

Outweigh the Risks?

by Ester Foster, OSHA Grant Administrator

OCAW Study

OCAW plans to take part in a proposed study where the University of Colorado Medical School will monitor the urine of oil workers for a two-year period to determine if these tests are useful. Since we already know from the many population studies of oil workers that have been conducted that there are carcinogens in the refinery environment and that they do pose a cancer risk, these studies will also hopefully allow an overall assessment of risk to oil workers. This study will also help determine whether specific work activities or sites are associated with the presence of urine mutagens.

The ultimate objective of these studies is to determine whether urine mutagenicity tests are useful in routine monitoring of exposed populations to determine the extent of their cancer risk.

The proposed study will begin to link environmental exposure data with the studies of refinery populations.

In this study no one will see the results except the researchers and individuals tested.

The ability to accept responsibility is the measure of the man.
— Roy L. Smith.

What the Law Says

The key question is, can the employer use genetic testing results, either monitoring or screening, to exclude an employee from a job?

There are two laws that have potential application to such exclusions. The first is Title VII of the Civil Rights Act of 1963. Title VII forbids discrimination in employment on the grounds of race, color, religion, sex, or national origin.

However, the law does allow employers to set up bona fide occupational qualifications for a job. For a simplistic example, an employer legitimately requires that a driver be able to see, thus excluding blind people from the job.

In a recent decision, involving the exclusion of women from jobs with exposure to substances that might affect the fetus, the courts ruled that "fetal protection policies" may be acceptable as a "business necessity" within strict guidelines. (Wright v. Olin Corp. 81-1229). Given the present state of the art of genetic testing techniques, it is unlikely that employers could justify any exclusionary policy based on the results of genetic screening or monitoring.

Some legal experts predict that, if the technology progresses and genetic screening becomes common, the workforce could be screened into a caste system with at least two classes of people.

One group would contain "super-people," those resistant to disease and the second group would be the "unemployables" those who are healthy but unable to work because of a hereditary trait or chromosome abnormality that puts them in a higher risk category for future illness statistically.

The Rehabilitation Act of 1973 applies only to those with government contracts or "recipients of Federal Assistance." Most state laws offer broader protection to employment opportunities for handicapped people. However, for the Rehabilitation Act to be applicable, two legal questions have to be answered.

First, is a particular genetic makeup a handicap? Secondly, if it is, can these handicapped individuals be denied employment on the basis of the probability of future illness?

For OCAW members, genetic testing should be considered as part of medical surveillance and, if instituted by the employer, should be considered an issue for bargaining and should have the assistance of the Health and Safety Dept. and your Int'l Rep.

Candidates for Hypersusceptibility Testing in the Workplace:

Occupational Hazards:

Genetic Factors Potentially Affecting Exposure Risks

GENETIC FACTOR	POTENTIAL CONSEQUENCES FOR BEARER	HIGH-RISK GROUPS: ESTIMATED FREQUENCY
Sickle-cell trait (or disease)	Increased risk of sickling and infarction; enhancement of lead intoxication	8% (U.S. Black males)
G-6-PD deficiency	Chemically induced anemia	16% (U.S. Black males) 12%-13% (Filipinos) 11% (Mediterranean Jews) 2.5% (Chinese)
Serum antitrypsin deficiency	Predisposition to emphysema	3% (General population)
Aryl hydrocarbon hydroxylase deficiency	Increased risk of lung cancer	10% (General population)
Acetylator phenotype	Vulnerability to arylamine bladder carcinogens	50% (General population)
Methemoglobin (NADH) reductase deficiency	Increased risk of methemoglobinemia following exposure to nitrates	High (Native Americans)
Thalassemia and trait	Intensifies lead toxicity and certain anemias	2%-7% (U.S. Blacks) 2% (Greeks) 4% (Italians and Greeks)

SAL 000045879



Interoffice Communication

To File
From J. J. Hall
Date June 21, 1982
Subject GUIDELINES FOR EMPLOYMENT IN CHEMICAL PLANTS

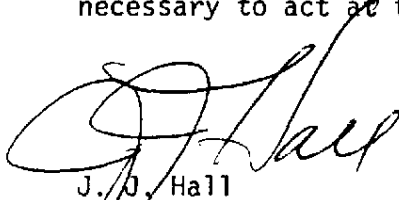
We have reviewed Conoco Chemicals' policy with respect to employment of females and teratogenic risks in light of recent legal developments and the merger with Du Pont. The decision has been made to make no changes at this time.

Legal

There have been two recent decisions involving this issue but both of these cases have been appealed so are not final.

Du Pont Merger

There are a number of Conoco policies which will need to be reviewed when the effects of the merger are clear. It doesn't seem appropriate or necessary to act at this point.



J. J. Hall
ajo

cc M. S. Fisher
M. Malloy
R. D. Gamblin
R. E. Lehmkuhl
D. L. Norwood
N. C. Frost

James J. Hall



RECEIVED
MAY 21 1982

To

DL Norwood
MA Fisher
M. Malley

Date

5/14/82

do you agree with this?

[Handwritten signature]

[Handwritten initials "js" and "MMP" with a flourish]

OK - MM



Interoffice Communication

To File

D R A F T

From J. J. Hall

Date ~~May 12, 1982~~

Subject GUIDELINES FOR EMPLOYMENT IN CHEMICAL PLANTS

We have reviewed Conoco Chemicals' policy with respect to employment of females and teratogenic risks in light of recent legal developments and the merger with du Pont. The decision has been made to make no changes at this time.

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Employee Relations

There are some negatives in changing a policy which was so recently established.

Du Pont Merger

There are a number of Conoco policies which will need to be reviewed when the effects of the merger are clear. It doesn't seem appropriate or necessary to act at this point.

J. J. Hall

cc: MA Fisher
M Malloy
RD Gamble
RE Calhoun
DC Norwood
NE Frost

SAL 000045882



JJS

Interoffice Communication

RECEIVED
MAY 03 1982

To Jim Hall

From Mary Ann Fisher

Date April 27, 1982

Subject GUIDELINES FOR EMPLOYMENT IN CHEMICAL PLANTS

You have asked whether there is anything in recent case law which would warrant revising the 1979 guidelines regarding employment in chemical plants. Prior to adopting these guidelines, it was Chemicals' policy to preclude females of childbearing age from the plants to protect them from potential exposure to teratogenic substances. In an attempt to balance those risks against the employment rights of women, Chemicals adopted the existing guidelines. There are two recent decisions which involve the issue of employment rights versus reproductive hazards.* However, both of these cases are on appeal.

In Secretary of Labor vs. American Cyanamid Company et al. (OSHRC Docket No. 79-5762, April 28, 1981) the Occupational Safety and Health Review Commission affirmed the administrative law judge's decision vacating a citation issued against American Cyanamid (American) alleging that it violated the General Duty Clause of the Occupational Safety and Health Act (OSHA) by adopting a fetus protection policy which required women employees to be sterilized in order to be eligible to work in those areas of the plant where they would be exposed to certain toxic substances.

American's policy, implemented at its pigments manufacturing plant, excluded women from the ages of 16 through 50 from production jobs in the lead pigments department unless they could prove that they had been surgically sterilized. As a

*Additionally, since Chemicals announced this policy, the Equal Employment Opportunity Commission (EEOC) and the Office of Federal Contract Compliance Programs (OFCCP) jointly issued proposed interpretive guidelines on employment discrimination and reproductive hazards, but eventually withdrew those guidelines on January 16, 1981, concluding that it would be more appropriate to evaluate this issue on a case by case basis.

SAL 000045883

Jim Hall
April 27, 1982
Page 3

Olin's policy also provided for the downgrading of jobs from "restricted" to "controlled" to "unrestricted", whenever Olin was able to reduce levels of exposure in the different areas. The district court found that Olin did not violate Title VII and that the policy was instituted for sound medical and humane reasons rather than with the intent to discriminate against females.

Although the final outcomes of the American and Olin cases are still unknown, it is my opinion that they will be affirmed by the Courts of Appeals and there will then be precedent for establishing a policy of restricting employment of females in areas where there are known teratogenic risks. In evaluating our current employment guidelines, you will want to consider such things as: the existence of any teratogenic risks to females working in the plants; if there are such risks, whether the jobs in the plants can be categorized according to exposure level so that women could be excluded from some, but not from all, jobs; if pregnant women are excluded from some jobs, whether it would be possible to transfer a female who becomes pregnant to another location.

I will keep you informed as I learn of any developments in these and any other cases in point.



Mary Ann Fisher
Attorney

cc: -D. D. Ehrlich
M. Malloy

SAL 000045885

James J. Hall



To

DL Norwood
MA Fisher
M. Malley

Date

5/14/82

do you agree with this?

Return to

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MAY 17 1982

Donald L. Norwood

SAL 000045886

Jim Hall
April 27, 1982
Page 2

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The only other case which has specifically considered the issue of employment rights versus reproductive hazards, Equal Employment Opportunity Commission vs. The Olin Corporation et al. (4th Cir. Nos. 81-1129, 81-1230) is also on appeal, to the Fourth Circuit Court of Appeals. At issue in that case is whether Olin's fetal vulnerability policy discriminates against women in employment on the basis of sex in violation of Title VII of the Civil Rights Act. In the case in the lower court, the parties stipulated that Olin had a policy under which women of childbearing capability were not allowed to occupy certain job classifications at its paper manufacturing facility because of possible harmful effects of certain chemicals upon the unborn fetus.

Under this policy, all of the jobs were classified as restricted, controlled, or unrestricted. Women of childbearing capability were excluded from certain restricted jobs in areas where there was exposure to known or suspected abortifacient or teratogenic agents such as lead, carbon disulfide and several solvents. Controlled jobs were those where under normal circumstances exposure to such substances would not exceed 50% of the current OSHA Threshold Limit Value for those agents. Non-pregnant females were permitted to work in controlled areas after receiving counseling, with the understanding that they would notify their supervisor if they became pregnant. The policy provided further that pregnant females who were moved from controlled jobs would have their seniority protected. Other jobs classified as unrestricted were those in areas where exposure to chemicals and physical agents did not constitute a hazard to the unborn fetus.

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J. J. Hall

Jim
 I believe I made the ~~comment~~ comment is relative
 to the merger - I really have no problem with
 changing any policy if there are good reasons
 to do so -

[Signature]

Interoffice Communication

To Jim Hall

From Mary Ann Fisher

Date April 27, 1982

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MAY 03 1982

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Mary Ann Fisher
Attorney

cc: ~~D.~~ D. Ehrlich
M. Malloy

SAL 000045890

Monitoring the Fertility of Workers By Means of a Brief Questionnaire

Richard J. Levine

Department of Epidemiology

In 1977, workers at a California pesticide plant noticed that although many wanted children, few were succeeding in having them. This observation soon afterward led to an epidemiologic study based on laboratory determinations of sperm concentration. The existence of male infertility was confirmed and related to occupational exposure to dibromochloropropane (DBCP).

Since workers do not readily volunteer for semen studies, such epidemiologic investigations can be performed only after a great deal of concern has arisen. Even then, adequate participation cannot be assured. A major problem is the identification of a suitable control population. The participation rate of unexposed plant employees desired as controls is usually much lower than that of exposed employees. Volunteer controls, therefore, are less likely to be representative of potential controls than exposed volunteers are of exposed employees. Should exposed volunteers be found to have a lower sperm concentration than volunteer controls, one may be hard pressed to decide whether it is the exposed group that has an abnormally low sperm concentration or the control volunteers whose sperm concentration is unusually high and not typical of the entire potential control population.

The distribution of sperm counts among U.S. males in general is known only for persons appearing at fertility clinics, those desiring vasectomies, or those whose wives have attended certain pre-natal care clinics. The first group is likely to be less fertile than the general population, whereas the others are probably more fertile.

The Questionnaire

These problems are avoided by the use of a questionnaire-based method developed by the Department of Epidemiology at CIIT. The method, which has proven highly acceptable to workers, utilizes the reproductive experience of wives of male employees as a surrogate measure of male fertility. The following information about the women is obtained: race (race of employee is an adequate substitute), dates of birth, dates of birth of all liveborn children, and dates of marriage, permanent separation, and widowhood. Appropriate U.S. national birth probabilities are used to determine the number of children each woman

would be expected to have. The ratio of the actual number of children to the expected number or "standardized fertility ratio" (SFR) for all such women is computed for periods at risk from exposure or not and compared. SFRs of subgroups with different exposure histories may be examined to test for the existence of a dose-response relationship. Demonstration of such a relationship or of a statistically significant difference in fertility between periods at risk from exposure or not is evidence for a possible occupational fertility effect.

In order to test its validity the method was applied to the experience of workers at the above-mentioned pesticide plant. A thorough medical evaluation of all employees had been conducted during the summer of 1977. The information needed for the method was obtained from records of examinations of the 36 male employees. Three of these had never married and were not included in the study. Most of the reproductive experience of the wives of two others had to be excluded from analysis because of incomplete recording of their children's



Daniel DalCorso, Epidemiology Department, administers fertility questionnaire to a chemical plant employee.

ages. What follows, therefore, is based largely upon the experience of current or last wives of 31 male employees.

Reproductive Experience

Observed and expected births for different portions of the reproductive experience of these women are displayed in Table 1. Each row represents the cumulative reproductive experience to January 1 of the indicated year or until the dates of medical evaluation in mid-1977. SFRs for non-exposure periods are consistently greater than those during employment at risk from exposure. Although these differences are statistically significant ($p \leq 0.05$) in 1974, 1976, and 1977, differences of borderline significance are evident as far back as 1970.

(cont on page 4)

QUESTIONNAIRE (MALE EMPLOYEES)

RACE: White 1 Non-White 2

1. Are you presently married, widowed, divorced, separated, or have you never been married?

Married 1 Widowed 2 Divorced 3 Separated 4 Never Married 5

If never married: Skip to Q14.

If presently married and not separated:

2. Is your wife currently employed full-time? Yes 1 No 2
3. How many times have you been married? _____

Now I would like to ask you some questions about your (present/last/ex-) wife:

4. When was she born?

Mo	Day	Year
----	-----	------

5. When were you and she married?

Mo	Day	Year
----	-----	------

It presently married and not separated: Skip to Q7.
6. When did you become widowed/
permanently separated from her?

Mo	Day	Year
----	-----	------

(cont on page 5)

Questionnaire (from page 3)

Estimates of the change in fertility with exposure are given by the ratio of SFRs during and in the absence of exposure. These range from 0.40 to 0.20, indicating a reduction in fertility of 60 to 80% during the period of exposure. The reduction in fertility is still apparent after restricting analysis to non-surgically sterilized experience, and it borders on statistical significance. To limit analysis in such a manner, however, diminishes the reproductive experience available for examination and introduces a source of confounding error.

Couples at high risk of occupationally induced infertility were defined as those who previously had produced children, but who had had none during the period at risk from exposure, despite a 50% or greater expectation of having had a child. The probability of having had a child during the exposure period was obtained from the product of the appropriate U.S. national birth probability and the group SFR for experience prior to employment at the plant.

In Table 2, couples at high risk of occupationally induced infertility are listed by employee. Probabilities of having had a child are recorded by year whenever these equal or exceed 0.50. Results of semen analyses conducted in mid-1977 and dates of surgical sterilization of either marital partner are noted. One employee (G) who had a normal sperm count (normospermic) in mid-1977 is listed as of January 1 of that year. Within the next six months, however, his wife gave birth to a child, and they no longer fulfilled the criteria for high risk of occupationally induced infertility. The other six employees were found at medical evaluation to be azoospermic (without sperm), oligospermic (low sperm count), or infertile due to surgical sterilization of themselves or their spouses.

Several persons are noted to be at high risk of occupationally induced infertility long before they were discovered to have low sperm counts. Reproductive damage in such individuals, it seems, may have existed for years. Employee D, who was azoospermic, appears in the table almost four years prior to his wife's hysterectomy. Employees A and B, also azoospermic, are noted to be at high risk of occupationally induced infertility in January 1970, when the difference between group reproductive experience in exposure and non-exposure periods first approaches statistical significance.

Date	Non-Employment† & Non-Exposure Area‡		Exposure Area§		p-value (one-tailed test) NX + X ₁ X ₂
	NX	X ₁	O/E	SFR	
Mid-1977	63/33.5	1.88	4/5.3	0.75	0.04
Jan 1977	63/33.0	1.91	3/4.9	0.62	0.02
Jan 1976	58/32.3	1.80	2/4.1	0.48	0.03
Jan 1975	58/31.4	1.78	2/3.4	0.58	0.07
Jan 1974	52/30.4	1.71	1/3.0	0.33	0.04
Jan 1973	48/29.2	1.64	1/2.7	0.37	0.07
Jan 1972	45/28.0	1.61	1/2.4	0.42	0.11
Jan 1971	44/26.6	1.65	1/1.9	0.52	0.18
Jan 1970	44/24.8	1.77	0/1.5	0	0.08
Jan 1969	39/23.8	1.64	0/0.9	0	0.23

* Each row represents the cumulative reproductive experience to the indicated date. Numbers were computed to four decimal places, then rounded.

† Not related to the factory.

‡ Related to the areas of the factory other than the pesticide plant.

§ Related to the pesticide plant.

O/E — Observed/expected births

SFR — Standardized fertility ratio

Date	Probability of Having Had a Child						
	Azoospermic (7/77)		Azoospermic Hysterectomy (12/75)	Oligospermic (7/77)	Vasectomy (7/67)	Normospermic (8/77)	
	EMPLOYEE						
	A	B	C	D	E	F	G
Mid-1977	1.03	1.62	0.55	0.70	0.56	0.88	—
Jan 1977	1.03	1.59	0.54	0.70	—	0.86	0.65
Jan 1976	1.00	1.50	0.52	0.68	—	0.82	—
Jan 1975	1.00	1.43	0.50	0.66	—	0.79	—
Jan 1974	0.96	1.29	—	0.61	—	0.73	—
Jan 1973	0.95	1.18	—	0.58	—	0.68	—
Jan 1972	0.91	1.00	—	0.52	—	0.60	—
Jan 1971	0.89	0.80	—	—	—	0.51	—
Jan 1970	0.90	0.53	—	—	—	—	—
Jan 1969	0.80	—	—	—	—	—	—
Jan 1968	0.75	—	—	—	—	—	—
Jan 1967	0.68	—	—	—	—	—	—
Jan 1966	0.58	—	—	—	—	—	—

In summary, a method has been developed for monitoring industrial workers exposed to environmental agents which may impair fertility. Information is collected primarily through use of a questionnaire which takes less than three minutes to complete. The analytic techniques have been validated by applying the method to a group of men whose fertility was known to be compromised as the result of exposure to DBCP at a pesticide plant. The technique has been demonstrated to be capable of having detected occupationally induced fertility among these men years before the actual discovery date.

(Dr. Levine earned his M.D. degree at St. Louis University, an M.S. from Cal Tech, and an M.P.H. from Harvard. Before joining CIIT in 1977, he was Senior Medical Scientist at the Center for

Occupational and Environmental Health, Stanford Research Institute.)

References

Levine, R. J., Symons, M. J., Balogh, S. A., Arndt, D. M., Kaswandik, N. T., and Gentile, J. W. (1980). A method for monitoring the fertility of workers: 1. Method and pilot studies. *J. Occup. Med.* 22, 781-791.

Levine, R. J., Symons, M. J., Balogh, S. A., Milby, T. H., and Whorton, M. D. (1981). A method for monitoring the fertility of workers: 2. Validation of the method among workers exposed to dibromochloropropane. *J. Occup. Med.* 23, 183-188.

Levine, R. J. (1981). Some questic concerning "A method for monitor. the fertility of workers," *J. Occup. Med.* 23, 324-325.

CIIT

ACTIVITY

Chemical Industry Institute of Toxicology

Vol. 2, No. 6

Computer Applications Adapt To Changing Needs of CIIT

CIIT's computer system has grown from a system intended primarily for acquisition and management of toxicology study data to a comprehensive information processing system for the Institute. In the two years since the VAX-11/780 computer was installed at CIIT, applications of the computer have expanded to support almost every activity at CIIT. A majority of the CIIT staff have become computer-literate in this period as they have discovered that the computer is a relatively easy to use tool for improving individual productivity.

CIIT itself may be viewed abstractly as an information processing system. Input to the system consists of the body of toxicology knowledge present in the published literature. Selective processing of this input information contributes to the selection of priority chemicals to be studied at CIIT and to development of the research program at CIIT. The research activities of the

Institute then generate new knowledge and information in the field of toxicology. The output from this system consists of the research papers and study reports published by CIIT.

Of course, the principal processing element for this abstract machine is the scientific staff of CIIT, but the physical engine which facilitates this complex and voluminous flow of information is the computer system. The descriptions of computer applications which follow serve to illustrate the correspondence between flow of information through the computer and flow of information through the Institute.

Information Services

Information input to CIIT is managed primarily by the Research Information Services Computer System (RISCS). The RISCS system contains publication reference information, including title of article, names of authors, publication source, date of publication, and keyword data fields. Records may be retrieved from this file using the DATATRIEVE query language which facilitates searches using various combinations of data fields in the reference records. The RISCS file now contains over 18,000 references of relevance to the work of CIIT. The RISCS system is used to compile bibliographies for CIIT's Current Status Reports on priority chemicals. The system is also used by the Information Services group to track documents such as CIIT publications, government documents and book collections, and publications available in-house and through interlibrary loan.

Testing and Research Program

New information generated internally by the research activities of CIIT enters the computer system through a variety of computer programs. Toxicology study

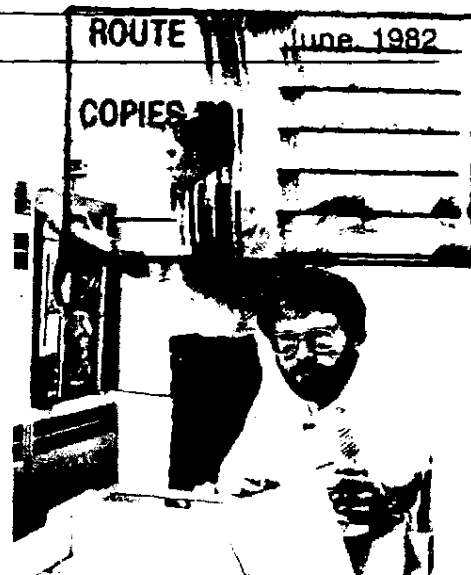
Progress in Testing

Carbon Disulfide. Animals were sacrificed during the first two weeks of May for this 90-day inhalation toxicity study in rats and mice, conducted for CIIT by ToxiGenics, Inc. A report is in preparation.

Chlorine. A 24-month inhalation toxicity study of Fischer-344 rats and rhesus monkeys exposed to chlorine is proceeding at IRDC as scheduled. The six-month sacrifice was completed April 28.

Dimethylamine. A six-month interim status report for this in-house 24-month

(cont on page 6)



Jim Gerard (seated), Associate Scientist-Systems Analyst, and Tom Adams, Research Assistant-Computer Programmer, advise CIIT staff on computer applications.

data is managed using the PATH/TOX System, a collection of protocol-driven data acquisition and reporting programs. Prior to the start of all studies at CIIT, study protocols are entered into the computer system and approved by the study director. During a study all in-life data such as body weight, clinical signs, food consumption, or inhalation chamber data is entered into the computer according to the schedule specified in the protocol. At scheduled sacrifice dates the computer accepts terminal body weights, organ weights, gross pathological observations, and clinical chemistry and hematology data. The PATH/TOX system also facilitates the entry of histopathology findings during microscopic slide examinations.

Data acquisition for toxicology studies is automated where possible to reduce data transcription errors and to ensure data integrity. All balances used for body and organ weighing transmit data directly to the computer, and clinical chemistry and hematology instruments

(cont on page 5)

Staff Publications

ACTIVITIES is published monthly by the Chemical Industry Institute of Toxicology. All correspondence should be directed to Ms. Willanna Griffin, Information Services, Chemical Industry Institute of Toxicology, P.O. Box 12137, Research Triangle Park, North Carolina 27709. Telephone (919) 541-2070.

Robert A. Neal, Ph.D., President
James E. Gibson, Ph.D., Vice President and Director of Research
Donald A. Hart, Ed.D., Vice President—Administration and Secretary

In the field of toxicology, the full and true significance of research observations can only be assessed when the work has been completed or at least when it has reached a stage at which the findings can be analyzed and interpreted. Any attempt to draw premature conclusions is likely to be misleading, and hence, is strongly discouraged. CIIT is fully committed to publish or otherwise make public all its research results when they have been properly evaluated.

CIIT Supporting Companies

Air Products and Chemicals, Inc.
Allied Corporation
Amoco Chemicals Corporation
ARCO Chemical Company
Bristol-Myers Company
Celanese Corporation
Conoco Chemicals Company
(a division of Conoco, Inc.)
Diamond Shamrock Corporation
The Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
Eastman Kodak Company
Ethyl Corporation
Exxon Chemical Company
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Gulf Oil Chemicals Company
Hooker Chemicals and Plastics Corporation
ICI Americas Inc.
Mobil Research and Development Corporation
Monsanto Company
National Distillers and Chemical Corporation Divisions, U.S. Industrial Chemicals Co. and Emery Industries, Inc.
Northern Petrochemical Company
Olin Corporation
Phillips Chemical Company
Polysar Incorporated
PPG Industries, Inc.
Rohm and Haas Company
Shell Chemical Company (a division of Shell Oil Company)
The Standard Oil Company (Ohio)
Stauffer Chemical Company
Tenneco Chemicals, Inc.
Texaco Inc.
Union Carbide Corporation
Velsicol Chemical Corporation
Contributor
The Lubrizol Corporation

Boreiko, C. J., Couch, D. B., and Swenberg, J. A. (1982). Mutagenic and carcinogenic effects of formaldehyde. In: *Genotoxic Effects of Airborne Agents*, R. R. Tice, D. L. Costa, and K. M. Schaich, eds. Plenum Publishing Corporation, New York, 353-367.

DuFrain, R. J., Littlefield, L. G., Wilmer, J. L., and Frome, E. L. (1982). Evaluation of chemically induced cytogenetic lesions in rabbit oocytes. II. A comparison of streptonigrin effects on somatic and germ cells. *Mutat. Res.* 94; 103-114.

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Abstracts

Boreiko, C. J., Abernethy, D. J., and Frazelle, J. H. (1982). Detection of carcinogens which initiate the process of C3H/10T½ cell transformation. *Proc. Am. Assoc. Cancer Res.* 23, 73.

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Leonard, T. B., Lyght, O., and Popp, J. A. (1982). Structure-specific dinitrotoluene (DNT) promotion of initiated hepatocytes. *Proc. Am. Assoc. Cancer Res.* 23, 10¹

Presentations

Dean, J. H. "Immunotoxicology," Department of Pharmacology and Toxicology, Michigan State University, East Lansing, MI, May 5, 1982.

Dean, J. H. "The Effect of Chemicals of Environmental Concern on Immune Function," Department of Pharmacology and Toxicology, Michigan State University, East Lansing, MI, May 8, 1982.

Gibson, J. E. "Update on CIIT Research of Interest to the Plastics Industry," The Society of the Plastics Industry, Washington, D.C., April 20, 1982.

Gibson, J. E. "Teratology," Mid-America Toxicology Course, University of Kansas Medical Center, Kansas City, KS, April 26, 1982.

Gibson, J. E. "Formaldehyde: Research and Testing Program of the Chemical Industry Institute of Toxicology," *Formaldehyde: The Facts* (Conference), Park Plaza Hotel, Toronto, Canada, May 3, 1982.

Gibson, J. E. "New Directions in Risk Assessment," Banquet Speaker, *Principles and Practices of Industrial Toxicology*, Wayne State University, Ann Arbor, MI, May 6, 1982.

Gibson, J. E. "Teratogenesis," *Principles and Practices of Industrial Toxicology*, Wayne State University, Ann Arbor, MI, May 7, 1982.

Hart, D. A. "An Overview of Hazardous Waste Disposal Regulations for Research Facilities," Society of Research Administrators, Joint Midwest-Southern Sectional Meeting, Atlanta, GA, April 23, 1982.

Irons, R. D. "Benzene-induced Immunotoxicity: The Lymphocyte as a Tool for Studying Subcellular Mechanisms of Toxicity," University of Rochester School of Medicine & Dentistry, Rochester, NY, April 23, 1982.

Kligerman, A. D., Erexson, G. L., and Wilmer, J. L. "Rodent Lymphocyte Culture Systems for Analyzing Sister Chromatid Exchange (SCE)," *American-Swedish Workshop on Individual Susceptibility to Genotoxic Agents in the Human Popu.*

(cont on page 6)

Questionnaire (from page 3)

7. How many times has your (present/last/ex-) wife been married? _____
 1. Skip to Q12.
 2+. Go to Q8.

8. When was she first married? _____
 Mo Day Year

9. When did she become widowed or permanently separated from her first husband? _____
 Mo Year

If married only twice: Skip to Q12.

10. When was she married for the second time? _____
 Mo Year

11. When did she become widowed or permanently separated from her second husband? _____
 Mo Year

12. How many babies has your (present/last/ex-) wife ever had, not counting miscarriages, stillbirths, stepchildren or adopted children? _____
 No.

If none: Skip to Q14.

13. Now I would like to know the birth dates and sex of all her children, beginning with the oldest. (Ask about as many children as were indicated in Q12.)

Was the first child a boy or a girl? Male 1
 Female 2

When was he/she born? _____
 Mo Day Year

14. What is the highest grade of school you completed? _____

Elem: 01-08 H.S.: 09-12 College: 13-16 Grad: 17-

(Interview ends for never married persons)

15. What is the highest grade of school your (present/last/ex-) wife completed? _____

Elem: 01-08 H.S.: 09-12 College: 13-16 Grad: 17-

(Interview ends for persons married once/twice)



Dr. Robert A. Neal (right) carries on an active research program in addition to his extensive duties as president of CIIT. He is shown discussing a project with Postdoctoral Fellow Dr. Tadashi Sawahata. Dr. Neal's particular area of interest is the study of chemical and biochemical mechanisms of toxicity, with special emphasis on chlorinated aromatic and aliphatic compounds and those containing thiono-sulfur.

A native of Casper, Wyoming, Dr. Neal earned his B.S. in chemistry at the University of Denver and his Ph.D. in biochemistry at Vanderbilt University (1963), where he rose to Professor of Biochemistry and Director of the Center in Environmental Toxicology at the Vanderbilt School of Medicine. He was named president of CIIT in February, 1981.

Dr. Sawahata, a native of Japan, earned his Ph.D. at the Tokyo College of Pharmacy.

Computer (from page 1)

are interfaced directly to the computer as well.

Many of the research activities at CIIT do not require the rigid protocol-driven data acquisition enforced by the PATH/TOX system, but benefit nonetheless from the reliability and efficiency of instrumentation interfaced directly to the computer system. Instruments in this category include a grain counter, an image digitizer, a cell sorter, and several scintillation counters — all of which transmit data to the computer system for analysis and storage. Furthermore, many research activities require flexibility in statistical analysis which is not provided by the predetermined statistical reports of the protocol driven system. To fill this need CIIT has installed the RS/1 Research System on the computer. RS/1 allows

tabular entry of data into the computer such as one would enter into a laboratory notebook. A variety of statistical tools and graphic plotting options are then available to the user for analysis and display of the research data.

Text Processing

Since CIIT presents its research results to the public in a variety of formats, it has become evident that the computer system must provide output in modes other than the standard computer printout. As users of the computer become adept at using the system for analyzing data, they soon find that they can also use the computer to manipulate text. Thus it is possible to use the computer to produce an entire research paper or study report. In order to make text processing practical on the

computer system, the word processing system at CIIT has been interfaced to the VAX 11/780. It is now possible to obtain letter quality or publication quality output using these merged systems. In addition to papers and reports, CIIT research results are often presented in poster format at scientific meetings. Since the digital graph plotter attached to the computer is often used to create graphs for these posters, it was a natural extension to provide the capability of printing text on the plotter as well.

Administrative Support

It has been shown up to this point how the computer system closely parallels the research activities at CIIT. The computer system has also been utilized to

(cont on page 6)

Presentations (from page 2)

tion, National Institute of Environmental Health Sciences, Research Triangle Park, NC, May 10-12, 1982.

Neal, R. A. "The Chemical Industry Institute of Toxicology (CIIT) — Its Organization and Activities," Annual Meeting, International Institute of Synthetic Rubber Producers, New Orleans, LA, April 27, 1982.

Neal, R. A. "Critical Issues in Toxicology: Contributions of the Chemical Industry Institute of Toxicology," Banquet Speaker, Short Course Program, Chemistry Department, The University of North Carolina at Chapel Hill, April 23, 1982.

Neal, R. A. "Absorption, Excretion, and Metabolism of TCDD in Experimental Animals," Seminar Presentation, University of Kentucky, Lexington, KY, April 28, 1982.

Neal, R. A. "2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (TCDD): Toxicity, Structure Activity and Metabolism," Environmental Pathology Seminar cosponsored by the Cancer Research Center, The University of North Carolina at Chapel Hill, May 5, 1982.

Neal, R. A. "2,3,7,8-Tetrachlorodibenzo-*p*-dioxin: Toxicity, Structure Activity and Metabolism," Seminar Presentation, Department of Pathology, Northwestern University, Chicago, IL, May 7, 1982.

Parker, G. D. "Incineration of Hazardous and Low-Level Radioactive Wastes," Society of Research Administrators, Joint Midwest-Southern Sectional Meeting, Atlanta, GA, April 23, 1982.

Popp, J. A., and Leonard, T. B. "Role of Dinitrotoluene Isomers in the Development of Rat Liver Neoplasms," *Rodent Liver Nodules — Significance to Human Cancer Risk?*, International Symposium of the Society of Toxicologic Pathologists, Reston, VA, May 11, 1982.

Swenberg, J. A. "Cell Specific Effects: Application of New Fluorometric Techniques to Detect DNA Adducts," Banbury Conference on *Indicators of Genotoxic Exposure in Man and Animals*, Cold Spring Harbor Laboratory, Cold Spring Harbor NY, April 20, 1982.

Swenberg, J. A. "DNA Damage, Repair and Replication in Hepatocarcinogenesis," Brookhaven National Laboratories, Upton, NY, April 22, 1982.

Swenberg, J. A. "Cell and Organ Specificity in DNA Damage and Repair," *American-Swedish Workshop on Individual Susceptibility to Genotoxic Agents in the Human Population*, National Institute for Environmental Health Sciences, Research Triangle Park, NC, May 11, 1982.

Seminars

Dr. Jane Chang, Chemical Industry Institute of Toxicology. "Tolerance and Cross-Tolerance Development Following Inhalation Exposure to Chlorine or Formaldehyde," April 22, 1982.

Ms. Bonnie L. Baranyi, Department of Pharmacology/Toxicology, Michigan State University, East Lansing, MI. "The Binding of Hepatocarcinogens to Specific Regions of Chromatin DNA Derived from Rat Hepatocytes and Nonparenchymal Cells," April 27, 1982.

Dr. Robert Langenbach, National Toxicology Program, Research Triangle Park, NC. "Cell Mediated Mutagenesis Using *Salmonella Typhimurium* and Chinese Hamster V-79 Cells," May 6, 1982.

Mr. Randall E. Miller, Department of Pharmacology, Center in Toxicology, Vanderbilt University, Nashville, TN. "Metabolism of Trichloroethylene by Isolated Hepatocytes, Liver Microsomes and Purified Cytochrome P-450: Evidence for Rearrangement Within a Pre-Epoxy Intermediate," May 7, 1982.

Ms. Rosemarie Osborne, Laboratory of Toxicology, Harvard School of Public Health, Boston, MA. "Actions of Phorbol Esters on Peptide Hormone Bindings in Rat Pituitary Cells," May 10, 1982.

Dr. James Halpert, Department of Medical Nutrition, Karolinska Institute, Sweden. "Suicide Inactivation of Cytochrome P-450 by Chloramphenicol," May 11, 1982.

Dr. Nobuyuki Ito, Department of Pathology, Nagoya City University — Medical School, Nagoya, Japan. "Analysis of Modifying Factors of Tumor Initiation-Promotion in Hepatocarcinogenesis in the Rat," May 13, 1982.

Progress in Testing (from page 1)

inhalation toxicity study of dimethylamine in rats and mice continues preparation. Animals are entering the fourteenth month of exposure.

Dinitrotoluene. The final report for this 24-month dietary toxicity study in Fischer-344 rats is undergoing editorial revision.

Ethylene and Toluene. The Institute's completed 24-month inhalation toxicity studies of ethylene and toluene in albino rats have been audited by Tracor Jitco, Inc. The audit report is available from CIIT Information Services.

n-Hexane. The final report for a 90-day inhalation toxicity study of *n*-hexane in albino rats may be obtained from CIIT Information Services.

Hydrogen Sulfide. A final report for this 90-day inhalation toxicity study in rats and mice, performed for CIIT by ToxiGenics, Inc., is in preparation.

Maleic Anhydride and Terephthalic Acid. The 18-month interim status report for a maleic anhydride 24-month dietary toxicity study is nearing completion. Final reports for both the maleic anhydride study and a similar study of terephthalic acid are expected to be completed by early fall.

Methyl Chloride. A reproduction fertility study in Fischer-344 rats exposed to methyl chloride by inhalation continues according to protocol in the CIIT laboratories.

Nitrobenzene. Termination of animal exposures for this 90-day inhalation toxicity study in rats and mice is scheduled for late June.

Computer (from page 5)

lend support to the administrative activities of the Institute. The Accounting Office also uses computer software to assist in managing accounts payable and financial reporting functions. The Quality Assurance Officer and Research and Radiation Safety Officer now use the computer to assist in the record keeping functions of these activities.

Although the computer system is now used in some way by most activities at CIIT, development of the system cannot be considered complete. There are additional areas of the CIIT laboratory which will benefit from automation, and the computer system must always be able to adapt to the changing needs of the Institute. The Computer Science Department strives to ensure that the diverse collection of computing resources available at CIIT remains well integrated and easily accessible to its users.

Interoffice Communication

To J. J. Hall
From Donald L. Norwood
Date January 4, 1982
Subject GUIDELINES FOR EMPLOYMENT IN CHEMICAL PLANTS

*file
Reproduction Hazards*

Please refer to your letter dated December 28th to the Legal Department requesting a review of the subject guidelines.

I am not sure at this time that all Conoco guidelines must be consistent with Du Pont guidelines. In any case, I would like for Gary Thomas of my office to be involved and included in any discussion and review of these guidelines.


Donald L. Norwood

nng

cc: REL-RDG-GDT-DAK-MAF-MM

SAL 000045897



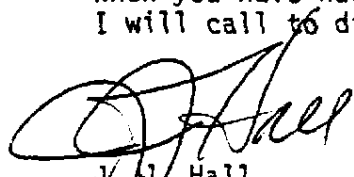
Interoffice Communication

*Just in
July*

To Michele Malloy, Mary Anne Fischer
From J. J. Hall
Date December 28, 1981
Subject GUIDELINES FOR EMPLOYMENT IN CHEMICAL PLANTS

The attached policy explains employment guidelines adopted by Chemicals in 1979. I feel it would be prudent to review this policy to: 1) ensure that it is consistent with the policies of our new parent company and 2) ensure that the policy still makes sense in light of recent court decisions.

When you have had an opportunity to familiarize yourselves with the policy I will call to discuss our next step.


J. J. Hall
ajo

cc R. E. L. w/o enclosures
D. L. N. w/o enclosures
D. A. K. w/o enclosures

SAL 000045898

CC - DON SPENCER
11/27/79



STEVE ASHBY
8/3/81

Interoffice Communication

To Plant Managers

From R. E. Lehmkuhl

Date October 31, 1979

Subject Guidelines for Employment in Chemical Plants

*new file
women
under "projects"*

RECEIVED
NOV 01 1979

Attached is a copy of my letter dated August 27 and a copy of Dr. Lembke's letter of October 17 in reply.

If you have any questions concerning any part of the guidelines, please advise D. L. Norwood.

Please implement these employment guidelines immediately.

REL
R. E. Lehmkuhl

wb

cc:

- R. W. Gerwig - Stamford
- J. D. Burns - Houston
- J. J. Hall - Houston
- D. L. Norwood - Houston
- D. C. Bartlett - Houston
- Flynt Kennedy - Ponca City
- D. A. Kuhn - Houston ✓
- J. E. Landers - Stamford
- R. L. Lembke, M. D. - Ponca City
- L. C. Reed - Houston
- S. E. Conly - Houston
- D. E. Nicholson - Houston
- T. D. Montgomery - Legal, Houston
- M. A. Fisher - Legal, Houston

Interoffice Communication

To R. E. Lehmkuhl - Houston
From Robert L. Lembke, M.D. - Ponca City
Date October 17, 1979
Subject GUIDELINES FOR EMPLOYMENT IN CHEMICAL PLANTS

Employee Reks

OCT 19 1979

After receiving your interoffice communication on the above subject dated August 27, 1979, I read it carefully and then circulated it to the other physicians and industrial hygienists in the Medical Division for their information and for any comments which they might like to make regarding its contents. Just yesterday, the interoffice communication was returned to me because in the interim many of the physicians and industrial hygienists were away from the office on company business.

All of us concur that the guidelines as set forth by you are appropriate and none of us disapprove of any statements which you have made.

Robert L. Lembke, M.D.
Medical Director

jr

cc:

R. W. Gerwig, Stamford
J. D. Burns, Houston
D. A. Kuhn, Houston
D. L. Norwood, Houston
M. A. Fisher, Houston
T. D. Montgomery, Houston

SAL 000045900

Interoffice Communication

To R. L. Lembke, M.D., D. E. Nicholson

From R. E. Lehmkuhl

Date August 27, 1979

Subject GUIDELINES FOR EMPLOYMENT IN CHEMICAL PLANTS

RECEIVED

AUG 29 1979

Donald L. Norwood

Any comprehensive policy for employment of men and women in our chemical plants must be compatible with sometimes conflicting restraints. It must give workers ample protection from hazards in the workplace yet be non-discriminatory where there is no reason to employ one sex but not the other. The subject guidelines are believed to strike a balance that will satisfy both requirements even in plants where chemicals such as benzene or vinyl chloride are found. The policy is not without risk to employees or Conoco. Indeed, we cannot provide a "risk-free" workplace for anyone. We believe, however, that the policy satisfactorily balances the needs to provide ample employee protection, maintain equal opportunity and keep the risk of costly litigation for Conoco low.

Please review this program and determine if it represents an acceptable course for Conoco Chemicals.

POLICY

- (1) Maintain the workplace in compliance or better with pertinent OSHA standards. Where OSHA standards do not exist, abide by industry consensus standards. When neither of these exist, establish Conoco standards, comply with them and exercise prudent control of all other chemicals.
- (2) Explain in detail to each employee at the time of initial hire and on a regular basis thereafter:
 - (a) What chemicals are present in the workplace and the safe practices for working near and handling these chemicals;
 - (b) What information we have about the potential carcinogenic, mutagenic, teratogenic, and other health effects of any chemicals in the workplace, the levels at which these effects have been known to occur and the fact that we maintain our exposures below these levels.
- (3) Assure that the safe practices are enforced.
- (4) Employ anyone capable of performing the job satisfactorily without regard to sex, race, age, or other non-performance standard.

BENEFITS OF THESE GUIDELINES

- (1) We maintain a workplace that amply protects the safety and health of everyone.

SAL 000045901

August 27, 1979

- (2) We have a policy that responds properly to the requirements of occupational safety and health as well as equal opportunity.
- (3) We are able to reach our goals of employing more women in our operations, especially female chemical engineers at entry level jobs for future assignments in management.
- (4) We open up for our recruiting a larger resource base (women) where there are qualified candidates. Our success with this group may be better because other companies exclude them from consideration.

RISKS

If a claim is brought by a worker against the company for an alleged injury or illness when we are fully complying with OSHA, consensus or Conoco standards, it is likely that we would be liable for workmen's compensation alone and would not be susceptible to a negligence suit. On the other hand, the developing fetus is not a "worker" so presumably a malformed child could sue the company for putting him at an unacceptable risk in the workplace. Since there is no precedent for this kind of case, I cannot imagine what the outcome would be. However, considering the number of women in our employ, the number who will get pregnant, the known percentage of birth defects as well as the probability of suit, and the burden on the plaintiff to establish a causal link between the malformation and the parent's exposure to chemicals, the likelihood of such a suit is small. Further, while the risk of liability is not eliminated through this policy, our present policy does not eliminate the risk of such a suit on behalf of the deformed fetus as a result of the father's exposure to toxic chemicals.


R. E. Lehmkuhl

ajo

cc	R. W. Gerwig	- Stamford
	J. D. Burns	- Houston
	D. A. Kuhn	- Houston
	D. L. Norwood	- Houston
	M. A. Fisher	- Legal, Houston
	T. D. Montgomery	- Legal, Houston

SAL 000045902

immediate

DU PONT CANCER EXPERIENCE

Status

Past occupational exposure (all U.S. industry) cause under 5% of total U.S. cancer. Du Pont employees and retirees have a lower cancer rate than the general public. Stringent controls in place for suspect carcinogens.

Background

• Major Known and Suspected Carcinogens in Du Pont

- Asbestos - _____ * asbestos-related medical cases have been identified among Du Pont employees and pensioners (see write-up _____).
- Acrylonitrile - Du Pont epidemiology study of workers at the Camden plant indicated a statistically significant higher risk of cancer. This analysis plus animal tests raise a serious suspicion that acrylonitrile might be a human carcinogen.
- Beta-naphthylamine and benzidine. Started making in 1918. Ceased manufacture and use between 1955 and 1972. As of March 1982, _____ employees developed bladder tumors with _____ deaths resulting.

• Policy

- Where acute or chronic illness is shown to be caused by workplace exposure, the Company accepts responsibility for all costs related to the illness. Du Pont also follows a policy that production and sale of products is contingent upon determination that products can be made, used, handled, and disposed of safely and in compliance with applicable regulations.

*This number has not been released previously.

Similar VCH

Draft
Environmental Quality Committee
3/5/82

SAL 000045903

EMBRYOTOXINS

Status

Du Pont makes or uses six chemicals shown to be embryotoxic in animal tests. Employees at sites which make or use these chemicals have been advised. Guidelines to protect employees have been in effect for several years.

Background

• Use in Du Pont

- C-8 (ammonium perfluoro octanoate) - A purchased surfactant. Study by supplier indicated a problem; 21 women removed. Recent studies showed first study to be faulty; exclusion policy rescinded 3/4/82. No adverse employee reaction.
- Five others - no women removed.
- HFA (hexafluoroacetone) is one of the five. It is the only substance in Du Pont where primary exposure levels are determined solely by effects on the male reproductive system.

• Policy

- The fetus is protected, first, by reducing potential exposure to safe levels where feasible; second, by personal protective equipment if practical; and finally, where the fetus cannot be adequately protected, by exclusion from certain job areas of those women who have childbearing potential.
- Pay protection - for women excluded from certain job areas:

Du Pont is concerned;
handled individually;
no problems to date.

Draft
Environmental Quality Committee
3/5/82

SAL 000045904