

**Summary of RG1<sup>1</sup>, RG2<sup>2</sup> and NTP Board Subcommittee<sup>3</sup> Recommendations  
for Nominations Reviewed for Listing in the  
Report on Carcinogens<sup>4</sup>, 11th Edition**

NOMINATION/ CAS NUMBER	PRIMARY USES OR EXPOSURES	RG1 ACTION	RG2 ACTION	NTP BOARD SUBCOMMITTEE ACTION
<b>1-Amino-2,4-dibromanthraquinone /</b> (81-49-2)	An anthraquinone-derived vat dye used in the textile industry.	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (8/0).	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (8/0).	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (9/0).
<b>Cobalt Sulfate /</b> (10026-2401)	Used in electroplating and electrochemical industries. Also used as a coloring agent for ceramics, a drying agent in inks, paints and linoleum, and has been added to animal feed as a mineral supplement.	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (9/0)	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by a vote of 8 yes to 1 no. Negative vote because member felt exposure data in background document needed to be more specific for cobalt sulfate.	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by a vote of 8 yes to 1 no. Negative vote cast because member felt human data not specific for cobalt sulfate.
<b>Diazoaminobenzene (DAAB)/</b> 136-35-6	Used as an intermediate in the production of dyes and to promote adhesion of natural rubber to steel.	Motion to list as <i>reasonably anticipated to be a human carcinogen</i> passed by unanimous vote (5/0).	Motion to list as <i>reasonably anticipated to be a human carcinogen</i> passed by majority vote (8/1). Negative vote cast because member felt there was not sufficient evidence for DAAB to list in the Report on Carcinogens.	Motion to list as <i>reasonably anticipated to be a human carcinogen</i> passed by majority vote (6/4) with 1 abstention. Negative votes: 3 members felt nomination did not meet criteria for listing and 1 member felt that because DAAB is metabolized to benzene, it should be listed as <i>known to be a human carcinogen</i> . Abstention – member felt if DAAB is metabolized to benzene, it should be listed as <i>known to be a human carcinogen</i> ; however, not convinced is metabolized to benzene in humans.

NOMINATION/ CAS NUMBER	PRIMARY USES OR EXPOSURES	RG1 ACTION	RG2 ACTION	NTP BOARD SUBCOMMITTEE ACTION
<b>Diethanolamine (DEA) /</b> (111-42-2)	Used in the preparation of surfactants used in liquid laundry, dishwashing detergents, cosmetics, shampoos, and hair conditioners; as a surface-active agent and corrosion inhibitor in metalworking fluids and as a dispersant in agricultural chemical formulations.	Motion <u>not</u> to list in the RoC passed by a vote of 7 yes to 2 no. Negative votes cast because members felt data sufficient to list as <i>reasonably anticipated to be a human carcinogen</i> .	Motion <u>not</u> to list in the RoC passed by unanimous vote (9/0)	Motion <u>not</u> to list in the RoC passed by a vote of 8 yes to 1 no. Negative vote cast because member felt data sufficient to list as <i>reasonably anticipated to be a human carcinogen</i> .
<b>Hepatitis B Virus (HBV)</b>	HBV is a small DNA-enveloped virus that along with Hepatitis C Virus causes most parenterally transmitted viral hepatitis.	Motion to list as <i>known to be a human carcinogen</i> passed by unanimous vote (4/0).	Motion to list as <i>known to be a human carcinogen</i> passed by unanimous vote (8/0).	Motion to list as <i>known to be a human carcinogen</i> passed by unanimous vote (12/0).
<b>Hepatitis C Virus (HCV)</b>	HCV is an RNA-enveloped virus that along with Hepatitis B Virus causes most parenterally transmitted viral hepatitis.	Motion to list as <i>known to be a human carcinogen</i> passed by unanimous vote (7/0).	Motion to list as <i>known to be a human carcinogen</i> passed by unanimous vote (8/0).	Motion to list as <i>known to be a human carcinogen</i> passed by unanimous vote (12/0).
<b>Human Papillomaviruses (HPVs), Genital-Mucosal Types</b>	HPVs are small, non-enveloped viruses that infect genital skin, and genital and non-genital mucosa. HPV infections are common throughout the world.	Motion to list as <i>known to be a human carcinogen</i> passed by unanimous vote. (7/0).	Motion to list H as <i>known to be a human carcinogen</i> passed by unanimous vote (8/0).	Motion to list as <i>known to be a human carcinogen</i> passed by unanimous vote (12/0).
<b>Lead and Lead Compounds</b>	Major use of metal is in making lead-acid storage batteries. Other common uses include ammunition and cable covering. Lead compounds are used in paint, glass, ceramics, fuel additives, and some traditional cosmetics.	Motion to list as <i>known to be human carcinogens</i> passed by unanimous vote (8/0).	Motion to list as <i>reasonably anticipated to be human carcinogens</i> passed by majority vote (4/3). Negative votes cast because members felt that human data were sufficient to list lead and lead compounds as <i>known to be human carcinogens</i> .	Motion to list as <i>reasonably anticipated to be human carcinogens</i> passed by majority vote (11/0) with 1 abstention. Abstention because member had a conflict of interest.

NOMINATION/ CAS NUMBER	PRIMARY USES OR EXPOSURES	RG1 ACTION	RG2 ACTION	NTP BOARD SUBCOMMITTEE ACTION
<b>Naphthalene</b> (91-20-3)	Used as an intermediate in the synthesis of many industrial chemicals. Has been used as an ingredient in some moth repellants and toilet bowl deodorants, and to control lice on livestock and poultry.	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by a vote of 6 yes to 1 no. Negative vote cast because member felt data not sufficient to list in RoC.	The RG2 could not make a majority recommendation for either listing or not listing in the RoC	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (9/0)
<b>Neutrons</b>	Exposure to neutrons normally occurs from a mixed irradiation field where neutrons are a minor component. The exceptions are exposure to neutron radiotherapy beams and exposures of aircraft passengers and crew.	Motion to list as <i>known to be a human carcinogen</i> passed by unanimous vote (7/0).	Motion to list as <i>known to be a human carcinogen</i> passed by unanimous vote (8/0).	Motion to list as <i>known to be a human carcinogen</i> passed by unanimous vote (11/0).
<b>Nitrobenzene</b> (98-95-3)	Used mainly in the production of aniline, or as a major chemical intermediate in the production of dyes.	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (7/0)	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (7/0)	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (9/0)
<b>Nitromethane</b> (75-52-5)	Used in specialized fuels, in explosives and in the synthesis of pharmaceuticals, agricultural soil fumigants and industrial antimicrobials.	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (8/0)	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (9/0)	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (9/0)
<b>4,4'-Thiodianiline</b> (139-65-1)	4,4'-Thiodianiline has been produced commercially since the early 1940's as an intermediate of several diazo dyes.	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by a vote of 6 yes to 2 no. Negative votes cast because members felt not sufficient exposure to list in RoC.	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by a vote of 6 yes to 3 no. Negative votes cast because members felt not sufficient exposure to list in RoC.	Motion to list as <i>reasonably anticipated to be human carcinogen</i> passed by a vote of 5 yes to 2 no with 2 abstentions. Negative votes and abstentions because members felt not sufficient exposure to list in RoC.

NOMINATION/ CAS NUMBER	PRIMARY USES OR EXPOSURES	RG1 ACTION	RG2 ACTION	NTP BOARD SUBCOMMITTEE ACTION
<p><b>Selected Heterocyclic Amines</b> (three nominations):</p> <p>1) <b>MeIQ</b> (2-Amino-3,4-dimethylimidazo[4,5-f]quinoline) / (77094-11-2)</p> <p>2) <b>MeIQx</b> (2-Amino-3,8-dimethylimidazo[4,5-f]quinoxaline) / (77500-04-0)</p> <p>3) <b>PhIP</b> (2-Amino-1-methyl-6-phenylimidazo[4,5-b]pyridine) / (105650-23-5)</p>	<p>MeIQ, MeIQx, and PhIP are heterocyclic amines that are formed during cooking of meats and fish.</p>	<p>Motion to list MeIQ as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (6/0).</p> <p>Motion to list MeIQx as <i>reasonably anticipated to be human carcinogen</i> passed by a vote of 5 yes to 1 no. Negative vote cast because member felt data meets criteria to list as <i>known human carcinogen</i>.</p> <p>Motion to list PhIP as <i>reasonably anticipated to be human carcinogen</i> passed by a vote of 5 yes to 1 no. Negative vote cast because member felt data meets criteria to list as <i>known human carcinogen</i>.</p>	<p>Motion to list MeIQ as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (8/0)</p> <p>Motion to list MeIQx as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (8/0)</p> <p>Motion to list PhIP as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (8/0)</p>	<p>Motion to list MeIQ as <i>reasonably anticipated to be human carcinogen</i> passed by a vote of 8 yes, 0 no and 1 abstention. Abstention because member felt insufficient data for human exposure to list.</p> <p>Motion to list MeIQx as <i>reasonably anticipated to be human carcinogen</i> passed by a unanimous vote (9/0)</p> <p>Motion to list PhIP as <i>reasonably anticipated to be human carcinogen</i> passed by unanimous vote (9/0)</p>
<p><b>X-Radiation and Gamma (☐)-Radiation</b></p>	<p>Exposure to these forms of ionizing radiation comes from a variety of natural (environmental exposure) and anthropogenic sources, including exposure for military, medical, and occupational purposes.</p>	<p>Motion to list X-Radiation and ☐-Radiation as <i>known to be human carcinogens</i> passed by unanimous vote (7/0).</p>	<p>Motion to list X-Radiation and ☐-Radiation as <i>known to be human carcinogens</i> passed by unanimous vote (8/0).</p>	<p>Motion to list X-Radiation and ☐-Radiation as <i>known to be human carcinogens</i> passed by unanimous vote (11/0).</p>

<sup>1</sup> - The NIEHS Review Committee for the Report on Carcinogens (RG1)

<sup>2</sup> - The NTP Executive Committee\* Interagency Working Group for the Report on Carcinogens (RG2)

\*Agencies from the NTP Executive Committee represented on RG2 include: Agency for Toxic Substances and Disease Registry (ATSDR), Consumer Product Safety Commission (CPSC), Environmental Protection Agency (EPA), National Center for Environmental Health of the Centers for Disease Control and Prevention (NCEH/CDC), National Center for Toxicological Research of the Food and Drug Administration (NCTR/FDA), National Institute for Occupational Safety and Health/CDC (NIOSH/CDC), Occupational Safety and Health Administration (OSHA), National Cancer Institute of the National Institutes of Health (NCI/NIH), and National Institute of Environmental Health Sciences/NIH(NIEHS/NIH)

<sup>3</sup> - The NTP Board of Scientific Counselors Report on Carcinogens Subcommittee (the External Peer Review Group)

<sup>4</sup> - RoC – Report on Carcinogens