

**ILLINOIS INSTITUTE OF TECHNOLOGY
SAFETY POLICY COMMITTEE**

SAFE HANDLING OF CARCINOGENS

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1. **INTRODUCTION:**

Federal regulations and widely recognized guidelines for safe practices with carcinogens provide the basis for this program and its appendices. This section also briefly addresses mutagens and reproductive hazards. All research and teaching activities involving the use of chemical carcinogens, as defined in this policy, in facilities controlled by Illinois Institute of Technology (“IIT”), shall be conducted in compliance with OSHA regulations, with granting agency guidelines, with the provisions of this section and as approved by IIT’s Department of Environmental Health and Safety (“DEHS”).

2. **PURPOSE AND SCOPE:**

The purpose of this Safe Handling of Chemical Carcinogens program is to establish procedures and criteria for physical facilities in order to protect against occupationally acquired cancers and to ensure that all known or suspected chemical carcinogens are maintained within prescribed limits in accordance with nationally recognized safe standards of operation. Accordingly, this policy establishes the specific Illinois Institute of Technology (“University” or “IIT”) requirements for laboratory and non-laboratory handling and use of Extreme, High and Moderate carcinogens, listed in Appendix A.

Program components:

- Identifying all users of chemical carcinogens on campus.
- Defining acceptable levels of exposure, as those permitted by federal and state regulations or recommended by authoritative sources such as the National Toxicology Program (NTP) and the International Agency for Research on Cancer (IARC).
- Limiting projects and activities involving the use of chemical carcinogens to those authorized consistent with the provision of this program.
- Developing and approving specific procedures for the use of chemical carcinogens to limit the exposure of, and the degree of hazard to, personnel and the environment.
- Identifying and categorizing chemicals where carcinogenic potential has recently been determined.

3. **DEFINITIONS:**

3.1. **Department** – a defined academic unit or administrative office of the University, including campuses, colleges, departments, institutes, schools and centers.

3.2. **Department Chairperson** – includes academic Department chairs and Department heads of administrative units.

- 3.3. **Worker** – an individual performing tasks with or around carcinogens, including students, visitors, faculty, staff and other employees.
- 3.4. **Project Leader** – supervisors, principal investigators, laboratory safety officers or any other position in charge of a research project, teaching laboratory, or other activity using chemical carcinogens.
- 3.5. **Select Carcinogen** – a chemical substance that meets one or more of the following criteria set forth by OSHA in 29 CFR 1910.1450, "Occupational Exposures to Hazardous Chemicals in Laboratories" (see [Appendix A](#)).
- It is regulated by OSHA as a carcinogen by means of a specific performance standard (29 CFR 1910.1001 and beyond).
 - It is listed as "known to be carcinogenic" in the "Annual Report on Carcinogens" published by the NTP.
 - It is listed under Group 1, Carcinogenic to Humans, in the latest edition of the "International Agency for Research on Cancer (IARC) Monographs."
 - It is listed in either Group 2A or 2B by IARC, or is listed as "reasonably anticipated to be carcinogenic" by NTP, *and* causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
 - *after inhalation exposures of 6-7 hours per day, 5 days per week, over a significant portion of the animal's lifetime, to doses less than 10 mg/mm³;*
 - *after repeated skin application of doses less than 300 mg/kg of the animal's*
 - *body weight per week; and*
 - *after oral exposures to doses less than 50mg/kg of body weight per day.*
- 3.6. **Extreme Hazard Carcinogen** – Chemicals regulated by law and Chemicals not regulated by law, but considered to be highly hazardous by DEHS.
- 3.7. **High Hazard Carcinogen** – Extreme carcinogens diluted to defined concentration ranges. Chemicals identified in IARC or NTP guidelines which do not exceed the hazardous category in any concentration. Other chemicals when used in research and teaching activities that could, on the basis of new information, require the restrictions listed for this category.
- 3.8. **Moderate Hazard Carcinogens** – those chemicals that, when used in research and teaching activities, pose risks for users and therefore require special training and handling.
- 3.9. **Designated Area** – an area segregated and posted for work with "select carcinogens" for the purpose of ensuring that appropriate protective measures are observed by Workers working in or near the vicinity. A designated area can be an exhaust hood, storage cabinet, countertop, or an entire laboratory.

3.10. **Mutagen** – a chemical or physical agent that induces genetic changes that may be passed on through proliferation of the changed cells, and in some cases may increase the likelihood that cancer will develop.

4. **RESPONSIBILITIES:**

41. Department Chairperson must:

- Provide DEHS with copies of all protocols and or forms requiring departmental approval.
- Provide college/department level review and control of carcinogen use projects.
- Approve written standard operating procedures (“SOP”) for the proposed use of carcinogens and any subsequent material revisions to those procedures.

42. The Project Leader must:

- Recognize carcinogen hazards and understand control methods necessary to minimize exposures of employees and the public.
- Obtain the Department Chairperson’s approval of the project.
- Provide Workers with specific information for working safely with carcinogens in Designated Areas; ensure that all applicable hazard communication has been provided.
- Ensure the preparation, review, approval and subsequent use of a project SOP that incorporates safe carcinogen practices under normal and emergency conditions.
- Ensure that carcinogen containers are labeled and Designated Areas are posted in accordance with the provisions described in section 9.
- Ensure sweeping, mopping, and vacuuming of Designated Areas conform to the requirements given in section 11.
- Promptly report occupational exposure incidents involving carcinogens to the DEHS.
- Ensure that carcinogens are disposed of in accord with IIT procedures.

43. Carcinogen Users must:

- Apply the required safe work practices and waste collection requirements.
- Wear buttoned laboratory coats when working with carcinogens.
- Report to the supervisor accidents involving carcinogens.
- Clean Carcinogen work areas as defined in section 11.
- Report to their supervisor accidents involving carcinogens, unsafe conditions, and questions regarding proper work.

44. DEHS must:
 - Provide carcinogen health hazard information, regulatory requirements, and consultation on control measures.
 - Perform SOP review.
 - Schedule exposure monitoring as appropriate.
 - Investigate all accidents which could or did result in exposure of personnel to chemical carcinogens.
 - Periodically inspect, all EXTREME and HIGH chemical carcinogen work areas, and notify the principal Investigator and the department chairperson of the result.
45. DEHS and Facilities will supply Hazardous Waste Disposal of waste containing carcinogens. Waste must be properly documented and packaged by the producer in labeled containers.
46. The University's Facilities Department will check and maintain all fume hoods.
47. The Campus Wide Safety Working Group ("CSWG") will assist in review of the SOP.

5. **CARCINOGEN INVENTORY:**

As new chemicals are received they must be placed on the area's chemical inventory. The SDS must be present. A standard operating procedure for the use of the chemical must also be readily available.

6. **EXPERIMENT REVIEW:**

- 6.1. All activities that involve the use of Moderate, High and Extreme carcinogens require the preparation, review, approval, and subsequent use of standard operating procedures that specify safe practices under normal and emergency conditions. The supervisor of carcinogen users must ensure these procedures are prepared. DEHS, with the assistance of the CSWG, will review the prepared procedures before the procedures are provided to the Department Chairperson for approval. The Department Chairperson must approve the procedures prior to their use and must take into account the recommendations provided by the DEHS.
- 6.2. Changes proposed for work processes that impact the use of Moderate, High and Extreme carcinogens must be reflected in an amended SOP before the changes in work processes are initiated. DEHS must review the changes before the revised procedures are provided to the Department Chairperson for approval. The Department Chairperson must approve the revised procedures prior to their use and must take into account the recommendations provided by DEHS.

63. Documentation used or prepared to meet the requirement for a SOP must provide the following information at a minimum:
- Designated Areas, assigned employees
 - Brief description of operation involving carcinogen
 - Engineering exposure controls
 - Hazard information and training, including required SDS
 - Personal protective equipment
 - Storage
 - Labeling
 - Packaging/transportation
 - Waste disposal
 - Staffing off-hours
 - Emergency/spill response
64. The form “Summary of Health and Safety Precautions for Chemical Carcinogens” is an optional form that may be used as a screening tool for work and summary statement for work requirements in order to facilitate the procedure development process. The information contained in this form in some cases may be sufficient to meet the written procedure requirement. Departments that work under a formal chemical hygiene plan may be able to use the procedures specified in the chemical hygiene plan as its carcinogen procedure. The safety review process should determine whether documentation in addition to the form or the chemical hygiene plan is needed to provide an adequate and effective SOP.

7. PHYSICAL FACILITIES:

Use of a carcinogen room must be under negative pressure with respect to general access areas such as hallways and offices. Procedures involving volatile chemical carcinogens and those involving solid or liquid chemical carcinogens that may result in the generation of aerosols are not to be conducted on an open bench; depending on the carcinogen category, they should be conducted in suitable containment equipment as described below.


- Examples of aerosol producing procedures are: the opening of closed vessels; transfer operations; preparation of feed mixtures; blending; open vessel centrifugation; and the application, injection or intubation of a chemical carcinogen into experimental animals.
- Use of ductless filtered devices for protection from volatile chemicals is not permitted.
- Tissue culture and other biological procedures involving chemical carcinogens may be conducted in a Class II, type B Biological Safety Cabinet. A Class II, type A Biological Safety Cabinet may also be used if the cabinet’s exhaust air is discharged to the outdoors.

- The Project Leader should obtain guidance from DEHS on the selection and use of a Class II Biological Safety Cabinet for procedures involving chemical carcinogens.
- It is expected that for a majority of situations, certain EXTREME compounds will be used in forms or dilutions which would place them in the HIGH category.
- Designated Areas for MODERATE chemical carcinogens may be standard chemical laboratories.
- Animals exposed to chemical carcinogens shall be housed in cages that confine, feed, feces, urine and bedding.
- Designated Areas used for animal experiments shall be negative pressure with respect to non-research areas (hallways, etc.).
- When nonvolatile carcinogens are used, a cage with solid sides and bottom in conjunction with filter top, or equivalent equipment will be used.
- When volatile carcinogens are used, the cage must be used in conjunction with an approved exhaust ventilation system.

8. LABELING AND POSTING:

8.1. Carcinogen containers must be labeled according to OSHA’s Hazard Communication requirements and provisions of this manual (Hazard Communication). Manufacturer container labels must be retained and should be augmented with the appropriate cancer hazard warning below.

8.2. Secondary containers must indicate a cancer hazard warning along with the identity of contents. The presence of a carcinogen must be indicated by one of the following labels:

<p>Class 1 carcinogens DANGER/Cancer Hazard (red/black/white)</p> 	<p>Class 2 Cancer Hazard CAUTION/Cancer Hazard (yellow/black)</p> 
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8.3. Designated Areas such as carcinogen hoods, storage cabinets, glove boxes, and laboratory rooms must be posted.

8.4. Wording for room posting should be the same as for the labels, plus the words "Authorized Personnel Only," Visitors to posted rooms, including custodial and maintenance staff, must be instructed as to the presence and location of carcinogenic material.

8.5. Project Leaders must ensure that a Designated Areas such as carcinogen hoods, storage cabinets, glove boxes, and laboratory rooms are posted. Project Leaders must ensure that visitors to posted rooms, including custodial and maintenance staff, are informed of the presence and location of carcinogenic material.

9. **WORK PRACTICES:**

9.1. To minimize exposure, Workers should adhere to recognized good laboratory practices (see Hazard Communication Program and Chemical Hygiene Policy for Lab Safety Standards).

- Wear buttoned laboratory coats while working with carcinogens to prevent contamination of street clothing. Neither laboratory coats nor IIT-issued work clothing contaminated with carcinogens will be worn home or taken home.
- Protective gloves should be selected based on the chemical properties of the carcinogen and the nature of the task (other chemicals present, dexterity, etc.) DEHS can assist with glove material selection. When disposable gloves become contaminated, discard them as carcinogen waste. Reusable gloves worn for carcinogen work should not be used for non-carcinogen work or in non-carcinogen areas.
- No eating, drinking, smoking, chewing of gum or tobacco, application of cosmetics, storage of food, or mouth pipetting in areas where chemical carcinogens are used.

10. **HOUSEKEEPING:**

10.1. Workers must thoroughly clean contaminated equipment before reuse in non-carcinogen areas, or dispose as hazardous waste.

10.2. Project Leaders must ensure that dry sweeping is not performed in areas that utilize carcinogens that become airborne as particulate contamination. Project Leaders should ensure that wet mops should be used instead, and the wet mops designated for use only in the carcinogen area.

10.3. Project Leaders must ensure that vacuum cleaning performed in carcinogen areas, utilizes a special unit equipped with a high-efficiency particulate (HEPA) *air filter*. The contaminated vacuum must display the Class 1 or Class 2 cancer hazard label and should remain in the carcinogen use area or storage area. Workers should supervise cleaning of restricted-entry laboratories.

11. STORAGE, TRANSPORT AND SHIPMENT:

- 11.1. Workers should store stock quantities of chemically compatible carcinogens in a designated and posted area or cabinet.
- 11.2. Project Leaders must ensure that carcinogens transported within a building and outside the user laboratory are packaged in unbreakable containers and labeled in accordance with section 9.
- 11.3. Project Leaders must ensure that carcinogens shipped off site comply with all applicable shipping regulations.
- 11.4. Private vehicles must not be used for storage or transport of carcinogenic materials.

12. WASTE DISPOSAL:

The waste generator must ensure the proper collection, packaging, and disposal of carcinogenic wastes. Carcinogenic waste must not be disposed of into the air, drains, or as ordinary trash. DEHS will handle this waste following the same procedures used for disposal of chemical waste. Suspect carcinogens should be handled the same as known carcinogens.

13. EMERGENCIES:

- 13.1. Project Leaders must plan for potential spills/emergencies involving carcinogens in all project reviews and SOPs. All personnel must evacuate the room to vapors or aerosols that may be present if a general contamination of an area occurs such as from a large spill or breakdown of a containment device (e.g., glovebox). Call Public Safety following evacuation and report pertinent information.
- 13.2. Workers must remove contaminated clothing and wash skin thoroughly with soap and water if skin contamination occurs. Workers must minimize tracking into other areas when shoes are contaminated from a spill, by removing them just prior to leaving the contaminated area. Workers must report contamination incidents involving known or suspected employee exposure immediately to Public Safety and the DEHS.

14. CHEMICAL MUTAGENS:

Many carcinogenic chemicals are also mutagens, although not all mutagens have demonstrable carcinogenic properties. Prudent practice requires, however, that mutagenic materials be handled in a manner that minimizes the possibility of exposure.

15. CHEMICAL REPRODUCTIVE HAZARDS:

Some carcinogens also are known to cause adverse reproductive effects in animals or humans. Exposure to these substances may occur via foods, beverages, tobacco, illicit drugs, medications,

medical treatments, or environmental chemicals. Potential for carcinogen exposure is also reviewed when a reproductive hazards review is conducted.

Pregnant Workers who are considering starting a family are advised to minimize all forms of chemical exposure, both on and off the job. When a job involves potential chemical exposure, employees can request that their work areas and tasks be reviewed to determine whether additional protective measures should be implemented. DEHS is available to consult confidentially with individuals. Declaration of pregnancy or intent to begin a family is considered confidential medical information. DEHS recommendations affecting workplace practices, procedures, or protective equipment will be communicated to the employee's supervisor.

Consultation before pregnancy or as early as possible during the pregnancy is strongly urged. Enforcement of recommendations made specifically to protect a reproductive consideration (such as a developing fetus) must not be discriminatory, in conformance with Title VII of the Civil Rights Act of 1964), which now also includes the Pregnancy Discrimination Act of 1978.

16. RELATED REQUIREMENTS:

- ✓ Hazard Communication_
http://www.iit.edu/general_counsel/pdfs/hazard_comm.pdf
- ✓ Chemical Hygiene Plan_
http://www.iit.edu/general_counsel/pdfs/chem_hygiene.pdf

17. APPROVAL:

The University's Safety Policy Committee has reviewed this policy and recommended its adoption on August 24, 2015, and this Safe Handling of Carcinogens policy is approved and effective this 26th day of August 2015. The Safety Policy Committee will review the contents, implementation and effectiveness of this Policy no less than annually (but as often as necessary) and will make modifications as necessary to ensure that it meets all required legal and regulatory requirements and is adequately providing a safe and healthful environment for the University's faculty, employees and students.

By: /s/ Frances Bronet Provost and Senior Vice President

By: /s/ Bruce Watts Vice President for Facilities & Public Safety

REFERENCES

- "12th Annual Report on Carcinogens," National Toxicology Program (NTP), U.S. Department of Health and Human Services, Public Health Service.
- "OSHA Standards for General Industry," Code of Federal Regulations, 29 CFR 1910.1000 to end.
- "IARC Monographs on the Evaluation of Carcinogenic Risks to Humans and Supplements", International Agency for Research on Cancer, World Health Organization.
- Lewis, R.J. Sr. "Reproductively Active Chemicals- A Reference Guide", Van Nostrand Reinhold NY, 1991.
- "Registry of Toxic Effects of Chemical Substances (RTECS)", National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services.
- "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices", American Conference of Governmental Industrial Hygienists (ACGIH) Cincinnati, Ohio. 2004.
- "Environment, Safety and Health Manual", Argonne National Laboratory, Argonne, IL. 2008.
- Oregon State University "Chemical Carcinogen Safety Program".
<http://oregonstate.edu/fa/manuals/saf/304>.

Summary of Health and Safety Precautions for Chemical Carcinogens

Project/Operation Title _____

Chemicals covered by this summary (list or attach inventory) _____

Custodian Name _____

Brief description of operations, quantities used, frequency of use _____

Are basic handling precautions and list of designated areas included in existing Chemical Hygiene Plan? Yes ___ No ___ (Attach copy of work precautions if No)

Are there any unique operations, frequency, or quantity of use that require written procedures in addition to the Chemical Hygiene Plan? Yes (attach) _____ No _____

Engineering Controls

General room exhaust ventilation	Yes _____	No _____
Lab Hood	Yes _____	No _____
Laminar flow biological safety cabinet	Yes _____	No _____
Vented to exhaust system	Yes _____	No _____
Glove Box	Yes _____	No _____

Other Hood (specify) _____

Information/training

General carcinogen safety Training: Completed ___ Scheduled ___ Planned _____

Task-specific training/information provided by department (including specific procedures/instructions, other hazard information): Completed ___ Scheduled ___ Planned _____

Is the MSDS/SDS readily available? Yes _____ No _____

Respirators issued, training provided? Yes _____ Not Required _____

Lab coats? (do not wear outside lab) Yes _____ No _____

Eyewash in work area? (user tests weekly) Yes _____ No _____

Safety shower in work area? (Facilities tests semiannually) Yes _____ No _____

Labeling/Posting

Designated work area (hoods, labs) posted? Yes _____ In Progress _____ No _____

Chemicals labeled (contents, hazard, and class 1/class 2 carcinogen)?

Yes _____ In Progress _____ No _____

Storage/Transport/Shipment

Labeled storage areas? Yes _____ No _____

Unbreakable labeled secondary containers for transport outside usearea?
Yes _____ No _____

Emergency Planning

Employees know emergency procedures (dial Public Safety, decontamination, reporting, etc.)?
Yes _____ No _____

Waste Disposal

Are packages labeled, identified as carcinogen and in secondary containment to be moved as hazardous waste?
Yes _____ No _____

Completed by: _____ ID number _____ Date: _____

Concurrence by Chair or department head: _____ Date: _____

Concurrence by department of EHS: _____ Date: _____

Appendix A

Material	Synonyms	CAS#	Extreme	High	Moderate	ALL
acetaldehyde		75-07-0			M	M
acetamide		60-35-5			M	M
acetylaminofluorene, 2-		53-96-3	> 1.0%	<1.0%		E
acrylamide		79-06-1		H		H
acrylonitrile		107-13-1		H		H
adriamycin		23214-92-8		H		H
aflatoxicol		1402-68-2	>0.03%	<0.03%		E
aflatoxin B1		1162-65-8	>0.03%	<0.03%		E
aflatoxin M1		6795-23-9	>0.1%	<0.1%		E
aflatoxins, naturally occurring		1402-68-2	>0.03%	<0.03 %		
amino-1,4-dimethyl-5h-pyrido[4,3-b]indole, 3-	Trp-P-1	62450-06-0			M	M
amino-1-methyl-5h-pyrido[4,3-b]indole, 3-	Trp-P-2	62450-07-1			M	M
amino-1-methyl-6-phenylimidazo[4,5-b]pyridine, 2-	PhIP	105650-23-5			M	M
amino-2-methylanthraquinone, 1-		82-28-0			M	M
amino-3,4-dimethylimidazo[4,5-f]quinoline, 2-	MelQ	77094-11-2			M	M
amino-3,8-dimethylimidazo[4,5-f]quinoxaline, 2-	MelQx	77500-04-0			M	M
amino-3-methyl-9h-pyrido[2,3-b]indole, 2-	MeA-a-C	68006-83-7			M	M
amino-3-methylimidazo[4,5-f]quinoline, 2-	IQ	76180-96-6		H		H
amino-5-(5-nitro-2-furyl)-1,3,4-thiadiazole, 2-		712-68-5			M	M
amino-6-methyldipyrido[1,2-a:3',2'-d]imidazole, 2-	Glu-P-1	67730-11-4			M	M
amino-9h-pyrido[2,3-b]indole, 2-	A-a-C	26148-68-5			M	M
aminoanthraquinone, 2-		117-79-3			M	M
aminoazotoluene, o-		97-56-3			M	M
aminobiphenyl, 4-	aminodiphenyl, 4-	92-67-1	>0.1%	<0.1%		E
aminodipyrido[1,2-a:3',2'-d]imidazole, 2-	Glu-P-2	67730-10-3			M	M
amitrole		61-82-5			M	M

<u>Appendix A, (Continued)</u>						
Material	Synonyms	CAS#	Extreme	High	Moderate	ALL
amsacrine		51264-14-3			M	M
androgenic (anabolic) steroids		NA		H		H
anisidine hydrochloride, o-		134-29-2			M	M
anisidine, o-		90-04-0			M	M
anthracenamine, 2-		613-13-8			M	M
antimony trioxide		1309-64-4			M	M
aramite		140-57-8			M	M
aroclor					M	M
aroclor 1254		11097-69-1			M	M
aroclor 1260		11096-82-5			M	M
arsenic		7440-38-2	E			E
arsenic compounds		NA		H		H
asbestos		1332-21-4		H		H
auramine (technical-grade)		492-80-8			M	M
azacitidine, 5-		320-67-2		H		H
azaserine		115-02-6			M	M
azathioprine		446-86-6	E			E
benz[a]anthracene		56-55-3		H		H
benzal chloride		98-87-3		H		H
benzene		71-43-2		H		H
benzidine		92-87-5	>0.1%	<0.1%		E
benzidine salts		NA	>0.1%	<0.1%		E
benzidine-based dyes		NA		H		H
benzo[a]pyrene		50-32-8	>0.1%	<0.1%		E
benzo[b]fluoranthene		205-99-2			M	M
benzo[j]fluoranthene		205-82-3			M	M
benzo[k]fluoranthene		207-08-9			M	M
benzofuran		271-89-6			M	M
benzotrichloride		98-07-7		H		H
benzoyl chloride		98-88-4		H		H
benzyl chloride		100-44-7		H		H
benzyl violet 4b		1694-09-3			M	M
beryl ore		1302-52-9		H		H
beryllium		7440-41-7	E			E
beryllium aluminum alloy		12770-50-2		H		H
beryllium chloride		7787-47-5		H		H
beryllium compounds		NA		H		H
beryllium fluoride		7787-49-7		H		H
beryllium hydroxide		13327-32-7		H		H
beryllium oxide		1304-56-9		H		H

<u>Appendix A, (Continued)</u>						
Material	Synonyms	CAS#	Extreme	High	Moderate	ALL
beryllium phosphate		13598-15-7		H		H
beryllium sulfate tetrahydrate		7787-56-6		H		H
beryllium zinc silicate		39413-47-3		H		H
b-hexachlorocyclohexane	Lindane	319-85-7			M	M
bis(2-chloroethyl)-2-naphthylamine, N,N-	chlornaphazine	494-03-1	E			E
bis(2-ethylhexyl) phthalate	di(2-ethylhexyl) phthalate; DEHP	117-81-7			M	M
bis(bromomethyl)propane-1,3-diol, 2,2-		3296-90-0			M	M
bis(chloroethyl) nitrosourea	BCNU; bischloroethyl nitrosourea	154-93-8		H		H
bis(chloromethyl)ether		542-88-1	>0.1%	<0.1%		E
bis(dimethylamino)benzophenone	4,4-(Dimethylamino)benzophenone michler's ketone	90-94-8			M	M
bleomycins		11056-06-7			M	M
bracken fern		NA			M	M
bromodichloromethane		75-27-4			M	M
butadiene, 1,3-		106-99-0	E			E
butanediol dimethanesulfonate, 1,4-	busulphan; myleran	55-98-1		H		H
butylated hydroxyanisole	BHA	25013-16-5			M	M
butyrolactone, b-		3068-88-0			M	M
cadmium		7440-43-9	E			E
cadmium chloride		10108-64-2		H		H
cadmium compounds		NA		H		H
cadmium oxide		1306-19-0	E			E
cadmium sulfate		10124-36-4		H		H
cadmium sulfide		1306-23-6		H		H
caffeic acid		331-39-5			M	M
captafol		191-90-6		H		H
carbon black		1333-86-4			M	M
carbon tetrachloride		56-23-5			M	M

<u>Appendix A, (Continued)</u>						
Material	Synonyms	CAS#	Extreme	High	Moderate	ALL
catechol	pyrocatechol	120-80-9			M	M
ceramic fibers					M	M
chlorambucil		305-03-3		H		H
chloramphenicol		56-75-7		H		H
chlordane		12789-03-6			M	M
chlordecone	kepone	143-50-0			M	M
chlrendic acid		115-28-6			M	M
chlorinated paraffins (c12, 60% chlorine)		108171-26-2			M	M
chlorinated toluenes, a-		NA		H		H
chloro-2-methylpropene, 1-	dimethylvinyl chloride	513-37-1			M	M
chloro-2-methylpropene, 3-		563-47-3			M	M
chloroethyl)-3-(4-methylcyclohexyl)-1-nitrosourea, 1-(2-	methyl-CCNU; semustine	13909-09-6		H		H
chloroethyl)-3-cyclohexyl-1-nitrosourea, 1-(2-	CCNU	13010-47-4		H		H
chloroform		67-66-3			M	M
chloromethyl methyl ether	methyl chloromethyl ether	107-30-2	E			E
chloro-o-phenylenediamine, 4-	chloro-ortho-phenylenediamine, 4-	95-83-0			M	M
chloro-o-toluidine hydrochloride, p-		3165-93-3			M	M
chloro-o-toluidine, 4-	chloro-o-toluidine, p-	95-69-2		H		H
chlorophenoxy herbicides		NA			M	M
chloroprene		126-99-8			M	M
chlorothalonil		1897-45-6			M	M
chlorozotocin		54749-90-5		H		H
chromium (VI) compounds		NA		H		H
CI acid red 114		6459-94-5			M	M
ci basic red 9	c.i. basic red 9 monohydrochloride	569-61-9			M	M
ci direct blue 15		2429-74-5			M	M
cisplatin		15663-27-1		H		H

<u>Appendix A. (Continued)</u>						
Material	Synonyms	CAS#	Extreme	High	Moderate	ALL
citrus red no. 2		6358-53-8			M	M
coal tar		NA		H		H
cobalt		7440-48-4			M	M
cobalt compounds		NA			M	M
creosote (wood or coal)		NA		H		H
credine, p-	para-credine	120-71-8			M	M
crystalite		14464-46-1			M	M
cupferron		135-20-6			M	M
cycasin		14901-08-7			M	M
cyclophosphamide		50-18-0		H		H
cyclophosphamide monohydrate		6055-19-2		H		H
Cyclosporin A		59865-13-3		H		H
dacarbazine		4342-03-4			M	M
daunomycin		20830-81-3			M	M
decabromobiphenyl		13654-09-6			M	M
diacetylbenzidine, N,N'-		613-35-4			M	M
diaminoanisole sulfate, 2,4-		39156-41-7			M	M
diaminoanisole, 2,4-		615-05-4			M	M
diaminodiphenyl ether, 4,4'-	4,4- oxydianiline	101-80-4			M	M
diaminotoluene, 2,4-		95-80-7			M	M
dibenz[a,h]acridine		226-36-8			M	M
dibenz[a,h]anthracene		53-70-3		H		H
dibenz[a,j]acridine		224-42-0			M	M
dibenzo[a,e]pyrene		192-65-4			M	M
dibenzo[a,h]pyrene		189-64-0			M	M
dibenzo[a,i]pyrene		189-55-9			M	M
dibenzo[a,l]pyrene		191-30-0			M	M
dibenzo[c,g]carbazole, 7h-		194-59-2			M	M
dibromo-3-chloropropane, 1,2-		96-12-8		H		H
dibromoethane, 1,2-	Ethylene dibromide; EDB	106-93-4		H		H

<u>Appendix A, (Continued)</u>						
Material	Synonyms	CAS#	Extreme	High	Moderate	ALL
dibromopropan-1-ol, 2,3-		96-13-9			M	M
dichloro-4,4'-diaminodiphenyl ether, 3,3'-		28434-86-8			M	M
dichlorobenzene, 1,4-	p-Dichlorobenzene	106-46-7			M	M
dichlorobenzidine dihydrochloride, 3,3-		612-83-9	> 1.0%	<1.0%		E
dichlorobenzidine, 3,3'- (and salts)		91-94-1	> 1.0%	<1.0%		E
dichlorodiphenyltrichloroethane	DDT; p,p'-DDT	50-29-3			M	M
dichloroethane, 1,1-		75-34-3			M	M
dichloroethane, 1,2-	ethylene dichloride	107-06-2			M	M
dichloroethylene, 1,1-		75-35-4			M	M
dichloromethane	methylene chloride	75-09-2			M	M
dichloropropene, 1,3-		542-75-6			M	M
dichlorvos		62-73-7			M	M
diepoxybutane		1464-53-5			M	M
diethyl sulfate		64-67-5		H		H
diethyldithiocarbamic acid 2-chloroallyl ester, N,N-	sulfallate	95-06-7			M	M
diethylhydrazine, 1,2-		1615-80-1			M	M
diethylstilbestrol		56-53-1		H		H
difluoroethane, 1,2-		75-38-7			M	M
diglycidyl resorcinol ether		101-90-6			M	M
dihydrosafrole		94-58-6			M	M
dihydroxyanthraquinone, 1,8-	chrysazin; dantron	117-10-2			M	M
diisopropyl sulfate		2973-10-6			M	M
dimethoxybenzidine, 3,3'-	o-dianisidine	119-90-4			M	M
dimethyl sulfate		77-78-1		H		H
dimethylaminoazobenzene, 4-	dimethylamino azobenzene, p-	60-11-7	> 1.0%	<1.0%		E

Appendix A, (Continued)						
Material	Synonyms	CAS#	Extreme	High	Moderat	ALL
dimethylaniline, 2,6-	2,6-xylydine	87-62-7			M	M
dimethylbenz[a]anthracene, 7,12-	DMBA	57-97-6			M	M
dimethylbenzidine, 3,3'-	o-tolidine	119-93-7			M	M
dimethylcarbamoyl chloride		79-44-7		H		H
Dimethylhydrazine dihydrochloride, 1,2-		306-37-6		H		
dimethylhydrazine, 1,1-	UDMH	57-14-7			M	M
dimethylhydrazine, 1,2-		540-73-8		H		H
dinitrofluoranthene, 3,7-		105735-71-5			M	M
dinitrofluoranthene, 3,9-		22506-53-2			M	M
dinitropyrene, 1,6-	dinitropyrene, 1,8-	42397-64-8			M	M
dinitrotoluene, 2,4-		121-14-2			M	M
dinitrotoluene, 2,6-		606-20-2			M	M
dioxane, 1,4-		123-91-1			M	M
direct black 38		1937-37-7	E			E
direct black 6	direct blue 6	2602-46-2	E			E
Direct brown 95	CI Direct brown 95	16071-86-6	E			E
disperse blue 1		2475-45-8			M	M
doxorubicin hydrochloride	adriamycin	25316-40-9			M	M
dyes that metabolize to benzidine	CI Direct brown 95 CI Direct black 38 CI Direct blue 6	16071-86-6 2602-46-2 1937-37-7	E			E
epichlorohydrin		106-89-8		H		H
epoxybutane, 1,2-		106-88-7			M	M
erionite		66733-21-9	E			E
estradiol-17b		50-28-2			M	M
estrone		53-16-7			M	M
ethinylestradiol		57-63-6			M	M
ethyl methanesulfonate		62-50-0			M	M
ethyl-3-nitro-1-nitrosoguanidine, 1-	ENNG	4245-77-6			M	M
ethylbenzene		100-41-4			M	M
ethylene oxide		75-21-8	E			E

<u>Appendix A, (Continued)</u>						
Material	Synonyms	CAS#	Extreme	High	Moderate	ALL
ethylene thiourea		96-45-7			M	M
ethyleneimine		151-56-4	> 1.0%	<1.0%		E
etoposide		33419-42-0		H		H
etoposide in combination with cisplatin and bleomycin		NA		H		H
firemaster bp-6					M	M
formaldehyde		50-00-0		H		H
formylhydrazino)-4-(5-nitro-2-furyl)thiazole, 2-(2-		3570-75-0			M	M
furan		110-00-9			M	M
furyl)-3-(5-nitro-2-furyl)acrylamide, 2-(2-	AF-2	3688-53-7			M	M
glasswool					M	M
glycidaldehyde		765-34-4			M	M
glycidol		556-52-5		H		H
ethylene thiourea		96-45-7			M	M
glycidyl ethers		NA			M	M
griseofulvin		126-07-8			M	M
hc blue no. 1		2784-94-3			M	M
heptachlor		76-44-8			M	M
hexabromobiphenyl	FireMaster FF-1	67774-32-7			M	M
hexachlorobenzene		118-74-1			M	M
hexachlorocyclohexane		608-73-1			M	M
hexachlorocyclohexane, a-		319-84-6			M	M
hexachlorocyclohexane, g-	lindane	58-89-9			M	M
hexachlorocyclohexanes		NA			M	M
hexachloroethane		67-72-1			M	M
hexamethylphosphoramide		680-31-9			M	M
hydrazine		302-01-2			M	M
hydrazine sulfate		10034-93-2			M	M
hydrazobenzene		122-66-7			M	M
indeno[1,2,3-cd]pyrene		193-39-5			M	M
iodomethane		74-88-4			M	M
iron-dextran complex		9004-66-4			M	M
isoprene		78-79-5			M	M
kanechlor 500		37317-41-2			M	M
lasiocarpine		303-34-4			M	M
lead acetate		301-04-2			M	M
lead and lead compounds, inorganic		7439-92-1			M	M

<u>Appendix A. (Continued)</u>						
Material	Synonyms	CAS#	Extreme	High	Moderate	ALL
lead arsenate		7778-40-9		H		H
Lead chromate		7758-97-6		H		H
lead phosphate		7446-27-7			M	M
levofuraladone		3795-88-8			M	M
magenta (containing ci basic red 9)		632-99-5			M	M
medroxyprogesterone acetate		71-58-9			M	M
melphalan		148-82-3		H		H
merphalan		531-76-0			M	M
mestranol		72-33-3			M	M
methoxypsoralen, 5-		484-20-8		H		H
methoxypsoralen, 8-	Methoxsalen	298-81-7	E			E
methyl methanesulfonate		66-27-3		H		H
methyl-1-nitroanthraquinone, 2-		129-15-7			M	M
methylaziridine, 2-	propyleneimine	75-55-8			M	M
methylazoxymethanol acetate		592-62-1			M	M
methylcholanthrene		56-49-5			M	M
methylchrysene, 5-		3697-24-3			M	M
methylene bis(2-chloroaniline), 4,4'-	MOCA; MBOCA	101-14-4	> 1.0%	<1.0%		E
methylene bis(2-methylaniline), 4,4'-		838-88-0			M	M
methylene chloride	dichloromethane	75-09-2			M	M
methylenebis(N,N-dimethylbenzenamine), 4,4-		101-61-1			M	M
methylenedianiline dihydrochloride, 4,4-		13552-44-8			M	M
methylenedianiline, 4,4'-		101-77-9			M	M
methylmercury compounds		NA			M	M
methyl-N-nitro-N-nitrosoguanidine, N-	MNNG	70-25-7		H		H
methyl-n-nitrosourethane, n-		615-53-2			M	M
methylthiouracil		56-04-2			M	M
metronidazole		443-48-1			M	M
mineral oil - untreated or mildly treated only		NA		H		H
mirex		2385-85-5			M	M
mitomycin c		50-07-7			M	M
mitoxantrone		65271-80-9			M	M

<u>Appendix A. (Continued)</u>						
Material	Synonyms	CAS#	Extreme	High	Moderate	ALL
monocrotaline		315-22-0			M	M
mopp (nitrogen mustard, oncovin, procarbazine and prednisone)		NA		H		H
mustard gas	Sulfur mustard	505-60-2	E			E
nafenopin		3771-19-5			M	M
naphthylamine, 1-		134-32-7	> 1.0%	<1.0%		E
naphthylamine, 2-		91-59-8	>0.1%	<0.1%		E
NDPA	nitrosodi-n-propylamine, N-	621-64-7		H		H
nickel		7440-02-0		H		H
nickel acetate		373-02-4		H		H
nickel alloys		NA			M	M
nickel carbonate		3333-67-3		H		H
nickel carbonyl		13463-39-3		H		H
nickel compounds		NA		H		H
nickel hydroxide		12054-48-7		H		H
nickel oxide		1313-99-1		H		H
nickel subsulfide		12035-72-2		H		H
nickelocene		1271-28-9		H		H
niridazole		61-57-4			M	M
nitrilotriacetic acid		139-13-9			M	M
nitrilotriacetic acid salts		NA			M	M
nitro-2-furyl)-2-thiazolyl]acetamide, N-[4-(5-		531-82-8			M	M
nitroacenaphthene, 5-		602-87-9			M	M
nitroanisole, 2-	nitroanisole, o-	91-23-6			M	M
nitrobenzene		98-95-3			M	M
nitrobiphenyl, 4-		92-93-3	>0.1%	<0.1%		E
nitrochrysene, 6-		2043-93-7			M	M
nitrofen		1836-75-5			M	M
nitrofluorene, 2-		607-57-8			M	M
nitrofurfurylidene)amino]-2-imidazolidinone, 1-[(5-		555-84-0			M	M
nitrogen mustard		51-75-2		H		H
nitrogen mustard hydrochloride		55-86-7			M	M
nitrogen mustard n-oxide		126-85-2			M	M
nitromethane		75-52-5			M	M
nitropropane, 2-		79-46-9			M	M
nitropyrene, 1-		5522-43-0			M	M

<u>Appendix A, (Continued)</u>						
Material	Synonyms	CAS#	Extreme	High	Moderate	ALL
nitropyrene, 4-		57835-92-4			M	M
nitrosodiethanolamine, N-	NDELA	1116-54-7			M	M
nitrosodiethylamine, N-	diethylnitrosamine; DEN	55-18-5	>1.0%	<1.0%		E
nitrosodimethylamine, N-	dimethylnitrosamine; DMN	62-75-9	>1.0%	<1.0%		E
nitrosodi-n-butylamine, N-	NDBA	924-16-3		H		H
nitrosodi-n-propylamine, N-	NDPA	621-64-7		H		H
nitrosomethylamino)-1-(3-pyridyl)-1-butanone, 4-(N-	NNK	64091-91-4			M	M
nitrosomethylamino)propionitrile, 3-(N-		60153-49-3			M	M
nitrosomethylethylamine, N-	NMEA	10595-95-6		H		H
nitrosomethylvinylamine, N-		4549-40-0		H		H
nitrosomorpholine, N-		59-89-2			M	M
nitroso-N-butyl-N-(4-hydroxybutyl)amine, N-	N-nitrosodi-n-butylamine	700-48-1			M	M
nitroso-n-ethylurea, N-	N-ethyl-N-nitrosourea; ENU	759-73-9		H		H
nitroso-n-methylurea, N-	N-methyl-N-nitrosourea	684-93-5		H		H
nitrosonornicotine, N ¹ -		16543-55-8			M	M
nitrosopiperidine, N-		100-75-4			M	M
nitrosopyrrolidine, N-		930-55-2			M	M
nitrososarcosine, N-		13256-22-9			M	M
n-nitroso-n-butyl-n-(3-carboxypropyl)amine	N-Nitrosodi-n-butylamine	38252-74-3			M	M
norethisterone		68-22-4			M	M
ochratoxin a		303-47-9			M	M
octabromobiphenyl		61288-13-9			M	M
oil orange ss		2646-17-5			M	M
o-toluidine hydrochloride		636-21-5			M	M
oxazepam		604-75-1			M	M
oxydianiline, 4,4-	4,4'-diaminodiphenyl ether	101-80-4			M	M
oxymetholone		434-07-1			M	M
PAHs		NA			M	M
palygorskite	attapulgit	12174-11-7			M	M
panfuran s		794-93-4			M	M

<u>Appendix A, (Continued)</u>						
Material	Synonyms	CAS#	Extreme	High	Moderate	ALL
para-aminoazobenzene		60-09-3			M	M
para-chloroaniline		106-47-8			M	M
para-dichlorobenzene		106-46-7			M	M
PBBs		NA			M	M
pentachloroethane		76-01-7			M	M
phenacetin		62-44-2		H		H
phenazopyridine hydrochloride		136-40-3			M	M
phenobarbital		50-06-6			M	M
phenolphthalein		77-09-8			M	M
phenoxybenzamine hydrochloride		63-92-3			M	M
phenyl glycidyl ether		122-60-1			M	M
Phenylphenol sodium salt tetrahydrate, 2-	sodium o-phenylphenate	132-27-4			M	M
phenytoin		57-41-0			M	M
phorbol myristate acetate	TPA	16561-29-8			M	M
polybrominated biphenyls	PBBs	NA			M	M
polychlorinated biphenyls	PCB	NA			M	M
polychlorinated biphenyls	PCBs	1336-36-3			M	M
polychlorophenols and their sodium salts		NA			M	M
polycyclic aromatic hydrocarbons	PAHs	NA			M	M
ponceau 3r		608-01-6			M	M
ponceau mx		3761-53-3			M	M
procarbazine hydrochloride		366-70-1		H		H
progesterone		57-83-0			M	M
progestins		NA			M	M
propanesultone, 1,3-		1120-71-4			M	M
propiolactone, b-		57-57-8	>1.0%	<1.0%		E
propylene oxide		75-56-9			M	M
propylthiouracil		51-52-5			M	M
reserpine		50-55-5			M	M
safrole		94-59-7			M	M
selenium sulfide		7446-34-6			M	M
semicarbazide hydrochloride		563-41-7			M	M
silica, crystalline (inhaled)	quartz silica, crystalline (respirable size)	14808-60-7		H		H
silica, crystalline (respirable size)		NA			M	M

<u>Appendix A, (Continued)</u>						
Material	Synonyms	CAS#	Extreme	High	Moderate	ALL
soot		NA		H		H
sterigmatocystin		10048-13-2			M	M
streptozotocin		18883-66-4			M	M
styrene		100-42-5			M	M
styrene-7,8-oxide		96-09-3		H		H
talc containing asbestiformfibres		NA		H		H
tamoxifen		10540-29-1		H		H
teniposide		29767-20-2		H		H
tetrachlorodibenzo-p-dioxin, 2,3,7,8-	TCDD	1746-01-6	E			E
tetrachloroethane, 1,1,1-		630-20-6			M	M
tetrachloroethane, 1,1,2-		79-34-5			M	M
tetrachloroethylene	perchloroethylene	127-18-4		H		H
Tetraethyllead		78-00-2		H		H
tetrafluoroethylene		116-14-3			M	M
Tetramethyllead		75-74-1		H		H
tetranitromethane		509-14-8			M	M
thioacetamide		62-55-5			M	M
thiodianiline, 4,4'-	Diaminodiphenyl sulfide, 4,4'-	139-65-1			M	M
thiotepa		52-24-4		H		H
thiouracil, 2-		141-90-2			M	M
thiourea		62-56-6			M	M
thorium dioxide		1314-20-1	E			E
Toluene 2,4-diisocyanate	toluene diisocyanate	584-84-9			M	M
toluidine, o-		95-53-4			M	M
toxaphene		8001-35-2			M	M
toxins derived from fusarium moniliforme		NA			M	M
treosulfan		299-75-2	E			E
trichloroethylene		79-01-6		H		H
trichlorophenol, 2,4,6-		88-06-2			M	M
trichloropropane, 1,2,3-		96-18-4		H		H
tris(2,3-dibromopropyl) phosphate		126-72-7		H		H
Tris(2-chloroethyl)amine hydrochloride	trichlormethine trimustine hydrochloride	817-09-4			M	M

<u>Appendix A, (Continued)</u>						
Material	Synonyms	CAS#	Extreme	High	Moderate	ALL
trypan blue		72-57-1			M	M
uracil mustard		66-75-1			M	M
urethane	ethyl carbamate	51-79-6			M	M
vinyl acetate		108-05-4			M	M
vinyl bromide		593-60-2		H		H
vinyl chloride		75-01-4	E			E
vinyl fluoride		75-02-5		H		H
vinyl-1-cyclohexene diepoxide, 4-	4- vinylcyclohexene diepoxide	106-87-6			M	M
vinylcyclohexene, 4-		100-40-3			M	M
zalcitabine		7481-89-2			M	M
zidovudine	AZT	30516-87-1			M	M