Diamond Shamrock

Interoffice Correspondence

To: M. Labovitz
R. A. Paradis
J. R. Semancik
From: R. R. Griffiths
Date: November 3, 1980

Subject: REPRODUCTIVE HAZARDS

cc: D. E. Frey
D. L. Lull
R. E. Nagy
J. E. Zimmerman
File: P905
Central Files - PD

The attached memo from Joe Ignatoski is a follow-up to our meeting on October 27 concerning the possible reproductive hazards of the chemicals we use. As you may recall, Joe was to send us a list of those chemicals EPA felt represented the greatest risk to the health and environment and, thus, should receive priority attention in their testing programs. We were to use this list in establishing our priorities in investigating the chemicals we use for their potential as a reproductive hazard.

You will notice that EPA has not stated the rationale for placing chemicals on this list. I believe the criteria for placing chemicals on this type of list involves a combination of sales volume and questionable toxicology. Therefore, while this list provides a good starting point, it does not address our specific concern -- reproductive hazards.

I have attached two articles from C&E News which provide a good update on the issues and problems in this area. Please note on page 31 that B. F. Goodrich has identified ten chemicals which may possibly represent a reproductive hazard. We use six of these ten chemicals (excluding VCM) in our work here at the Research Center. Additionally, Kent Hatfield has added phthalates and cyclohexanone to the list, bringing the total to eight chemicals which might represent a reproductive hazard.

As a starting point, the Department of Safety Assessment (DOSA) is evaluating the specific reproductive hazards associated with the chemicals we use which contain barium,

boron, cadmium, lead, phthalates, and cyclohexanone. I would recommend that this be followed up with an investigation of the teratogenic potential of carbon tetrachloride, chloroform, methyl ethyl ketone, mercury, and N,N-dimethyl-acetamide. Next, chemicals we use which fit the EPA list should be evaluated.

I will review the list of chemicals R&E uses for a match with the EPA list. Perhaps at this point, another meeting should be held between R&E, SAL and DOSA to determine future direction.

R. R. Griffiths

/jsh

Attachments

Memo From

J. A. IGNATOSKI

October 27, 1980

TO: Reuss Griffiths

Per our conversation at lunch today, attached on page 3 is the TSCA list of top 50 as it stands today.

Joe

JAI

Attachment

jms

Diamond Shamrock

Diamond Shamrock

(F)

Interoffice Correspondence

To: R. W. McBurney
From: J. A. Ignatoski
Date: July 21, 1980

Subject: TOXIC SUBSTANCES CONTROL ACT (TSCA) -- HUMAN HEALTH AND ENVIRONMENTAL DATA REQUIREMENTS ON CHEMICAL SUBSTANCES

With the recent promulgation by the Environmental Protection Agency (EPA) under TSCA listing the proposed testing programs to develop the above-captioned information on chlorinated benzenes and chloromethane, I felt a brief review of this subject relative to Diamond Shamrock's position in cases where the proposed testing requirements are germane is in order.

Under TSCA an Interagency Testing Committee was established and charged with the responsibility of making recommendations to the Administrator of the EPA regarding chemicals which should be given priority by EPA for testing to determine adverse effects on human health and the environment. To date, this committee has issued six reports covering thirty-nine (39) chemicals and/or chemical classes (see attachments). As you will note, the first report was to be acted upon by the EPA by October, 1978. The EPA has missed this deadline and has taken its first action this week on chloromethane and chlorinated benzenes.

Since these reports by the Interagency Testing Committee go back to 1978, I thought it might be well for the various divisions within Diamond Shamrock to review the attached list and indicate which of these chemicals are of interest. We should be specific as to whether the compound in question is a final product or an intermediate, since only the manufacturers of the final product will have to generate the necessary health and safety data. We will, however, follow developments on key intermediates since their test results may impact our plant operations under OSHA. This communication by HEAD to the various divisions would serve two purposes: (1) Serve as a reminder as to what compounds or classes of compounds are presently being reviewed by the EPA under TSCA, and (2) the Department of Safety Assessment needs the feedback to know what specific chemicals are of interest to Diamond Shamrock so we can review the test rules covering these compounds as they are promulgated.

Regarding the review of the test rules, I would suggest the following procedure: Once the rules covering a compound of interest to Diamond Shamrock are promulgated, the Department of Safety Assessment, upon notification of such a promulgation would notify the appropriate division of such action and given them our view. If the appropriate Division agrees, the

Department of Safety Assessment will respond within one hundred and five (105) days to the EPA as to Diamond Shamrock's view. If after informing the EPA as to our views, testing requirements are still required, we will again inform the appropriate division as to the significance of such tests, their costs and time frames to conduct them. If the chemicals involved are commodity chemicals produced by several manufacturers, I presume a task force will then be created to finance and direct this effort. The Safety Assessment Department will give any assistance it can in this endeavor.

The significance of the above-described procedure is that: (1) we need an update of chemicals which to date have made the list of chemical substances reported on by the Interagency Task Force so we may address ourselves to the EPA's proposals on pertinent compounds as quickly as possible; and, (2) it is my recommendation that no working task force be formed until test rules on a given compound are promulgated since I cannot see anything to be gained in trying to second-guess the EPA.

J. A. Ignatoski

jms

Attachments

ITC REPORT NUMBER	CHEMICAL SUBSTANCE OR CATEGORY	DESIGNATED FOR ACTION BY		FEDERAL REGISTER TEST RULES PROPOSED	FINAL
1	Alkyl epoxides	October	1978		
	Alkyl phthalates	"	"		
	Chlorinated benzenes, mono- and di-	"	"	7/17/80	
	Chlorinated paraffins	"	"		
	Chloromethane	"	"	7/17/80	
	Cresols	"	"		
	Hexachloro-1,3-butadiene	"	"		
	Nitrobenzene	"	"		
	Toluene	"	"		
	Xylenes	"	"		
2	Acrylamide	April	1979		
	Aryl phosphates	"	"		
	Chlorinated naphthalenes	"	"		
	Dichloromethane	"	"		
	Halogenated alkyl epoxides	"	"		
	Polychlorinated terphenyls	"	"		
	Pyridine	"	"		
	1,1,1-Trichloroethane	"	"		
3	Chlorinated benzenes, tri-, tetra- and penta-	October	1979	7/17/80	
	1,2-Dichloropropane	"	"		
	Glycidol and its derivatives	"	"		
4	Acetonitrile	April	1979		
	Aniline and chloro-bromo-, and or nitro-anilines	"	"		
	Antimony (Metal)	"	"		
	Antimony (Sulfide)	"	"		
	Antimony (Trioxide)	"	"		
	Cyclohexanone	"	"		
	Hexachlorocyclopentadiene	"	"		
	Isophorone	"	"		
	Mesityl Oxide	"	"		
	4,4-Methylene dianiline	"	"		
	Methyl ethyl ketone	"	"		
	Methyl isobutyl ketone	"	"		
5	Benzidene based dyes	November	1979		
	O-dianisidine-based dyes	"	"		
	O-tolidine-based dyes	"	"		
	Hydroquinone	"	"		
	Quinone	"	"		
6	Phenylenediamine				

News Feature

Reproductive hazards in the workplace

Confrontation over issues surrounding genetic protection involves chemical companies, unions, workers' rights groups, and several government agencies

Rebecca L. Rawls
C&EN, Washington

The stage is set for confrontation. The overture began in the mid-1970's when workers in plants manufacturing chemicals such as kepone and 1,2-dibromo-3-chloropropane (DBCP) began to complain of sterility and other reproductive deficiencies caused, they thought, by exposure to these chemicals.

The curtain rose late last year when the Department of Labor cited American Cyanamid for work policies which, it claimed, forced women to be sterilized or lose their jobs at Cyanamid's Willow Island, W.Va., lead pigments manufacturing facility.

At about the same time, a woman in Ohio brought suit against B. F. Goodrich Co. for not allowing her to continue to work in an area where vinyl chloride is polymerized because of the potential risk of chemical exposure to a fetus should she become pregnant.

The 1980's as a "decade of genetic confrontation"—which one labor leader already is calling it—seems well under way.

It is a confrontation that is drawing in many parties. Labor unions and other workers' rights groups are involved. Coalitions of many of these groups are forming. Probably most notable is the Coalition for the Reproductive Rights of Workers (CROW), which pulls together labor unions, women's rights groups, and legal groups concerned with possible violations of an individual's right to fair employment in the name of genetic protection.

The federal government also is involved through several different agencies. The Occupational Safety & Health Administration in the Department of Labor has taken the lead among the government agencies. Its interest comes from its charge to assure a healthful workplace for all employees. But the federal agencies responsible for assuring equal treatment of men and women in employment also are involved, principally the Equal Employment Opportunity Commission and the Department of Labor's Office of Federal Contract Compliance Programs. Just last week these two agencies issued joint guidelines to employers on which programs aimed at protecting workers' offspring they would consider nondiscriminatory.

And, of course, the chemical companies are involved. So far, their role remains the key one, for individually they are still setting personnel policies within their companies. There were no uniform federal guidelines until last week, and it is still too early to see the impact of the new guidelines on company policies. Labor unions and other workers' rights groups, for now, are aiming their efforts primarily at influencing the government to control the companies tightly. They have only begun in a small way any direct action against the companies themselves.

The most recent cases to draw public attention have centered on the question of women working in certain areas. But women workers are only part of the issue. Men, too, can be affected by exposure to certain chemicals, and such exposure could very likely cause abnormalities in offspring.

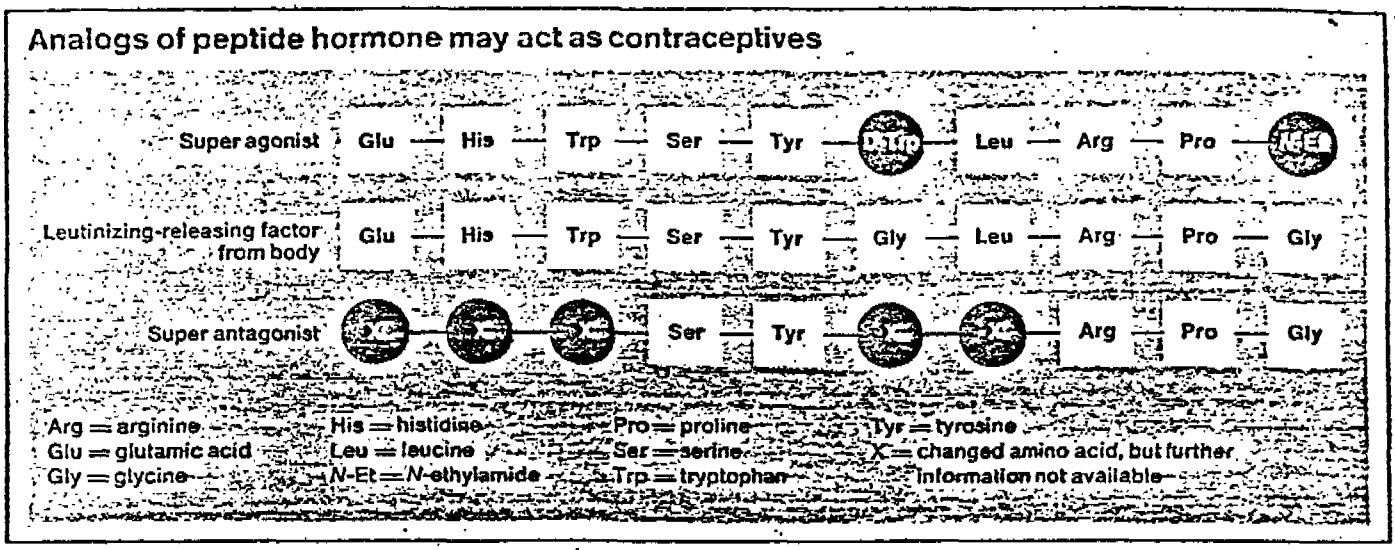
A case in point is that of chemical workers at a Rensselaer, N.Y., chemical plant that made Oryzalin, a herbicide sold by Eli Lilly & Co. for control of weeds in soybean and fruit crops. Last November, the International Chemical Workers Union urged OSHA to shut down the Rensselaer plant and the Environmental Protection Agency to ban the use of Oryzalin, charging that the Lilly herbicide was responsible for birth defects or miscarriages among the offspring of five male workers at the facility.

According to the union, no normal pregnancies occurred in the families of the 110 workers at the plant during the 18 months that the compound was being produced there. But three children were born with heart defects, a fourth, who died of pneumonia two months after birth, also may have had a heart defect; and a fifth pregnancy ended in miscarriage. In each case, it was only the fathers of the children who worked with Oryzalin (C&EN, Nov. 12, 1979, page 6).

OSHA and the National Institute for Occupational Safety & Health are looking into the union's claims about Oryzalin, both at the Rensselaer plant and at other locations where Oryzalin is made. So far, according to ICWU general counsel Salvatore J. Falletta, NIOSH has not found any evidence of harm to offspring of workers at other locations. This does not mean that the chemical is not the source of the problem, Falletta points out. It may, for instance, be handled differently at the other locations, posing a hazard only at the Rensselaer site. OSHA's final report on the question is expected in the next few weeks.

Eli Lilly says that the birth defects among the families of workers at the Rensselaer plant are "multiple coincidences" and have nothing to do with exposure of the fathers to Oryzalin or its precursors. This is the conclusion of the New York Institute of Birth Defects and doctors at the Albany Medical Center, who have been investigating the cases since the first of the children were born in 1976, the company says.

This article is part 1 of a two-part series. Here, C&EN examines the issue of male reproductive hazards, disputes that seem headed for court settlements, and the government's emerging position. Part 2 will examine how government, chemical companies, and unions are approaching th problems of worker protection.



men and women. For example, administration of LRF and LRF agonists to women by nasal spray has been going on for some time in the U.S. and Europe. Although ovulation can be blocked by such treatment, dose is difficult to regulate, which may contribute to side effects.

However, when dose is controlled by administering LRF agonists in daily injections, ovulation can be blocked apparently without producing undesired side effects, he says. "The longest experiment so far has lasted 16 weeks. And we know the ovary is still working even though the contraceptive effect is working."

There still are many unknowns and potential drawbacks. Though daily injections aren't a particularly attractive means of administration, other possibilities, such as by vaginal application, may prove equally effective.

Other questions about side effects remain open, waiting for longer-term studies on larger groups. So far, the few volunteers who have received daily injections of agonists also have had their blood monitored for changes in hormone concentrations. "Production of estrogen simmers down to normal levels," Yen says. But if that is a positive sign about the agonists' effects, the problem remains that the agent apparently must be given once daily without interruption. Thus menstruation is prevented, a disruption that could have undesirable health effects.

The superagonists also have been tested in men, again in limited fashion so far. Most testing has been done on patients having gonadal deficiencies that have prevented normal sexual maturation. But, according to David Rabin of Vanderbilt University, testing of the agonist's potential contraceptive value soon will begin on a few volunteers who had planned to have vasectomies. □

Technology

Matheson recycles gas lecture bottles

A program to recover spent gas lecture bottles of all manufacturers from users has been set up by Matheson, Lyndhurst, N.J. This recovery program will solve disposal problems for users, who often let spent lecture bottles pile up, not knowing how to get rid of them safely.

About 250,000 of these convenient, 2- by 14-inch gas bottles are sold each year for small-scale use in research, lecture demonstrations, and industrial processes. Electronics firms use them, for example, to dispense the small amounts of gases for doping semiconductor materials.

Problems start when pressure is exhausted. "Empty" bottles still contain residual gas, possibly flammable, reactive, or toxic, at or near atmospheric pressure. It isn't safe to throw them into the trash, because incineration may cause explosion. Up on long standing, spent bottles may leak.

Matheson marketing vice president Frank Scornavacca estimates that there may be 500,000 spent lecture bottles lying around at colleges, universities, research institutes, and companies all over the country. He points out that Matheson has bought back its own lecture bottles for several years at $2.00 each. Under the new program, the firm now will pay $2.00 each for bottles of other suppliers also, provided that customers buy an equal number of filled Matheson bottles. Matheson will clean and test all recovered bottles, regardless of original supplier, install new valves, and refill them for sale. Scornavacca says other suppliers accept spent bottles only under duress or not at all.

Persons wanting to take up Matheson's offer can contact any of the company's 12 plants or call Al Steenwyk, product manager for gases, in Lyndhurst. Those located some distance from a Matheson plant may have to arrange packing and shipment by United Parcel Servic or common carrier. Scornavacca says the $2.00 rebate will more than make up costs of packing and shipping from users who have let hundreds of bottles collect.

Users of gas lecture bottles hav resorted to drastic means through the years to dispose of spent bottles. One electronics firm hauled a load of bottles to a desolate area and dynamited them. Another user set up an old drill press at a remote site to drill holes in bottles. Scornavacca says all too many persons resort to the dangerous practice of drilling holes in bottles or valves with hand-held drills. One man, faced with a leaking phosgene bottle, had himself driven to a Matheson plant, holding the bottle in the back seat of the car and wearing a gas mask. The driver was not wearing a gas mask, though, and neither man realized phosgene can be absorbed through the skin. □

A case in which the data more definitely establish a connection between occupational exposure to certain chemicals and effects on male reproductive function is that of DBCP, a soil fumigant used to control nematodes. Studies in laboratory animals and human data indicate that exposure to relatively low levels of this compound can reduce sperm counts enough to cause sterility. When data on the effects on human workers became public in 1977, the two major U.S. producers of DBCP, Dow Chemical and Shell Chemical, both stopped making it.

OSHA quickly issued temporary emergency standards for exposure to nonagricultural workers of 10 ppb in the air. OSHA's permanent standard, issued in 1978, set the exposure level at 1 ppb. EPA restricted use of the compound to a limited number of crops, chiefly citrus fruits, in 1977. Even these uses are now being challenged, however, since data gathered last summer show unexpectedly high levels of DBCP in drinking water near agricultural areas.

There is also concern that DBCP may cause birth defects in the children of workers exposed to it. One suit is under way involving California DBCP workers who claim that their sons were born with defective penises because of the workers' exposure to the chemical.

However, probably the compound attracting the most attention, because of its possible effects on male fertility or on offspring through the fathers' exposure, is 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, the contaminant in agent orange, the military herbicide used in Vietnam. Suits and countersuits have been filed in federal courts concerning the exposure of about 3000 Vietnam veterans to the compound. A Vietnam veterans group that is suing on behalf of these veterans claims, among other things, that exposure to the herbicide led to loss of sexual ability in the men and malformations in their children (C&EN, Jan. 21, page 14).

Although the veterans' suit charges birth defects associated with agent orange exposure in Vietnam, data on this point are not uniformly accepted as conclusive. NIOSH is in the midst of a multiple-generation study with rodents designed to show whether exposure to the chemical by the father can cause defects in his offspring. And at least one of the chemical companies that supplied the Defense Department with agent orange during the Vietnam war is conducting a massive study of its workers who made the herbicide to determine whether there have been any reproductive effects in this group.

Horton Co. safety products division photo

With women exposed to chemicals in work activities, such as this plating operation, concern has focused on reproductive hazards of chemical exposure

Despite the very real concern over reproductive hazards to men arising from exposure to hazardous chemicals in the workplace, the focus of this issue at the moment is on women. Nearly all chemical companies, and a great many toxicologists, generally maintain that there are chemicals that can damage a developing embryo or fetus but are not harmful to a healthy male or female adult. Controlling worker exposure to these substances is causing most of the current concern.

Not everyone agrees with this viewpoint. Anthony Mazzocchi, director of health and safety for the Oil, Chemical & Atomic Workers International Union (OCAW), for instance, says existing data do not show the fetus to be any more vulnerable to chemical damage than the sperm. "We know of no substance that affects the fetus and not male sperm," Mazzocchi says.

The emerging government position appears to be somewhere in between these two views. That is, it does not state that a substance that affects the fetus must necessarily also affect the sperm, but it does caution companies that such effects are possible and cannot be ignored without the risk of the company's being charged with sex discrimination.

Companies whose workers are exposed to reproductive hazards in th workplace may not discriminate in the hiring or work assignments of their employees on the basis of sex, including pregnancy or childbearing capacity, say th new federal guidelines issued last week by the Equal Employment Opportunities Commission (EEOC) and the Department of Labor's Office of Federal Contract Compliance Programs (OFCCP).

Companies may establish "neutral" policies to protect employees and their offspring from reproductive hazards, but they must be certain that in practice the plans do not adversely affect only one sex.

However, the new guidelines do allow for "temporary" exclusion of workers of one sex only from a workplace under certain conditions. The first of these is that there be reputable scientific evidence that the hazard is likely to harm only one sex or only pregnant employees. The employer also must show that it has thoroughly searched the scientific literature and cannot find evidence of a similar hazard for the nonexcluded sex. Finally, companies must begin, within six months, research projects to find out whether the chemicals in question also produce adverse reproductive effects in the nonexcluded sex. These research projects are to be conducted under "accepted scientific methods" and produce results within two years.

For now, these are only proposed guidelines. Chemical companies and others are being given 120 days to comment on them before they come out in final form.

The EEOC-OFCCP position reflects concerns sounded earlier in statements by officials at both NIOSH and OSHA. In a letter last month to B. F. Goodrich's manager of industrial relations F. R. Pruitt, for example, NIOSH director Anthony Robbins discusses the lack of adequate data in some cases for establishing safe levels of exposure to certain chemicals for an unborn embryo or fetus. "We must, however, stand firm on the principle that if an exposure is sufficiently toxic to produce genetic damage in an unborn child or in a fertile female, then it must be considered to be equally toxic to the fertile male worker and to his unborn child," Robbins says. "There is a priori no reason to believe that the genetic material of a male worker is in any way more resistant to toxic occupational injury than that of the female. In addition, we feel that workers of both sexes should be counseled regarding the nature of the materials with which they work and the potential toxic effects on them and on their offspring."

Robbins' letter marks a definite change from the agency's stand on this question in the early 1970's. In 1974, for example, NIOSH's occupational exposure standard for vinyl chloride recommended that "no

woman who is pregnant or expects to become pregnant should be employed directly in vinyl chloride monomer operations." In his letter to Goodrich, Robbins now says that companies that keep women of childbearing age from working in certain areas, based on the 1974 NIOSH recommendation, could be guilty of sex discrimination.

OSHA Administrator Eula Bingham has been warning companies for several years that her agency does not like policies that exclude workers from unhealthful workplaces just to avoid cleaning up the workplace. Companies should be careful in particular, she has said, of focusing their concerns for fetal safety only on the hazards that may come by way of the mother.

"Concern for female reproductive capacity and the fetus is praiseworthy, but experience is demonstrating that any given substance may be equally damaging to the male reproductive system and through the male to the fetus. I believe that attention must be focused on hazards faced by all workers—men as well as women," she stated in a letter to corporate medical directors in 1978.

"OSHA is convinced that the mere exclusion of workers does nothing to eliminate the hazard which is purported to justify exclusion," Bingham also says, "and that such exclusion is not intended by the Occupational Safety & Health Act . . . . The laws of this nation are committed to guaranteeing both healthful working conditions and equal employment opportunity. I believe, therefore, that employers should exhaust all possible avenues of worker protection (be they engineering controls, work practices, personal protective equipment, etc.) before considering the adoption of exclusionary employment practices."

Nevertheless, every chemical company contacted by C&EN maintains, at least in principle, that women who are biologically capable of pregnancy cannot be allowed to work in areas where feto-toxic chemicals are found at levels that could damage an embryo or fetus, regardless of whether the women actually are pregnant. These policies come about because major malformations, if they occur at all during a pregnancy, occur during the period from the 14th to the 40th day, when the major organ systems are being formed. And companies do not consider it possible to detect pregnancy in women workers and remove them to a safe workplace before that critical period. Thus, unless safe exposure levels for these chemicals can be established for the fetus and work exposures kept below that level, certain work areas are not open for fertile women.

Whether such a policy, in principle, illegally discriminates against women is being widely argued among the groups that are concerned with this issue. And even if the principle itself is allowed, the question still arises as to how well the personnel policies of individual companies adhere to it. Do companies sometimes act illegally to keep women out of certain kinds of jobs in the name of protecting their unborn children?

Such questions will almost certainly be resolved ultimately in the courts. The first cases in this area may be approaching the courts now.

One case centers on women who worked at American Cyanamid's Willow Island lead chromate pigments plant. These women maintain that they were pressured by the company to become surgically sterilized to keep their jobs. Cyanamid says that it did not condone the sterilization procedure and counseled the women against it. Nevertheless, under their employment practices, surgically sterilized women can work in the lead pigment area but fertile women cannot.

Lead is one of five chemicals used by Cyanamid that, it considers, poses special hazards to the fetus, according to corporate medical director Robert M. Klyne. The other four are hydrazine hydrate, hydrazine sulfate, and two pharmaceuticals, Thiotepa and Methotrexate.

These compounds were winnowed from a larger list of suspected feto-toxins through an extensive search of the information available in the literature on their toxicological effects, Klyne explains. For each substance, the company has established exposure values that it considers safe for a healthy adult and for a developing fetus. Typically, the safe levels for adult exposure are five to 10 times higher than for the fetus. In the case of lead, Klyne says, the literature review and setting of safe exposure levels took more than a year.

C&EN staff photo

Bingham: worker exclusion not answer

Altogether 23 women who worked in manufacturing operations at Willow Island were informed early in 1978 that they might be working with feto-toxic substances and that the company was formulating policies that would require their transferring to other work areas if their exposure were found to be hazardous, says William A. Fead, manager of manufacturing and marketing services for Cyanamid's organic chemicals division. By October 1978, when the policy went into effect at Willow Island, the only affected area of the plant was lead chromate pigment manufacturing, where eight women worked. In the meantime, 14 women and their union, OCAW, filed complaints against the policy with OSHA, the West Virginia Human Rights Commission, or with the Equal Employment Opportunity Commission in West Virginia or in Washington, D.C. Of the eight women working in the lead area, only two were capable of bearing children when the policy went into effect, so they were the only ones moved.

Both women initially took janitorial jobs with no change in their pay for 90 days and with special opportunities to bid for other openings in the plant as they became available. Both were offered jobs at their old pay level during the 90-day period, Fead says. One took the new job; the other chose to remain in the janitorial job and reverted to the customary pay for that job at the end of the 90 days—about a 5% reduction from the pay level in her original production line job.

Both Fead and Klyne vigorously defend Cyanamid's policy at Willow Island. "The ideal is that the workplace has to be safe for everyone—the man, the woman, and the child," Klyne explains. "In the real world, that's totally unachievable without emasculating the chemical industry. The fetus is far more susceptible to certain risks. There is no way, even with the best engineering controls, to always protect it. In those instances where we cannot protect the fetus, we are required to move it away from the hazard, and that has to mean moving the mother as well."

Effecting this policy at Willow Is-

land was particularly difficult because of the small size of the facility, Fead says. The same policy was put into effect at about the same time at Cyanamid's pharmaceutical manufacturing facility, Lederle Laboratories, with a very different outcome, Klyne says. There, 15 or 20 women were affected. They were counseled individually, rather than in group meetings as at Willow Island, and, as Klyne puts it, "The women took a far more reasonable approach." All were transferred within a couple of days into new permanent positions within Lederle at the same pay as before. Most of the women transferred from production to packaging lines within the same plant, he says. There have been no indications of dissatisfaction from these transfers, Klyne says.

Klyne attributes the main difference in the effect of the policy at the two plants to the fact that Lederle is about 10 times larger—with about 2000 jobs—than the pigments facility at Willow Island. Thus, equivalent positions were immediately available for women who were transferred out of hazardous work areas. At Willow Island, equivalent jobs were not immediately available, and the women had to be placed temporarily in lower-status jobs, although with retention of pay, until openings became vailable.

To OSHA, which cited Cyanamid for its actions at Willow Island and fined the company $10,000, any extenuating circumstances at that site are no excuse for a policy that ultimately led some women to have themselves sterilized rather than risk losing their jobs.

"It seems a very simple thing to us," says OSHA senior policy analyst Margaret R. Richardson. "You do not protect workers by inducing them to harm themselves. If an employer has people working on a roof and does not want to put a fence around the roof or provide them with safety harnesses, he can't nail their feet to the roof to keep them on."

In citing Cyanamid, OSHA is attempting to expand its authority over the setting of safety standards in the workplace. In addition to citing Cyanamid for not being in compliance with the lead standards for adults at Willow Island—a side issue that is sure to complicate the matter—it also cited the company under the general duty clause of the Occupational Safety & Health Act of 1970. This is the first time this clause has been used to justify an OSHA citation.

The clause says that the employer must provide an environment free from recognized hazards likely to cause death or serious physical harm. Serious physical harm includes harm to the reproductive system caused by sterilization, OSHA is saying with this citation. "No worker must be forced to sacrifice his or her right to conceive children in order to hold a job," OSHA's Bingham says.

The Willow Island case was supposed to be heard by an OSHA administrative law judge—the first forum for disputing the citation—last December. The hearings have been postponed, however, although they probably will be held very soon.

"Where we cannot protect the fetus, we are required to move it away from the hazard, and that has to mean moving the mother as well"

Another case that has been briefly in the courts and is likely to be back again involves a woman who worked for Goodrich Chemical Co. in Avon Lake, Ohio. The woman, Carole Doerr, worked in a vinyl chloride polymerization area and was removed from there last August when Goodrich introduced a policy of not allowing women who could be pregnant to work in areas where they are exposed to vinyl chloride.

The Goodrich policy covers 10 chemicals besides vinyl chloride. They are benzene, carbon tetrachloride, chloroform, chromium(IV), lead, methyl ethyl ketone, ethylene thiourea, mercury, acrylonitrile, and dimethylacetamide. When the policy went into effect last summer, about two dozen were found to be working in areas where they were exposed to at least one of these feto-toxic substances, says Goodrich director of health and environmental services Harold W. Dietz.

For these substances, the company does not absolutely prohibit exposure, Dietz says, but has what he calls a "practical zero." "We won't put fertile women in an environment where we know they are exposed," he says. "The fetus needs an extra degree of protection that is not feasible or required for adults. We have solid evidence that this is true."

According to Goodrich, Doerr and the other women affected by the policy were counseled individually about the reasons for the policy and were offered other jobs at the same plant with the same pay. Doerr was off red a position with the same job title as her old job in a different building at the Avon Lake facility. She chose, instead, to stay in the sam building in a lower-status job, still at the same pay. But she wants her old job back and has complained to th Equal Employment Opportunity Commission, charging sex discrimination.

Doerr bases her charge on medical evidence that vinyl chloride, in addition to possibly being a transplacental carcinogen, is also a mutagen that causes damage to sperm. Therefore, she contends, Goodrich's policy, which protects the fetus only from the cancer risk arising from the mother's occupational exposure to vinyl chloride and not from the mutation risk caused by the father's exposure, discriminates illegally by sex.

Doerr filed suit in the U.S. District Court in Cleveland last October and asked for a temporary injunction so that she not be removed from her old job. The suit was denied on a technicality—she had failed to get a right-to-sue order from the Equal Employment Opportunity Commission after first filing the complaint with them. The temporary injunction also was denied because the court felt that since her new job retained the pay and seniority of her original position she would not suffer irreparable harm by remaining in it until the dispute is settled. The court also said she hadn't demonstrated the substantial likelihood of winning her suit, another requirement for a temporary injunction.

In his decision, Judge Robert B. Krupansky spells out what he sees as the relevant issue to be decided in this case, should it ever be refiled in the proper manner: "the comparative risks of transplacental carcinogenesis on the one hand and male mutagenesis on the other resulting from exposure to vinyl chloride at the current permissible levels." These risks "are not well established, as the medical evidence to date appears largely inconclusive," he continues. "To the extent that it can be subsequ ntly demonstrated that the risk of fetal damage associated with transplacental carcinogenesis is substantially greater than that associated with male mutagenesis, it might appear that defendant's policy is grounded upon a legitimate, nondiscriminatory factor." Just how EEOC's new guidelines will affect this issue, if at all, remains to be seen.

Goodrich expects to see the case return to court. "It is very clear that B. F. Goodrich Co. is not going to be able to settle with Ms. Doerr in a way that will satisfy her," says director of industry affairs F. Terrence Flannery. "The judge has spelled out what we think is the issue. We are prepared to defend on that." □

Reproductive hazards in the workplace

Government and companies are at odds over approaches to worker protection, mainly because of differences in interpretation of the problem

Rebecca L. Rawls
C&EN, Washington

The long-awaited federal guidelines proposed early this month to detail what programs companies may have to institute to protect workers from reproductive hazards without unfairly discriminating against women in job placement are not likely to find much favor with the chemical industry.

The guidelines, issued jointly by the Equal Employment Opportunity Commission and the Department of Labor's Office of Federal Contract Compliance Programs, say that programs set up to protect workers against reproductive hazards may not discriminate in hiring or work assignments on the basis of sex, including pregnancy or childbearing potential. Women, or men, may be temporarily excluded from a particular work area where a special hazard to them is thought to be present. However, this may happen only if the hazard is well documented, there is no evidence of a similar hazard to the nonexcluded sex, and the company establishing the policy also begins, within six months, animal studies that will demonstrate, within two years, whether there is, in fact, a similar hazard to the nonexcluded sex.

It is common practice in the chemical industry not to allow women capable of bearing children to work in areas where they would be exposed to toxic levels of chemicals thought to be hazardous to a developing embryo or fetus. A great many chemical companies—though not all—have some chemicals and some workplaces where this exclusion occurs. It is done in the name of protecting the unborn child.

Clearly, the new federal guidelines, if they go into force in their present proposed form, will make it much more difficult for companies to continue these policies. The problem, as companies see it, is that federal regulators are confusing two related but separate issues. One is the need to protect workers against exposure to substances that could endanger their ability to produce healthy offspring. The second issue is the protection of the fetus or embryo, once conceived, which may itself spend several months in the workplace, possibly exposed to toxic substances.

Karrh: two separate issues

Policies that exclude fertile women from certain work areas are not aimed at protecting the woman's reproductive ability or even at protecting the unborn child from toxic effects inherited from the mother, the companies say. Instead, they are aimed at protecting the fetus as a separate individual who is in the workplace and may be faced with special risks that healthy adults, men or women, do not face.

"The biggest problem we have," says Bruce W. Karrh, corporate medical director for Du Pont, "is the seeming lack of understanding that these are two separate issues. The problem is not protecting the reproductive potential of males or females. We think we can do this with engineering and other controls. The problem is protecting the fetus."

The problem is compounded by the fact that the most critical period in the development of the embryo and fetus, in terms of the possibility of major malformations, is the period from the 14th to the 40th day after conception, when the major organ systems are being formed. Most companies believe this period is too early to be able to detect pregnancy and move women in hazardous work environments to safer ones before damage to the embryo can occur. Thus, companies restrict women who might be pregnant from working at jobs that involve exposure to hazardous levels of feto-toxic substances. Since most fertile women are not pregnant at any given time, this means that most of the women who are excluded from such workplaces on any given day would face no special risk from working in them.

The Occupational Safety & Health Administration, though not concerned directly with sex discrimination issues, has taken the lead at the federal level in showing concern about this type of restriction of women from certain jobs. In May 1978, Eula Bingham, administrator of OSHA, urged corporate medical directors to use the greatest possible restraint in adopting or expanding "policies which require that women of childbearing age and pregnant women be excluded from jobs involving potential exposure to certain toxic sub-

This article is part 2 of a two-part series. It examines how government and chemical companies are approaching the problems of worker protection. Part 1, which appeared last week, examined the issue of male reproductive hazards, disputes that seem headed for court settlements, and the government's emerging position.

C&EN staff photo

Infante: need to identify hazards

stances." She said that the view that certain substances present a special health risk to the fetus is often unsubstantiated.

"The laws of this nation are committed to guaranteeing both healthful working conditions and equal employment opportunity," she said. "I believe, therefore, that employers should exhaust all possible avenues of worker protection (be they engineering controls, work practices, personal protective equipment, etc.) before considering the adoption of exclusionary practices."

OSHA would like to see two things change about the way most chemical companies handle the problem of fetal risk from occupational chemical exposure. The first is to get better data on which to base protection policies, and the second is to provide temporary transfer of women from hazardous work environments rather than permanent exclusion of fertile women from these areas.

"The data are not very good on any aspect of this issue," says OSHA senior policy analyst Margaret R. Richardson. Sometimes employers exclude women from a workplace with very little information on whether there is a hazard to the fetus, she says. Also, toxicologists and epidemiologists have not made a big enough effort to look into the reproductive hazards to males.

"We can't even say how many chemicals are out there that cause reproductive problems in animals, let alone in man," says Peter F. Infante, an OSHA toxicologist who heads the office of carcinogen identification. More work in this area is badly needed, he says, because "in the little study that has been done, we have, in fact, found hazards."

Infante identifies several research areas that need attention before occupationally related reproductive hazards can be well identified. These include better epidemiological studies of reproduction through standardized occupational history forms for use in the medical community, recording of the occupational history of both parents on birth certificates, and certification of stillbirths as well as live births so that causes of aborted and malformed children can be traced. He also calls for better animal testing for reproductive hazards.

Some chemical company toxicologists, such as Bernard A. Schwetz, director of toxicological research at Dow Chemical, share Infante's concern about the need for more data on reproductive effects.

"I don't think we should overreact to this one potential source of hazard [harm to the fetus]," Schwetz says. "We need to remember that there are other potential routes of harm and study them all."

He cites lead as an example. This chemical does affect the development of the embryo and fetus, he says. It is a teratogen in humans. But research also shows that it may affect male fertility or cause mutations.

Nevertheless, Schwetz cautions, there are such things as teratogens—substances that cause harm to a developing organism at levels that are not harmful to the adult. Mercury and thalidomide, two of the most potent teratogens that have been studied, are only that—they do not cause harm to either male or female adults at the same exposure level that will harm a fetus, Schwetz says.

Dow has been doing reproductive studies on animals for 30 years, Schwetz says. Currently these studies usually involve three animal species (rats, mice, and rabbits) and study the effect of exposure of both male and female animals through three generations of offspring. With such data, he believes, it is possible to set policies to control exposure that are acceptable to all the parties involved.

Though companies may agree with OSHA that more and better data on reproductive hazards would be useful, OSHA's call for temporary removal of women from areas that present fetal hazards rather than permanent exclusion from these areas during their reproductive lives is another matter.

Every chemical company contacted by C&EN says that such a policy does not provide enough protection for the fetus against exposure to toxic chemicals and could not be adopted at that company.

It's a "Pollyanna" approach, says Monsanto's equal opportunity affairs director, Bill McEwen, summing up industry reaction. This attitude is based in part on medical argument, but it stems, too, from legal considerations.

Legally, the fetus is not an employee, and it did not choose to be in the work environment. Nor is it capable of either understanding the hazards it may be exposed to or of waiving its rights to protection against these hazards.

Worker injuries are covered by workmen's compensation laws, designed to speed up settlement of liability claims, but which also limit an employer's liability toward the worker. But the fetus is legally a "third party." If it is damaged but not killed, the person it becomes can sue for any amount of compensation it can convince a jury is justified. Cases that have gone to court concerning malformations caused by exposure to thalidomide and other drugs in utero lead chemical companies to view this potential liability as enormous. And their health policies reflect this determination to avoid such claims.

"We'd rather go to bat with the regulatory agencies [over possible job discrimination caused by a health policy] than run the risk of open-ended liability should a malformed child result," one chemical company lawyer says frankly.

If the government really wants the responsibility for deciding whether to accept the risk of exposure to fetotoxic substances in early pregnancy to rest with the employee, says Joseph B. Wollenberger, corporate labor counsel for Monsanto, all that needs to be done is to pass a law saying that companies that are following all of the OSHA regulations have no further liability should workers have malformed children.

Such a law would be ridiculous, he adds. The responsibility is the company's and that is where it should stay.

The ideal position on fetal hazards, most companies agree, is to be able to identify safe levels for each of these compounds and keep exposure below these levels everywhere the chemicals are used. Few companies claim to be able to do that in all cases, however.

Monsanto's McEwen sums up what could be the attitude of all chemical employers. The notion that every job ought to be available to every person just isn't true, he says. "There is no such thing as a risk-free environment. As more and more nontraditional jobs open up for people, there are going to be trade-offs."

Monsanto identifies mercury and two or three other compounds as posing particular hazards to the fetus in the work environment. Often the company has been able, through en-

gineering changes or the use of protective devices, to bring exposure to these chemicals to safe levels, and women are allowed to work in these areas, says James H. Spraul, a senior physician in the department of medicine and environmental health. However, sometimes they feel "uneasy" about exposure at a particular location. Then, says Spraul, "it's reasonable to ask women not to work there."

Altogether Monsanto has about 150 jobs which it does not allow fertile women to hold, out of about 50,000 jobs in the U.S. Probably less than half these jobs have ever been held by women, since men are also eligible for the positions.

This policy is no different from the way the company handles other types of hazards that affect only certain groups of employees, explains Ray E. Witter, director of safety and property protection. Monsanto does not allow color-blind people (usually men) to work as electricians, for example, since they cannot distinguish the different colors which key electrical wiring. Nor are people who lack depth perception allowed to operate certain kinds of trucks where this deficiency could be a hazard.

Du Pont treats reproductive and fetal hazards in the same way it treats any other hazard from chemical exposure, says Karrh. All hazardous chemicals are controlled for their most potent hazard. Thus, for example, hexafluoroacetone is viewed by Du Pont as being hazardous both because of its possible effect on male reproduction and for its feto-toxicity. However, the acceptable threshold limit value to protect against the effect on men, 0.1 ppm, is lower than would be needed to protect a fetus. So the company controls for the male reproductive effect and automatically protects the fetus as well.

Much as OSHA's Bingham has recommended, Karrh says Du Pont tries to limit worker exposure to toxic chemicals first by engineering means, then by modifying work practices so that the job is done without people having to enter the high-exposure areas, and then by administrative practices that limit the amount of time that workers spend exposed to the hazardous chemical. If all of these measures still leave fertile women unacceptably exposed to a feto-toxic substance, then the company excludes them from that job.

Du Pont has six compounds found in the workplace that it has identified as hazardous to the fetus. They are hexafluoroacetone, dimethylacetamide, dimethylformamide, formamide, ethylenethiourea, and lead. For all of these compounds except lead, the company has established safe exposure levels for the fetus and allows women to work with these compounds if the exposures can be kept below these levels. The level set for lead is the background level, since the company has not been able to establish any level that presents no risk to the fetus.

Wollenberger and McEwen: proposal doesn't provide enough protection for fetus

Karrh says Du Pont recently has been able to bring exposure levels for dimethylacetamide to below its safety level at all locations where the chemical is used, so no women are excluded from working with this substance. However, for each of the other five compounds, there are some areas where fertile women are not allowed to work. Women who were working in these areas when the policy went into effect were transferred to other comparable jobs. Karrh says he is reasonably sure that no woman has ever been denied employment or terminated because of this policy and that he is not aware of any woman who has ever been moved to a job with lower pay.

Shell Chemical is still trying to draft a formal policy for protecting the fetus, says Howard L. Kusnetz, corporate manager of safety and hygiene for all Shell operations in the U.S. Shell is collecting information from the literature and its own toxicological research on the reproductive effects of the compounds it manufactures. The company also is carrying out special examinations of its workers when there is a suggestion that a compound might pose a hazard. So far, these worker studies have not turned up any hazards.

"We have the dual function of protecting the worker, and protecting the fetus if the fetus is the target, and yet making sure that the worker is not deprived of economic opportunity," Kusnetz says.

Dow Chemical set up a special task force that labored for four years to come up with a policy on reproductive hazards, says personnel relations director Frank P. Hammond. The policy controls exposure to feto-toxic materials whenever possible. When this is not possible, women capable of reproduction are not allowed to work in areas where they might be subject to hazardous exposure.

Dow has a fetal toxicity group which is responsible for analyzing and evaluating all chemicals used at Dow for possible fetal toxicity. All chemicals are put into three categories, explains Benjamin B. Holder, Dow's medical director. They are either fetal toxins for which there is no known safe level of exposure—Dow has yet to put anything into this category; suspected feto-toxins that do have a safe exposure level; or chemicals that are not toxic to the fetus.

Unlike many other chemical makers, Holder says, Dow is able to keep exposures at all its locations below the levels it considers safe. Thus, women may work anywhere at Dow. Holder attributes Dow's ability to do this a little bit to luck. There are some chemicals, such as lead, that cause other companies problems and that Dow does not work with.

"It's quite possible that we might at some time have one plant where exposure couldn't be kept down to an acceptable level," Holder says. "Then we would temporarily transfer the women out and get the level lower."

Hammond says, "I suspect if we ever found a substance that had no safe exposure level for fetal toxicity, we would lean really hard toward not handling it."

Holder agrees. "Unless there were a very special need for it—a life-saving drug, for instance—we probably wouldn't make it," he says. □