

Table A1: Breakdown of Contaminants

Contaminant	Human	Zoonotic	Total
Allergens	9	0	9
Bacteria	60	31	91
Bacterial Spores	7	1	8
Dust	4	0	4
Fungal Spores	65	6	71
Yeast	1	0	1
Pollen	61	0	61
Viruses	36	46	82
Total	243	84	327

Appendix A: Human and Zoonotic Airborne Pathogens and Particulates			
Contaminant	Group	Size μm	H/Z
Absidia	Fungal Spore	3.536	Human
AC Fine Road Test Dust	Dust	0.97	Human
Acacia (wattle, mimosa)	Pollen	73	Human
Acer (maple, box elder)	Pollen	33	Human
Acinetobacter	Bacteria	1.225	Human
Acremonium	Fungal Spore	2.449	Human
Actinomyces bovis	Bacteria	0.5	Zoonotic
Actinomyces israelii	Bacteria	0.901	Human
Adenovirus	Virus	0.079	Human
Aerococcus viridans	Bacteria	1	Zoonotic
Aeromonas	Bacteria	2.098	Human
Alcaligenes	Bacteria	0.775	Human
Alnus (alder)	Pollen	25	Human
Alternaria alternata	Fungal Spore	11.225	Human
Amaranthaceae (pigweed, amaranth, cottonweed)	Pollen	30	Human
Ambrosia (ragweed)	Pollen	27	Human
Ambrosia artemisiifolia (Ragweed, common ragweed)	Pollen	27	Human
Ambrosia artemisiifolia (Short ragweed)	Pollen	20	Human
Ambrosia trifida (Giant ragweed, False ragweed)	Pollen	27	Human
Artemisia (sage, wormwood, mugwort)	Pollen	22	Human
Arterivirus	Virus	0.05	Zoonotic
Arthrimum phaeospermum	Fungal Spore	5	Human
Asbestos	Dust	3	Human
Aspergillus chevalieri	Fungal Spore	3.354	Human
Aspergillus clavatus	Fungal Spore	3.354	Human
Aspergillus flavus	Fungal Spore	3.354	Human
Aspergillus fumigatus	Fungal Spore	3.354	Human
Aspergillus niger	Fungal Spore	3.354	Human
Aspergillus ochraceus	Fungal Spore	3.354	Human
Aspergillus parasiticus	Fungal Spore	3.354	Human
Aspergillus ustus	Fungal Spore	3.354	Human
Aspergillus versicolor	Fungal Spore	3.354	Human
Asteracea (goldenrod, aster, cocklebur, etc.)	Pollen	24	Human
Aureobasidium pullulans	Fungal Spore	4.899	Human
Avian Adenovirus (FAV)	Virus	0.08	Zoonotic
Avian Encephalomyelitis Virus	Virus	0.023	Zoonotic
Avian Influenza A	Virus	0.098	Zoonotic
Avian Leukosis virus (RSA)	Virus	0.107	Zoonotic
Avian metapneumovirus	Virus	0.1	Zoonotic
Avian Sarcoma virus	Virus	0.098	Zoonotic
Bacillus anthracis	Bacterial spore	1.118	Human
Bacillus cereus	Bacterial spore	1.118	Human
Bacillus subtilis	Bacterial spore	1.12	Human
Bacteroides fragilis	Bacteria	3.162	Human
Betulaceae (birch, hazlenut, hop hornbeam)	Pollen	25	Human
Blastomyces dermatitidis	Fungal Spore	12.649	Human
Bordetella avium	Bacteria	0.7	Zoonotic
Bordetella bronchiseptica	Bacteria	0.707	Zoonotic
Bordetella pertussis	Bacteria	0.245	Human
Botrytis cinerea	Fungal spore	6.708	Human
Bovine Coronavirus (BCV)	Virus	0.113	Zoonotic
Brachyspira pilosicoli	Bacteria	0.5	Zoonotic
Brucella abortus	Bacteria	0.57	Zoonotic
Brucella canis	Bacteria	0.566	Zoonotic
Brucella maris	Bacteria	0.566	Zoonotic
Brucella melitensis	Bacteria	0.566	Zoonotic
Brucella neotomae	Bacteria	0.566	Zoonotic
Brucella ovis	Bacteria	0.566	Zoonotic
Brucella suis	Bacteria	0.57	Zoonotic

Appendix A: Human and Zoonotic Airborne Pathogens and Particulates

Contaminant	Group	Size μm	H/Z
Burkholderia cenocepacia	Bacteria	0.707	Human
Burkholderia mallei	Bacteria	0.674	Human
Burkholderia pseudomallei	Bacteria	0.494	Human
Calliandra (calliandra)	Pollen	73	Human
Campylobacter coli	Bacteria	2.12	Zoonotic
Campylobacter jejuni	Bacteria	2.12	Zoonotic
Canary Pox Virus	Virus	0.24	Zoonotic
Candida albicans	Bacteria	4.899	Human
Canine Adenovirus Type 1 (CAV-1)	Virus	0.093	Zoonotic
Canine Adenovirus Type 2 (CAV-2)	Virus	0.093	Zoonotic
Canine Calicivirus (CaCV)	Virus	0.034	Zoonotic
Canine Coronavirus	Virus	0.113	Zoonotic
Canine Distemper Virus (CDV)	Virus	0.15	Zoonotic
Canine Influenza H3N2	Virus	0.098	Zoonotic
Canine Influenza H3N8	Virus	0.098	Zoonotic
Canine Norovirus	Virus	0.035	Zoonotic
Canine Parvovirus 2	Virus	0.022	Zoonotic
Cannabinaceae (wax myrtle)	Pollen	20	Human
Cardiobacterium	Bacteria	0.612	Human
Carpinus (hornbeam)	Pollen	35	Human
Carya (hickory, pecan)	Pollen	26	Human
Cat dander	Allergen	0.4	Human
Chaetomium globosum	Fungal Spore	5.455	Human
Chenopodiaceae (goosefoot, saltbush, Russian pigweed)	Pollen	24	Human
Chikungunya virus	Virus	0.06	Human
Chlamydia pneumoniae	Bacteria	0.548	Human
Chlamydophila abortus	Bacteria	0.283	Zoonotic
Chlamydophila caviae (formerly C.psittaci)	Bacteria	0.283	Zoonotic
Chlamydophila felis	Bacteria	0.283	Zoonotic
Chlamydophila muridarum	Bacteria	0.283	Zoonotic
Chlamydophila pneumoniae	Bacteria	0.283	Zoonotic
Chrysanthemum (ox-eye)	Pollen	34	Human
Cladosporium sphaerospermum	Fungal Spore	8.062	Human
Clostridium botulinum	Bacterial Spore	1.975	Human
Clostridium difficile spores	Bacterial Spore	1.14	Human
Clostridium perfringens	Bacterial Spore	5	Human
Clostridium tetani	Bacterial Spore	5	Zoonotic
Coccidioides immitis	Bacterial Spore	3.464	Human
Cockroach allergens	Allergen	3	Human
Coronavirus	Virus	0.113	Human
Coronavirus (SARS)	Virus	0.11	Human
Corylus (hazel)	Pollen	22	Human
Corynebacterium diphtheriae	Bacteria	0.698	Human
Cowpox	Virus	0.173	Zoonotic
Coxiella burnetii	Bacteria	0.283	Human
Coxsackievirus	Virus	0.027	Human
Crimean-Congo hemorrhagic fever	Virus	0.09	Human
Cryptococcus farciminosus	Fungal Spore	4.9	Zoonotic
Cryptococcus neoformans	Fungal Spore	4.899	Human
Cryptomeria (evergreen, Japanese cedar)	Pollen	30	Human
Cryptosporidium parvum	Fungal Spore	3	Human
Cryptostroma corticale	Fungal Spore	3.742	Human
Cupressaceae (juniper family, cedar, conifers)	Pollen	27	Human
Cupressus arizonica (Arizona cypress)	Pollen	27	Human
Cupressus sempervirens (Italian cypress)	Pollen	25	Human
Curvularia lunata	Fungal Spore	11.619	Human
Cyperaceae (sedge family)	Pollen	37	Human
Dengue fever virus	Virus	0.045	Human
Dermatophilus congolensis	Fungal Spore	1	Zoonotic

Appendix A: Human and Zoonotic Airborne Pathogens and Particulates

Contaminant	Group	Size μm	H/Z
Desert ragweed	Pollen	27	Human
Dog dander	Allergen	0.4	Human
Drechslera	Fungal Spore	69.282	Human
Dust (I.e. flour, cement)	Dust	0.75	Human
Dust Mite (Dermatophagoides) Antigen Der fl	Allergen	1.1	Human
Dust Mite (Dermatophagoides) Antigen Der pl	Allergen	1.1	Human
Eastern Equine Encephalitis (EEE)	Virus	0.07	Human
Ebola	Virus	0.09	Human
Echovirus	Virus	0.024	Human
Elm	Pollen	28	Human
Emericella nidulans	Fungal Spore	3.24	Human
Enterobacter cloacae	Bacteria	1.414	Human
Enterococcus	Bacteria	1.414	Human
Enterococcus faecalis	Bacteria	0.707	Human
Enterococcus faecalis	Bacteria	1.414	Human
Epicoccum purpurascens	Bacteria	17.321	Human
Epidermophyton	Fungal Spore	8.5	Zoonotic
Equine Influenza	Virus	0.1	Zoonotic
Erysipelothrix spp.	Fungal Spore	1	Zoonotic
Escherichia coli O157:H7	Bacteria	0.5	Human
Eurotium chevalieri	Fungal Spore	5.612	Human
Exophiala	Fungal Spore	2.121	Human
Fagus (beech)	Pollen	41	Human
Feline Calicivirus (FeCV)	Virus	0.037	Zoonotic
Feline Distemper (Feline Parvovirus, FPV)	Virus	0.022	Zoonotic
Feline Herpesvirus T1 (Rhinotracheitis, FVR)	Virus	0.18	Zoonotic
Feline Infectious Peritonitis virus (FIP)	Virus	0.11	Zoonotic
Feline Influenza A (H7N2)	Virus	0.098	Zoonotic
Feline Panleukopenia (Picornavirus) (FPV)	Virus	0.037	Zoonotic
Fowlpox virus (Avian poxvirus)	Virus	0.24	Zoonotic
Francisella tularensis	Bacteria	0.2	Human
Fraxinus (ash, black ash, green ash)	Pollen	22	Human
Fugomyces cyanescens	Fungal Spore	2.12	Human
Fusarium graminearum	Fungal Spore	11.225	Human
Fusarium moniliforme	Fungal Spore	11.225	Human
Fusarium nivale	Fungal Spore	11.225	Human
Fusarium solani	Fungal Spore	11.225	Human
Fusarium sporotrichoides	Fungal Spore	11.225	Human
Giant ragweed	Pollen	27	Human
Goldenrod	Pollen	24	Human
Grass	Pollen	52	Human
Guineapig adenovirus	Virus	0.079	Zoonotic
Haemophilus influenzae	Bacteria	0.285	Human
Haemophilus parainfluenzae	Bacteria	1.732	Human
Hantavirus (Hantaan Virus)	Virus	0.095	Zoonotic
Hazelnut	Pollen	25	Human
Helicobacter pylori	Bacteria	2.1	Human
Helminthosporium	Fungal spore	11.577	Human
Hendra Virus	Virus	0.175	Zoonotic
Hepatitis A	Virus	0.03	Human
Hickory	Pollen	26	Human
Histoplasma capsulatum	Fungal Spore	2.236	Human
Histoplasma farciminosum	Fungal Spore	2.236	Zoonotic
HPV	Virus	0.06	Human
Infectious Bronchitis Virus (IBV)	Virus	0.113	Zoonotic
Infectious Laryngotracheitis (Psittacid herpes)	Virus	0.18	Zoonotic
Influenza A virus	Virus	0.098	Human
Influenza B	Virus	0.098	Human
Influenza C	Virus	0.098	Human

Appendix A: Human and Zoonotic Airborne Pathogens and Particulates

Contaminant	Group	Size μm	H/Z
Japanese cedar	Pollen	30	Human
Japanese encephalitis	Virus	0.045	Human
Juglans (walnut, butternut)	Pollen	26	Human
Junin virus	Virus	0.122	Human
Klebsiella pneumoniae	Bacteria	0.671	Human
Kocuria rhizophila	Bacteria	0.5	Human
Kyasanur Forest virus	Virus	0.045	Zoonotic
Lassa virus	Virus	0.122	Human
Latex	Allergen	2.5	Human
Legionella pneumophila	Bacteria	0.52	Human
Leptospira spp.	Bacteria	0.1	Zoonotic
Liquidambar (sweet gum, gum tree)	Pollen	6	Human
Listeria monocytogenes	Bacteria	0.707	Zoonotic
Louping III (LIV)	Virus	0.05	Zoonotic
Lymphocytic choriomeningitis (LCMV)	Virus	0.087	Zoonotic
Machupo	Virus	0.12	Human
Marburg virus	Virus	0.039	Human
Marek's Disease Virus (Herpesvirus)	Virus	0.18	Zoonotic
Measles virus	Virus	0.158	Human
Micromonospora faeni	Bacteria	0.866	Human
Microsporium spp.	Fungal spore	2.96	Zoonotic
Moraxella	Fungal Spore	1.225	Human
Morus (mulberry)	Pollen	17	Human
Mucor plumbeus	Fungal Spore	7.071	Human
Mugwort	Pollen	22	Human
Mulberry	Pollen	17	Human
Mumps virus	Virus	0.164	Human
Mycobacterium abscessus	Bacteria	0.69	Human
Mycobacterium avium	Bacteria	1.118	Human
Mycobacterium bovis	Bacteria	0.637	Zoonotic
Mycobacterium chelonae	Bacteria	0.64	Human
Mycobacterium chimaera	Bacteria	1.64	Human
Mycobacterium fortuitum	Bacteria	0.637	Human
Mycobacterium kansasii	Bacteria	0.637	Human
Mycobacterium marinum	Bacteria	0.637	Human
Mycobacterium tuberculosis	Bacteria	0.637	Human
Mycobacterium ulcerans	Bacteria	0.564	Human
Mycoplasma gallisepticum	Bacteria	0.177	Zoonotic
Mycoplasma hyopneumoniae	Bacteria	0.177	Zoonotic
Mycoplasma pneumoniae	Bacteria	0.177	Human
Mycoplasma synoviae	Bacteria	0.177	Zoonotic
Neisseria meningitidis	Bacteria	0.775	Human
Nettles	Pollen	13	Human
Newcastle Disease Virus (NDV)	Virus	0.212	Zoonotic
Nipah virus (Henipah virus)	Virus	0.175	Zoonotic
Nocardia asteroides	Bacteria	1.118	Human
Nocardia brasiliensis	Bacteria	1.414	Human
Norwalk virus	Virus	0.029	Human
Olea (olive)	Pollen	22	Human
Omsk hemorrhagic fever	Virus	0.043	Zoonotic
Orchard grass	Pollen	52	Human
Ornithobacterium rhinotracheale (ORT)	Bacteria	0.64	Zoonotic
Paecilomyces variotii	Fungal Spore	2.828	Human
Paper mulberry	Pollen	17	Human
Papilloma virus	Virus	0.055	Zoonotic
Paracoccidioides brasiliensis	Fungal Spore	4.472	Human
Parainfluenza virus	Virus	0.194	Human
Parietaria (pellitory)	Pollen	14	Human
Parvovirus B19	Virus	0.022	Human

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Contaminant	Group	Size μm	H/Z
Penicillium citrinum	Fungal Spore	3.262	Human
Penicillium crustosum	Fungal Spore	3.262	Human
Penicillium cyclopium	Fungal Spore	3.262	Human
Penicillium expansum	Fungal Spore	3.262	Human
Penicillium islandicum	Fungal Spore	3.262	Human
Penicillium purpurogenum	Fungal Spore	3.262	Human
Penicillium roquefortii	Fungal Spore	3.262	Human
Penicillium viridicatum	Fungal Spore	3.262	Human
Phialophora	Fungal Spore	1.47	Human
Phoma	Fungal Spore	3.162	Human
Pinaceae (pine family)	Pollen	117	Human
Pinus radiata D (New Zealand pine)	Pollen	71	Human
Plantago (English plantain)	Pollen	28	Human
Platanus (sycamore, plane tree)	Pollen	18	Human
Pneumocystis carinii	Fungal Spore	2	Human
Poaceae (grass family, Gramineae)	Pollen	52	Human
Pollen fragments	Pollen	5	Human
Polygonaceae (buckwheat, rumex, sorrel)	Pollen	32	Human
Polyomavirus	Virus	0.0424	Zoonotic
Populus (poplar, cottonwood, aspen)	Pollen	32	Human
Porcine Respiratory Coronavirus (PRCV)	Virus	0.14	Zoonotic
Proteus mirabilis	Bacteria	0.494	Human
Pseudallescheria boydii	Bacteria	3.162	Human
Pseudomonas aeruginosa	Bacteria	0.494	Human
Pseudomonas diminuta	Bacteria	0.494	Zoonotic
Pseudorabies (PRV)	Virus	0.194	Zoonotic
Psittacine Beak and Feather Disease (PBFD)	Virus	0.055	Zoonotic
Quercus (oak)	Pollen	27	Human
Rabies virus	Virus	0.07	Zoonotic
Reovirus	Virus	0.075	Human
Respiratory Syncytial Virus (RSV)	Virus	0.19	Human
Rhinovirus	Virus	0.023	Human
Rhizomucor pusillus	Fungal Spore	4.183	Human
Rhizopus	Fungal Spore	6.928	Human
Rhodoturula	Fungal Spore	13.856	Human
Rickettsia prowazeki	Bacteria	0.6	Human
Rickettsia rickettsii	Bacteria	0.6	Human
Rift Valley fever	Virus	0.0922	Human
Rotavirus	Virus	0.073	Human
Rubella virus	Virus	0.061	Human
Saccharomyces cerevisiae	Fungi	6	Human
Saccharopolyspora rectivirgula	Fungal Spore	1.342	Human
Salix (willow)	Pollen	25	Human
Salmonella enteritidis	Bacteria	0.81	Zoonotic
Salmonella typhi	Bacteria	0.806	Human
Scedosporium spores	Fungal Spore	3.162	Human
Scopulariopsis	Fungal Spore	5.916	Human
Serratia marcescens	Bacteria	0.632	Human
Shigella dysenteriae	Bacteria	0.801	Human
Shigella paradysenteriae	Bacteria	0.801	Human
Shigella sonnei	Bacteria	0.801	Human
Silkworm (Bombyx mori) fragments	Allergen	10	Human
Slender ragweed	Pollen	20	Human
Spider Mite allergens	Allergen	1.1	Human
Spirillus minus	Bacteria	1	Zoonotic
Sporothrix schenckii	Fungal Spore	6.325	Human
Stachybotrys chartarum	Fungal Spore	5.623	Human
Staphylococcus aureus (MRSA)	Bacteria	0.866	Human
Staphylococcus epidermis	Bacteria	0.866	Human

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Contaminant	Group	Size μm	H/Z
Storage Mite allergens	Allergen	1.1	Human
Streptobacillus moniliformis	Bacteria	0.707	Zoonotic
Streptococcus pneumoniae	Bacteria	0.707	Human
Streptococcus pyogenes	Bacteria	0.894	Human
Swine Influenza	Virus	0.1	Zoonotic
Taraxacum (dandelion)	Pollen	34	Human
Taxodium (Cypress)	Pollen	27	Human
Taxodium distichum (Bald cypress)	Pollen	27	Human
Thermoactinomyces sacchari	Bacteria	0.855	Human
Thermoactinomyces vulgaris	Bacteria	0.866	Human
Thermomonospora viridis	Bacteria	0.52	Human
Tilia (baswood, linden)	Pollen	31	Human
Tobacco smoke	Dust	0.025	Human
Trichoderma viridae	Fungal Spore	4.025	Human
Trichophyton	Fungal Spore	4.899	Human
Trichosporon	Fungal Spore	8.775	Human
Typha (cattail)	Pollen	23	Human
Ulmus (elm)	Pollen	28	Human
Ulocladium	Fungal Spore	14.142	Human
Urticaceae (nettle family, pellitory)	Pollen	13	Human
Ustilago	Fungal Spore	5.916	Human
Ustilago maydis (Corn smut)	Fungal Spore	5.916	Human
Vaccinia virus	Virus	0.224	Human
Varicella-zoster virus (VZV)	Virus	0.173	Human
Variola (Smallpox)	Virus	0.224	Human
Venezuelan Equine Encephalitis (VEE)	Virus	0.06	Human
Verticillium	Fungal Spore	4.796	Human
Vibrio cholerae	Bacteria	2.12	Human
Wallemia sebi	Fungal Spore	2.958	Human
Western Equine Encephalitis (WEE)	Virus	0.07	Human
Yersinia pestis	Bacteria	0.707	Human
Yersinia pseudotuberculosis	Bacteria	0.63	Zoonotic