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Routine Toxic Exposures in New Jersey

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Background Information on Toxic Exposures in New Jersey

In March, 2003, the N.J. Department of Environmental Protection (DEP) published the *Final Report of the New Jersey Comparative Risk Project*.[1] The project had spent four years studying environmental problems in New Jersey. The project steering committee was chaired by Daniel Rubenstein of Princeton University and by Sheryl Telford of E.I. du Pont de Nemours & Co.

The Final Report includes Appendix 4, a 369-page catalog of toxic exposures in New Jersey.[2] Here are excerpts from the DEP's Appendix 4 (all page numbers inside parentheses refer to this appendix):

FINE PARTICLES (SOOT)

"[We] estimate... approximately 500 to 1000 premature deaths per year in NJ due to PM 2.5 [fine particles]." (pg. 919)

"Groups most widely affected include young children, asthmatics, the elderly, smokers, and individuals with chronic lung or cardiovascular disease....” (pg. 923)

1,3 BUTADIENE

1,3 Butadiene -- a known human carcinogen -- the entire population of New Jersey is exposed at low levels, the DEP report says. (pg. 716) [Read the N.J. Department of Health fact sheet about 1,3-butadiene here.]

ACROLEIN

People in urban areas of N.J. are exposed to acrolein at levels as high as 20 times the EPA "safe" dose. Children exposed to acrolein may have increased respiratory illnesses, the DEP report says. (pg. 722) [Read the N.J. Department of Health Fact Sheet about acrolein here.]

BENZENE

Benzene is a known human carcinogen. Across N.J., exposures range from 1 to 342 times the one-on-a-million cancer danger level. (pg. 753)

CADMIUM

An estimated 80,000 citizens each year (1% of the state's population) may be developing "adverse health effects" from current exposures to the toxic metal cadmium, says the DEP report. (pg. 759)

DIOXINS

Dioxins arise from burning garbage, coal, and oil. Everyone in N.J. is considered to be exposed about equally to dioxins, and current exposures "may be in the range to observe health impacts," the DEP report says. Dioxins are known to degrade the human immune system, interfere with sexual development, and cause cancer. (pg. 789)

WATER DISINFECTANT BYPRODUCTS

Chlorinating drinking water in N.J. is thought to be causing 40 to 350 bladder cancers, 2 neural tube birth defects, and 200 miscarriages each year. Disinfection byproducts are also associated with colorectal, brain, and kidney cancers, DEP notes without providing a numerical estimate. (pg. 796)

ENDOCRINE-DISRUPTING CHEMICALS

"Individuals exposed during sensitive stages of development may experience permanent developmental deficits whose degree may range from mild to severe," says the DEP report. And: "Virtually everyone has been exposed to some degree."

"While recognition of the potential for ED effects is increasing, many substances with potential ED effects continue to be released into the environment and levels of population exposure may increase as background levels in the environment increase," says the DEP report. (pg. 806)

FORMALDEHYDE

"Formaldehyde is a pervasive pollutant, therefore all New Jersey citizens are exposed." And: "Formaldehyde affects lung function and raises the susceptibility toward infection.... Related to its effects on lung function, formaldehyde may be an important contributor to the onset of asthma," says the DEP report. (pg. 810)

Without providing a numerical estimate, DEP points out that formaldehyde is considered a probable human carcinogen. (pg. 810)

LEAD

The State of New Jersey collects, but does not publish, data on the number of children who have 5 micrograms of lead in each deciliter of blood, so the following data are national. It seems likely that New Jersey children might fare worse than the national average because of the age of New Jersey's urban housing stock.

26% of U.S. children ages 1-6 have blood lead greater than 5 micrograms/deciliter,[3] which is 300 times as high as the natural background level of lead in blood.[4]

In a study of 4,853 children, math and reading test scores declined with blood-lead levels as low as 2.5 micrograms/deciliter.[5]

19% of white children have blood lead greater than 5 micrograms/deciliter.[4]

28% of Hispanic children have blood lead greater than 5 micrograms/deciliter.[4]

47% of black children have blood lead greater than 5 micrograms/deciliter.[4]

Thus, roughly half of all African-American children have enough lead in their blood to reduce their math and reading scores.

Furthermore, "There are persuasive reasons to believe that cognitive dysfunction may not be the most important effect of lead, and that we may be entering a fifth stage of understanding of lead's effects, in which lead is recognized to adversely affect social behavior," meaning attention deficits, aggression, delinquency, and violent crime.[6]

MERCURY

An estimated 92% of N.J. children are exposed to methyl mercury in the womb, says the DEP report.

"For women of child bearing age/pregnant women in NJ, 10-21% are estimated to be exposed above the RfD [reference dose, set by federal EPA, also known as the 'safe' dose] intended to be protective against neurologic developmental effects of the fetus in utero." (pg. 867)

This means somewhere between 11,000 and 24,000 infants each year in N.J. are exposed to mercury at levels thought to harm their brain development.

MTBE (Methyl Tertiary Butyl Ether)

In an air monitoring program in Camden, MTBE was found in 29 out of 31 samples (94%) with a mean concentration of 1.29 ppb which is roughly twice (1.8 times) the EPA reference ('safe') concentration. (pg. 876)

NICKEL

"Because of the ubiquitous nature of nickel and its use in everyday household items and consumer products, the statewide population is exposed on a daily basis," says the DEP report. (pg. 883)

"Chronic (long-term) respiratory effects such as asthma and an increased risk of chronic respiratory tract infections in humans have been associated with exposure to nickel."

NITROGEN OXIDES (NOx)

"The total population of New Jersey is exposed to significant levels of NO2," says the DEP report. (pg. 896)

"Children are susceptible to NOx and its effects on immune systems. Asthmatics are also susceptible to low level exposures," says the DEP report. (pg. 897)

The federal standard for NO2 is an annual average of 0.053 ppm; NJ has its own standard -- an annual average of 0.05.

"...some individual studies suggest effects in children as low as 0.015 ppm [one-third of the allowable average in N.J.]. The most noticeable and reproduced impacts observed at low levels are the susceptibility to respiratory disease (such as cold and flu symptoms)." (pg. 897)

OZONE

"The entire population of the state has been potentially exposed to ozone concentrations above the 8-hour standard." (pg. 898)

"Children are most at risk from exposure to ozone because they are active outside, playing and exercising, during the summertime when ozone levels are at their highest."

"Exposure to ozone can also increase susceptibility to respiratory infections."

"Thousands of studies of ozone exposure indicate that there is no minimum threshold for triggering respiratory responses and a significant proportion of hospital visits can be associated with exposure to elevated ozone levels."

PESTICIDES IN FOOD (pg. 926)

"There are no crops grown or food consumed that can be guaranteed completely pesticide free..."

"There are no current NJ data available that can be used for quantification of actual exposure to pesticide residues from food grown in NJ."

"It is difficult to actually quantify the exposure level to the over 300 different pesticides used on foods.... The conclusion is that while there is much data available, there are great gaps in what is required before a valid assessment can be performed on the impacts from the presence of the myriad of pesticides."

"Infants and children have higher susceptibility to pesticide residues due to their stage of immature development and their increase in risk from pesticide exposure. Exposure to even trace levels of POPs [persistent organic pollutants] at crucial times in fetal or infant development can disrupt or damage human hormone, reproductive, neurological, or immune systems."

"Of 316 pesticides with food tolerances [numerical limits on allowable residues on foods], only 163 (52%) of them are routinely analyzed under FDA's [regulatory program]. Pesticide metabolites and breakdown products, significant or toxic inert ingredients need to be analyzed but we do not have estimates of these. No risk estimates can be done because this basic data are [sic] not available."

"All New Jersey citizens are exposed to pesticides in the food that they eat. Monitoring of food products shows that 40% of grain samples, 55% of fruits and 30% of vegetables test positive for at least some level of pesticide residues. In a few cases, these detections show concentrations of pesticides over established safety limits. There is evidence that children are more susceptible to pesticide toxicity because of rapid growth during development and the higher body burden that results when children intake levels are similar to adults."

PESTICIDES INDOORS (pg. 936)

"[In a 1986-1988 EPA study of 32 pesticides]... Thirty commonly used household pesticides were found in house dust and yard soil.... Residues of many pesticides were found in and around the home even when there was no known use of them on the premises."

"EPA among others has serious concerns about the chronic impacts of low doses especially on the endocrine system and reproduction, the neurological and immune systems, cognitive and behavioral systems such as learning, and memory."

PESTICIDES OUTDOORS (pg. 946)

Total annual outdoor pesticide use in N.J.: 2,365,845 pounds (or 5 ounces for every resident of the state)

"There are more than 600 pesticides in use in New Jersey... They are designed to be toxic to target species, and in most cases create risk to humans as well," says the DEP report.

PCBs (polychlorinated biphenyls)

"As many as 2000 to 2500 cases of cancer per year may be attributable to PCBs in New Jersey. This is approximately one-third to one-half of the total incidence of breast, pancreatic and non-Hodgkins lymphatic malignancies in the state. There are however significant uncertainties in these estimates. There is also evidence that pre- and post-natal exposures to PCBs may have adverse effects on neurological development." (pg. 974)

PAHs (polycyclic aromatic hydrocarbons)

"All New Jersey residents have been and will continue to be exposed to PAHs, however, the degree of exposure from these sources can vary greatly from region to region, with higher levels in urban areas... Children and adolescents may be at increased risk due to higher rates of metabolism." (pg. 988)

"There are insufficient exposure data available to quantify the number of illnesses in New Jersey."

RADIUM IN WATER (pg. 1005)

"Bone sarcoma [cancer] increases have been reported in relationship to radium in drinking water in studies in Canada, Illinois, and Iowa. Because of these findings, and unknowns regarding actual tap water concentrations in many well water sites, elevated radium in some New Jersey drinking water sources is rated as an important health/public health issue for the state."

"Radium passes through mother's milk to the feeding infant; it also crosses the placenta during pregnancy, and is retained in fetal bones."

"Radium content of fish and game could be important in some populations with high consumption."

"In some areas of the state more than 50% of drinking water wells exceed health based standards."

RADON IN AIR (pg. 1017)

"The total number of lung cancers resulting from radon exposure may be as high as 1700 per year."

SECOND-HAND TOBACCO SMOKE (STS) (pg. 1024)

Health effects in N.J. attributable to STS exposures:

Otitis media (middle ear infections): 14,000-32,000 cases/yr

Asthma exacerbation: 8,000-20,000 cases/yr

Bronchitis and pneumonia: 3,000-6,000 cases/yr

New asthma cases: 160-520 cases/yr

Ischemic heart disease: 700-1240 deaths/yr

Low birth weight: 194-372 cases/yr

Lung cancer: 60-80 deaths/yr

Sudden infant death syndrome (SIDS): 38-54 deaths/yr

Lower Respiratory Tract Illness (LRI) in children up to 18 months: 2-4 deaths/yr

CONCLUSION

It seems clear from this very limited DEP catalog of routine toxic exposures in New Jersey that substantial numbers of innocent people are being killed each year, and many more are being made sick, especially children.

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[1] http://www.state.nj.us/dep/dsr/njcrp/

[2] http://www.state.nj.us/dep/dsr/njcrp/Appendix4.pdf

[3] Susan M. Bernard and others, "Prevalence of Blood Lead Levels >= 5 ug/deciliter Among US Children 1 to 5 Years of Age and Socioeconomic and Demographic Factors Associated with Blood lead Levels 5 to 10 ug/deciliter, Third National health and Nutrition Examination Survey, 1988-1994," *Pediatrics* Vol. 112, No. 6 (Dec., 2003), pgs. 1308-1313.

[4] A. Russell Flegal and Donald R. Smith, "Lead Levels in Preindustrial Humans," *New England Journal of Medicine* Vol. 326 (May 7, 1992), pgs. 1293-1294.

[5] Bruce Lanphear and others, "Cognitive Deficits Associated with Blood Lead Concentrations less than 10 micrograms/deciliter in US Children and Adolescents," *Public Health Reports* Vol. 115 (Nov./Dec., 2000), pgs. 521-529.

[6] Herbert Needleman, "Lead Poisoning," *Annual Reviews of Medicine* Vol. 55 (2004), pgs. 209-222.