Lead Levels in Drinking Water at Middlebury Union High School, Middlebury, VT

Technical Summary

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This summary is not intended as a stand-alone document, but rather as a ready reference for the primary findings and recommendations. Outlets prioritized for remediation are listed in **Table 1** and their locations shown in **Figure 1**. A full report, including description of the study methods, complete data, and additional information, is available at **sites.middlebury.edu/mcostanz/research/lead**.

Table 1. Middlebury Union High School outlets that exceeded the EPA action level (red) or the American Academy of Pediatrics safety level (blue) by outlet type, lead level, and remediation priority level. Both first draw concentrations are provided for outlets that were sampled twice. * indicates samples were not collected.

Outlet Type	Exceedance Level[1]	Outlet ID	Outlet Location (see also **Figure 1**)	First Draw (ppb)	Flush (ppb)	Remediation Priority[2]
Water fountain or bottle filler	First Draw exceeds AAP safety level	PU35	Basement hallway	12	4	Highest
		BL02	Weight room	9	*	Highest
		TQ01	3rd floor hallway	6	*	Highest
Kitchen sink or sprayer	First Draw exceeds EPA action level	BL01	Cafeteria pizza kiosk hand wash sink	26 and 18	8	Highest
	First Draw exceeds AAP safety level	RD09	Kitchen hand wash sink	7	*	Highest
		RD07	Kitchen sink/sprayer	7	*	Highest
		RD11	Kitchen sink	5	*	Highest
		RD08	Kitchen sink/sprayer	4	*	Highest
		YW08	Instructional kitchen (classroom) sink	3	*	Highest
		YW03	Instructional kitchen (classroom) sink	2	*	Highest
		YW05	Instructional kitchen (classroom) sink	2	*	Highest
		YW06	Instructional kitchen (classroom) sink	2	*	Highest
Classroom or office sink	First Draw exceeds EPA action level	PU21	H003 chemistry classroom	41 and 8	<1	Highest
		PU23	H003 chemistry classroom	32 and 13	2	Highest
		PU22	H003 chemistry classroom	29 and 6	<1	Highest
		PU32	H003 chemistry classroom	24 and 12	1	Highest
		PU14	H004 classroom	23 and 21	<1	Highest

[1] No outlets/samples at SES met or exceeded the U.S. Environmental Protection Agency (EPA) action level (≥15 ppb); Outlets/samples exceeded the American Academy of Pediatrics (AAP) safety level if water lead levels were >1 ppb.
[2] Priority level is based on evaluation against the EPA and AAP levels and likelihood and frequency of use for consumption. See full report for more information.

Classroom or office sink *(cont.)*	First Draw exceeds EPA action level *(cont.)*	PU19	H003 chemistry classroom	18 and 13	2	Highest
		PU30	H003 chemistry classroom	18 and 17	1	Highest
		PK04	2nd floor classroom/office	18 and 16	2	Highest
		PU11	H005 classroom	16 and 12	1	Highest
		PU31	H003 chemistry classroom	15 and 14	<1	Highest
	First Draw exceeds AAP safety level	PU24	H003 chemistry classroom	14 and 12	2	High
		PU12	Basement classroom	14 and 11	1	High
		PU27	H003 chemistry classroom	11	*	High
		PU33	Basement classroom	11 and 11	1	High
		PU25	H003 chemistry classroom	10	*	High
		PU26	H003 chemistry classroom	10	*	High
		PU34	H002 classroom	10 and 9	1	High
		RD30	C101 classroom	9	*	High
		BL20	1st floor classroom/office	8	*	High
		PU16	H004 classroom	8	*	High
		PU28	H003 chemistry classroom	8	*	High
		RD29	C101 classroom	8	*	High
		PU17	H004 classroom	7	*	High
		PU18	H004 classroom	7	*	High
		PU07	H005 classroom	6	*	High
		PU08	H005 classroom	6	*	High
		PU29	H003 chemistry classroom	6	*	High
		RD27	C102 classroom	6	*	High
		YW09	B101 classroom	5	*	High
		BL19	1st floor classroom/office	4	*	High
		PK10	H213 classroom/office	4	*	High
		PU10	H005 classroom	4	*	High
		PU13	H004 classroom	4	*	High
		PU15	H004 classroom	4	*	High
		RD28	C102 classroom	4	*	High
		BL05	Athletic trainer's office	3	*	High
		PU20	H003 chemistry classroom	3	*	High
		RD14	F102 main office sink	3	*	High
		YW02	B104 classroom	3	*	High
		PU06	H005 classroom	2	*	High
		PU09	H005 classroom	2	*	High
		RD15	Office	2	*	High
		RD16	F103 health office	2	*	High
Bathroom sink	First Draw exceeds AAP safety level	BL04	1st floor bathroom	13 and 9	2	High
		RD20	1st floor bathroom	13 and 10	1	High
		RD33	1st floor bathroom	10 and 4	1	High
		BL16	1st floor bathroom	9	*	High
		BL06	Locker room	8	2	High
		RD21	1st floor bathroom	7	<1	High
		PU02	Basement bathroom	6	*	High

Bathroom sink *(cont.)*	First Draw exceeds AAP safety level *(cont.)*	RD22	1st floor bathroom	5	*	High
		RD34	1st floor bathroom	5	*	High
		BL11	Locker room	4	*	High
		BL11.5	1st floor bathroom	4	*	High
		BL14	1st floor bathroom	4	*	High
		RD01	1st floor bathroom	4	*	High
		RD02	1st floor bathroom	4	*	High
		RD04	1st floor bathroom	4	*	High
		BL07	Locker room	3	*	High
		BL15	1st floor bathroom	3	*	High
		PK06	2nd floor bathroom	3	*	High
		PK09	2nd floor bathroom	3	*	High
		PK12	2nd floor bathroom	3	*	High
		RD03	1st floor bathroom	3	*	High
		RD17	Health office bathroom	3	*	High
		RD23	1st floor bathroom	3	*	High
		RD25	1st floor bathroom	3	*	High
		RD36	1st floor bathroom	3	*	High
		BL12	1st floor bathroom	2	*	High
		PK05	2nd floor bathroom	2	*	High
		PK11	2nd floor bathroom	2	*	High
		PU01	Basement bathroom	2	*	High
		PU36	Basement bathroom	2	*	High
		PU37	Basement bathroom	2	*	High
		PU38	Basement bathroom	2 and 2	<1	High
		PU39	Basement bathroom	2 and 2	<1	High
		RD12	1st floor bathroom	2	*	High
		RD13	1st floor bathroom	2	*	High
		RD26	1st floor bathroom	2	*	High
Utility sink	First Draw exceeds AAP safety level	TQ03	3rd floor in custodial closet	5	*	Low
		TQ02	3rd floor in custodial closet	4	*	Low
Other	n/a					

Low levels of lead in FL samples suggest that the predominant source of lead is the fixtures or their immediate connections, rather than incoming water or pipes within the school. Nevertheless, nearly 40% of the FL samples exceeded the AAP recommendation *even after flushing*, which suggests that some more distal pipes or connections may contain lead and also contribute to lead levels in water and that flushing prior to use is not a generally effective approach at MUHS for reducing lead to acceptable levels.

We recommend that MUHS pursue the following *permanent* remediation approaches for priority outlets:

1) replace existing outlet fixtures with "lead-free" fixtures/solder or remove the outlets entirely
2) if replaced, verify remediation efficacy via follow-up lead testing

Until priority outlets are permanently remediated, we suggest the following *temporary* approaches:

1) disconnect water supply to priority water fountains
2) disconnect water supply to priority sinks/showers/sprayers in locations where water is not needed for non-

consumption uses

3) for priority sinks/showers/sprayers in locations where water *is* needed for non-consumption uses,
    a. establish school-wide policies for water consumption from outlets by outlet type (e.g., "only drink from water fountains and bottle fillers"), rather than location-specific policies
    b. complement school-wide water consumption policy with age-appropriate signage at each priority outlet instructing against consumption and with educational outreach regarding the policy and its rationale

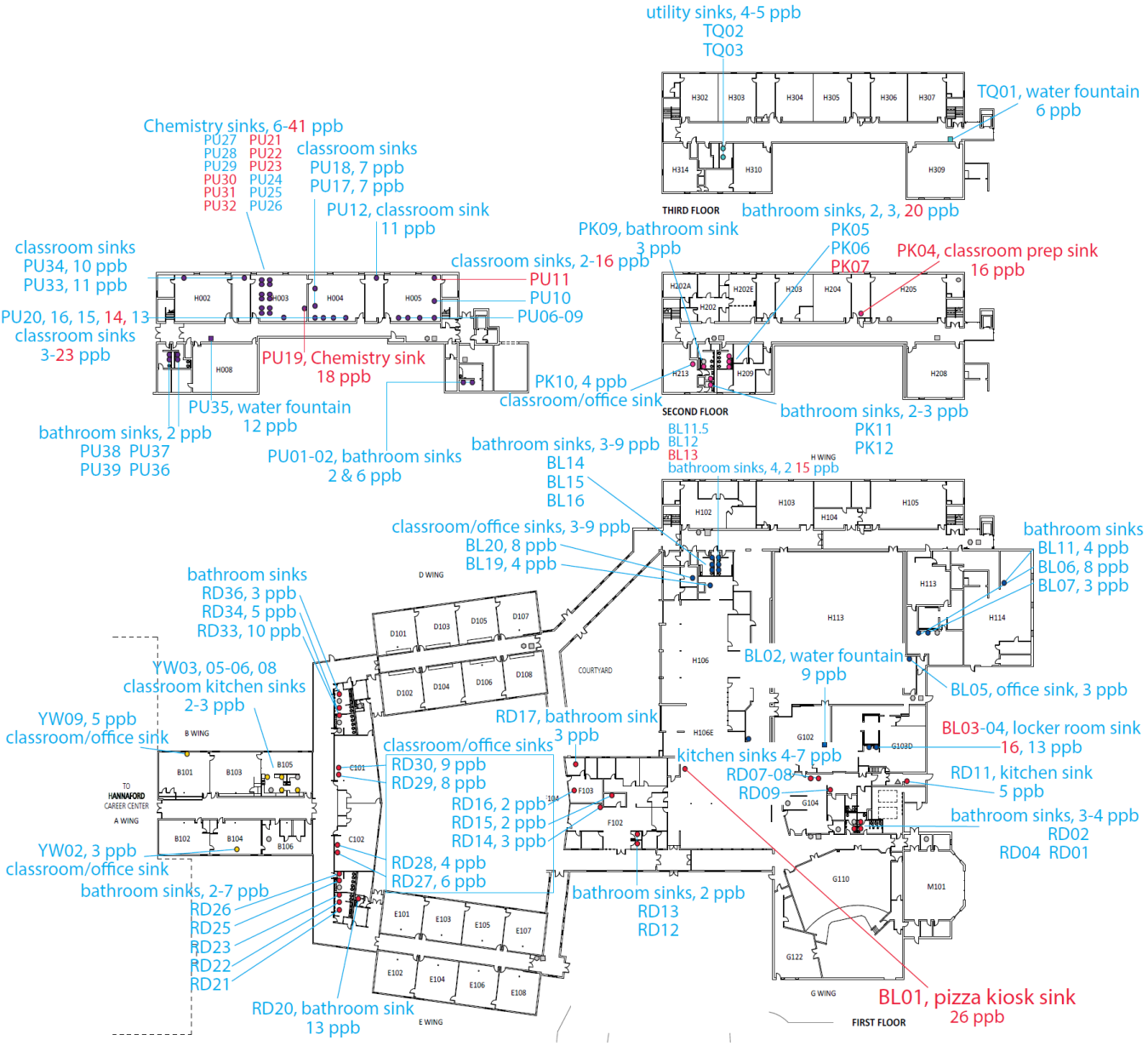

Figure 1. Floor plan showing locations of Middlebury Union High School outlets that met/exceeded the EPA action level or the American Academy of Pediatrics safety level (see also **Table 1**).