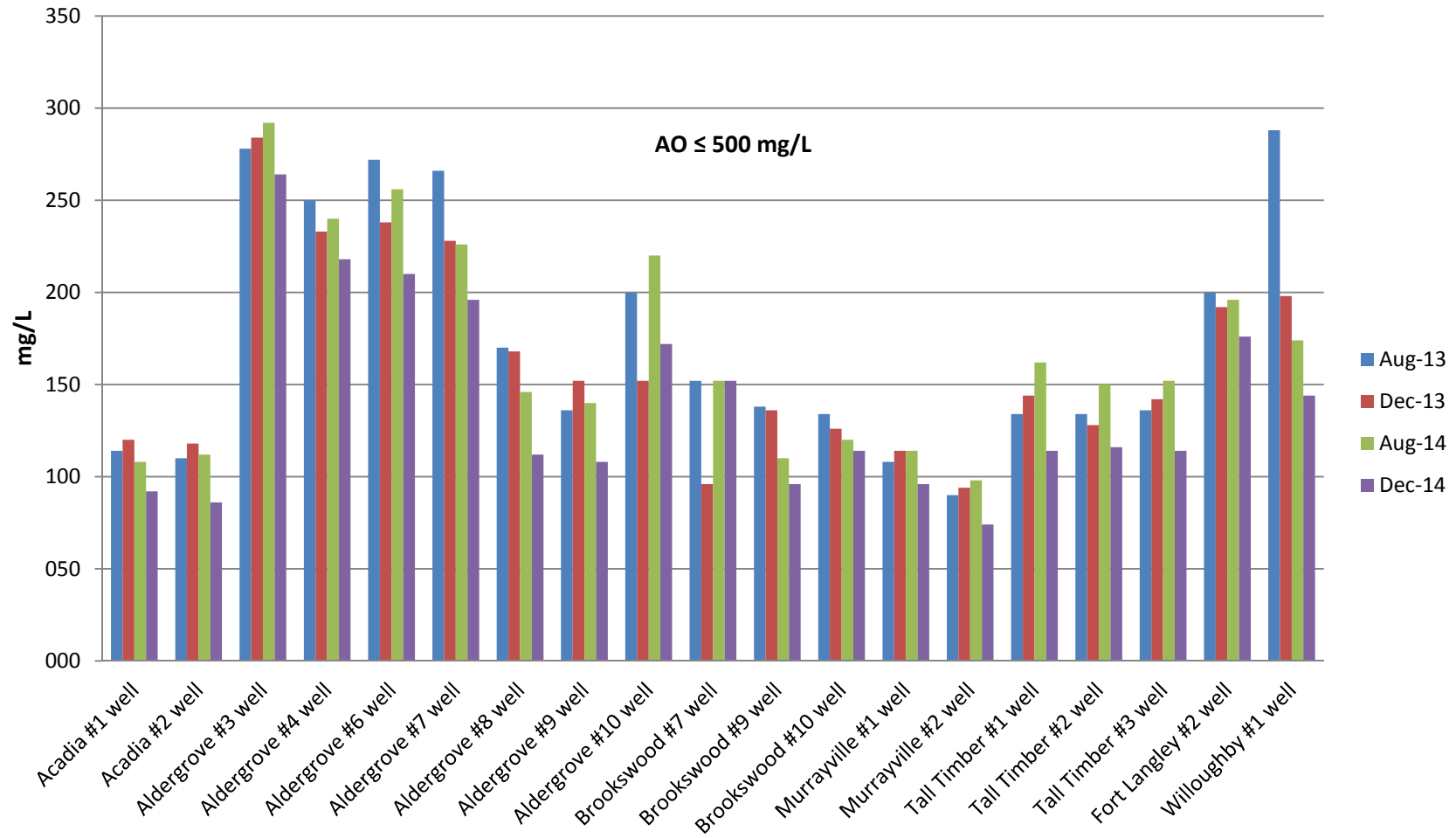


Figure A.13: Total Dissolved Solids

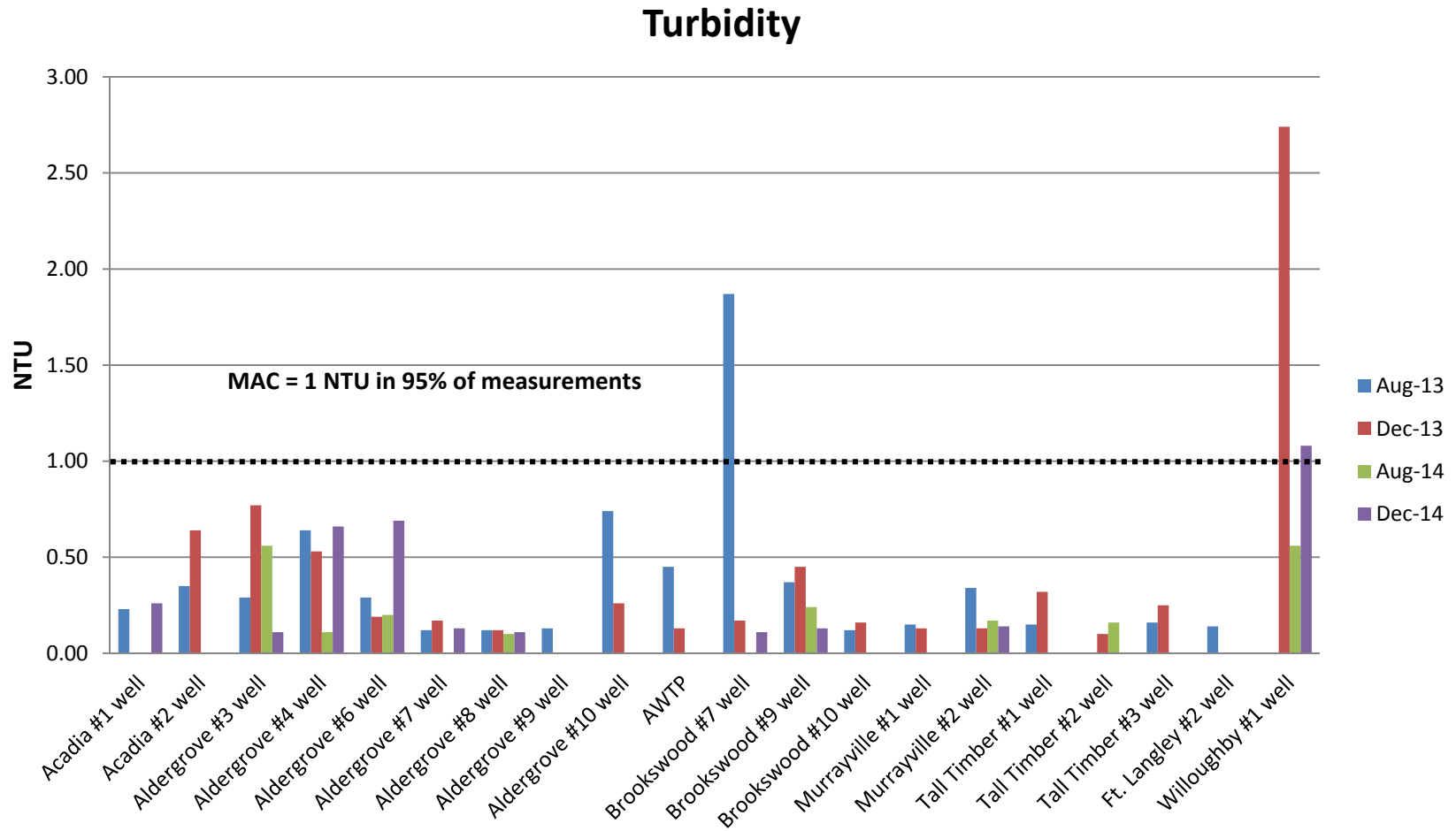


Figure A.14: Turbidity

Township of
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Water Quality Report 2014

Appendix B GVWD Potable Water Results

