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Table 2
Summary of Environmental and Occupational Links with Cancer

Category	Carcinogenic Agent	Source/Uses	Strong*	Suspected**
Aromatic Amines	Benzidine, 2-naphylamine, 4,4'-methylenebis 2-choloraniline (MOCA), chlornaphazine heterocyclic aromatic amines	Used as antioxidants in the production of rubber and cutting oils, as intermediates in azo dye manufacturing, and as pesticides. Common contaminant in chemical and mechanic industries and aluminum transformation and an air contaminant from tobacco smoking. Used widely in the textile industry and as hair dyes.	Bladder (Benzidine, 2-naphylamine, 4,4'-methylenebis 2-choloraniline (MOCA), chlornaphazine)	Prostate (heterocyclic aromatic amines)
Chlorination Byproducts	Trihalomethanes	Trihalomethanes include chloroform, bromodichloromethane, chlorodibromomethane, and bromoform. Result from the interaction of chlorine with organic chemicals. Several halogenated compounds may form from these reactions although trihalomethanes are the most common. Brominated by-products are also formed from the reaction of chlorinated by-products with low levels of bromide in drinking water.		Bladder; Rectal
Environmental Tobacco Smoke	Contains more than 50 known carcinogens	Environmental tobacco smoke (ETS), also known as passive smoke, is a combination of smoke emitted from the burning end of a cigarette, cigar, or pipe, and smoke exhaled by the smoker	Lung; Breast	
Metals	Arsenic	Is produced commercially as a by-product of nonferrous metal production, primarily from copper production, comprising greater than	Bladder; Lung; Skin; Soft tissue sarcoma	Brain/CN S; Kidney; Liver &

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		10% of dust content in some smelter operations. Inorganic arsenic is primarily used to preserve wood, but is also used as a pesticide mainly on cotton plants.	(angiosarcoma of the liver)	Biliary; Prostate; Soft tissue sarcoma
	Beryllium	Used in the nuclear, aircraft and medical devices industry. Used also as an alloy or in specialty ceramics for electrical and electronic applications. Found as a contaminant in the combustion of coal and fuel oil.	Lung	
	Cadmium	Occurs naturally in ores together with zinc, lead and copper. Used as stabilizers in PVC products, color pigment, several alloys and now most commonly in re-chargeable nickel-cadmium batteries. Also present as a pollutant in phosphate fertilizers.	Lung	Pancreatic; Kidney; Prostate
	Chromium	Chromium is used in steel and other alloy production. Chromium III and Chromium VI are used in chrome plating, the manufacture of dyes and pigments, leather tanning and wood preserving.	Lung; Nasal and Nasopharynx	
	Lead	Used primarily in the production of batteries, ammunition, metal products such as solder and pipes and devices to shield X-rays. Lead is also found in gasoline, paints, ceramic products, caulking, and pipe solder, but has been reduced dramatically in the US.		Brain/CNS; Lead; Kidney; Stomach
	Mercury	Used to produce chlorine gas and caustic soda, and is also used in thermometers, dental fillings, and batteries. Mercury salts are sometimes used in skin lightening creams and as antiseptic creams and ointments. Elemental mercury is transformed to		Brain/CNS

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		methylmercury by microorganisms in water and soil.		
	Nickel	Used primarily as an alloy in stainless steel. Also used in nickel plating and battery production.	Lung; Nasal and Nasopharynx	Laryngeal; ; Pancreatic; Stomach
Metalworking Fluids &/or Mineral Oils	Straight oils, soluble oils, synthetic and semi-synthetic fluids	Used in a variety of industries including metal machining, print press operating and cotton and jute spinning.	Bladder; Laryngeal; Lung Nasal and Nasopharynx (mineral oils); Rectal; Skin; Stomach;	Esophageal; Pancreatic; Prostate
Natural Fibers/Dust	Asbestos	An inorganic naturally occurring fibrous silicate particle used primarily in acoustical and thermal insulation. Asbestos fibers can be divided into two groups: chrysotile (most widely used) and amphibole which include amosite, crocidolite, anthophyllite, actinolite and tremolite fibers.	Laryngeal; Lung; Mesothelioma;	
	Silica	An inorganic particle used in foundries, brick-making and sandblasting.	Lung	
	Talc containing asbestiform fibers	A mineral used in the manufacture of pottery, paper, paint and cosmetics	Lung	
	Wood dust	Used primarily in carpentry, joinery and in furniture and cabinetry making	Lung; Nasal and Nasopharynx	Laryngeal

Category	Carcinogenic Agent	Source/Uses	Strong*	Suspected**
Pesticides	Herbicides, Fungicides & Insecticides [For specific pesticides, see Section 1 of this paper and Clapp et al 2005 (Reference #1 in citation list)]	Used for preventing, destroying, repelling or mitigating any pest or in use as a plant regulator, defoliant or desiccant. The majority of pesticides as registered with the U.S. EPA are used in agricultural applications, although residential application is also an important source.		Brain/CNS; Breast; Colon; Hogkin's; Leukemia; Lung; Multiple Myeloma; NHL; Ovarian; Pancreatic; Kidney; Soft tissue sarcoma; Stomach; Testicular
Petrochemicals and Combustion By-Products	Petroleum products, motor vehicle exhaust (including diesel), polycyclic aromatic hydrocarbons (PAHs), soot, and dioxins	Petrochemicals are derived from natural gas or petroleum and used to produce a variety of other chemicals and materials including pesticides, plastics, medicines and dyes. Substances can be produced as the building blocks for other products, but mainly result from the incomplete combustion of burning coal, oil, gas (diesel exhaust), household waste, tobacco and other organic substances. Dioxins are a class of chemical that are the by-products of combustion processes containing chlorine and carbon-based chemicals such as polyvinyl chloride (PVC) plastics. Dioxins are also created during the chlorine-bleaching processes for whitening paper and wood pulp.	Lung (PAHs, air pollution including diesel exhaust, soot, dioxin); NHL (dioxin); Soft tissue sarcoma (dioxin); Skin (PAHs)	Bladder (PAHs); Breast (dioxin); Esophageal (soot); laryngeal (PAHs); Multiple Myeloma (dioxin); Prostate (dioxin & PAHs)
Radiation	Ionizing radiation	Any one of several types of particles and rays given off by radioactive material, high-voltage equipment, nuclear reactions and stars. Alpha and	Bone; Brain & Central Nervous System;	Bladder; Colon; Nasal & nasopharynx

Category	Carcinogenic Agent	Source/Uses	Strong*	Suspected**
		beta particles, X-rays and gamma rays are radiation particles of concern to human health.	Breast; Leukemia; Liver & Biliary; Lung; Multiple Myeloma; Soft tissue sarcoma; Skin; Thyroid	ynx; Ovarian; Stomach
	Non-ionizing	Comprised of microwaves and electromagnetic frequencies including radio waves and extremely low-frequency electromagnetic fields.		Brain; Breast; Leukemia
	Ultraviolet radiation	Ultraviolet radiation is part of the solar radiation emitted by the sun.	Skin	
Reactive Chemicals	Butadiene	Used in the production of polymers for the manufacture of styrene-butadiene rubber for tires, nitrile rubber for hoses, gaskets, adhesives and footwear; acrylonitrile-butadiene-styrene polymers for parts, pipes, and various appliances; and styrene-butadiene latexes for paints and carpet backing.		Leukemia
	Ethylene oxide	Used as a sterilant, disinfectant and pesticide. It is also used as a raw ingredient in making resins, films and antifreeze.	Leukemia	Breast
	Formaldehyde	Used primarily in the production of urea, phenol or melamine resins for molded products such as appliances, electric controls, and telephones; in particle-board, plywood and in surface coatings.		Nasal and Nasopharynx
	Mustard Gas	Produced and used primarily in World	Lung	Laryngeal

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		War I as a chemical warfare agent.		
	Vinyl Chloride	Vinyl chloride is used in polyvinyl resins for the production of plastic pipes, floor coverings, and in electrical and transportation applications.	Liver & Biliary; Soft tissue sarcoma (angiosarcoma of the liver)	
	Sulfuric Acid	Used widely in industry for the production of isopropanol, ethanol; treatment of metals; and the manufacture of soaps, detergents and batteries.	Laryngeal	Lung
Solvents	Benzene	Used as an intermediate in the production of plastics, resins and some synthetic and nylon fibers. Also used to make some types of rubbers, lubricants, dyes, detergents, drugs and pesticides. Is also found in crude oil, gasoline and cigarette smoke.	Leukemia; NHL	Brain/CNS; Lung; Nasal & nasopharynx; Multiple Myeloma
	Carbon Tetrachloride	Used primarily in various industrial applications. Before being banned, was also used in the production of refrigeration fluid and propellants for aerosol cans, as a pesticide, as a cleaning fluid and degreasing agent, in fire extinguishers, and in spot removers.		Leukemia
	Methylene Chloride	Used primarily as a solvent in industrial applications and as a paint strippers. It may also be found in some aerosol and pesticide products and in the production of photographic film.		Brain/CNS; Liver & Biliary
	Styrene	Used in the production of rubber, plastic, insulation, fiberglass, pipes, automobile parts, food containers and carpet backing.		NHL

Category	Carcinogenic Agent	Source/Uses	Strong*	Suspected**
	Toluene	Used in the production of paints, paint thinners, fingernail polish, lacquers, adhesives and rubber. Also used in some printing and leather tanning processes.		Brain/CNS; Lung; Rectal
	Trichloroethylene (TCE)	Used mainly for degreasing metal parts. Previously used as a dry cleaning agent. TCE may be found in printing inks, varnishes, adhesives, paints and lacquers. Important contaminant in the general environment as a result of emissions & leakage from industrial settings.	Liver & Biliary; Kidney	Cervical; Hodgkin's; Leukemia; NHL; Kidney
	Tetrachloroethylene (PCE)	Used to degrease metal parts and as a solvent in a variety of industrial applications. Since 1930s used by an increasingly large percentage of U.S. dry-cleaning operations.		Bladder; Cervical; Esophageal; NHL; Kidney
	Xylene(s)	Used as a cleaning agent, a thinner for paint and in paint and varnishes. Used in printing rubber and leather industries and found in small amounts in gasoline and airplane fuel.		Brain/CNS; Rectal
Other	Creosotes	Includes coal tar and coal tar pitch formed by high-temperature treatment of wood, coal or from the resin of the creosote bush. Wood creosote was historically used as a disinfectant, laxative and cough treatment. Coal tar products are used in medicine, animal and bird repellents and pesticides. Coal tar creosote is widely used as a wood preservative. Coal tar, coal tar pitch and coal tar pitch volatiles are used in roofing, road paving, aluminum smelting and coking.	Bladder (coal tars); Lung; Skin	
	Endocrine	A number of chemicals capable of	Breast	Breast;

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	Disruptors	mimicking the body's natural hormones. See: http://www.ourstolenfuture.org/Basics/chemlist.htm	(DES); Cervical (DES)	Prostate; Testicular
	Hair dyes	Coloring products used on hair. Hair dyes usually fall into 1 of four categories: temporary, semi-permanent, demi and permanent. Chemical agents used in dyes are specific to the color and the degree of permanency.		Bladder; Brain/CNS; Leukemia; Multiple Myeloma; NHL
	Nitrosamines & N-nitroso compounds	A class of chemicals that forms as a result when amines and nitrosating agents chemically react. Are found in the rubber, metal and agricultural industries, and in cosmetics and foods such as fried bacon and cured meats.		Brain/CNS
	Polychlorinated Biphenyls (PCBs)	Used as coolants and lubricants in transformers, capacitors and other electrical equipment. PCBs were banned in the US in 1977.	Liver & Biliary	Breast; NHL

*Strong causal evidence of a causal link is based primarily on a Group 1 designation by the International Agency for Research on Cancer.

**Suspected evidence of a causal link is based on our assessment that results of epidemiologic studies is mixed, yet positive findings from well-designed and conducted studies warrant precautionary action and additional scientific investigation.