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Waterborne Dangers: A Review of Data Available From CDC Resources 1971–2010

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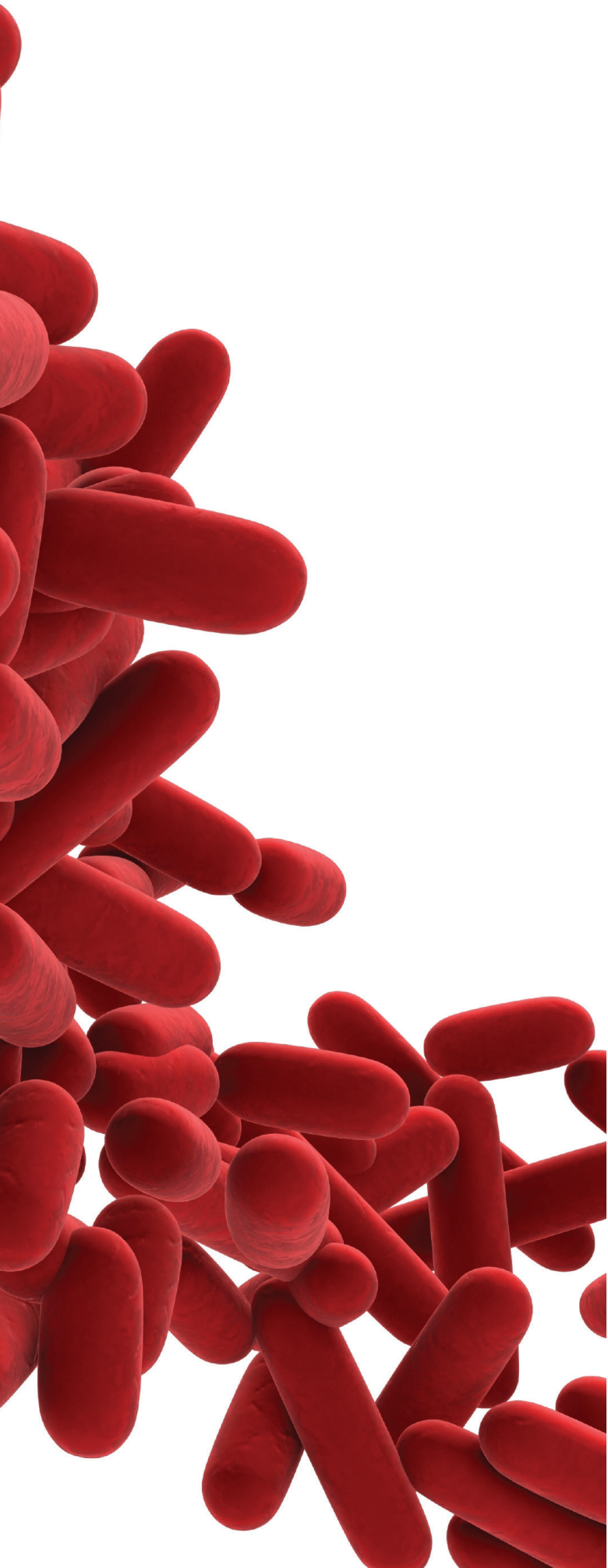
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Waterborne Dangers: A Review of Data Available From CDC Resources 1971–2010

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Recently, several opinion pieces and learned articles have been published concerning the dangers of waterborne diseases. Much of the speculation and opinions have been driven by ASHRAE's multiyear effort to promulgate ASHRAE Standard 188P, "Prevention of Legionellosis Associated with Building Water Systems" (the title as of the Third Public Review in January 2013). ASHRAE's efforts are undoubtedly spurred by the fact that *Legionella* spp. bacteria have been shown to amplify in premise plumbing conditions. This area is not covered under the jurisdiction of either local water system suppliers or EPA drinking water regulations. Rather, it is the responsibility of the individual property owner. (*Editor's Note: The fourth edition of ASHRAE Standard 188P has changed the name to Legionellosis: Risk Management for Building Water Systems, September 26, 2014.*)

With this in mind, let us examine the data available for waterborne dangers. The first place to start is the danger of water itself. MMWR 61(19):344-347, May 18, 2012 "Drowning – United States, 2005-2009" documents that, on average, there were 3,880 fatal drownings annually, accounting for the loss of 323 individuals per month. Of these, 513 per year (or 43 children per month, over one per day) are 0 to 4 years old.. Clearly, water itself is a very dangerous commodity.

Table 1: Recently Published Articles

1.	"Unreported and misunderstood Legionnaires' cases across the U. S. soar," Pittsburg Tribune-Review, March 32, 2013.
2.	"Through the <i>Legionella</i> Looking Glass – Part I" Healthy Indoors. 30–38, March 2014.
3.	"Through the <i>Legionella</i> Looking Glass – Part II" Healthy Indoors. 32–41, April 2014.
4.	"Bacteria and viruses commonly found in drinking water," Water Technology, July 31, 2014.
5.	"Waterborne disease surveillance data" Water Technology, May 15, 2014
6.	"Causes of Outbreaks Associated with Drinking Water in the United States from 1971 to 2006," <i>Clin. Microbiol. Rev.</i> 2010, 23(3):507.DOI: 10.1128/CMR.00077-99.

The data in reference 6 will be presented as a start to extending the data to 2010. The author has researched the primary sources of Surveillance Summaries for Waterborne-Diseases for the years 2001–2010. The total number of incidences (cases) and recorded deaths has been obtained from Summary of Notifiable Diseases covering the appropriate years.

Let us begin with definitions for waterborne-disease criteria.

Table 2: Timeline of WBD OSS Definitions and Inclusion Criteria for Drinking Water

1971–1972	WBD OSS initiated: “Outbreak” defined as “two or more cases epidemiologically linked to consumption of water from municipal, semipublic, or individual water systems”; “individual water system” defined as “wells or springs used exclusively by single residences in areas without municipal systems.”
1974	Inclusion of single cases of chemical poisoning when drinking water was demonstrated to be contaminated by a chemical.
1976	“Individual water systems” redefined as “wells or springs used by a single residence or several residences or by persons traveling outside populated areas.”
1979	“Drinking water systems” redefined as “community systems, noncommunity systems, and individual systems.”
1989–1990	“Total number of cases” redefined to exclude secondary cases.
1991–1992	Specific exclusion of outbreaks due to contamination of water or ice at point of use.
1995–1996	Estimated case count used instead of actual case count when the study population was randomly sampled or the estimated count was calculated using the attack rate.
1999–2000	Inclusion of outbreaks associated with occupational water; inclusion of water not intended for drinking and bottled water in individual water systems.
2001–2002	Inclusion of outbreaks of Legionnaires’ disease.
2003–2004	Introduction of expanded deficiency classifications that capture point-of-use outbreaks, except contamination of ice; removal of water not intended for drinking and bottled water outbreaks from individual water system classification; revision to definition of etiologic agent (multiple etiologies listed when each agent individually represents 5% of positive specimens); “unidentified” is now used instead of “AGI” to identify acute gastrointestinal illness of unknown etiology; illness types listed when 50% of patients reported a symptom in that category.
2005–2006	Deficiency classifications expanded to include a deficiency whereby current treatment is not expected to remove a chemical contaminant; single cases excluded from analyses of outbreaks.

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“Legionellosis outbreaks are considered in separate categories according to the types of water involved (i.e., drinking water, water not intended for drinking, and water of unknown intent).” Current authors’ note 1: These authors did not include outbreaks from recreational waters in this statement. “WBDOs associated with *Legionella* are analyzed separately because they were not reported to WBD OSS prior to 2001 and they share characteristics that are distinct from other types of outbreaks (e.g., *Legionella* colonization of premise plumbing systems or cooling towers and inhalation as the route of water exposure).”

Table 3: Etiology of Waterborne Outbreaks and Cases, 1971 to 2006
1971–2006 Inclusive = 36 years 2001–2006 Inclusive = 6 years

Etiologic Agent	Averages/Year					
	Drinking Water			All Water Types		
	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases
Non- <i>Legionella</i> bacteria	105 (13.5)	22,446 (3.9)	113 (13.6)	22,632 (3.9)	629	4.1
<i>Legionella</i> ^a	24 (3.1)	126 (0.0)	38 (4.6)	389 (0.1)	65	0.4
Chemicals	90 ^b (11.5)	3,901 (0.7)	90 (10.8)	3,901 (0.7)		
Parasites	143 (18.3)	449,959 ^c (78.0)	153 (18.4)	450,085 (77.9)		
Viruses	64 (8.2)	16,728 (2.9)	66 (7.9)	16,775 (2.9)		
Mixed ^d	6 (0.8)	1,755 (0.3)	7 (0.8)	1,757 (0.3)		
Undetermined	348 (44.6)	82,179 (14.2)	366 (43.9)	82,452 (14.3)		
Total	780 (100)	577,094 (100)	883 (100)	577,991 (100)		

^a Outbreaks associated with *Legionella* were reported only during 2001 to 2006.
^b Includes 15 events in which a single ill person was identified.
^c Includes 403,000 cases from a single cryptosporidiosis outbreak in Milwaukee, Wisconsin.
^d More than one infectious agent type (i.e., bacteria, chemicals, parasites, and viruses).

Table 4: Associated Deaths (Constructed)

Etiologic Agent	Deaths	% of Deaths
<i>Cryptosporidium hominis</i>	50	49
<i>Legionella</i> spp.	25	24.5
<i>Salmonella enterica</i> serovar Typhimurium	7	6.9
<i>Vibrio cholerae</i> 01	6	5.9
<i>Escherichia coli</i> O157:H7	2	2.0
<i>Shigella</i> spp.	2	2.0
Chemicals	6	5.9
<i>Naegleria fowleri</i>	2	2.0
Norovirus	1	1.0
Undetermined	1	1.0
Total	102	100

Current authors’ note 2: Therefore, CDC and any public water supplier have no control over amplification of premise plumbing. This is thought to account for 100% of the drive to promulgate ASHRAE Standard 188P.

“However, during 2001 to 2006, when legionellosis outbreaks were reported, 55 (65.5%) of the 84 drinking water outbreaks were associated with acute gastrointestinal illness and 24 (28.6%) legionellosis outbreaks with acute respiratory illness.”

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“The growth of *Legionella* in premise plumbing contributed to 24 (26.7%) of the 90 deficiencies reported in drinking water WBDOs during 2001 to 2006. Most legionellosis outbreaks associated with drinking water occurred in hospitals, health care facilities, and nursing homes ($n = 16$, 66.7%). Of these, 14 (87.5%) occurred in community water systems and two (12.5%) in non-community water systems. Four outbreaks (16.7%) occurred in hotels, motels, lodges, and inns; half of these were in community water systems and half in non-community water systems. Three (12.5%) outbreaks occurred in apartments and condominiums; all were associated with community water systems. The remaining legionellosis outbreak occurred in a gym with a community water supply.”

Table 5: Premise Plumbing Outbreaks

Locations	Number
Health Care	16
Hotels, Inns	4
Apartments	3
Gym	1

Note: There are no office buildings.

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“EPA recommendations for protecting private wells are available at <http://www.epa.gov/safewater/pwells1.html>. CDC information about private wells is available at <http://www.cdc.gov/healthywater/drinking/private/wells/index.html>.”

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“Outbreaks in Water of Unknown Intent

Six reported outbreaks and 36 cases involving water not intended for drinking were reported since 2003. No deaths were reported. Five (83.3%) of the outbreaks were associated with legionellosis; two occurred at hotels, one at a nursing home, one at a city garage, and one at an apartment building. One outbreak (16.7%) that occurred at a sports complex was associated with acute gastrointestinal illness caused by *E. coli* O157:H7.”

Table 6: Outbreaks in Water of Unknown Intent

Locations	Number
Hotels, Inns	2
Health Care	1
Apartments	1
City Garage	1

Note: There are no office buildings.

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“Locations of Outbreaks: Recreational and Residential Foci

The primary outbreak locations in non-community systems are different from those locations common among community and individual systems and suggest that both recreational areas and residential settings need increased attention to prevent waterborne disease. Nearly half of non-community outbreaks occurred in camps, cabins, or other recreational areas, underscoring the importance of regular monitoring and water testing in these types of settings, which tend to be seasonal and have intermittent water use. Other important locations for non-community outbreaks included restaurants and cafeterias; hotels; and educational settings, including schools, colleges, and universities.”

Note: There are no office buildings.

The current author has re-examined the data presented for “Waterborne Disease Outbreaks from 2001 to 2006” and expanded the search to 2010 with new information. References for each year are shown at the bottom of the Drinking Water table.

Table 7: Drinking Water 2001–2010

Etiologic agent	1-2	Cases	3-4	Cases	5-6	Cases	7-8	Cases	9-10	Cases
Bacteria other than <i>Legionella</i>										
<i>Campylobacter jejuni</i>	1	13	3	164	1	32	4	77	4	812
<i>Escherichia coli</i>	1	2					1	6	2	39 (1)
<i>Salmonella</i>			1	70			3	1307		
<i>Providencia</i>							1	55		
Pontiac fever	2	185								
Chemicals	5	39	8	27			1	145	1	3
Parasites										
<i>Giardia intestinalis</i>	3	18	1	11	1	41	2	81	2	14
<i>Cryptosporidium</i> species	1	10			1	10	1	82	1	34
<i>Naegleria fowleri</i>	1	2								
<i>Entamoeba Histolytica</i>										
Viruses										
Norovirus	5	727	1	70	2	196	4	265	1	47
Hepatitis A					1	16	1	9	1	2
Mixed	1	12	3	1589	2	199	2	270	2	17
Unknown	7	117	5	802	2	75	4	1756		
<i>Legionella</i> species	7	97	8	27	10	43	12	75	19	72
Healthcare related	4	32	5	12	9	39	9	18	7	27
Deaths				4		4		2		8
Totals	34	1,222	30	2,760	20	612	36	4,128	33	1,001

References for Table 7

- MMWR Surveillance Summaries, Vol.53/No.SS-8 October 23, 2004
Surveillance for Waterborne-Disease Outbreaks Associated with Recreational Water – United States, 2001–2002, pp. 1–22
Surveillance for Waterborne-Disease Outbreaks Associated with Drinking Water – United States, 2001–2002, pp. 23–46
a. *C. jeni* and *Yersinia enterocolitica* moved to mixed
b. Two outbreaks of pontiac fever transferred from *Legionella* to bacteria, 185 cases
- MMWR Surveillance Summaries, Vol.55/No.SS-12 December 22, 2006
Surveillance for Waterborne-Disease Outbreaks Associated with Recreational Water – United States, 2003–2004, pg 1–30
Surveillance for Waterborne-Disease Outbreaks Associated with Drinking Water – United States, 2003–2004, pp 31–66
CDC introduces a new category, “Water not intended for drinking.”
a. Adds 2 LD to 2002, 1, *E. coli*, and 1 parasite.
- MMWR Surveillance Summaries, Vol.57/No.SS-9 September 12, 2008
Surveillance for Waterborne-Disease Outbreaks Associated with Recreational Water – United States, 2005–2006, pp. 1–38
Surveillance for Waterborne-Disease Outbreaks Associated with Drinking Water – United States, 2005–2006, pp. 39–70
a. In 2005–2006 all recreational water *Legionella* outbreaks are associated with spas
- MMWR Surveillance Summaries, Vol.60/No.12 September 23, 2011
Surveillance for Waterborne-Disease Outbreaks Associated with Recreational Water – United States, 2007–2008, pp. 1–37
Surveillance for Waterborne-Disease Outbreaks Associated with Drinking Water – United States, 2007–2008, pp. 38–76
a. Table 7 of WDOADW, pp. 47–48 lists 69 outbreaks added to the databases from 1973–1998. None show an office building!
- MMWR divides drinking water and recreational water into two separate publications
MMWR, Vol. 62/No.35 September 6 2013, pp. 714–720, Drinking water and other non-recreational water 2009–2010
MMWR, Vol. 63/No. 1 January 10, 2014, pp. 6–10, Recreational water 2009–2010

Table 8: “Settings” Associated With Drinking Water Outbreaks

In order of Table 7	1-2	Cases	3-4	Cases	5-6	Cases	7-8	Cases	9-10	Cases
1 Hospital	1	4	3	7	8	2	6	7	11	2
2 Nursing Home	2	28	6 (2)	6	1 (4)	33	2	8	7	12
3 Hotel	3	20	7	2	9	4	1	25	3	28
4 Government Building	4	28	8 (1)	2	3	4	3	3	1	16
5 Automotive Plant	5	17	1	7			8 (1)	12	14	8
6 Condominium			2 (1)	3			14	19	15	3
7 Apartment									9	3
8 Senior Housing										
9 Long Term Care										
10 Restaurant										
11 Membership Club										
12 Community										
13 Vehicle Washing Station										
14 Assisted Living, Personal Care										
15 Prison, Jail										
16 Military Facility										
17 Factory										
18 Worksite										
Totals		97		27		43		74		72

Table 9: Water Not Intended for Drinking (Excluding Recreational Water)

Etiologic agent	1-2	Cases	3-4	Cases	5-6	Cases	7-8	Cases	9-10	Cases
Bacteria other than Legionella										
<i>Campylobacter jejuni</i>									2	14
<i>Enterocolitica</i>										
<i>Escherichia coli</i>			1	12	1	14				
<i>Salmonella</i>										
<i>Providencia</i>										
Chemicals										
Parasites										
<i>Giardia intestinalis</i>					2	9	1	13	2	46
<i>Cryptosporidium</i> species										
<i>Naegleria fowleri</i>										
Viruses										
Norovirus										
Hepatitis A										
Mixed										
Unknown							2	20	1	75
Legionella species			5	26	5	73	9	46	7	99
Healthcare related			3	11	3	52	4	10	4	22
Deaths				4		7		4		6
Totals										
“Settings” from Table 8			2 x CT	11	1x2CT	24	11	2	14	8
			18	13	2 x CT	28	1	2	9	6
			3	2	3	3	12 x 2CT	32	16 x CT	64
					10	18	8		3 x CT	9
							13	2	17	4
							2	2	1 Fountain	8
						14 x CT	4			

Table 10: Recreational Waters

Etiologic agent	1-2	Cases	3-4	Cases	5-6	Cases	7-8	Cases	9-10	Cases
Bacteria other than Legionella										
<i>Campylobacter jejuni</i>					1	6			1	6
<i>Pseudomonas aeruginosa</i>	18	393	8	274	4	28	4	52	4	50
<i>Escherichia coli</i>	4	78			3	10	3	45	4	31
<i>Shigella sonnei</i>	2	78	3	79	4	41	4	33	2	71
Bacillus species	1	20	4	18	2	46	1	2		
<i>Staphylococcus</i> species	1	3								
Pontiac fever	1	68								
Chemicals	4	102	3	25	2	22	9	747	4	38
Parasites										
<i>Giardia intestinalis</i>	1	2	2	158	1	11	3	19	1	7
<i>Cryptosporidium</i> species	11	1,474	11	1,206	31	3,751	60	12,154	27	422
<i>Naegleria fowleri</i>	8	8	1	1	1	2				
Avian schistosomes	1	19								
Schistosomes							4	300		
Viruses										
Echovirus 9			1	36						
Norovirus	5	146	5	300	4	86	5	121	1	69
Hepatitis A										
Mixed			2	128	1	55	2	73	1	45
Unknown	8	145	18	356	16	230	29	298	32	579
Legionella species			4	117	8	124	10	122	4	8
Healthcare related										
Deaths										
Totals	65	2,536	62	2,698	78	4,412	134	13,966	81	1,326
"Settings"			Spas	117	Spas	124				

Table 11: Combined All Types of Waters

Etiologic agent	1-2	Cases	3-4	Cases	5-6	Cases	7-8	Cases	9-10	Cases
Bacteria other than Legionella										
<i>Campylobacter jejuni</i>	1	13	3	164	2	38	4	77	7	832
<i>Shigella sonnei</i>	4	78	3	79	4	41	4	33	2	71
<i>Escherichia coli</i>	5	80			4	22	4	51	6	70
<i>Pseudomonas aeruginosa</i>	18	393	8	274	4	28	4	52	4	50
<i>Salmonella</i>			1	70			3	1,307		
Bacillus species inc. <i>providencia</i>	2	23	1	12			2	57		
Pontiac fever	2	185								
Chemicals	9	141	11	52	2	22	10	892	5	41
Parasites										
<i>Giardia intestinalis</i>	4	20	3	169	4	61	6	113	5	67
<i>Cryptosporidium</i> species	12	1484	11	1206	32	3761	61	12236	28	456
<i>Naegleria fowleri</i>	9	10	1	1	1	2				
Avian schistosomes	1	19								
Schistosomes										
Viruses										
Echovirus 9			1	36						
Norovirus	10	873	6	370	5	282	9	386	2	116
Hepatitis A					1	16	1	9	1	2
Mixed	1	12	5	1717	3	254	4	343	3	62
Unknown	15	262	23	1158	18	305	35	2074	33	654
Legionella species	7	97	17	170	23	238	31	419	30	179
Healthcare related	4	32	8	23	12	91	13	28	16	33
Deaths				8		11		6		14
Outbreaks other than <i>Legionella</i>	93	3,593	77	5,308	80	4,832	147	17,630	96	2,421
Totals	100	3,690	94	5,478	106	5,120	182	18,106	119	1,326

	Total	Percentage of Totals	No. Deaths	Healthcare	% of Legionella
Total <i>Legionella</i> Outbreaks	108	20.73	39	Outbreaks	53
Total <i>Legionella</i> Cases	1,103	3.16		Cases	207
Total Other Outbreaks	413	79.27		Deaths % of Cases	3.54
Total Other Cases	33,784	96.84			
Total Outbreaks	521				
Total Cases	34,887				

When the totals are taken as a whole, *Legionella* outbreaks represent 20.73% of all outbreaks. However, they represent only 3.16 % of the incidence! Of the *Legionella* outbreaks, 49.1% take place in healthcare facilities. The cases not related to healthcare facilities are 1103 – 207 = 896. Of the 896, 371 represent recreational waters, shown in Table 10; 896 – 371 = 525 cases exist in all the other *Legionella* outbreaks. This represents 525/10 years = 52 or 53 cases/year, on average. Again, none of these incidences (cases) represents values from an office building.

The final area that needs to be covered is the number of incidences and recorded deaths per year. Data for 1975 through 2011 is shown in Table 12, Legionellosis Reported in the United States and Recorded by CDC 1975–2011.

Table 12: Legionellosis Reported in the United States and Recorded by CDC 1975–2011

Year	Incidence	i/100,000 Calculated	i/100,000 Reference	Population US Census	Deaths Recorded	% of Incidences	Reference
1975				215,973,199			1
1976	235	0.108		218,035,164	34		1
1977	359	0.163		220,239,425			1
1978	761	0.342		222,584,545			1
1979	593	0.263		225,055,487			1
1980	457	0.201		227,224,681			1
1981	408	0.178		229,465,714			1
1982	654	0.282		231,664,485			2
1983	852	0.364		233,791,994			2
1984	750	0.318		235,824,902			2
1985	830	0.349		237,923,795			2
1986	960	0.400		240,132,887			2
1987	1,038	0.428		242,288,918			2
1988	1,085	0.444		244,498,892			2
1989	1,190	0.482		246,819,230			2
1990	1,370	0.549		249,438,712			3
1991	1,317	0.522		252,127,402			3
1992	1,339	0.525		254,994,517			3
1993	1,280	0.497		257,746,103			3
1994	1,615	0.620		260,289,237			3
1995	1,241	0.472	0.48	262,764,948			3-5
1996	1,198	0.452	0.47	265,189,794	88 ⁶	7.35	3-5
1997	1,163	0.434	0.44	267,743,595	110 ⁶	9.46	3-5
1998	1,355	0.501	0.51	270,298,524	94 ⁶	6.94	4-5
1999	1,118	0.410	0.41	272,690,813	78 ⁶	6.98	4-5
2000	1,185	0.420	0.42	282,171,957			4-5
2001	1,168	0.420	0.42	278,095,238			4-5
2002	1,321	0.470	0.47	281,063,830	62 ⁹	4.69	4-5
2003	2,232	0.780	0.78	286,153,846	98 ⁹	4.39	4-5
2004	2,093	0.710	0.71	294,788,732	72 ⁹	3.44	4-5
2005	2,301	0.780	0.78	295,000,000	78 ⁹	3.39	4-5
2006	2,834	0.960	0.96	295,208,333	91 ⁹	3.21	7-8
2007	2,716	0.910	0.91	298,461,538	67 ⁹	2.47	7-8
2008	3,181	1.050	1.05	302,952,381	92 ⁹	2.89	7-8
2009	3,522	1.153	1.16	305,529,237	104 ¹¹	2.95	7-8
2010	3,346	1.084	1.09	308,745,538	104 ¹²	3.11	7-8
2011	4,202	1.349		311,591,917			10
Average 2002–2010					85		
Total	53,269			Average 2002–2010		3.39	

References for: Table 12. Legionellosis Reported in the United States and Recorded by CDC 1975–2011. Population 1976–1998 www.npr.gov/facts/us_historical_pops.htm. 1999–2000 US Census Bureau. Historical Estimates. Private Communication. MMWR Summary of Notifiable Diseases 2005, Vol. 54/No. 53 March 30, 2007

- 1 Table 11, P. 81
- 2 Table 10, P. 80
- 3 Table 9, P. 79 Incidence
- 4 Table 8, P. 77 Incidence
- 5 Table 7, P. 75 i/100,000 MMWR Summary of Notifiable Diseases 2001, Vol. 50/No. 53 May 2, 2003
- 6 Table 12, P. 98 MMWR Summary of Notifiable Diseases 2010, Vol. 59/No. 53 June 1, 2012
- 7 Table 8, P. 96 Incidence
- 8 Table 7, P. 93 i/100,000
- 9 Table 12, P. 103 MMWR Summary of Notifiable Diseases 2011, Vol. 60/No. 53 July 5, 2013
- 10 Table 8, P. 100 Incidence
- 11 Table 12, P. 107
- 12 Hear-say, ACE14

Please note that the recorded incidences and deaths display significant variation from the estimated values published in the OSHA Technical Manual, published in January 1999. In Section III: Chapter 7, Legionnaires' Disease, Section II C, is perhaps the most quoted Legionellosis statistic in the literature: "Approximately 1,000 cases are reported annually to the CDC, but it is estimated that over 25,000 cases of the illness occur each year and cause more than 4,000 deaths." However, these estimates are based on an incorrect publication.

The only definitive study of Community-Acquired Pneumonia was conducted in 1991 by Barbara J. Marston, et. al. in Franklin and Summit Counties of Ohio. The final report was issued as "Incidence of Community-Acquired Pneumonia Requiring Hospitalization" *"Results of a Population-Based Active Surveillance study in Ohio"*, ARCH INTERN MED/ VOL 157, AUG 11/25, 1997, 1709–1718.

However, a "Preliminary Findings of a Community-Based Pneumonia Incidence" study was released by Marston in 1993. These "Preliminary Findings" were obtained by OSHA, and became the basis for its projections of the hazards of legionellosis in "OSHA Safety Hazard Information Bulletin on Legionnaires' Disease: Risk for Workers in the Plastic Injection Molding Industry," wherein the statement is made, "Although only about 700 cases of the disease are reported to CDC annually, the number of cases which are contracted in the community and which require hospitalization has been *conservatively* estimated by CDC at 11,000 cases per year in the US." This document was finalized and printed on December 9, 1998.

This same reference most assuredly forms the reference for the OSHA Technical Manual, published in January 1999. In Section III: Chapter 7, Legionnaires' Disease, Section II C, the quote of data numbers becomes "Approximately 1,000 cases are reported annually to the CDC, but it is estimated that over 25,000 cases of the illness occur each year and cause more than 4,000 deaths." These "estimates" published by OSHA are grossly overstated.

Information that CDC might consider adding to the "Surveillance of Waterborne-Disease Outbreaks" reports is the age of the incidence. The data available strongly shifts legionellosis susceptibility to ages greater than 60.

MMWR Vol. 60/No. 32, August 19 2011 Table 2 shows the demographic characteristics of legionellosis cases.

Table 13: Demographic Characteristics of Legionellosis Cases

Age group (years)	No.	(%)
≤ 9	79	0
10–19	125	1
20–29	516	2
30–39	1,473	7
40–49	3,622	16
50–59	5,401	24
60–69	4,658	21
70–79	3,672	16
≥ 80	2,834	13

TJC and ASHE have already adopted the ASHRAE drafts for Standard 188P, including the HASCP provisions. Hospitals and associated care facilities represent approximately 5,900 individual locations. These are now covered by TJC orders. There are 4.9+ million office buildings in the United States. Only one—a government building—has experienced in an outbreak, which occurred in 2001. There is one other famous case of a GSA building in the San Francisco bay area in 1998, wherein an outbreak occurred and the cases sued and won a very large settlement.

Other than these two cases, I see no justification for promulgating a "prevention standard" which when already applied to healthcare facilities and has not stopped outbreaks.

While there is evidence that Legionnaires' disease exists, and the microbe responsible for its propagation can colonize premise plumbing, there is no known level of colony-forming units per milliliter (CFUs) that definitely cause the disease. Therefore, as with healthcare facilities that house immune suppressed individuals, the only safe level must be set at "not detectable." The only way to prove this condition exists is to routinely test for *Legionella* spp. As CDC has stated all along, if you test, you will find it, and then what are you going to do?

The fact that TJC and ASHE have adopted the proposed "standard" without testing provisions, and that outbreaks continue to happen in healthcare facilities, is, in my opinion, primary evidence that the "standard" does not work to "prevent legionellosis." ☹️

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