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ANALYSIS OF THE IMPACT OF THE REGULATION OF TOXIC SUBSTANCES ON SANDIA

C. Arnold, Jr. and J. Pigg

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ANALYSIS OF THE IMPACT OF THE REGULATION
OF TOXIC SUBSTANCES ON SANDIA*

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The research for this report was completed October 1, 1979; the nature of the regulations and regulatory agencies necessitates continual up-dating.

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ABSTRACT

In recent years, Congress has passed two regulatory acts, namely the Occupational Safety and Health Act (OSHA) and the Toxic Substance Control Act (TSCA) which seek to control the manufacture, use, and disposal of hazardous chemical substances. These acts can have a significant impact on Sandia's missions and will particularly affect those organizations involved in materials development and selection. The primary purpose of this report is to describe in some detail the impact of these acts on Sandia's corporate goals and make recommendations on what our response should be. Also described in this report is the present position of Sandia with respect to these regulatory acts and the policies and actions that Sandia has taken to date in an effort to minimize their impact.

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INTRODUCTION

In recent years, Congress has passed a number of regulatory acts which seek to control the manufacture, use and disposal of hazardous chemical substances. These acts, and the governmental agencies responsible for their implementation and enforcement are listed in Table I.

In this report, the discussion primarily will focus on two of these acts, namely, the Toxic Substances Control Act and the Occupational Safety and Health Act; these regulatory acts have the greatest potential impact on Materials and Process Sciences, 5800 and other organizations involved in selection of materials. However, people in these organizations should also be aware of certain provisions of the Hazardous Materials Transportation Act; these provisions will be discussed in the sections on impacts and responses. The impact of some of these acts, such as the Clear Air Act or the Clean Water Act, is minimal because Sandia is not a major source of pollutants. This is not to say, however, that these acts are being ignored; organizations such as Industrial Hygiene, 3311, Safety Engineering, 3442 and Traffic Management, 3742 are responsible for complying with or dealing with these acts.

In addition to a discussion of the acts themselves, the role of various agencies and special committees in implementing these acts will be discussed. We will, for example, discuss the function of the National Institute of Occupational Safety and Health, the Interagency Testing Committee and the Interagency Regulatory Liaison Group.

The major purposes of this report are:

1. to describe the intent, mandate, requirements and modes of implementation of the Toxic Substances Control Act and the Occupational Safety and Health Act;
2. to review the current status of these acts;
3. to define the serious impacts that the regulation of toxic substances can have on Sandia's mission;
4. to describe the policies and actions that Sandia has taken to date in an effort to minimize the impact of these acts; and
5. to make recommendations with regard to future responses.

DESCRIPTION OF ACTS

Toxic Substances Control Act (TSCA). The intent of this act is to protect human health and the environment from chemical hazards. This act differs from other acts that control chemicals, such as the Clean Air Act or the Water Pollution Control Act, in that it seeks to primarily control chemicals at their source rather than as by-products of processes or at disposal sites. The Toxic Substances Control Act is very intricate and far reaching, and it can have a substantial impact on Sandia. Under the mandate of this act,

the Environmental Protection Agency has the authority to control or ban not only any chemical already in commerce, but also any new chemical prior to its introduction into the market place. The mandate of this act can be generally divided into four parts listed below:

1. Inventory Reporting (Section 8)
2. Testing Rules (Interagency Testing Committee) (Section 4)
3. Notification (Section 5)
 - a) Premanufacture (Section 5a)
 - b) Substantial Risk (Section 8e)
4. Control Authority (Section 6).

Section 8(b) deals with the development of an inventory of chemicals manufactured, imported, or processed in the U. S. since January 1, 1975. The initial inventory, published in June 1979, was compiled from information received from manufacturers, processors or users on chemicals made or used in quantities greater than 1000 lbs/year; information was also gathered on sites of manufacture and type of usage of each chemical. Currently, a second, 210-day reporting period is underway in order to include any chemicals which may have been omitted from the initial inventory; the publication of this list will be known as the Revised Chemical Inventory.

In the section on testing, the Environmental Protection Agency has the authority to require that manufacturers or processors conduct toxicological tests on all new chemicals and on any chemical which the Agency suspects may present an unreasonable risk of injury to health or environment. As a start toward implementing this section of the law, the Environmental Protection Agency appointed the Interagency Testing Committee to recommend chemicals which should have priority testing. In establishing such a list, it was decreed that this committee should give top priority to those chemical substances and mixtures which are either known to cause or suspected of causing cancer, gene mutations or birth defects. In addition, if insufficient data are available to ascertain if a given chemical poses an unreasonable risk, this committee will designate which tests are acceptable and can be used to determine the degree of risk.

Section 5 requires that any manufacturer must submit information to the Environmental Protection Agency of any new chemical that they plan to commercialize ninety days prior to its introduction. This rule also applies to any "old" chemical for which a "significant" new application is contemplated. The information must include toxicity testing. Furthermore, the Agency (Administrator) must be notified by any person "who obtains information which reasonably supports the conclusion that a given substance or mixture presents substantial risk of injury to health or the environment, unless such a person has actual knowledge that the Agency (Administrator) has been adequately informed of such information."

Under Section 6 of the Act, the Environmental Protection Agency has the authority to prohibit the manufacture, processing or distribution of any chemical substance deemed to pose an unreasonable risk. They can also impose limits on the amount used and total exposure. Section 7 of the

Act, gives the EPA the authority to commence civil action to seize chemicals judged to be imminently hazardous.

Occupational Safety and Health Act (OSHA). The intent of this act is to assure so far as possible that every working man and woman will have safe and healthful working conditions. Under this act, the Occupational Safety and Health Administration has the authority to promulgate standards on all facets of work conditions. There are three kinds of standards: (1) early standards, (2) temporary emergency standards, and (3) permanent standards. Early standards are those that are chosen from standards already in existence as federal or national consensus standards. Temporary emergency standards are designed to deal quickly with a potentially dangerous situation. Permanent standards are typically more complex, formulated more slowly and based on broader research and expertise. Standards for hazardous chemicals are based, in part, on data generated by the National Institute of Occupational Safety and Health (NIOSH). NIOSH proposes and recommends standards which later may or may not be adopted by OSHA.

Department of Energy Contractors (including Sandia) are required to comply with the standards issued by the Occupational Safety and Health Administration; The Department of Energy is responsible for the enforcement of these standards. Employee complaints should, therefore, be directed to the Department of Energy and not directly to OSHA.

POLICY ON CARCINOGENS

As mentioned above, the Interagency Testing Committee was instructed to give top priority to mutagens, carcinogens and teratogens in their selection of chemicals for further testing and possible control. Another advisory committee, the Interagency Regulatory Liaison Group (IRLG), was also appointed by EPA, OSHA and 3 other agencies, to define a policy on carcinogens which will be adhered to by all agencies. The Committee will make recommendations on what criteria are to be used to identify carcinogens and what is the best way to control such substances. Although the policy that this group will recommend has not yet been finalized, the following, we believe, summarizes their current thinking:

1. There will be greater reliance on animal testing in the laboratory to determine carcinogenic potential;
2. Epidemiological studies on humans, are valuable and should be used in conjunction with animal studies;
3. The threshold concept for carcinogens will probably be a matter for regulatory policy rather than a matter for precise scientific determination; therefore, in setting standards for occupational exposure to carcinogens, the regulatory agency should require that employee exposure be reduced to the lowest possible level.

Final standards promulgated by the Occupational Safety and Health Administration will form the basis of the regulations on carcinogens by the other agencies.

CURRENT STATUS WITH RESPECT TO IMPLEMENTATION

Toxic Substances Control Act. The initial chemical inventory has been compiled and distributed (June 1979). Processors and users are now obliged to review this list and add to it any chemical which they use that are not included. (Copy of the initial inventory available in Org. 3311). The Synthetic Organic Chemical Manufacturers Association has reported that this inventory is far from complete. Some manufacturers are distressed with the reporting requirements, particularly those parts which deal with site location and volume of production. They feel that this information could be used to their disadvantage by competitors.

In three reports, the Interagency Testing Committee has identified classes of chemicals and individual compounds for priority testing and made recommendations for the kinds of testing needed. The first list, along with the rationale of how these materials were chosen, was published in the Federal Register on October 4, 1977.

Classes of Compounds

- *Alkyl epoxides
- *Alkyl phthalates
- *Monochlorinated and dichlorinated benzenes
- Monochlorinated and dichlorinated paraffins
- Cresols
- *Xylenes

Individual Compounds

- Chloromethane
- Hexachloro-1,3-butadiene
- Nitrobenzene
- *Toluene

A second report was published in the Federal Register of 4/19/78. It recommends addition of eight items to the priority list; four classes and four individual compounds. These are:

Classes of Compounds

- *Aryl phosphates
- Chlorinated naphthalenes
- *Halogenated alkyl epoxides
- Polychlorinated terphenyls

Individual Compounds

- *Dichloromethane
- Acrylamide
- Pyridine
- 1,1,1,-Trichloroethane

*The asterisked compounds are used by Sandia. The potential impact of this on Sandia will be discussed in a later section.

A third report on 10/30/78, includes the following:

Chlorinated benzene, tri, tetra and penta
1,2-dichloropropane
*Glycidyl derivatives

With the exception of polychlorinated biphenyls (PCB's) and aerosol chlorofluorocarbons, no regulations have yet been issued under the mandate of this act. Partly because Congress felt that the Environmental Protection Agency was dragging their feet in the regulation of PCB's under the mandate of other regulatory acts, they included a provision in the Toxic Substances Control Act to prohibit the manufacture of these products.

Occupational Safety and Health Act/National Institute of Occupational Safety and Health. Since the passage of this act in 1970, seven emergency temporary standards have been published under Section 6(c) of the Act. They are:

Asbestos (12/7/73)
Organophosphorus pesticides (5/1/73)
Carcinogens (14) (5/3/73)
Vinyl chloride (4/5/74)
Benzene (5/3/77)
DBCP (9/9/77)
Acrylonitrile (7/1/77)

Methylene bis-o-chloroaniline (MOCA), a urethane curing agent that was widely used by Sandia and specified in many weapons, was among the fourteen carcinogens specified in the above standard. Permanent standards on the following compounds or mixtures have been promulgated:

Asbestos
Carcinogens (13)
Coke oven emissions
Benzene
DBCP
Arsenic
Cotton dust
Acrylonitrile
Lead

Because of a legal technicality, MOCA was removed from the standard on carcinogens. It is anticipated that a new permanent standard will eventually be promulgated on MOCA but at the present time there are no regulations on MOCA.

The National Institute of Occupational Safety and Health has proposed fifty-six recommended standards on the basis of toxicological data that they have gathered or generated. These are:

Acrylamide
 *Alkanes (C₅-C₈)
 **Allyl chloride
 Anesthetic gases and vapors, waste
 Asphalt fumes
 *Benzoyl peroxide
 *Beryllium
 Boron trifluoride
 Cadmium
 ***Carbon disulfide
 ***Carbon monoxide
 **Chlorine
 Fluorocarbon polymers,
 decomposition products
 **Formaldehyde
 *Glycidyl ethers
 *Hydrazines
 Hydrogen cyanide and cyanide salts
 ***Hydrogen sulfide
 *Hydroquinone
 *Isopropyl alcohol
 Kepone
 *Lead, organic
 *Mercury, inorganic
 *Methyl alcohol
 *Methylene chloride
 Methyl parathion
 *Nickel, inorganic
 *Nitric acid
 Nitroglycerin & EGD

*Chloroform
 *Chromic acid
 *Chromium (VI)
 Dioxane
 *Epichlorohydrin
 Ethylene dibromide
 Ethylene dichloride (1,2-
 dichloroethane)
 Ethylene glycol dinitrate
 Fibrous glass
 Flouride, inorganic

 *Organotin compounds
 Parathion
 Pesticides
 *Phenol
 **Phosgene
 *Polychlorinated biphenyls
 *Silica, crystalline
 *Sodium hydroxide
 Sulfur dioxide
 *Sulfuric acid
 *Toluene
 *Toluene diisocyanate
 *Trichloroethylene
 *Tungsten & cemented tungsten
 carbide
 *Ultraviolet radiation
 Vanadium
 Vinyl chloride
 *Zinc oxide

Again substances that Sandia uses are indicated by an asterisk. A single asterisk means that Sandia either uses the material or calls it out; a double asterisk means that the product is used to make a material that Sandia uses; and a triple asterisk refers to compounds that could, if regulated, have an adverse effect on emerging energy technologies.

In addition, the National Institute of Occupational Safety and Health has issued intelligence bulletins on the following compounds that Sandia uses and are called out in weapons systems:

Chloroprene
 4,4'-Diaminodiphenylmethane
 Chloroform
 Explosive azides
 B-naphthylamine
 Glycidyl ethers

IMPACTS

Potential Impacts. The Toxic Substances Control Act and the Occupational Safety and Health Act give the regulatory agencies the authority to:

1. Prohibit the manufacture of a given toxic chemical;
2. Limit the amount that a toxic chemical may be produced;
3. Limit the human and environmental exposure to such a point that elaborate engineering controls would be required to achieve these exposure levels.

Even if the regulatory agency did not ban a chemical, the economic impact of the regulation could force a manufacturer to withdraw his product from the market. The impact on Sandia could be quite serious. Some of the adverse consequences of stringent regulatory actions are listed below:

1. Delays in the transfer and commercialization of new energy technologies;
2. Delays in the procurement of materials essential for National Security Operators;
3. Greater costs for testing to assess the health and environmental risks;
4. Greater costs to provide the additional engineering controls required to protect health and the environment;
5. Liability of Sandia personnel for non-compliance with the provisions of these acts.
6. Increased costs of funding or developing non-toxic substitutes if compliance is not feasible or if the materials are withdrawn;
7. Problems associated with the aging and compatibility of new materials which could lead to uncertainties in the stockpile life of weapons.

This does not mean that if a chemical were regulated these impacts would automatically occur. These are the worst case possibilities. It is rather difficult to foresee how stringently a toxic material will be regulated. While we can sometimes infer something about the degree of stringency from the proposed standards published by the National Institute of Occupational Safety and Health, the Occupational Safety and Health Administration is not bound by their recommendations. Also, it should be remembered that standards that are unreasonably stringent can be appealed and/or modified. Consequently, the final standard might be quite a bit different from an early version.

Impacts to Date. The impact of one of these regulatory acts, namely the Occupational Safety and Health Act, was felt when the Occupational Safety and Health Administration promulgated their standard on fourteen carcinogens. As mentioned above, MOCA, a urethane curative widely used in weapons, was

included in the list. The restrictions were so severe that the decision was made to abandon the use of MOCA and substitute another material in its place. The replacement material that was recommended was EN-7. It was recognized at the time that EN-7 was not an "across the board" replacement for Adiprene/MOCA because of its tendency to creep under stress, but it could be used in about 90% of the applications when Adiprene/MOCA had been used. After several years it was found that a material called Apocure 601 could be used to cure Adiprene; the cured urethane obtained using Apocure 601 is regarded as an "across the board" replacement for Adiprene/MOCA and is specified as such. The impact of this regulation on Sandia and the other integrated contractors was considerable; weapons production was delayed and considerable expense was incurred in phasing out Adiprene/MOCA and searching for a replacement material. Furthermore, the aging and compatibility characteristics of the replacement material is still an uncertainty.

Sandia Materials Vulnerable to Future Regulation. Because few regulations have been promulgated by the Environmental Protection Agency under the mandate of the Toxic Substances Control Act, the impact of this act on Sandia, or anyone else for that matter, has been minimal to date. However, a look at the priority list of substances that the Interagency Testing Committee has singled out as the most hazardous from the standpoint of chronic toxicological effects (carcinogenicity), indicates that we might be in for rough times ahead. The chemicals that Sandia uses that are either members of the classes on the priority list or are individual chemicals on the priority list are summarized in Table II together with information on how the chemical is used. Sandia can also be impacted by restrictions on a chemical which we do not use but which is used in the synthesis of other chemicals that we do use. An example is halogenated alkyl epoxides. Epichlorohydrin is a member of this class; while we don't use this material directly, it is used in the manufacture of Bisphenol A, one of the major ingredients of epoxy resins. A ban of epoxy resin or their predecessors would be devastating to the weapons programs. Epoxy resins are widely used as encapsulants and adhesives; because of their unique processing characteristics and properties, we would have difficulty finding replacements. It is unlikely, however, that the Environmental Protection Agency would impose an outright ban on the above chemicals. Under the mandate of the Toxic Substances Control Act, the Environmental Protection Agency is required to consider the economic and social impact of their actions (Section 2b). Furthermore, their authority should not be exercised in such a manner as to impede technological innovation (Section 2c). Since all of the above chemicals are large production volume items, the economic and social impact of a ban would be sizable. If regulations are published on these compounds, the extent of the impact will very much depend on the severity of the restrictions imposed.

The National Institute of Occupational Safety and Health has proposed fifty-six recommended standards. Of these, Sandia uses and/or specifies twenty-three, five are used in the manufacture of substances that Sandia uses or specifies and three are by-products of energy technologies (see previous section). Not all of these materials, however, are of equal

importance; the greatest impact would be felt by restrictions on the materials listed in Table III. In addition, alerts have been published on thirty-one chemicals, six of which Sandia uses or specifies. The most critical of these are also listed in Table III.

It is likely that at least some of these materials will be controlled in the future. Again, how severe the impact will be depends on how severe the restrictions are. The impact of discontinuance, which could either result from a governmental ban (unlikely) or from a decision by the supplier to discontinue the manufacture of the product because of costly engineering controls (more likely), could be devastating.

The Hazardous Materials Transportation Act (Public Law 49 CFR 173) is an act which can have an impact on personnel involved in materials selection and development. Under the mandate of this act, any new material that is hazardous must be classified before it can be transported. According to sources at ALO, the classification process takes about two years. Clearly, this could result in rather long delays of any newly developed material for either new energy technology or weapons.

Impacts on Individuals. Non-compliance with the provisions of these regulatory acts can impact individuals as well as corporate objectives. For example, in Section 8(e) of the Toxic Substances Control Act with regard to notification of substantial risk, it is stated:

Any person who manufactures, processes, or distributes in commerce a chemical substance or mixture and who obtains information which reasonably supports the conclusion that such substance or mixture presents a substantial risk of injury to health or the environment shall immediately inform the Administrator of such information unless such person has actual knowledge that the administrator has been adequately informed of such information.

This appears to mean that virtually all employees are personally accountable for such notification. Since the penalty for non-compliance can range as high as \$25,000/day, this paragraph caused considerable distress. Numerous attempts have been made by the Environmental Protection Agency to clarify their intent here; they emphasized that they were not planning to "go after" bench chemists but would use their enforcement discretion where responsible officers have deliberately withheld information. Our opinion is that the law is deficient in that it does not force an adequate response mechanism within a company and does not define what is meant by substantial risk. Sandia's response will be described in the next section.

PRESENT POSITION OF SANDIA

In this section, a description of Sandia's present position with respect to these regulatory acts, and the actions which have been taken to mitigate their impact to date, will be discussed. Circumstances where no action is needed will also be described.

Toxic Materials Advisory Committee (TMAC). The first major action taken to minimize the impact of the use of toxic substances was the formation of the Toxic Materials Advisory Committee. This action was initiated by the Albuquerque Operations Office of the Department of Energy in 1975. Serving on this committee are members from each of the design agencies (two from each agency), a member from the Albuquerque Operations Office, and representatives from each of the production agencies. Experts in areas of industrial hygiene and materials are represented on this committee. JoAnne Pigg (3311) and C. Arnold (5811) represent Sandia Albuquerque on this committee. Specifically, the functions of this committee are:

1. Provide advice and assistance regarding the use of toxic materials.
2. Provide a reference source for consideration involving toxic material usage.
3. Provide an inter-laboratory/plant information exchange network.
4. Investigate and identify toxicity of materials used in new designs.
5. Identify toxic materials in use or planned for use which may be subject to regulatory action.
6. Act in a liaison capacity with other organizations.

Functions 1, 5, and 6 are being implemented to some extent by the writing of this report.

Toxic Substances Control Act. The following steps have been taken to comply with the provision of this act.

Inventory. As mentioned above, the initial chemical inventory is available and is incumbent upon us (Sandia) as a user and processor to make sure that any chemical that we use or process is included in this list. We have until June 1, 1980, to do this. Any chemical or material not on the final inventory will be subjected to pre-notification requirements.

Testing. If additional testing is required to assure the Environmental Protection Agency that a given chemical used by Sandia does not present an unreasonable risk to health or the environment, the manufacturers of said chemicals must bear the cost of this testing, not us. Sandia as a user or processor, is not obliged to even share the cost of this testing. If, on the other hand, a new material is developed at Sandia and this material is put into production by one of the production agencies, we will be required to do some testing to meet the premarket notification requirements.

Notification of Substantial Risk. At Sandia, it was decided that notification of the Environmental Protection Agency of substantial risks

due to toxic materials should be done through Organization 3311. This organization then has the responsibility to transmit this information to the appropriate people at EPA.

Occupational Safety and Health Act. Sandia attempts to maintain compliance with all of the standards that have been promulgated on toxic materials under the mandate of this act. Organization 3311 in cooperation with Organization 5811 is keeping a close watch on chemicals that might be regulated in the future. These chemicals have been identified in this report.

Internal Control of Toxic Materials at Sandia. Division 3311 exercises control of the procurement, transportation, handling procedures, and disposal of toxic chemicals at Sandia. Details concerning their policies and procedures can be obtained by contacting D. R. Parker, 3311, or members of his group. It should be noted that it is Sandia's policy to minimize exposure to the lowest feasible level of any compound that is suspected to be carcinogenic or mutagenic on the basis of laboratory tests even though this material may not be regulated.

5800 RESPONSES AND RESPONSE OPTIONS

Search for non-toxic substitutes. Besides identifying chemicals which may be regulated in the future and disseminating this information to the proper materials specialists, 5800 is attempting to minimize the impact of toxic materials by evaluating non-toxic substitutes for compounds likely to be regulated in the future. A substitute, for example, is being sought for 4,4'-diaminodiphenylmethane, a component of an epoxide hardner that is suspected to cause cancer.

Compliance versus replacement. While the search for substitutes is justified in some cases, this approach may not always be justified, or even feasible, in other cases. Because a material is regulated does not necessarily mean that it should be replaced by another. It may make a lot more sense to comply with the regulation. In the authors' view, compliance with a new regulation would be the correct action to take if one or more of the following circumstances prevail:

1. If the regulation is technically sound and reasonable;
2. If the cost of compliance would be less than the estimated cost of finding substitute materials;
3. If it is likely that the proposed substitutes would be hazardous and therefore subject to future regulation;
4. If it is unlikely that the regulation would cause the manufacturers to withdraw the material from the marketplace;
5. If the feasibility of finding a suitable replacement is small;

6. If there is reason to believe that the proposed replacement materials would present aging or compatibility problems.

It should also be remembered that the Toxic Substances Control Act requires premarket notification and evidence must be presented to assure the Environmental Protection Agency that any new material poses no unreasonable risk to health and the environment.

If the opposite of the above circumstances is the case, serious consideration should be given to searching for or developing replacement materials.

Appeals. There are alternative course actions other than simple compliance or replacement, and that is to contest the regulation. Standards, which many have sincerely believed to be unreasonable, have been modified and even abandoned upon appeal or by the application of pressure. This happened in the case of MOCA. Sandia should not be hesitant to take this course of action if it is believed to be warranted. Another option is to appeal on the grounds of National Security; this course of action requires Presidential approval.

CONCLUSIONS

The possible consequences of regulating toxic chemicals under the mandate of the Toxic Substances Control Act or the Occupational Safety and Health Act are:

1. Withdrawal of the chemical from commerce by
 - a. Governmental prohibition of its manufacture and use.
 - b. Economic distress caused by stringent regulations which forces the manufacturer to discontinue its production.
2. Requirements for the installation of stringent engineering controls to minimize personal exposure or injury to the environment.
3. Requirements for additional toxicological testing of new materials prior to their introduction into the marketplace.

These consequences could adversely affect Sandia's mission in the following ways:

1. Delays in the transfer and commercialization of new energy technologies.
2. Delays in the procurement of materials essential for National Security operations.
3. Greater costs for testing to assess the health and environmental risks.
4. Greater costs to provide the additional engineering controls required to protect health and the environment.

5. Liability of Sandia personnel for non-compliance with the provisions of those acts.
6. Increased costs of finding or developing non-toxic substitutes if compliance is not feasible or if the material is withdrawn.
7. Problems associated with the aging and compatibility of new materials which could lead to uncertainties in the stockpile life of weapons.

The following actions have been and are being taken by Sandia to minimize these impacts:

1. We have identified toxic substances used by Sandia for which standards have been proposed by the National Institute of Occupational Safety and Health and/or which have appeared on the intelligence bulletins published by this agency.
2. We have informed materials specialists and design engineers and their managements of our findings so that they can make timely decisions concerning materials selection. It may be possible to avoid a problem by substitution of a non-toxic material for a toxic one that may be regulated later on.
3. We are participating in the activities of the Toxic Materials Advisory Committee; among other benefits this committee provides us with contacts in the Washington Office of the Department of Energy, who in turn have contacts with their people in the regulatory agencies.
4. We have established a channel by which one can report to the Environmental Protection Agency on substantial risks.
5. We internally control the handling and use of chemicals suspected of causing cancer.
6. We have initiated a study to evaluate non-toxic and non-carcinogenic substitutes for 4,4'-diaminodiphenylmethane, a component of an apoxy curing agent that is suspected to cause cancer.

RECOMMENDATIONS

1. It is recommended that consideration be given to incorporating toxicological data into K. Mead's Compatibility Data Bank. This could be an aid to people involved in weapons design and materials selection.
2. In addition, it is recommended that records should be kept for epidemiological studies and legal scrutiny.

Table 1. Some Regulatory Acts Which Impact on Hazardous Chemicals

Act	Agency
Toxic Substances Control Act	Environmental Protection Agency (EPA)
Clean Air Act	EPA
Clean Water Act	EPA
Resource Conservation and Recovery Act	EPA
Safe Drinking Water Act	EPA
Occupational Safety and Health Act	Occupational Safety and Health Administration (OSHA); Dept. of Labor
Consumer Product Safety Act	Consumer Product Safety Commission
Hazardous Materials Transportation Act	Dept. of Transportation

Table II. Compounds of Interest to Sandia on Priority List of Interagency Testing Committee

Class or Individual Compound on Priority List	Specific Products that Sandia Uses and/or Specifies	Application/Comments
Alkyl epoxide	Bisphenol A Butylglycidyl ether	Ingredients for epoxy resins used as encapsulants and adhesives
Aryl phthalate	Diallyl phthalate	Molding compounds for connectors
Halogenated alkyl epoxide	--	Epichlorohydrin used to make Bisphenol A
Chlorinated benzene	Picryl chloride	Explosives
Xylene	Xylene	Solvent, cleaning agent
Toluene	Toluene	Solvent, cleaning agent
Arylphosphates	Proprietary ingredients of foams	Flame retardants
Dichloromethane	Dichloromethane	Cleaning agent

Table III. Compounds of Interest to Sandia on which NIOSH has Proposed Standards or Issued Alerts

Class of Individual Compound	Application at Sandia	Comments
Chromium VI	Batteries (BaCrO_4 , CaKrO_4)	Proposed Standard
Carbon monoxide	By-product of oil shale and/or coal liquefaction	Proposed Standard
Hydrogen sulfide	By-product of oil shale and/or coal liquefaction	Proposed Standard
Epichlorohydrin	Used to make epoxy resins	Proposed Standard
Formaldehyde	Used to make phenolic plastics	Proposed Standard
Nickel	Plating on uranium alloys	Proposed Standard
Organotin compounds	Urethane catalyst	Proposed Standard
Phenol	Used to make phenolic plastics	Proposed Standard
Phosgene	Used to make isocyanates for urethane rubbers and foams	Proposed Standard
Toluene diisocyanate	Used to make urethane rubbers and foams	Proposed Standard
Trichloroethylene	Degreasing solvent	Proposed Standard
Chloroprene	Rubber insulators	Alert
4,4'-Diaminodiphenylmethane	Epoxy resin curative (one component)	Alert
Glycidyl ethers	Epoxy resin diluant	Alert

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