

37
38 Common PVC additives include plasticizers such as phthalates, which are used to soften PVC, and
39 stabilizers such as lead, cadmium, and organotins.¹²⁻¹⁵ Manufacturing flexible PVC requires the use of
40 plasticizers, over 85 percent of which are phthalates.^{10, 19} Therefore, the use of phthalates in flexible PVC
41 products **cannot** be separated from the use of flexible PVC.²⁰ Testing has identified phthalates in air²¹⁻²³
42 and dust²⁴ of facilities using flexible PVC products. In recent studies by the CDC, phthalates have been
43 found in 97 percent of people tested in the U.S., including new born infants.^{25, 26} The highest levels were
44 in children ages 6 to 11, and in women of reproductive age.²⁵

45
46 **Phthalates and asthma.** A number of studies have found associations between phthalates emitted from
47 PVC consumer products and an increased risk of asthma and allergies, especially in children.²⁷⁻³³ APHA
48 Resolution #200012 has previously recognized that childhood asthma is an important predictor of asthma
49 over a lifetime and that children are known to be more exposed and susceptible to a number of
50 environmental factors known to be associated with asthma.”⁶ Phthalates may play such a role by
51 impacting asthma rates among vulnerable populations using facilities that have flexible PVC products.

52
53 **Phthalates and reproductive toxicity.** A number of papers have reviewed the adverse health effects
54 associated with exposure to phthalates.³⁴⁻³⁶ Numerous studies, including an expert panel of the U.S.
55 National Toxicology Program,³⁷ have found that phthalates are linked to a variety of reproductive
56 problems.^{23, 34, 38-41} Other adverse health effects include altered liver⁴² and kidney function,⁴³ and
57 respiratory problems in children.^{44, 45} The weight of the evidence is in favor of concern and preventive
58 action, but the data is still coming in and more studies are needed, especially in humans, to define the
59 range of these effects.

60
61 **Metal additives.** Metal additives are used in flexible PVC products to prevent degradation from heat
62 during processing and from exposure to ultraviolet light during the useful life of a product.^{12-15, 46} They
63 include lead, cadmium, zinc, and the organotins. These metals leach out of PVC products.⁴⁷⁻⁵⁴ Lead is a
64 known cause of neurodevelopmental problems.⁵⁵ Cadmium causes cancer and kidney damage.⁵⁶
65 Organotin stabilizers, which were introduced to replace lead and cadmium, also leach from PVC
66 products⁴⁸⁻⁵⁰ and can affect the central nervous system, skin, liver, immune system and reproductive
67 system.⁵⁷⁻⁶²

68
69 **Broad Concerns about PVC**

70 In addition to direct exposures that threaten children and other vulnerable populations, the public is also at
71 risk from exposure to toxic chemicals released by PVC during other periods of its lifecycle - during
72 production and disposal. PVC products are ranked among the most hazardous of plastic materials.²⁰ They
73 are made from vinyl chloride monomer at facilities that release vinyl chloride, ethylene chloride, and
74 dioxins, a highly toxic group of chemicals.^{10, 12-15} Vinyl chloride causes a rare form of liver cancer, and
75 damages the liver and central nervous system⁶³ and is considered a human carcinogen.^{64, 65}

76

77 **Environmental Justice.** The chemical plants where PVC is manufactured are often located in or near
78 low-income neighborhoods and communities of color. Mossville, LA is a historic African American
79 community surrounded by five PVC production plants, which release dioxins in their air emissions and
80 wastewater discharges.⁶⁶ Testing by the Agency for Toxic Substances and Disease Registry (ATSDR) in
81 Mossville found fish, vegetables, and fruit contaminated with dioxin.⁶⁷ Some Mossville residents had
82 more than three times the national average of dioxins in their blood.⁶⁸ Residents reportedly were two to
83 three times more likely to suffer a variety of adverse health problems including respiratory and nervous
84 system disorders.⁶⁹ The impact on the communities near facilities that produce PVC is a major
85 environmental justice concern.

86

87 **PVC Disposal.** When PVC materials are burned, the metals present as additives are released. In addition,
88 dioxins are formed.⁷⁰ APHA Resolution #9607 previously recognized that dioxins are formed by the
89 disposal of chlorinated compounds, such as PVC.⁵ One of the dioxins formed, TCDD, is a potent cancer-
90 causing agent classified as a human carcinogen.^{71, 72} TCDD and other dioxins cause adverse effects in the
91 reproductive, developmental, immune, and endocrine systems in both animals and humans.⁷³

92

93 APHA Resolution #9304 previously recognized that chlorine-containing compounds such as PVC “pose
94 public health risks involving the workplace, consumer products, and the general environment” and that
95 the elimination of these compounds from “certain manufacturing processes, products, and uses may be the
96 most cost-effective and health protective way to reduce health and environmental exposures to
97 chlorinated organic compounds.”² The International Joint Commission, a treaty body established by the
98 United States and Canada, similarly recommended that the governments, “...in consultation with industry
99 and other affected interests, develop timetables to sunset the use of chlorine and chlorine-containing
100 compounds as industrial feedstocks...”⁷⁴

101

102 **Alternatives to PVC**

103 Primary prevention of exposure to these toxic additives could be easily accomplished by replacing

104 flexible PVC with safer readily available products and materials. For example, vinyl flooring can be
105 replaced by linoleum; vinyl roofing by thermoplastic polyolefin (TPO); PVC medical tubing by materials
106 including silicone, polyurethane and rubber and vinyl IV bags by materials including nylon, ethylene
107 vinyl acetate, polyethylene, and other plastics.⁷⁵ Researchers at Tufts University found that the initial cost
108 of PVC flooring may be cheaper than other alternatives, but over the life of a product, PVC costs more
109 due to the increased cleaning costs needed to maintain the flooring. The total cost over 20 years was
110 estimated at \$1,048 for Armstrong solid vinyl flooring compared to \$805 for Armstrong linoleum.⁷⁵
111 Similarly, for a single ply commercial roofing system, the cost of PVC for a standard 45 mm roof
112 application was \$3.70 per square foot for materials and labor fully adhered compared to \$3.50/SF for
113 TPO.⁷⁵ These researchers found that alternatives providing equal or better performance are available for
114 almost every use of PVC; some are cost-competitive, while others cost slightly more.⁷⁵⁻⁷⁷ Furthermore,
115 replacing PVC with safer alternatives will likely not result in job loss according to one analysis.⁷⁷
116

117 The public health risks posed by PVC's additives during its lifecycle have been recognized by a growing
118 body of organizations. Major corporations in the electronics industry are phasing out PVC in favor of
119 readily available safer and cost-effective alternatives.⁷⁸ Hospitals and healthcare providers have pledged
120 to reduce or phase out PVC and/or DEHP.⁷⁹ Several governmental bodies around the U.S. and world have
121 enacted policies to reduce the purchase of products like PVC.⁷⁵ The U.S. Green Building Council's
122 LEED program provides incentives to avoid building materials such as PVC that release Persistent
123 Bioaccumulative Toxins (PBTs) and contain phthalates.^{80,81} In addition, PVC ranked low in several
124 studies of sustainability metrics including life cycle impacts and green design principles.^{82, 83}
125

126 While plastics including PVC may offer considerable benefits,⁸⁴ our current approaches to production, use
127 and disposal are not sustainable and present concerns for public health and the environment.⁸⁵ A
128 precautionary approach, such as described in APHA Resolution #200011⁷ and by the President's Cancer
129 Panel⁸⁶ can reduce exposures to this avoidable public health and environmental risk.

130
131 Further, removal of PVC products from schools would be a step in accomplishing APHA Resolution
132 #200010 which recognized that "every child and school employee should have a right to an
133 environmentally safe and healthy school," that parents and school staff have a right to know about
134 environmental health hazards and threats in the school environment, and that schools should follow
135 "pollution prevention principles for infrastructure siting, construction, maintenance, and other practices
136 that reduce or eliminate children's exposures that affect health, learning, or behavior."¹
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138 In light of the widespread hazards to children and other vulnerable populations due primarily to the
139 release of additives from flexible PVC products, as well as at every stage of its lifecycle, and PVC's
140 pervasiveness in schools, daycare centers, medical care facilities, nursing homes, public housing, facilities
141 for special needs and the disabled, and other facilities with vulnerable populations, **the American Public**
142 **Health Association hereby:**

- 143
144 1. Urges local, state and federal governments to educate administrators, purchasing staff,
145 employees, parents and care-givers about PVC hazards and safer alternatives in schools, daycare
146 centers, medical care facilities, nursing homes, public housing, facilities for special needs and the
147 disabled, and other facilities with vulnerable populations;
- 148 2. Urges state and federal governments to consider requiring labeling of PVC used in products, and
149 consider requiring product manufacturers that sell PVC products to schools, daycare centers,
150 medical care facilities, nursing homes, public housing, facilities for special needs and the
151 disabled, and other facilities with vulnerable populations to notify purchasers of the amount of
152 PVC and the specific chemical name of additives used in individual products. This information
153 should be made available online in a searchable database;
- 154 3. Urges state and federal governments to consider providing financial incentives for schools,
155 daycare centers, medical care facilities, nursing homes, public housing, facilities for special needs
156 and the disabled, and other facilities with vulnerable populations for the development, purchase
157 and use of safer alternatives to PVC in schools;
- 158 4. Urges local, state and federal governments and decision-makers to consider phasing out the use
159 and purchase of flexible PVC in building materials, consumer products and office suppliers in
160 schools, daycare centers, medical care facilities, nursing homes, public housing, facilities for
161 special needs and the disabled, and other facilities with vulnerable populations when cost-
162 effective alternatives are available;
- 163 5. Urges state and federal governments, in enacting such phase-outs, to consider policies that
164 alleviate short-term economic impacts on the PVC production workforce, and to also consider
165 economic benefits to workers in industries making safer alternatives; and
- 166 6. Urges the National Institute of Allergy and Infectious Diseases (NIAID) and other federal
167 agencies to research the link between asthma and other health impacts, and exposure to phthalates
168 and other additives released from PVC products.

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