

JANETTE D. SHERMAN, M.D.  
INTERNAL MEDICINE

please reply to:

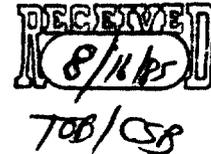
□ 25811 W. 12 MILE ROAD  
SOUTHFIELD, MICHIGAN 48034  
313 - 358-5830

FYI-OTS-0885-0402P FLWP  
SEQUENCE J

□ P O BOX 1239  
MAKAWAO, MAUI  
HAWAII 96768  
808 - 572-1172

August 9, 1985

Dr. <sup>Fred</sup> Albert Wiedow, Ph D  
Office of Toxic Substances TS778  
Environmental Protection Agency  
401 M Street, S.W.  
Washington, D.C. 20460



Dear Al:

Enclosed are my report and bibliography concerning the birth defects in this unfortunate child who was born in Kona, Hawaii. I have censored any identifying data but suggest that if you need further follow up as to specifics, you contact the attorney, William Pickett, who is at Suite 1413 Bank of Kansas City Building, 1125 Grand Avenue, Kansas City, Missouri 64106.

I would appreciate it if you would supply me with additional information about the nonylphenol.

Earlier, I contacted you about the toxicology para tertiary butyl benzoic acid. (ptbba).

I will be back in my Detroit office as of August 19th. Please feel free to contact me if any of this requires additional information and/or clarification.

Kindest regards to you and your wife and to Harry.

*Janette*  
Janette D. Sherman

JDS:bf

Enclosures

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HAWAII 96768  
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July 22, 1985

The Dow Chemical Toxicology  
Research Laboratory  
Midland, Michigan

Dear Madams & Sirs:

I would appreciate receiving copies of your reports concerning Acrylonitrile. It is my understanding that there is a 90 day oral toxicity study done by Humiston, C; a two-year study by Norris, J.M.; and an additional study by Quast, J.F., et al.

Thank you for your attention to this request.

Very truly yours,

*Janette D. Sherman*  
Janette D. Sherman, M.D.

JDS:bf

*do your  
folder  
have this?*



DEAR COLLEAGUE,

WE REGRET WE ARE UNABLE TO FILL YOUR REQUEST FOR A COPY OF  
Acrylonitrile reports. These were contract studies

and can be obtained from CMA.

*Al -  
Who's that?*

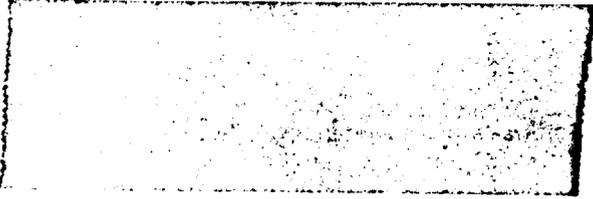
- NO REPRINTS AVAILABLE FROM PUBLISHER.
- REPRINT SUPPLY EXHAUSTED.

THANK YOU FOR YOUR INQUIRY.

TOXICOLOGY INFORMATION SERVICES  
1803 BUILDING  
THE DOW CHEMICAL COMPANY  
MIDLAND, MICHIGAN 48640

x

May 24, 1985



Re: [redacted] Baby Boy

[redacted] Mother

Kona, Hawaii

Date of Birth: [redacted]

Date of Death: [redacted]

*July  
1985*

Dear [redacted]

I have reviewed the medical records which you sent to me in regard to the [redacted] baby.

Without reiterating the entire list, I have reviewed all of the records which you sent to me with your cover letter of April 16, 1985.

Review of these records indicates that the [redacted] baby, a boy, was born on 7/14/81. At the Kona Hospital, immediately after birth, he was found to have the following abnormalities:

- Myelomeningocele
- Deformity of the head
- Deformity of the penis
- Absent anus
- Deformities of the lower limbs

He was transferred to Kapiolani Childrens Hospital in Honolulu, whereupon a more thorough evaluation revealed the following birth defects:

- Low set small ears
- Barrel chest
- Lateral urethra
- Left hydrocele
- Right small testicle
- Meningomyelocele
- Imperforant anus with the colon ending 3 cm. short of the anus
- Rectovesical fistula
- Hypoplasia of the lower extremities
- Small abnormal kidneys
- Short neck

Short upper arm  
Dysmorphic facies  
Lumbosacral agenesis  
Lumbosacral hemangioma

I will not review the entire Kapiolani medical events. However, suffice it to say that despite excellent medical care, attention to the various abnormalities, multiple consultations, and a number of procedures, this unfortunate child died approximately three weeks following his birth.

Review of [redacted] obstetrical record indicates that her last menstrual period was October 2, 1980, and that her estimated date of confinement was 7/7/81. The child was delivered one week later, on 7/14/81.

It is my understanding that a chemical was used in Mrs. [redacted]'s place of employment, in order to install insulation materials. It is my understanding that this product was used between the fifth and sixth week of her gestation. Answers to Interrogatories supplied by the National Cellulose Corporation (Celanese Corporation) reveal the products used in the insulation is as follows:

SK-131A-HIGH Molecular Weight Emulsion Polymer of Ethyl Acrylate, Acrylonitrile, Itaconic acid dispersed in water, using ethylene oxide nonyl phenol adducta non ionic dispersants. Less than 0.1% of formaldehyde and ammonia added for bacterial and pH control.

SK-131-B-High Molecular Weight Emulsion Polymer of Ethyl Acrylate N-methylol acrylamide itaconic acid dispersed in water using ethylene oxide nonyl phenol adducta non ionic dispersants. Less than 0.1% formaldehyde and 0.01% of other bacteriacides (1,2-dibromo-2, 4-dicyanobutane) added for bacteriacidal control.

I assume that the last named chemical is dibromo (not bidromo).

Further Answers to Interrogatories identified the polymers with the following CAS numbers:

35705-21-6  
9016-45-9  
26428-44-4  
51811-79-1

I have done a number of literature searches, and data collections on the various chemicals listed in the Answers to Interrogatories.

I will summarize the information that has been collected in regard to these various chemicals:

Acrylates:

Acrylic resins are produced by the polymerization of acrylamide with partial hydrolysis or the copolymerization of acrylamide with acrylic acid. This family of chemicals has been associated with the production of neuropathy, embryo toxicity, and fetal toxicity.

Acrylonitrile:

Multiple testing has shown this chemical to be toxic by both the inhalation and cutaneous routes. It is mutagenic in micro-organism test systems. When administered to animals it has produced axial skeletal malformation, mesodermal changes, encephalocoel, limb and tail defects, and heart defects.

Ethyl Acrylate:

This chemical has been tested in rats and shown to cause malformations.

Ethylene Oxide:

This chemical is also known as epoxy ethane. It is active by the inhalation, intravenous and dermatological routes. It has been shown to cause teratogenic changes in rats, and has proven to be mutagenic in thirteen species. It binds to DNA in a covalent fashion. In monkeys, ethylene oxide has been shown to cause sister chromatid exchanges, as well as chromosomal aberrations. It has caused increased spontaneous abortions as well as leukemias and mesotheliomas in rats. In summary, this is an extremely biologically active substance shown to have teratogenic, mutagenic, and carcinogenic effects.

Formaldehyde:

This chemical has been associated with the development of mutations since at least 1946, and with carcinogenic effects since 1936. Multiple reports are in the medical literature showing mutagenic effects in *Drosophila*, *Neurospora*, *Salmonella*, grasshoppers, flowering plants, and fungi. Formaldehyde has been shown to cross-link between two amino acids and between nucleic acids in the nucleic acid bases. In cultured human cell test systems, formaldehyde has been shown to be mutagenic. There is a strong association between mutagenicity, carcinogenicity, and teratogenicity.

Itaconic Acid:

This product is also called methylene succinic acid. It has been used in agriculture as a plant growth regulator, as well as promoting ripening and flowering of tomatoes. It has been shown to increase peritoneal macrophages in animal test systems. A look at its chemical structure reveals that it is a highly reactive substance.

Nonyl Phenol:

This chemical is a non-ionic surfactant that is hydrophobic. It increases the penetration of other chemicals and is useful in industry for this. Multiple tests have been done indicating that nonyl phenol causes changes in viral replication, histamine release, and interacts with other chemicals.

Review of additional data indicates membrane damaging effects, a questionable association with the toxic shock syndrome, and a malignant transformation. Testing in animal species has shown birth defects, as well as changes in liver function studies and changes in the metabolism of cholesterol in the liver. Nonyl phenol has been shown to cause changes in the growth of seeds, as well as decreased photosynthesis and decreased growth in aquatic plant systems. When added to pesticidal formulations, nonyl phenol has been shown to result in an increase in the pesticidal properties. It also increases the persistence of xenobiotics, with persistence in sediment. It appears from testing that nonyl phenol is dependent upon bacterial systems for degradation. In aquatic species, it has been shown to be toxic to salmon, shrimp, and Daphnia. The chemical is currently being considered for CHIPS (Chemical Hazard Information Profile).

Computer searches for the CAS numbers of the reacted final products revealed little to no information. I do not know if data <sup>has</sup> been submitted to EPA under the Toxic Substance Control Act for registration in regard to these chemicals or not. If these data have been submitted, I would appreciate it if you would obtain them for me.

Appended to this report are the chemical structures of a number of the chemicals. Please note that, by and large, they are highly reactive, and are useful not only in the chemical industry because of their reactivity, but toxicologically active in biological systems because of the same reactivity.

Because of the fat solubility of a number of these chemicals they are retained within biological systems, and so exert their actions longer than the immediate exposure period. This is especially true of substances such as nonyl phenol, designed because it is indeed a hydrophobic (lipophilic).

Review of the Standard Embryological Reference for Human Development, according to age and weeks and body system (Arey Developmental Anatomy, W.B. Saunders Co.) of 13 body systems, the [redacted] child had defects in 7 of them. These are of body form, urogenital system, skeletal system, muscular system, nervous system, and sense organs.

His multiple abnormalities indicate profound interruption of normal development at an early stage of life, which correlates closely with the time of Mrs. Woodbury's exposure. Additionally, because of the multiple abnormalities, it is likely that they resulted from insults from a combination of chemicals, as indicated in the make-up of the Celanese product.

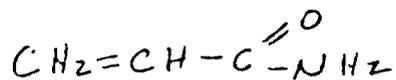
Review of the [redacted] baby's medical records, Mrs. [redacted] prenatal records, the chemical toxicology data, and the times of exposure, indicates to me that within a reasonable degree of medical certainty, the aforementioned chemicals were involved in the teratogenic effects and resulted in this child's death.

If any of this requires additional information and/or clarification, please contact me.

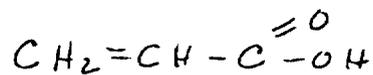
If you wish bibliographic references in regard to these chemicals please let me know and I will supply them.

Very truly yours,

Janette D. Sherman, M.D.



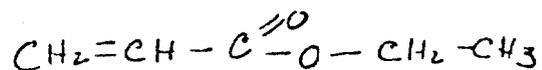
ACRYLAMIDE



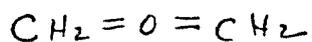
ACRYLIC ACID



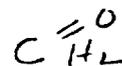
ACRYLONITRILE



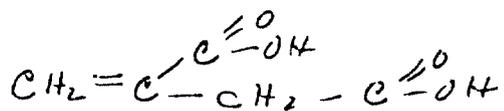
ETHYLENE ACRYLATE



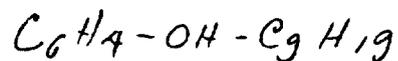
ETHYLENE OXIDE



FORMALDEHYDE



ITACONIC ACID  
(Methylene succinic acid)



NONYL PHENOL  
2,6, di-methyl 4 heptyl  
phenol hydroxide

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INTERNAL MEDICINE

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313-358-5830

P O BOX 1239  
MAKAWAO MAUI  
HAWAII 96768  
908-572-1172

July 22, 1985

Re: [REDACTED] baby boy. Mother [REDACTED]

Hawaii 96740

Date of Birth: 7- [REDACTED] 81 Date of Death: 8- [REDACTED] 81

Dear Mr. [REDACTED]:

Enclosed is the bibliography of teratogenic effects, caused by chemicals involved in the National Cellulose Corporation products. Specifically, the bibliography is in reference to acrylics, acrylonitrile, ethylene oxide, formaldehyde, itaconic acid and nonylphenol.

Please be advised that this bibliography is not all inclusive. It does however, represent the known literature about the teratogenic effects of these chemicals.

Because of the volatile nature of these chemicals, it must be assumed that they would have been absorbed into [REDACTED] body by inhalation. These chemicals are very reactive, and capable of causing a variety of adverse effects, including teratogenicity and mutagenicity. A number are also known proven carcinogens.

Please keep me apprised of the situation. If any of this material requires additional information and/or clarification please contact me.

Very truly yours,

Janette E. Sherman, M.D.

JDS:bf

## CHEMICALS AND BIRTH DEFECTS

Abrahams, R.H.

Recent studies on workers exposed to ethylene oxide. In Jarkasky JF (ed): "The Safe Use of Ethylene Oxide." Proc Educational Semin Health Industry Manufacturers Association, Washington DC:

HIMA Report No. 80-4, pp 27-38 and 211-220.

1980

Ames, B.N., McCann, J., Yamasaki, E.

Methods for Detecting Carcinogens and Mutagens with the Salmonella/Mammalian - Microsome Mutagenicity Test. Mut. Res. 31:347-363

1975

Anon.

Medical Letter on Drugs and Therapeutics 25(642):78-80.

1983

Anon.

Formaldehyde, University's effective research  
Consumers Research Magazine

Mar 1979

Anon.

The health hazards of formaldehyde  
The Lancet, p 926 Indian lands in the  
Continental United States and Hawaii.

Auerbach, C.

The Mutagenic Mode of Action of Formalin  
Science 110:419-20

1949

Auerbach, C.

Mutation Tests on Drosophila Melanogaster with Aqueous  
Solutions of Formaldehyde

Am. Naturalist 86, 330-332

1952

Auerbach, C.; Moutschen-Dahmen, M. and Moutschen, J.

Genetic and Cytogenetical Effects of Formaldehyde and  
Related Compounds

Mutat. Res. 39-317-362

1977

Autian, John.  
Acrylonitriles.  
Environmental Health Perspectives 11:141-52.  
Jun 1975

Burdette, W.J.  
Tumor Incidence and Lethal Mutation Rate in a Tumor Strain  
of *Drosophila* Treated with Formaldehyde  
Cancer Res. 11:555-558  
1961

Nonoxynol-9  
Fertility and Sterility Vol 37, No. 2  
Feb 1982

Chvapil, M.; Eskelson, C.D.; Stiffel, V., Owen, J.A.;  
Droegemueller, W.  
Studies on Nonoxynol-9. II. Intravaginal Absorption,  
Distribution, Metabolism and Excretion in Rats and Rabbits  
Contraception 22(3):325-39  
Sep 1980

Chvapil, M.; Ulreich, J.B.; O'Dea, K., Betts, K.;  
Droegemueller, W.  
Studies on Nonoxynol-9. III. Effect on Fibroblasts and  
Spermatozoa  
Fertility and Sterility Vol 33, No. 5  
May 1980

Cooper, P.  
Genetic effects of formaldehyde  
Food and Cosmetic Toxicology 17(3):300-1  
1979

Council on Environmental Quality  
Chemical Hazards to Human Reproduction  
Jan 1981

Dickey, F.H.; Cleland, G.H.; Lotz, C.  
The Role of Organic Peroxides in the Induction of Mutations  
Nat. Aca. of Sci. of USA Proceedings 35:581-586  
1949

Ehrenberg, L. Hallstrom, T, Osterman-Golkar, S.  
Etylenoxid. Kriteriedokument for Gransvarde  
Arbete och Halsu G:1-33. Stockholm Swedish Board of  
Occupational Health  
1981

Eiberg, G.S.; Baranowski, E.  
Health Implications of Urea-Formaldehyde Foam Insulation  
Canadian Journal of Public Health 72(5):335-8  
Sep-Oct 1981

EPA  
Response to Interagency Testing Committee Recommendations  
Federal Register Vol 44, No. 94  
May 14, 1979

Ewards, P.M.  
The insensitivity of the developing rat foetus to the toxic  
effects of acrylamide  
Chem Biol' Interact 12(1):13-8  
Jan 1976

Federal Panel on Formaldehyde  
Report of the Federal Panel on Formaldehyde  
Environ Health Perspect 43:139-68  
Feb 1982

Garry, V.F.; Hozier, J.; Jacobs, D.; Wade, R.L.; Gary, P.G.  
Ethylene oxide: evidence of human chromosome effects  
Environ Mutagen 1:375-382  
1979

Generoso, W.M.; Cain, K.T.; Krishna, M.; Sheu, C.W.; Gryder,  
R.M.  
Heritable translocation and dominant-lethal mutation  
induction with ethylene oxide in mice  
Muta. Res 73:133-142  
1980

Goldmacher, Victor, S.; Thilly, William G.  
Formaldehyde is mutagenic for cultured human cells  
Mutation Research, 116, 417-422, Elsevier Biomedical Press  
1983

Gordon, J.; Meinhardt, T.J.  
Ethylene oxide - spontaneous abortions (Letter to Editor)  
Br. Med J 286  
1976-1977

Hardin, B.D. Niemeier, R.W.; Sikov, M.R.; Hackett, P.L.  
Reproductive-toxicologic assessment of the epoxides ethylene  
oxide, propylene oxide, butylene oxide, and styrene oxide  
Sand j work environ health 9 94-102  
1983

Hashimoto, Kazuo  
Toxicology of Acrylonitrile (AN)  
Jap. J. Ind. Health, Vol 22  
1980

Hashimoto, Kazuo  
The Toxicity of Acrylamide  
Jap. J. Ind. Health, Vol. 22  
1980

Hemminki, K.; Lindbohm, M.L.; Hemminki, T.; Vainio, H.  
Reproductive Hazards and Plastics Industry  
Progress in Clinical and Biological Research 141:79-87  
1984

Hemminki, R.; Mutanen, P.; Saloniemä, J.; Niemi, M.L.;  
Vainio, H.  
Spontaneous abortions in hospital staff engaged in  
sterilizing instruments with chemical agents  
Br. Med. J. 285:1461-1463  
1982

Hermann, A.A.  
Pilot research chromosome study of workers at sites where  
ethylene oxide gas is utilized as a sterilant.  
Johnson and Johnson Corporate Submittal to OSHA  
Mar 30, 1982

Hoch-Ligeti, C.; Argue, M.F.; Arcos, J.C.  
Induction of Carcinomas in the nasal cavity of rats by  
dioxane  
Br. J. Cancer: 24(1)164-167  
1970

Hogstedt, B.; Gullberg, B.; Hedner, K.; Kolnig, A.;  
Mitelman, F.; Skerfving, S.; Widegren, B.  
Chromosomal aberrations and micronuclei in bone marrow cells  
and peripheral blood lymphocytes in humans exposed to  
ethylene oxide  
Hereditas 98:105-3  
1983

Hogstedt, C.; Malmqvist, N.; Wadman, B.  
Leukemia in workers exposed to ethylene oxide.  
JAMA 241:1132-1133  
1979a

IARC  
Monographs of the evaluation of the carcinogenic risk of  
chemicals to humans  
Ethylene Oxide  
11:157-167  
1976

IARC  
Monographs in the evaluation of the carcinogenic risk of  
chemicals to humans  
Succinic Anhydride  
Vol 15:265-271  
1972

IARC  
Monographs of the evaluation of the carcinogenic risk of  
chemicals to humans  
Acrylates  
Vol 19  
1979

IARC  
Acrylonitrile, acrylic and modacrylic fibres, and  
acrylonitrile-butadiene-styrene and styrene-acrylonitrile  
copolymers  
Monogr Eval Carcinog Risk Chem Hum  
Vol 19:73-113  
Feb 1979

IARC

Monographs on the evaluation of the carcinogenic risk of  
chemicals to humans  
Methyl methacrylate and polymethyl methacrylate  
Vol 19:187-211  
Feb 1979

IARC

Monogr Eval Carcinog Risk Chem Hum  
Acrylamide  
Vol 31:47-61  
1983

Kaplan, W.D.

Formaldehyde as a Mutagen in Drosophila  
Science 108:43  
1948

Korhonen, A.; Hemminki, K.; Vainio, H.

Embryotoxic effects of acrolein, methacrylates, guanidines  
and resorcinol on three day chicken embryos  
Acrylates and Resorcinol  
Acta Pharmacol Toxicol (Copenh) 52(2):95-9  
Feb 1983

LaBorde, J.B.; Kimmel, C.A.

The teratogenicity of ethylene oxide administered  
intravenously to mice  
Toxicol & Pharmacol 56:16-22  
1980

Lambotte-Vandepaer, M.; Duverger-Van Bogaert, M.

Genotoxic properties of acrylonitrile  
Mutat. Res. Vol 134, ISS 1:49-59  
1984

Landrigan, P.J.; Meinhardt, T.J.; Gordon, J.; Lipscomb,  
J.A.; Burg, J.R.; Mazzuckelli, L.F.; Lewis, T.R.; Lemen,  
R.A.

Ethylene Oxide: An overview of toxicologic and epidemiologic  
research  
American Journal of Industrial Medicine 6:103-115  
1985

Lee, S.H.S.; Rozee, K.R.; Safe, S.H.; Crocker, J.F.S.  
The properties of emulsifiers that enhance the replication  
of viruses in cell cultures  
Chemosphere 7(7):573-89  
1978

Lynch, D.W.; Lewis, T.R.; Moorman, W.J.  
Chronic inhalation toxicity of ethylene oxide and propylene  
oxide in rats and monkeys - a preliminary report  
Toxicologist 2:11-18  
1982

Malling, H.; Miltenburger, H.; Westergaard, M.; Zimmer, K.G.  
Differential response of a double mutant--adenineless,  
inositolless-in *Neurospora crassa* to combined treatment by  
ultra-violet radiation and chem.  
Int. J. Rad. Biol. 4:328-343  
1959

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Metcalf, C.D.  
Lethality and accumulation of alkylphenols in aquatic fauna  
Chemosphere 10(7):723-30  
1981

McOmie, W.A.  
Comparative toxicology of methacrylonitrile and  
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J. Indust. Hygiene and Toxicol 31:113-116  
1949

Moerman, D.G.; Baillie, D.L.  
Formaldehyde mutagenesis in the nematode  
Mutation Research, 80, 273-279  
Elsevier/North Holland Biomedical Press  
1981

Morin, N.C.; Kubinski, H.  
Potential toxicity of materials used for home insulation  
Ecotoxicol Environ Safety 2(2):133-41  
Sep 1978

Murray, J.S.; Miller, R.R.; Deacon, M.M.; Hanley, Jr., T.R.;  
Hayes, W.C.; Rao, K.S.; John, J.A.  
Teratological evaluation of inhaled ethyl acrylate in rats  
Toxicology and Applied Pharmacology 60:107-11  
1981

Murray, F.J.; Schwetz, B.A.; Nitschke, K.D.; John, J.A.;  
Norris, J.M.; Gehring, P.J.  
Teratogenicity of acrylonitrile given to rats by gavage or  
by inhalation  
Food and Cosmetic Toxicology 16(6):547-51  
Dec 1978

National Institute of Environmental Health Sciences (NIEHS)  
Teratologic evaluation of ethylene oxide (CAS No. 75-21-8)  
in New Zealand white rabbits  
NIEHS Contract No. PR 259231  
April 18, 1983

National Institute for Occupational Safety and Health  
(NIOSH)  
Current intelligence bulletin: Ethylene oxide (EtO)  
DHHS(NIOSH) Publication No. 81-130, Cincinnati  
1981

Nicholas, C.A.; Lawrence, W.H.; Autian, J.  
Embryotoxicity and fetotoxicity from maternal inhalation of  
methyl methacrylate monomer in rats  
Toxicology and Applied Pharmacology 50, 451-458  
1979

Obe, G.; Beek, B.  
Mutagenic activity of aldehydes  
Drug and Alcohol Dependence, 4, 91-94 (Netherlands)  
1979

Occupational Safety and Health Administration  
Occupational exposure to ethylene oxide: proposed rule  
Federal Register 48:17284-17319  
April 21, 1983

Pero, R.W.; Bryngelsson, T.; Widegren, G.; Godstedt, B.;  
Welinder, H.

A reduced capacity for unscheduled DNA synthesis from  
individuals exposed to propylene and ethylene oxide  
Mutat. Res. 104:193-200  
1982

Perocco, P.

Increase of sister chromatid exchange and unscheduled  
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lymphocytes in vitro  
Scand. U. Work, Environ. Health Vol 8, Iss 4:290-3  
1982

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Possible mechanisms of lethal and mutagenic action of  
formaldehyde

Mutation Research 27:123-126 (Printed in the Netherlands)  
1975

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Behavioral and pharmacological responses following  
acrylamide exposure in rats  
Govt. Reports Announcements & Index (GRA&I) ISS 05  
1983

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Carbonyl compounds and the chemical mechanism of mutations  
Compt. Rend. Acad. Sci., URSS 54:65-67  
1947

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Effects of a very hydrophobic non-ionic surfactant (NP-E06)  
on the apical border of frog urinary bladder  
Institute Nationale de la Sante et de la Recherche  
Medicale. Collog. Vol 85:85-96  
1979

Ross, W.E.; McMillan, D.R.; Ross, C.F.

Comparison of DNA damage by methylmelamines and formaldehyde  
JNCI National Cancer Institute Journal 67(1):217-221  
Jul 1981

Sarto, F.  
Toxicity of ethylene oxide and its importance for man  
Med. Lav. 75(4):254-63  
Jul-Aug 1984

Schaffner, C.; Brunner, P.H.; Giger, W.  
4-Nonylphenol, a highly concentrated degradation product of  
nonionic surfactants in sewage sludge  
Commission of European Communities Rep. Eur. #Eur 9192:168-  
71  
1984

Shapiro, S.; Slone, D.; Heinonen, O.P.; Kaufman, D.;  
Rosenberg, L.; Mitchell, A.A.; Helmrich, S.P.  
Birth defects and vaginal spermicides  
American Medical Association Journal 247(17):2381-84  
May 7, 1982

Singh, A.R.; Lawrence, W.H.; Autian, J.  
Embryonic-fetal toxicity and teratogenic effects of a group  
of methacrylate esters in rats  
Journal of Dental Research 51(6):1632-8  
Nov-Dec 1972

Slizynska, H.  
Cytological Analysis of Formaldehyde Induced Chromosomal  
Changes in Drosophila Melanogaster  
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Attorneys for Defendant  
CELANESE CORPORATION

IN THE CIRCUIT COURT OF THE THIRD CIRCUIT  
STATE OF HAWAII

	and	)	Civil No. 8252
		)	
Plaintiffs,		)	CELANESE CORPORATION'S
		)	SUPPLEMENTAL ANSWERS TO
vs.		)	FIRST REQUEST FOR ANSWERS
		)	TO INTERROGATORIES
		)	
NATIONAL CELLULOSE		)	
CORPORATION, et al.,		)	
		)	
Defendants.		)	

CELANESE CORPORATION'S SUPPLEMENTAL ANSWERS  
TO FIRST REQUEST FOR ANSWERS TO INTERROGATORIES

Comes now CELANESE CORPORATION, by and through its attorneys, and pursuant to the Order Granting Plaintiffs' Motion to Compel Answers to Interrogatories, supplements its response to Plaintiffs' First Request for Answers to Interrogatories as follows:

8. What are the ingredients that are compounded to produce said product?

NO 200  
CAS 8001 40885

ANSWER: SK-131-A--High molecular weight emulsion polymer of ethyl acrylate, acrylonitrile, itaconic acid dispersed in water using ethylene oxide nonyl phenol adduct nonionic dispersants. Less than .1 percent of formaldehyde and ammonia added for bacterial and pH control.

SK-131-B--High molecular weight emulsion polymer of ethyl acrylate, n-methylol acrylamide, itaconic acid dispersed in water using ethylene oxide nonyl phenol adduct nonionic dispersants. Less than .1 percent formaldehyde and .01 percent of other bactericides (1,2-dibromo-2, 4-dicyanobutane) added for bactericidal control.

dibromo

9. State the chemical formula for each such ingredient.

ANSWER: See answer to interrogatory 8.

10. State the common and/or generic name of each such ingredient.

ANSWER: See answer to interrogatory 8.

DATED: Honolulu, Hawaii, January 2, 1985.

Brian Aburano  
WILLIAM A. BORDNER  
BRIAN ABURANO

Attorneys for Defendant  
CELANESE CORPORATION

Itaconic acid  
 $CH_2=CH(COOH)CH_2COOH$

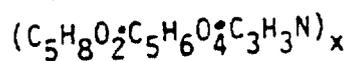
glycerine

9. State the chemical formula for each such ingredient.

SK-131-A

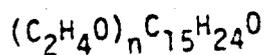
CAS number for polymer is 35705-21-6

Butanedioic acid, methylene-, polymer with ethyl 2-propenoate and 2-propenenitrile



CAS number for dispersant is 9016-45-9

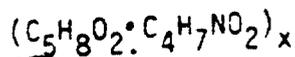
Poly(oxy-1,2-ethanediyl), a-(nonylphenyl)-w-hydroxy-



SK-131-B

CAS number for polymer is 26428-44-4

2-Propenoic acid, ethyl ester, polymer with N-(hydroxymethyl)-2-propenamide



CAS number for dispersant is 51811-79-1

Poly(oxy-1,2-ethanediyl), a-(nonylphenyl)-w-hydroxy-, phosphate

*request the structural formula*