

THE DOW CHEMICAL COMPANY
EXHIBITS - 2

NO.	DATE	DESCRIPTION	STATUS
1019		TCDD 3-Generation Reproduction Study, Murray, et al., 1978 %21-Day Postnatal Survival	In
1020		Frequency of Hydronephrosis in Wistar Rats 1,2,3	
1021		Hertiable Hydronephrosis ina Mutant Strain of Brown Norway Rats ^{1,2,3,4} by Bennett J. Cohen, R.W. DeBruin, and W. J. Kort	"
1022		Proceedings of the Society for Experimental Biology and Medicine "Spontaneous Hydronephrosis in the Rat, by Alvin L. Sellers, et al.	"
1023		Investigative Urology "Congential Renal Strucutral Alterations in a Mutant Strain of Rats, by Emilio A. Machado and Bismarck B. Lozzio	"
1024		Laboratory Animal Care "Spontaneous Pathologic Findings in Long-Evans Rats, by J.M. Kihlstrum and G. R. Clements	"
1025		Transcript of Proceedings, in the Matter of FIFRA Scientific Advisory Panel Twenty-Sixth Meeting, September 20, 1979	"
1026		Statistics with Applications to the Biological and Health Sciences by Richard D. Remington and M. Anthony Schork	"
1027		"Letters" (Choice of the Number of Sampling Units in Teratology") (Statistical Analysis and Choice of Sample Units)	"
1028		Selection of the Experimental Unit in Teratology Studies, Joseph K. Haseman and Michael D. Hogan	"
1029		Selction of Appropriate Experimental Units in Teratology	"
1030		The Litter Effect as a Variable in Teratologic Studies of the Albino Rat	"
1031		Selection of the Valid Number of Sampling Units and a Consideration of their Combination in Toxicological Studies Involving Reproduction Teratogenesis or Carcinogenesis, C.S. Weil	"
1032		Ltr dtd March 28, 80 to B.A. Schweitz by J.A. John, Toxicology Research Laboratory, the Dow Chemical U.S.A.	"
1033		Dose Level of TCDD EX 85 Bionetics 1968	"
1034		Dose of TCDD EX 61 Collins and Williams (1971)	"
1035		The Reproductive Endocrine System of Nonhuman Primates -- A Model for Prediction of Toxicity, by William C. Hobson, Gene B. Fuller, and Frederic Coulston	"
1036		Laboratory Studies on the Immune Effects of Halogenated Aromatics, Michael I. Luster, Robert E. Faith and George Clark	"

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NO.	DATE	DESCRIPTION	STATUS
1037		Investigations ofn the Effects of 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) on Parameters of Various Immune Functions, by Robert E. Faith and Michael I. Luster	In
1038	4-16-80	Memorandum to Dioxin Meeting Members in re 2,4,5-T/Dioxins: Analytical Collaborators Meetin June 15, 1976	"
1039	"	Laboratory Report	"
1040	"	Laboratory Report	"
1041	"	Laboratory Report	"
1042	"	Memorandum dtd August 1, 1975 to Dr. Ralph Ross, EPA Criteria & Evaluation Division from Larry J. Anderson, Accident Investigation Officer Pesticides Branch	"
1043	"	Liver Samples Tables	"
1044	"	Liver Samples Table (Larger copy of page #017941)	"
1045	"	Liver Samples Table (Larger copy of page #107945)	"
1046	4-17-80	Principles for Evaluating Chemicals in the Environment	"
1047	"	Memorandum to Participants of Dioxin Meeting dated Dec. 13, 1973, from Criteria and Evaluation Division of EPA	"
1048	"	Report of the Advisory Committee on 2,4,5-T to The Administrator of the Environmental Protection Agency	"
1049	"	Disappearance of TCDD From Grass Following Field Treatment With Esteron 245 Herbicide	"
1050	"	Tables - Residues of 2,4,5-T and TCDD found in grass samples collected shortly after treatment with ESTERON 245 Herbicide (3 gal/A equivalent to 12 lb. 2,4,5-T per acre).	"
1051		Bioaccumulation of 2,3,7,8-Tetrachlorodibenzo-para- Dioxin	
1052		IG(7) Residues: Animal Products	
1053	4-18-80	WATER (Table)	In
1054	"	National Monitoring Program for the Assessment of Pesticide Residues In Water - H. R. Feltz, William T. Sayers, and H. P. Nicholson	"
1055	"	Summary of Water Residue Studies Reported by Thomas Dixon (Table)	"
1056	"	(Corrected) Summary of Storet Water Sampling for 2,4,5-T and Silvex	"
1057	"	Letter to Federal Reg. Section dtd 9/15/78 from ITT Roger Tollefson	"

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NO.	DATE	DESCRIPTION	STATUS
1058	4-22-80	Unidentified High Molecular Weight Chlorinated Compounds In Vietnamese Fish and Interference With The Analysis of TCDD by Robert W. Baughman	In
1059	"	Letter to Mr. John R. McGuire, USDA dated October 19, 1977 from Barbara Blum, Acting EPA Administrator	"
1060	"	USAF OEHL Technical Report - The Toxicology, Environmental Fate and Human Risk of Herbicide Orange and Its Associated Dioxin	"
1061	"	Memorandum from Dr. Robert Baughman, et al. Harvard University Department of Biochemistry and Molecular Biology dated March 1, 1977 in re Human Milk Monitoring: Preliminary Results For Twenty-five Samples	"
1062			
1063	"	Report of the Panel Convened to Review the Results of EPA-Sponsored Studies to Determine Tetrachlorodibenzodioxins (TCDD) in Human Milk Samples	"
1064	"	Letter to Mr. Richard L. McConnell, Kirkland & Ellis dated April 2, 1980 from Robert S. Murphy, HEW	"
1065	"	Air Pollution from Pesticides and Agricultural Processes by Robert E. Lee, Jr., Ph.D.	"
1066	"	Air Monitoring System Laboratory Residue Findings dated July 13, 1972	"
1067		Letter to Ms. Sandra C. Strassman-Sundy dated February 12, 1980 from Herbert L. Hetzler, The University of Iowa	
1068	4-23-80	Memorandum to Tom Dixon dated Dec. 20, 1979 from Aubry E. Dupuy	"
1069	"	Pesticides Monitoring Laboratory, NSA/NST1 - My thoughts of the Future Direction of the Dioxin Program by Aubry Dupuy, Jr., Ph.D. and Mr. Tom Holloway, Dioxin Project Manager	"
1070	"	Note to Michael Dellarco, EPA dated September 10, 1979 from Aubry Dupuy, Jr., Ph.D.	"
1071	"	Memorandum to Dupuy, Gross & Harless dated Sept. 4, 1979 from Tom Holloway, in re to Summary of the August 3, 1979 Work Session at the Pesticide Monitoring Laboratory, Bay St. Louis, Mississippi	"
1072	"	Tables	

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NO.	DATE	DESCRIPTION	STATUS
1073	4-23-80	Memo to Tom Hollaway dated July 20, 1979 from Robert Harless in re Results of Capillary Columns GC/HRMS Analyses Performed On Extracts of Water, Sediment, Still Bottoms, and Fly Ash for 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) Residues	In
1074	"	Letter to Mike Dellarco dated January 24, 1980 from Michael L. Gross	"
1075	"	Memo to Michael Dellarco dated Sept. 6, 1979 from Aubry E. Dupy, Jr., Ph.D. in re Decoding of Sample Extracts Shipped to RTP and University of Nebraska for TCDD Analysis on 9/5/79	"
1076	"	Letter to Dr. Michael Gross, U. of Nebraska dated Sept. 5, 1979 from Aubry E. Dupuy, Jr., Ph.D.	"
1077	"	Letter to Ms. Pat Ott dated Dec. 6, 1977 from Michael L. Gross U. of Nebraska-Lincoln	"
1078	4-24-80	Memorandum to Dave Redford USEPA, SAD from Robert Harless dated March 19, 1980 in re Dioxin Monitoring Program	"
1079	"	Comparison of Criteria For TCDD Detection	"
1080	"	Memorandum to Mr. Richard L. Reising from Dr. Edward O. Oswald dated May 9, 1978 in re Analysis of Fortified Human Milk Samples at the Sub Part Per Trillion Levels	"
1081	"	DIOXIN Toxicological and Chemical Aspects	"
1082	"	The Trace Chemistries of Fire- A Source of Chlorinated Dioxins	"
1083	"	Handwritten Memo to Dr. Oswald from Robert Harless dated 2-26-79	"
1084	"	Memorandum to Mike Dellarco from Robert Harless dated August 23, 1979 in re Results of Capillary Column GC/HRMS Analyses Performed On Extracts of Human Milk, Water, and Sediment for 2,3,7,8-TCDD Residues	"
1085	"	Memorandum to Ms. Carolyn Offutt from Robert Harless dated April 24, 1979 in re Results of Capillary Column GC/HRMS Analyses Performed on Extracts of Human Milk for 2,3,7,8-tetrachlorodibenzo-p-dioxin TCDD Residues	"
1086	"	Memorandum to Ms. Carolyn K. Offutt from Edward O. Oswald, Ph.D. dated November 8, 1978 in re Results of GC/MS Analyses Performed on Extracts of Human Mother's Milk for Parts Per Trillion (PPT) Levels of 2,3,7,8-Tetrachlorodibenzo-paradoxin (TCDD)	"

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NO.	DATE	DESCRIPTION	STATUS
1087	4-24-80	Map	In
1088	4-25-80	Analytical Methodology for 2,3,7,8-Tetrachlorodibenzo-p-Dioxin and Its Application By the U.S. Environmental Protection Agency To Human and Environmental Monitoring	"
1089	"	Letter to Dr. Aubry Dupy dated May 2, 1978 from Richard L. Reising	"
1090	"	Memorandum to Dr. Edward O. Oswald from Mr. Richard L. Reising dated May 22, 1978	"
1091	"	Oregon Water and Sediment Study Preliminary Results	"
1092	"	Memo to Mr. J.B. Homolya from Robert Harless dated March 28, 1980 in re Preliminary Report for the Quantifications of Tetrachloro-dibenzo-p-dioxin Residues in Extracts of Samples Collected From a Minicipal Incinerator	"
1093	"	Handwritten Memo dated 11-21-78 to Dr. Oswald from Robert Harless in re GC/MS Analyses of MTF Human Milk Extracts from TCDD Residues ACB-75	"
4	"	Letter to Russell E. Train dated March 30, 1976 from Thomas O. Tiernan, Wright State University	"
1095	"	Letter to Ms. Carolyn Offutt dated March 23, 1979 from Thomas O. Tirenian, Ph.D. transmitting copies of a quarterly report	"
1096	"	Ltr to Ms. Carolyn Offutt dated April 30, 1979 from Thomas O. Tiernan transmitting Table Results of Analyses of EPA Beef Fat Sample Extracts	"
1097	"	Ltr to Ms. Carolyn Offutt dated May 8, 1979 from Thomas O. Tiernan in re Results of Analyses of EPA Beef Fat and Human Milk Sample Extracts for Tetrachlorodibenzo-p-Dioxin By Wright State University	"
1098	"	Memorandum dated March 27, 1979 to Dr. T. O. Tiernan, from Dr. M.L. Taylor in re Telecon with Ms. Carolyn Offutt	"
1099	"	Letter to Mr. Michael Dellarco dated February 22, 1989 from Thomas O. Tiernan, Ph.D.	"
1100	"	Ltr to Mr. David Watkins, dated Feb. 5, 1980 from Thomas O. Tiernan	"
1101	"	Identification of Polychlorinated Dibenzo-p-Dioxin Isomers Found In Fly Ash	"
1102	"	Chlorodibenzo-p-Dioxin and Chlorodibenzofurans are Trace Components of Fly Ash and Flue Gas of Some Municipal Incinerators in the Netherlands	"

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NO.	DATE	DESCRIPTION	STATUS
1103	4-25-80	Results of Beef Fat (PHASE I) Positives Reported by Tiernan	In
1104	"	Laboratory Report # 331365	"
1105	"	Laboratory Report # 331381	"
1106	"	Map of Southern Missouri	"
1107	"	Memorandum to Edwin L. Johnson dated Sept. 5, 1979 in re Region 10 Request for TCDD Analysis of Oregon and Washington Samples of Elk and Deer Fat	"
1108	"	Theoretical Calculation of Formulas Indistinguishable from TCDD (m/e 322) at 10,000 Resolving Power	"
1109	4-30-80	Note to Ed (Preliminary Data - Not for Public Release) 3-26-79	"
1110	"	The Dioxin Issue (The Pendulum and the Toxic Cloud)	"
1111	"	Memo dtd June 13, 79 to Chief, HEB, Dr. Jack Griffith from FSC - Iowa Center Subject: Soil Samples Freedlund Farm, w/attachments	"
1112	"	Ltr dtd Oct 2, 79 to Mr. Tom Holloway, Mr. Mike Delarrco, SPR from Michael L. Gross	"
1113	5-1-80	Episode Summary for Reports Involving 2,4,5-T	"
1114	"	Pesticide Episode Report	"
1115	5-6-80	Dioxin Implementation Plan Monitoring Programs	"
1116	"	Letters Submitted to EPA in Response to 2,4,5-T RPAR: No. 111 Effects from Registered Uses	"
1117	5-7-80	Letter to Mr. Paul Painter, Field Investigator, EPA dated Dec. 4, 1979 in re Damage claims allegedly resulting from application of 2,4-D and 2,4,5-T on the Trenckmann property near the County Line Dickerson and Houston Counties in Tennessee from L. B. Davis, Davis-Frazier Agri-Consults, Inc.	"
1118	"	Letter dated Sept. 14, 1978 to Mr. Frank Davido in re Herbicide Spraying in Houston County, Tennessee from Robert N. James, Houston County Department of Public Health	"
1119	"	Memorandum dtd Sept. 5, 1978 to Chief of Human Effects Monitoring Branch EPA from Pesticide Incident Response Officer in re Phenoxy Herbicide Spraying Near Nashville, Tennessee	"
1120	"	Follow-up Investigation - Potential Health Effects of 2,4,-D and 2,4,5-T Aerial Applications in Tennessee	"

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NO.	DATE	DESCRIPTION	STATUS
1121	5-7-80	Laws and Regulations Governing Pest Control Operators and Applicators of Restricted Use Pesticides - Tennessee Department of Agriculture - Division of Plant Industries	In
1122	5-8-80	Handwritten notes in re Field study	"
1123	"	Complaint - No. Civ.-78-47 William Alan Pumphrey, Elizabeth Young Pumphrey and W. A. Pumphrey vs. Richard Black, Thompson Hayward, Arkansas Kraft Corporation and Omnelight Helicopter, Inc., In the Circuit Court of Perry County, Arkansas	"
1124	5-9-80	Guidelines on Analytical Methodology for Pesticide Residue Monitoring	"
1125		The Biologic and Economic Assessment of 2,4,5-T - A Report of the USDA States-EPA 2,4,5-T RPAR Assessment Team	
1126	5-12-80	Handwritten document dated 7/11/79, 8 pages	"
1127	"	Code of Federal Regulation 40 - Protection of Environment Part 100 to 399	"
1128	"	The Responses of Tomato Plants To Vapors of 2,4,-D and or 2,4,5-T Formulations at Normal and Higher Temperatures	"
1129	"	Toxicity of 45 Organic Herbicides to Cattle, Sheep, and Chickens	"
1130	5-14-80	Location Map: Coos Bay District Showing approximate location of streams monitored during the FY 1977 BLM Herbicide Spraying Program	"
1131	"	Review of BLM Herbicide Stream Monitoring Study	"
1132	"	A Report of Herbicide Usage and Related Procedures on State Owned Forest Lands - August 1, 1978	"
1133		withdrawn	
1134	"	Letter to Ms. Patton dtd Nov. 19, 1979 from Office of State Forester Salem, Oregon signed by Carl W. Smith	"
1135	"	Toxicity Summary Sheet - Static Toxicity Tests	"
1136	"	The Science of 2,4,5-T and Associated Phenoxy Herbicides - Toxixology of Phenoxy Herbicides	"
1137	"	The Science of 2,4,5-T and Associated Phenoxy Herbicides - Physiological Effects of Phenoxy Herbicides in Higher Plants	"

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NO.	DATE	DESCRIPTION	STATUS
1138	5-14-80	The Science of 2,4,5-T and Associated Phenoxy Herbicides - Residues and Fate of Phenoxy Herbicides in the Environment	In
1139	"	Determination of Vapor Pressures of Some Phenoxyacetic Herbicides by Gas-Liquid Chromatography by David J. Jensen and E.D. Schall Purdue University	"
1139a		Ltr to Mr. John Zackrison dtd May 15, 1980 in re Corrections in equations	"
1140	"	Report on Investigation of Possible Herbicide Damage For Norma McMillin of Rose Lodge, Oregon	"
1141		Memo to Bill Koesan dated Sept. 22, 1977 from Tom Harrison Department of Agriculture, State of Oregon	
1142		Memorandum to Ed Schroeder & Art Goodman dated March 2, 1977 from Janet McLennan in re Domestic Water Supply for Homer and Norma McMillan	
1143		Interoffice Memorandum to Art Goodman dated March 10, 1977 from James Kirk, Oregon Health Div. in re Protection of McMillin's domestic water supply against herbicide contamination	
1144		Summons No. 31866 In the Circuit Court of the State of Oregon to Evergreen Helicopters, Inc. in re Gary Green and Gisela Green vs. Evergreen Helicopters, Inc. and Oregon Corporation	
1145	5-16-80	Map (Alsea Quadrangle Oregon)	"
1146	5-20-80	Map	"
1146a	"	Map	
1147	5-20-80	Civil No. 73-302- In The United States District Court For The District of Oregon- Amended Complaint in Jean Anderson, Ph.D., and Ugo Pezzi vs. Phil Wickham, Dale Robertson, Theodore Schlapfer, and Earl Butz	"
1148	"	Civil No. 73-302-In The District Court of The United States For The District of Oregon - Deposition of Ugo Pezzi	"
1149	"	Letter to Theodore A. Schlapfer dated Dec. 5, 1972 from Ugo Pezzi	"
1150	"	USDA Forest Service Environmental Statement Calendar Year 1973 Zone Vegetation Management Project Using Selective Herbicides	"
1151	"	Letter to Theodore A. Schlapfer dated March 22, 1973 from Ugo Pezzi	"
1152	"	Siskiyou, Siuslaw, and Umpqua National Forests - Calendar Year 1973 Pacific Northwest Region U.S.D.A Forest Service- VEGETATION MANAGEMENT WITH HERBICIDES	"

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NO.	DATE	DESCRIPTION	STATUS
1153	5-21-80	Letter to Mr. Costle, EPA Administrator dated May 3, 1978 signed by F. Farrell Higbee Executive Director National Agricultural Aviation Association	In
1154		Exploratory Analyses of Data Contained In and Collected for the Draft Report "Investigation of Six-year Spontaneous Abortion Rates In Three Oregon Areas in Relation to 2,4,5-T Spray Areas"	"
1155		Forest Spray - Miscarriage Investigation, Alsea, Oregon: Questionnaire Evaluation and Study Plan	"
1156		Memorandum to Field Studies Coordinator from Health Statistician in re Mini Survey of Licensed Physicians Practicing in Alsea Study and Control Areas dated 8-27-79 (handwritten)	"
1157		Emergency Action To Stop Spraying of Herbicides 2,4,5-T and Silvex Press Conference Statement - by EPA Deputy Administrator Barbara Blum Thursday, March 1, 1979, Wash., D.C.	
1158	5-22-80	USEPA Press Conference by Barbara Blum, Deputy Administrator Barbara Blum - Also Responding: Steven Jellinek, Ed Johnson, Charles Duncan, Marlin Fitzwater - 1:08 p.m. Thursday March 1, 1980 (transcript)	"
1159	"	A Scientific Critique of the EPA Alsea II Study and Report with the November 16, 1979 Supplement, dated October 25, 1979- Oregon State University- Environmental Health Sciences Center (Pamphlet filed in Expando)	"
1160	"	Plot of Monthly Spontaneous Abortion Index for the Study and Control Areas Oregon, 1972 - 1977	"
1161	"	Plot of Monthly Spontaneous Abortion Index for the Study and Control Areas Oregon, 1972 - 1977	"
1162	"	Plot of Monthly Spontaneous Abortion Index for the Study and Control Areas Oregon, 1972 - 1977 (With Control Data Shifted 6 Months)	"
1163	"	Exploratory Analyses of Data Contained In and Collected for the Draft Report "Investigation of Six-year Spontaneous Abortion Rates in Three Oregon Areas In Relation to 2,4,5-T Spray Areas"	"
1164	"	New Zealand - An Evaluation of the "Preliminary Report of Assessment of a Field Investigation of Six-year Spontaneous Abortion Rates In Three Oregon Areas In Relation To Forest 2,4,5-T Spray Practices". Dept. of Health, Wellington, New Zealand - May, 1979 Press Releases	"
1165	"	An Evaluation of the Statistical Methods Used In EPA's "Report of Assessment of the Field Investigation of Six-Year Spontaneous Abortion Rates In the Three Oregon Areas In Relation to Forest 2,4,5-T Spray Practices" (the Alsea II Report) dated May 26, 1979	"

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1166	5-22-80	Letter to Benjamin P. Holder, M.D., Dow Chemical, U.S.A. dated March 19, 1979 from Morton A. Stenchever, M.D., University of Washington, Seattle, Washington, Department of Obstetrics and Gynecology	In
1167	"	Letter to Benjamin B. Holder, M.D. dated March 15, 1979 from Kenneth R. Niswander, M.D., University of California, Davis Dept. of Obstetrics and Gynecology School of Medicine	"
1168	"	Panel Report - Panel to Discuss the Epidemiology of 2,4,5-T New York City, July 10-11, 1979	"
1169	"	Letter to Douglas M. Costle dated May 15, 1979 from Gordon W. Burt Associate Professor, University of Maryland	"
1170	"	Draft Report: "Preliminary Assessment of A Field Investigation of Six-year Spontaneous Abortion Rate In Three Oregon Areas In Relation to 2,4,5-T Spray Areas." and to "Exploratory Analyses of Data Contained In and Collected For The Draft Report' Investigation of Six-year Spontaneous Abortion Rates in Three Oregon Areas in Relation to 2,4,5-T Spray Areas." by Robert C. Duncan	"
1171	5-23-80	Letter to John and Debbie Marano dated Aug. 15, 1977 from Michael Watson Toxicologist, EPA Seattle, Washington	"
1172	"	Request from EPA - Post-Questionnaire Strategy: Alsea Oregon Miscarriage Investigation	"
1173	5-29-80	Memorandum dated Feb. 27, 1979 from Harvey L. Warnick in re Briefing by Clemet Associates on Preliminary Risk Assessment for 2,4,5-T	"
1174	"	Memorandum dated July 6, 1977 to Harvey L. Warnick to Frederick W. Kutz, Ph.D. in re Environmental Monitoring Data on 2,4,5-T, 2,4,5-TP(Silvex) Erbon, and Ronnell	"
1175	"	List of Air Sampling Sites of the Surban Air Monitoring Study for Pesticides	"
1176	"	The Science of 2,4,5-T and Associated Phenoxy Herbicides by Rodney W. Bovey & Alvin L. Young	"
1177	"	Proprietary Data - Rebuttal Analysis, 2,4,5-T, Dietary Exposure	"
1178	"	Veon 245 label	"
1179	"	Estimate of Maxium Possible TCDD Residue In Rice	"

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1180	6-6-80	Inspections by Mike Peoples (handwritten)	In
1181	"	J. Yowell Notes (handwritten)	"
1182	"	Record of Communication dated May 1, 1980 in re 2,4-D and 2,4,5-T Application to Thomas Beasley from James R. Yowel	"
1183	6-17-80	Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death	"
1184	6-24-80	2,4,5-T Publication	"
1185	"	Developmental Toxicity of 2,4,5-T II Comparison of the Embryotoxicity of Purified and Technical Grades in Dihybrid and CD-1 Mice	"
1186	"	Retrospective Study of the Relationship between Agricultural Use of 2,4,5-T and Cleft Palate Occurrence in Arkansas	"
1187	"	2,4,5-T Teratology Study	"
1188	"	Overview - 2,4,5-T Program	"
1189	"	Handbook of Teratology by James G. Wilson and F. Clark Fraser	"
1190	"	Replication Values for Mean Fetal Weights	"
1191	"	Memo from Director National Center for Toxicological Research to Dioxin Project Manager Criteria and Evaluation Division, EPA in re Dioxins Relative Risks to Man and the Environment dtd Dec. 17, 1975	"
1192	6-25-80	Memo dtd January 30, 79 in re Request for Contract Negotiation with Dr. Michael L. Gross for Dioxin Assays in Human Fat	"
1193	"	Ltr dtd March 10, 80 to Brooks Air Force Base in re paper on the concentration of TCDD in the body fat ..., from Lawrence B. Hobson, M.D., Ph.D.	"
1194	"	Tables: Concentration TCDD	"
1195	"	Tables: Fat Biopsy - Air Force Volunteers	"
1196	"	Fat Assays for Dioxins	"
1197	"	TCDD (Dioxin) Content of Human Fat: Progress Report (3/12/80)	"
1198	"	Memo dtd January 9, 80 "Results of Capillary Column GC-HRMS Analysis for the Determination of 2,3,7,8-TCDD Residues in University of Nebraska Sample Extracts	"

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NO.	DATE	DESCRIPTION	STATUS
1199	6-25-80	Ltr dtd June 26, 79 to Dr. Lyndon Lee, Veterans Administration from Michael L. Gross	In
1200	"	Comparison of University of Nebraska and EPA Results on the Analysis of Human Adipose for the VA	"
1201	"	Memo to Dr. Lawrence Hobson, Veterans Administration dtd May 29, 80 in re "Review of VA Study of TCDD in Body Fat of Vietnam Veterans	"
1202	"	Determination of Tetrachlorodibenzo-p-dioxin (TCDD) in Human Adipose Tissue	"
1203	"	Paper in re Veterans Administration Study	"
1204	"	Memo dtd February 20, 80 from Robert Harless, to Mike Dellarco Thru R.G. Lewis "Results of Capillary Column GC/HRMS Analysis Performed on Extracts of Human Adipose Tissue for 2,3,7,9-TCDD Residues	"
1206	6-27-80	Toxicology of Chlorinated Dibenzo-p-dioxins, by B.A. Schwetz	"
1207		Memo dtd August 22, 1978 to Acting Director, HED from Pharmacologist, Toxicology Branch in re Dr. McNulty's Primate Teratology Study	"
1208		Note to Bill Murray dtd 2 Aug 78	"
1209		Memo dtd Nov 9, 1978 subject Toxicity of TCDD	"
1210	7-1-80	Metric Weight Conversion Table	"
1211	7-3-80	EPA Monitoring Studies -- A Case History of Dioxin, by Carolyn K. Offutt	"
1212	"	Critique if Segments of Letters Which Relate To The Adequacy of Analytical Methods for TCDD In Environmental Samples	"
1213	7-7-80	Underlining Exposure Questionnaire & responses	"
1214	"	Chart	"
1215a-c	"	Charts	"

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1216	7-7-80	Package of Questionnaires re smoking (Swedish)	"
1217	"	Translation of the Swedish Questionnaires	"
1218	"	Death Certificates and the Tumor Diagnoses	"
1219	"	The Case-referent (case-control) Study In Occupational Health Epidemiology by Olav Axelson, M.D.	"
1220		The Merck Manual of Diagnosis and Therapy	"
1221		A Dictionay of Symptoms by Dr. Joan Gomez	"
1222		Sample Data Sheet (Water Sample)	"
1223		Symptoms -- The Complete Home Medical Encyclopedia	"
1224		Letter to Mr. Steve Van Strum dtd June 26, 1980 from James M. Witt, Estension Specialist in Chemistry & Environmental Toxicology Oregon State University	"
1225		The Merck Manual of Diagnosis and Therapy	"
1226		Letter to H. Michael Wehr, Ph.D. dated July 17, 1980 from William S. Argonza	"
1227		Letter to Department of Public Health , Attn: Mr. William S. Argonza, dated Oct 18, 1980 from Robert A. Reynolds, GHT Laboratories Agricultural Analysis	"
1228		The Science of 2,4,5-T and Associated Phenoxy Herbicides Rodney W. Bovey & Alvin L. Young	"
1229		Fate of Silvex Following Oral Administration To Humans	"
1230	7-15-80	Water Quality Following Aerial Herbicide Spraying	"
1231a			
1231	"	Silvicultural Chemicals and Protection of Water Quality	"
1231a	"	Silvicultural Chemicals and Protection of Water Quality PB-271 923	"
1232	7-16-80	Chemical Brush Control and Herbicide Residues in The Forest by L. A. Norris	"
1233	"	Ltr to Mr. William Seward, Dow Chemical U.S.A in re Siuslaw	"

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1234	7-16-80	Degradation of Herbicides in the Forest Floor by Logan N. Norris	In
1235		Sampler Sheets	
1236		Letter to Mr. Douglas M. Costle dtd Nov. 13, 1978 from John R. McGuire U. S. Park Service	
1237	7-17-80	Preliminary Report on Potential Drift of 2,4,5-T in the Alsea Oregon Area by W. E. Yates	In
1238	"	Residue Reviews Vol. 49/ Pesticide Volatilization	"
1239	"	Persistence of Foliar-Applied 2,4,5-T In Woody Plants by Homer A. Brady	"
1240	"	2,4,5-T Residues in Storm Runoff from Small Watersheds	"
1241	7-23-80	Letter to Major James W. Tremblay USAF Environmental Health Lab. from Michael L. Taylor, Wright State University	"
1242	"	Test Grids, Major Flight Paths, and Total Kilograms of Herbicides Disseminated on 210 Hectares of Test Area C-52A	"
1243	"	Disappearance of TCDD From Sils of Grid I	"
1244	"	Field Studies On The Soil Persistence and Movement of 2,4,-D, 2,4,5-T and TCDD	"
1245	"	Absence of TCDD Toxicity to a Rodent Population Following Massive Field Applications of 2,4,5-T Herbicide	"
1246	7-25-80	Soil Taxonomy- A Basic System of Soil Classification For Making and Interpreting Soil Surveys	"
1247	"	The Science of 2,4,5-T and Associated Phenoxy Herbicides	"
1248	9-4-80	USDA Report of the Forest Service Fiscal Year 1977	"
1249	"	Memo to M. Rupert Cutler, Assistant Sec. U.S. Forest Ser. in re 2,4,5-T Project Proposal, Rouge River, R-6 from John R. McGuire Chief of USDA Forest Service	"
1250	"	Memo to Chief dtd June 20, 1980 in re Final Report -NAPIAP Proposal FS-974 from Frank J. Kopeck Deputy Reg. Forester	"

THE DOW CHEMICAL COMPANY EXHIBITS

NO.	DATE	DESCRIPTION	STATUS
1251	9-4-80	Ltr to Mr. Ernie Shanks dtd May 28, 1980 from Ross W. Williams Forest Supervisor	In
1252	"	Memo to Herbicide Monitoring Task Force dtd Feb. 13, 1978 in re Herbicide Monitoring Program from C.R. Batten Director of Communications, Calif. Forest Protective Assoc.	"
1253	"	Memo to Staff Director, TM and FIDM Dr. Benjamin Spada, PSW Dave Graham, WO, FIDM dtd Aug. 31, 1978 in re Cooperative Agreement for Administrative Study of 2,4,5-T Release Spray Project from Hugh C. Black, Regional Wildlife Ecologist	"
1254	"	Project Design	"
1255	"	Report on Aerial Application Procedure and Spray Deposit Sampling Herbicide Study, Blodgett Forest by David B. Drummond & John W. Barry	"
1256	"	Reference Slip dtd 7/23/80 to Mike Dellarco, EPA from Dave Graham Forest Service	"
1257	"	Ltr to Ralph Ross, Assistant to the Administrator Agricultural Research USDA dtd July 24, 1980 from Michael J. Dellarco	"
1258	"	Ltr to Aubry DuPuy, Pesticide Monitoring Laboratory dtd Sept. 13, 1978 from Hugh C. Black, Regional Wildlife Ecologist	"
1259	"	FR Vol 40, No. 248 dtd Dec. 24, 1975 Title 40, Chapter 1, Subpart D - Part 141 National Interim Primary Drinking Water Regulations	"
1260	"	Ltr to Honorable William G. Milliken Governor of Michigan dtd Oct. 17, 1979 from Sherwin Gardner Acting Commissioner of Food & Drugs	"
1261	9-5-80	Texas Herbicide Regulations 176.26.00.001-.010 - Texas Department of Agriculture	"
1262	"	Rules and Regulations on Mixing and Application of Pesticides for the Enforcement of The Louisiana Pesticide Law	"
1263	"	Memo dtd May 1, 1979 from USEPA Economist, Economic Analysis Branch to Harvey Warnick, Project Manager	"
1264	"	Memo to Mr. C. L. Dunn from E. N. Woodbury dtd June 3, 1969	"
1265	"	Syracuse University Research Corporation - Life Sciences Div.- Report on 2,4,5-T Residues in Rough Rice & Rice Straw dtd Jan. 26, 1970	"

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NO.	DATE	DESCRIPTION	STATUS
1266	9-5-80	Syracuse University Research Corporation - Life Sciences Div. Pesticide Analyses Laboratory Report on <u>Silvex Residues</u> in Rough Rice and Rice Straw	In
1267	9-15-80	Comparison of Diagnoses by Kociba, Squire, Haberman, and Goodman Concerning The TCDD 2-Year Diet Study	In
1268	"	Intramandibular Tumors In Mice	"
1269	"	Experimental Production of Intramandibular Carcinoma In Mice by Mechanical Damage	"
1270	"	Tongue Lesions of Male Rats of The 2,4,5-T Study as Diagnosed by Montali	"
1271	9-23-80	Federal Regulatory Agency Approaches to the Assessment and Control of Risk from Carcinogens, by Robert E. Albert, M.D.	"
1272	"	The Carcinogen Assessment Group's List of Carcinogens, July 14, 1980	"
1273	"	Department of Labor "List of Substances Which May be Candidates for Futher Scientific Review and Possible Identification, Classification, and Regulation as Potential Occupational Carcinogens	"
1274	"	Pages 39 - 43 of Transcript of Sept 4, 80 Hearing	"
1275	"	The Carcinogen Assessment Group's Risk Assessment on (2,4,5-Trichlorophenoxy) Acetic Acid (2,4,5-T), (2,4,5-Trichlorophenoxy) Propionic Acid (Silvex), 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD)	"
1276	"	How the Risk is Derived From Intake of Beef Fat	"
1277	"	Carcinogen Assessment Group's Preliminary Report on Population Risk to Ambient Coke Oven Exposures	"
1278	"	Ltr. dtd June 14, 79 signed by David G. Hawkins w/attachments	"
1279	"	The Carcinogen Assessment Group's Updated Quantitative Risk Assessment on Ethylene Dibromide (EDB)	"
1280	"	Memo dtd 26 Oct 77 to Victor Kimm, DAA Water Supply from Roy E. Albert, CAG's Review of the Proposed Trihalomethane Amendment to the Interim Primary Drinking Water Regulations	"
1281	"	Upper Limit Risks Associated with Regulation of Carcinogens	"
1282	"	Final Report: NTA (dtd April 22, 80)	"
1283	"	Comparision of Estimated Average Daily Dietary Intake of Aflaxtoxin and TCDD	"

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NO.	DATE	DESCRIPTION	STATUS
1284	9-23-80	Assessment of Estimated Risk Resulting From Aflatoxins in Consumer Peanut Products and other Food Commodities	In
1285	"	Anticarcinogenic Effects of 2,3,7,8-Tetrachlorodibenzo-p-dioxin on Benzo(a)pyrene and 7,12-Dimethylbenz(a)anthracene Tumor Initiation and Its Relationship to DNA Binding, by Gerald Cohen, et al.	"
1286	"	Lack of Tumor-Promoting Ability of Certain Environmental Chemicals in a Two-Stage Mouse Skin Tumorigenesis Assay by D.L. Berry, et al.	"
1287	"	Pesticide Risk Analysis Methods Attached, Defended at ACS Seminar	"
1288	"	Memo dtd Feb 23, 79 to Harvey Warnick, from Elizabeth Anders Subj: Carcinogen Assessment Group's Risk Assessment on 2,4,5-Trichlorophenoxy Acetic Acid (2,4,5-T), and 2,3,7,8-Tetrachloro-dibenzo-p-dioxin (TCDD)	"
1289	"	Aflatoxins in Corn	"
1290	9-26-80	Chart	"
1291	"	Pages of Transcript Nos. 10142 - 10152 (2,4,5-T Hearing)	"
1292	"	Pages of Transcript Nos. 10182 - 10186	"
1293	"	Memo from Director, HED (TS-769) to Director, SPRD (TS-791) dtd Feb. 22, 1980 in re Identification of Pesticide Possibly Contaminated With Chlorodioxins	"
1294	"	Kearney Experiment (Chart)	"
1295	"	2,3,7,8-TCDD Molecule (Chart)	"
1296	"	Environmental Significance of Chlorodioxins	"
1297	"	The Dioxin Story: Is 2,4,5-T Safe? by Phillip C. Kearney	"
1298	9-30-80	Svenska Dagbladet - Aug. 17, 1977 - "Cancer Connection Possible"	"
1299	"	Ltr to Dr. Charles Poole USEPA dtd Oct. 24, 1979 from Lennart Hardell M.D.	"
1300	"	Report by Regional Hospital in Umea, Oncological Center	"

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NO.	DATE	DESCRIPTION	STATUS
1301	9-30-80	Report - Oncological Center in Lund and Umea - Regional Hospital dated March 1979	In
1302	"	Report - Oncological Center In Lund and Umea dated April, 1979	"
1303a	"	Questionnaire In The Study By Hardell, Sandstrom (In English)	"
1303b	"	" " " " " " (In Swedish)	"
1304a	"	Article "All These Lies To Defend Hormoslyv"	"
1304b	"	" "The Public Opinion Stops Herbicides"	"
1304c	"	" "The Death of Hormoslyv"	"
1304d	"	" "Just the First Step"	"
1304e	"	" "All Political Parties agree on Ban of Hormoslyv"	"
1304f	"	" "The Experts Will Have To Bow" - "Hormoslyv is being Banned"	"
1305	"	The Phenoxy acid Problem In Sweden	"
1306a&b	"	(In Camera)	"
1307a&b	"	(In Camera)	"
1308a	"	Instructions to the Interview (In Swedish)	"
1308b	"	Instructions For Completing Questionnaire Form (In English)	"
1309a&b	"	(In Camera)	"
1310	"	(In Camera)	"
1311	"	(In Camera)	"
1312	"	(In Camera)	"
1313	"	(In Camera)	"
1314	"	(In Camera)	"
1315	"	(In Camera)	"
1316	"	(In Camera)	"
1317a	"	Article "Hormoslyv Process: Invalidity Among Railway Employees"	"
1317b	"	" "Spread Lies and Poison"	"
1317c	"	" "Phenoxy acids-- A New Environmental Scandal"	"

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	DATE	DESCRIPTION	STATUS
1317d	9-30-80	Article "Hormoslyr Causes Cancer"	In
1317e	"	" "Hormoslyr Increases The Cancer-Risk"	"
1317F	"	" "Poison In The Forest"	"
1317g	"	" "Stop The Poison"	"
1318a	"	Hard to Deny Facts by Lennart Hardell (In Swedish)	"
1318b	"	Hard to Deny Facts by Lennart Hardell (In English)	"
1319	10-1-80	Mortality Among Rubber Workers by Richard R. Munson and Kenneth K. Nakano	"
1320	10-7-80	Memo dtd Aug. 21, 1980 to Gunter Zweig, Ph.D. from Robert E. Lee, Ph.D. in re 2,4,5-T and Silvex Usage Related Information	"
1321	"	Index to Articles On Pesticide Residues In Total Diet Samples (In Expando)	"
1322	"	Memorandum for the file - dtd Feb. 25, 1980 in re FDA's Findings of 2,4,5-T, Silvex, and TCDD In Raw Agricultural Commodities, Animal Feeds, and Total Diet Studies for 1972-1977	"
1323	"	Memorandum to Steven P. Bayard, CAG from Gunter Zweig, Ph.D., dated June 16, 1980 in re Estimation of Exposed Population Size and Duration of Exposure	"
1324	"	Differences In Numbers of Workers and Hours of Exposure In June and September CAG Report	"
1325	"	Memo dated May 1, 1978 to Acting Chief Toxicology Branch, EPA from R.D. Schmitt, Ph.D., Toxicology Branch in re Update of Food Factor Tables	"
1326	"	Residues of Silvex in Sugarcane and Its Factory Products Resulting From Applications of Kuron Herbicide dtd April 21, 1971	"
1327	"	Residue Study of Phenoxy Herbicides In Milk and Cream	"
1328	10-8-80	Economic Comparisons of Alternatives For Improving Honey Mesquite-- Infested Rangeland (In Expando)	"
1329	"	Record of Communication dtd 4/28/80 to Dr. Paul D. Chlenbusch, Dept. of Agronomy Kansas State University from William Schutte Economist EPA in re 1978 Kansas Pesticide Usage Survey Accuracy	"
1330	"	Letter to EPA Document Control Officer dtd Sept. 13, 1979 from Roger L. Mitchell, Vice Pres. for Agriculture Kansas State University	"

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NO.	DATE	DESCRIPTION	STATUS
1331	10-8-80	Letter to William D. Schutte, USEPA dtd June 10, 1980 from Will R. Jeffrey, District Conservationist, USDA	In
1332	"	Structural Characteristics of Beef Cattle Raising In the United States	"
1333	"	TCDD Residues By Animal - Beef Fat Phase I	"
1334	"	Average Residues In Beef Fat Phase I Study Under Alternative Assumptions (PPT)	"
1335	"	Livestock and Meat Situations - May 1980	"
1336	"	Summary of personal Communication with Jean Pennington dtd 8/25/80	"
1337	10-9-80	Report of Official Sample of Economic Poison	"
1338	"	Impact of 2,4,5-T On Blodgett Forest	"
1339	"	Ltr to Dr. Dave Graham EPA dtd Aug. 29, 1980 in re Results of Mr. Bob Harless' analyses of the quality control samples in the Blodgett Forest Study	"
1340	"	Memo to Mike Dellarco, EPA Dioxin Project Manager dtd Aug. 14, 1980 from Robert Harless in re Addendum to Memorandum dated May 12, 1980, Results of Capillary Column GC-HRMS Analyses Performed on Extracts of Deer (USDA Study) for 2,3,7,8-TCDD Residues	"
1341	"	Blodgett Forest Study - Deer Samples	"
1342	"	USFS Blodgett Forest Deer Study Summary	"
1343	"	Memo to Hugh C. Black, USDA Forest Service dtd April 14, 1978 from Logan A. Norris in re Protocol for Sampling Deer for TCDD Residues	"
1344	"	Memo to The Record dtd Sept. 1, 1978 signed by David G. Graham, Pesticide Specialist USDA Forest Service in re Trip Report -- Aug. 14-15, 1978 2,4,5-T Deer Exposure Study--California	"
1345	"	Memo to David Graham, Forest Insect and Disease Management Forest Service dated Aug. 17, 1978 from Ralph T. Ross, Acting Assistant to Deputy Director in re Limitations of the Analytical Procedure for the Analysis of 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) In Environmental Samples	"
1346	"	Herbicide Residues In Blacktail Deer From Forests Treated with 2,4,5-T and Atrazine	"
1347	"	The Effect of Plant Growth Substances and Natural Products on RNA and DNA Synthesis in Leukocytes	"
1348	"	Teratogenic Effects of the Plant Hormone Indole-3-Acetic Acid In Mice and Rats	"

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NO.	DATE	DESCRIPTION	STATUS
1349	10-10-80	Synthesis and Identification of the 22 Tetrachlorodibenzo-p-dioxin Isomers by High Performance Liquid Chromatography and Gas Chromatography - T. J. Nestruck, L. L. Lamparski, and R.H. Stehl	In
1350	"	Letter to Dr. Warren Crummett, Dow Chemical dtd Jan. 3, 1979 from David Firestone	"
1351	"	Ltr to Document Control Officer, U.S.EPA in re Additional Information Concerning the Presence of Chlorinated Dioxins In The Environment	"
1352	"	Ltr to Dr. Philip H. Abelson, Edigor Science dtd May 16, 1979	"
1353	"	"A Closer Look at the Alchemy of Fire, L.L. Lamparski, T.J. Nestruck, & S.S. Cutie'	"
1354	"	Dioxin Study dated February 27, 1979	"
1355	"	Ltr to Dr. Etchyl H. Blair, Vice President, Director, Health and Environmental Sciences Dow Chemical Company dtd June 14, 1979 from L. B. Rogers	"
1356	"	Dispute over Dow Chemicals' Theory of Dioxin Traces	"
1357	"	Debate Continues over Dow's Dioxin Theory	"
1358	"	Handwritten notes from John Strouss Dow Chemical Company	"
1359	"	Ltr to Mr. Bob G. Caldwell dtd January 12, 1979 from Howard A. Tanner, Director of State of Michigan Department of Natural Resources	"
1360	"	Memo to Joseph J. Merenda, Director Assessment Division, OTE/OTS from Frank D. Kover, Assessment Division, OTE/QTS in re Status RReport 8EHQ-1178-0209 dtd Feb. 8, 1979	"
1361	"	Laboratory of Environmental and Toxicological Chemistry, U. of Amsterdam "Chlorinated Dibenzo-p-Dioxins and Related Compounds In Incinerator Effluent: A Review of Measurements and Mechanisms of formation	"
1362	"	Tetrachlorodibenzo-p-Dioxin Quantitation in Stack-Collected Coal Fly Ash by B.J. Kimble and M.L. Gross	"
1363	"	Analysis of Fly Ash from Municipal Incinerators for Trace Organic Compounds, G.A. Elceman, R.E. Clement and F.W. Karasek	"
1364	"	TCDD Distributed from Use of 2,4,5-T and Silvex	"

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NO.	DATE	DESCRIPTION	STATUS
1365	10-14-80	Transcript of FIFRA Scientific Advisory Panel dtd Aug. 16, 1979	In
1366	"	Technical Data Sheet - Product Stewardship Guidelines for Safe Handling of 2,4,5-Trichlorophenol	"
1367	"	Ltr to C.E. McCoy dtd August 26, 197r from Ralph R. Langner Industrial Hygiene Service, 607 Building Dow Chemical Co.	"
1368	"	2,4,5-T Hearing - Miscellaneous Data - J.M Theis	"
1369	"	In Camera	"
1370	"	In Camera	"
1371	"	TCDD Specification For 2,4,5-T Products	"
1372	"	In Camera	"
1373	"	In Camera	"
1374	"	In Camera	"
375	"	BIOPA 1449 in re 2,4,5-T - Holland dtd Feb. 5, 1979	"
1376	10-16-80	Guidelines for Carcinogen Bioassay In small Rodents	"
1377	"	Proposed System for Food Safety Assessment - Final Report of the Scientific Committee of the Food Safety Council, June, 1980	"
1378	"	FR Tuesday, August 22, 1978 EPA Pesticide Programs Proposed Guidelines for Registering Pesticides In The U.S., Hazard Evaluation: Humans and Domestic Animals	"
1379	"	Determination of Chlorinated Dibenzo-p-dioxins and Debenzofurans In Various Materials by W.B. Crummett and R.H. Stehl	"
1380	"	Probilities of Detecting a Real Increase In Incidence of Tumors In Chronic Animal Cancer Studies	"
1381	10-17-80	Origins of Human Cancer, Hiatt, Watson, & Winsten - Cold Spring Harbor Conferences on Cell Proliferation	"
1382	"	Determination of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin In Diamond Alkali 2,4,5-Trichlorophenoxyacetic Acid (2,4,5-T)	"
1383	"	Chloracne Studies Conducted on 2,4,5-Trichlorophenoxyacetic Acid Sample From Diamond Alkali Used In The Biogetic's Study	"

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NO.	DATE	DESCRIPTION	STATUS
1384	10-17-80	Carcinogenicity Testing With Special Reference to the Value and Interpretation of Long-term Studies in Laboratory Animals: Discussion Paper prepared by FJCR	In
1385	"	FR, Vol 39, No. 203 October 18, 1974	"
1386	"	Current methods employed in testing for carcinogenic activiry by Francis J. C. Roe	"
1387	"	Lecture to Association of the British Pharmaceutical Industry (9,6,76) Title: Definition of a Carcinogen	"
1388	"	FR Vol. 45--No. 15, p. 5001-5296 (1-22-80) (Filed in Expando)	"
1389	"	Toxic Chemicals and Public Protection - A Report to the President by the Toxic Substances Strategy Committee dtd May 1980	"
1390	"	Trends in Cancer Incidence and Mortality In the United States, 1969-76 by Earl S. Pollack and John W. Horm	"
1391	10-22-80	Teratological Potential of 2,4,5-T by James G. Wilson, Ph.D.	"
1392	"	Use of Rehesus Monkeys in Teratological Studies, James G. Wilson	"
1393	"	Environmental Chemicals As Potential Hazards to Reproduction	"
1394	"	Current Status of Teratology - General Principles and Mechanisms Derived From Animal Studies	"
1395	"	Teratology - The International Journal of Abnormal Development, 4/1980	"
1396	"	Sources of Error that May Confound Teratologicity Test (Handwritten)	"
1397	"	Regulating Pesticides	"
1398	"	2,4,5-T and @ 20mg/kg/day, ds 7-13	"
1399	"	Laboratory Report	"
1400	"	Ltr to Dr. V.K. Rowe dated Nov. 25, 1970 from James G. Wilson, Ph.D.	"
1401	"	Report on 2,4,5-T Acid	"
1402	"	Monkey Fetus Autopsy Record	"

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NO.	DATE	DESCRIPTION	STATUS
1403	10-27-80	Ltr to Mr. Thomas Hollaway, EPA dtd Sept. 7, 1977 from Michael J. Traynor, Dow Chemical Co., in re Dow Long Term TCDD Feeding Studies In Rats	In
1404	"	Dow Redefines Word It Doesn't Like	"
1405	"	A New Area of Concern in Teratology by James G. Wilson	"
1406	"	Report - Results of Tolerance Studies of 2,4,5-Trichlorophenoxy Propionic Acid (Silvex) in Pregnant Rats	"
1407	"	withdrawn	
1408	10-28-80	Prenatal Effects of 2,4,5-T, 2,4,5-Trichlorophenol, and Phenoxyacetic Acid In Mice	"
1409	"	Review of Manuscript (Report) titled: Chronic Oral Toxicity of 2,4,5-T, Batch No. 503, Control No. 153574B- Short "2,4,5-T" - In A Reproduction Study Covering Three Generations of Sprague-Dawley Rats, Dated May 2, 1978 (Handwritten)	"
1410	"	Handwritten Report No. 6681-29	"
1411a	"	Dead Storage #1521 - K-66681-(29), TCDD 3 Generation Reproduction Study of No. 1 of 14	"
1411b	"	Dead Storage #1521 - K-66681-(29), TCDD 3 generation reproduction Study of No. 2 of 14	"
1411c	"	Dead Storage #1521 - K-66681-(29), TCDD 3 generation reproduction Study of No. 3 of 14	"
1411d	"	Dead Storage #1521 - K-66681 - (29) TCDD 3 generation reproduction Study of No. 14 of 14	"
1412	"	Historical Pregnancy Rates of Control Animals	"
1413	"	Perinatal Nephropathies by James E. Gibson	"
1414	"	The Effects of Various Doses of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin Administered with 2,4,5-Trichlorophenoxyacetic Acid On Rat Fetal Development - Manuscript 1971	"
1415	10-30-80	False-Positive and False-Negative Rates for Carcinogenicity Screens Thomas R. Fears, Robert E. Tarone, and Kenneth C. Chu	"

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NO.	DATE	DESCRIPTION	STATUS
1416	10-30-80	Choice of the Number of Sampling Units in Teratology	In
1417	"	The Statistics of Teratology	"
1418	"	Reduced Interlitter Variability In Rats Resulting from a Restricted Mating Period, and reassessment of the "Litter Effect"	"
1419	"	Principles and Procedures of Statistics - With Special Reference to The Biological Sciences , Robert G.D. Stell	"
1420	"	The Analysis of Variance, Henry Scheffe	"
1421	"	Analysing Qualitative Data, A.E. Maxwell, M.A., Ph.D.	"
1422	"	Some Methods for Strengthening The Common χ^2 Tests	"
1423	"	Z-Statistic to Test Trends	"
1424	"	Workshop D - Statistics, Chairman: C.N. Park	"
1425	"	"Insensitivity of Test For Reproductive Problems", by B.A. Schewtz, K.S. Rao	"
1426	"	Sample Size Required to Detect Increase Over Control Incidence	"
1427	"	Chart	"
1428	"	Handbook of Teratology - Research Procedures and Data Analysis	"
1429	"	Drugs and Chemical Associated with Intrauterine Growth Deficiency Kenneth L. Jones, M.D., and Gerald F. Chernoff, Ph.D.	"
1430	"	Reproductive Tract Anomalies in Mice After Prenatal Exposure to DES	"
1431	"	The Fetal Alcohol Syndrome - Sterling K. Clarren, M.D. and David W. Smith, M.D.	"
1432	10-31-80	Memorandum of Record dtd Sept 13, 1979	"
1433		Figures showing Study Area and Controlled Area	"
1434			
1435	10-31-80	Comparison of Two Proportions Based on the Z-test	"
1436	"	Recalculation of Table 4,p. 17 of Dr. Agresti's Direct Testimony	"

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NO.	DATE	DESCRIPTION	STATUS
1437	11-4-80	The Environment and Disease: Association or Causation	In
1438	"	Case Control Studies	"
1439	"	Foundations of Epidemiology - Abraham M. Lilienfeld, M.D., M.P.H., D.Sc. Department of Epidemiology The Johns Hopkins University School of Hygiene and Public Health	"
1440	"	The Lancet - Saturday 21 September 1974 - Reserpine and Brest Cancer	"
1441	11-5-80	Case Studies	"
1442	"	Comparison of the Coding of Death Certificates Related to Cancer In Seven Countries, Constance Percy, MS Alice Dolman	"
1443	"	What Proportion of Cancers Is Attributable to Occupation: Statistical and Social Considerations(Presented at the American Society for Preventive Oncology, Chicago, March 6-7, 1980)	"
1444	11-7-80	<u>Pathology</u> - 43 Mesenchymal Tumors of Soft Tissues, Richard Shuman W.A.D. Anderson	"
1445	"	Tumors of the Soft Tissues	"
1446	"	<u>Cancer</u> A Comprehensive Treatise - Biology of Tumors: Surfaces, Immunology, and Comparative Pathology, Frederick F. Beckerr	"
1447	"	Management of Primary Bone and Soft Tissue Tumors - Recent Developments In The Classification of Soft Tissue Sarcomas, Franz M. Enzinger, M.D.	"
1448	"	Cancer and Occupation: Status and Needs of Epidemiologic Research, Philip Cole, M.D.	"
1449	"	Book Title: <u>Persons at High Risk of Cancer</u> , J.F. Froumeni, II Occupation, Philip Cole, M.D. and Marlene B. Goldman	"
1450	"	The Evolving Case-Control Study, Philip Cole	"
1451	"	<u>British Medical Journal</u> , Sept 30, 1950, Smoking and Carcinoma of the Lung, Preliminary Report by Richard Doll, M.D., M.R.C.P.& A. Bradford Hill, Ph.D., D.Sc.	"
1452	"	Smoking and Cancer of the Lower Urinary Tract, Philip Cole, M.D., Richard R. Monson, M.D., Hedda Haning, M.D., and Gilbert H. Friedell, M.D.	"
1453	"	Questionnaire	"

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NO.	DATE	DESCRIPTION	STATUS
1454	11-7-80	Chart	In
1455	"	Exposure To Phenoxy Acids In Cases and Referents Divided by Occupation	"
1456	"	Exposure to Phenoxy Acids among cases and controls after dissolving of the matching. Subjects with high-grade of exposure to Chlorophenols are excluded.	"
1457	"	Epidemiology of Hodgkin's Disease, Nancy Gutesohn and Philip Cole	"
1458		Letter to Dr. Larsson dated Feb. 28, 1980 from L. Tomatis, M.D.	"
1459	11-12-80	<u>Nature</u> Vol. 264, Nov. 25, 1976	"
1460	"	Dr. Luigi Dardanoni, "TCDD" Case Studies of Selected Area - Wide Environmental Exposures," Presented at the NAS Workshop on Plans for Clinical and Epidemiological Follow-Up After Area-Wide Chemical Contamination," Washington, D.C. (March 17, 1980) Preface by Dr. Pocchiari (Director, NIH, Rome)	"
1461	"	The History of the Seveso Accident, G.M Fara, University of Milano	"
1462	"	Letter to J.H. Davidson dated June 21, 1977 from Lewis Shadoff	"
1463	"	Synopsis of the Information Released Regarding the Chemical Release In Milan, Italy, at the Givaudan Plant, Which is a Subsidiary of the Hoffmann Laroche Company	"
1464	"	Experience of the Accident of Seveso	"
1465a	"	Letter to Dr. Gehring, Dow Chemical Company dated Dec. 12, 1977 from Dr. Reggiani	"
1465b	"	Letter to Dr. Gehring, Dow Chemical Company dtd Dec. 22, 1977 from Dr. Geggiani	"
1465c	"	Letter to Dr. Geggiani dtd Jan. 6, 1978 from Dr. Gehring	"
1466	"	Medical - Epidemiological Commission, Prof. G.M. Fara, Coordinator Milan, August 27, 1976	"
1467	"	Board on Agriculture and Renewable Resources Commission On Natural Resources - A Report of the Ad Hoc Dioxin Advisory Group National Academy of Sciences, 1977	"

THE DOW CHEMICAL COMPANY
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NO.	DATE	DESCRIPTION	STATUS
1468	11-12-80	"Dr. Luigi Dardanoni," "Dermatologic Effects: Chloracine in Seveso," Presented at the NAS Workshop on Plans for Clinical Epidemiological Follow-Up After Area-Wide Chemical Contamination," Washington, D.C. (March 18, 1980)	In
1469	"	Accidental TCDD Contamination in Seveso (Italy): Epidemiological Aspects, F. Pocchiari	"
1470	"	Human Health Effects From Accidental Release of TCDD at Sevesco (Italy)	"
1471	"	Report on Seveso Facts and Controversies	"
1472	11-13-80	Chart	
1473	"	Experience of the Accident of Seveso by L. Bisanti, F. Boneti, F. Caramaschi, G. Del Corno, C. Favaretti, S. Giambelluca, E. Montesarchio V. Puccinelli, G. Remotti, C. Volpatio and E. Zambrelli	"
1474	"	Localized Contamination with TCDD - Seveso, Missouri and other Areas, G. Reggiani	"
1475	"	Graph (showing Pregnancy loss)	"
1476	"	Spontaneous Abortions In The Territory of the C.S.Z. Brianza Di Seveso 1,2,3	"
1477	"	Teratoepidemiology, Marcus A. Klingberg and Cheri M. Papier	
1478	"	Pathological-Embryological Investigations In Cases Of Abortion Related To The Seveso Accident	"
1479	"	FR, Aug 22, 1978, Part II, EPA - Pesticide Programs, Proposed Guidelines for Registering Pesticides In The U.S.; Harzard Evaluation: Humans and Domestic Animals	
1480	"	<u>Minutes</u> of work group meeting about the results of embryo-morphological Studies In Abortion cases in connection with the Seveso Accident on 10th July 1976 held in Lubeck on the 24/25 Feb. 1977.	"
1481	11-14-80	<u>The Merck Manual</u> of Diagnosis and Therapy, David N. Holvey, M.D.	"
1482	"	Critically Acute Chloracine Caused By Trichlorophenol Decomposition Products	"
1483	"	Evaluation of Trichlorophenol Plant For Chloracne Hazards, Informative Summary With Conclusions	"

THE DOW CHEMICAL COMPANY
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NO.	DATE	DESCRIPTION	IN
1484	11-14-80	The Chloracne Problem-Biochem's Contribution	In
1485	"	Report on the Chloracne Problem Meeting on 3/24/65	"
1486	"	Occupational <u>Chloracne</u> Caused By Aromatic Cyclic Ethers	"
1487	11-14-80	Results of Human Skin Irritation and Sensitization Studies On H-1500 an Herbicidal Composition Containing 55% Sodium Salt of Silvex	In
1488	11-17-80	Investigation of the Immune Capability of Workers Previously Exposed To 2,3,7,8-Tetrachlorodibenzo-para-Dioxin (TCDD)	"
1489	"	Mortality Study of Persons exposed to dioxin accident tin Germany	"
1490	"	TCDD Accident at a Chemical Factory in the Netherlands	"
1491	"	Acne chlorina, porphyria cutanea tarda a jine projevy celkove itoxikace pri vyrobe herbicid	"
1492	"	Toxic Effects of 2,3,7,8 tetrachlorodibenzo 1,4 dioxin in laboratory workers, R.M. Oliver	"
1493	11-18-80	Extraction Efficiencies of Polychlorinated dibenzo-p-dioxins and Polychlorinated dibenzofurans from Fly-Ash, RM.M. Kooke, J.W.A. Lustenhouwer, K. Olie and O. Hutzinger	"
1494	"	Municipal Waste -(Charts and figures)	"
1495	"	Computer printout	"
1496	"	Hutzinger's Fly Ash "Isomer Specific" CDDs Analyses	"
1497	"	In Camera	"
1498	"	In Camera	"
1499	"	Handwritten Notes (1 page)	"
1500	"	Letter to Dr. O. Hutzinger dtd Aug. 19, 1980 from B.J. Kimble, Ph.D.	"
1501	"	Quanititative Determination of 2,3,7,8-Tetrachlorodibenzo-p-dioxin Residues by Gas Chromatography/Mass Spectrometry	"
1502	"	Graph	"
1503	"	Ltr to Dr. O. Hutzinger dtd Feb. 13, 1980 from C.E. Holloway	"

THE DOW CHEMICAL COMPANY
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NO.	DATE	DESCRIPTION	STATUS
1504	11-18-80	The Formation of Chlorodibenzo-p-Dioxins by Air Oxidation And Chlorination of Bituminous Coal, Nels H. Mable and L.F. Whiting	In
1505	11-19-80	An Unsolicited Proposal GSRI Proposal No. 329-1-76-15, A Quality Assurance Program	"
1506	"	2,4,5-T Ad Hoc Task Force Meeting Summary, Nov. 19, 1974	"
1507	"	Memo to Dr. Ralph Ross dtd Aug. 1, 1975 from Larry J. Anderson In re Rangeland Treatment	"
1508	"	Memo to Files and Attendees dtd June 27, 1980 from Dioxin Program Coordinator Criteria and Evaluation Division in re Dioxins: Beef Sample Collection Meeting Ad Hoc Task Force (Meeting Summary)	"
1509	"	Interim Results of 2,4,5-T/TCDD Residue dtd Aug. 5, 1975	"
1510	"	Interim Results of 2,4,5-T/TCDD Residues Monitoring Program-- Briefing Memorandum dtd Aug. 1, 1975	"
1511	11-21-80	Chart	
1512	"	Range Forage Production and Consumption Following Aerial Spraying of Mixed Brush	"
1513	"	Soil Ingestion by Cattle Grazing Crested Wheatgrass	"
1514	"	Vegetational Areas of Texas	"
1515	"	Motley County, Texas	"
1516	"	Cottle County, Texas	"
1517	11-23-80	Ltr to J.H. Davidson, dated July 8, 1975 in re EPA Ad Hoc Task force Beef Sampling from M.E. Getzendaner	"
1518	"	Memorandum of Telephone Conversation between: Patrick O'Keefe and David Firestone dated July 7, 1977	"
1519	"	Memorandum to Bill McCredie from Bruce Grefrath dated Jan. 23, 1979 in re Summary of the Dioxin Implementation Plan (DIP) Meeting On January 16, and 17, 1979	"
1520	"	The Determination of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) In Human Milk	"
21	"	Beef Fat Phase I Animal	"

THE DOW CHEMICAL COMPANY
EXHIBITS

NO.	DATE	DESCRIPTION	STATUS
1522	11-23-80	Statement of Lewis A. Shadoff On 2,3,7,8 Tetrachlorodibenzo-p-Dioxin (TCDD) In The Environment 8/4/76	In
1523	"	Memo to the Files dtd March 5, 1976 in re Dioxin, Patrick E. Phillips	"
1524	"	Description of Beef-Fat Monitoring Samples	"
1525	"	Map of Missouri (only 1 copy too large for reproduction)(Original file)	"
1526	"	Memorandum to Mr. William Barthel from Environmental Hazards Activity Cancer and Birth Defects Division Bureau of Epidemiology In re 2,3,7,8-Tetrachlorodibenzodioxin Contamination of Salvage Motor Oil Used in Dust Control Spraying, Lincoln, Missouri	"
1527	"	Notes of Interviews and Conversations of EPI-75-17-1 dated Aug. 21, 1974 in re Bliss Salvage Oil Company, Interview with Russell Bliss, Ellisville, Missouri	"
1528a	11-26-80	Transcript of Case No. 79 10064 - United States District Court For The Eastern District of Michigan, Southern Division - The Dow Chemical Company, et al. v. Barbara Blum & Douglas M. Costle dated Apr. 6, 1979	"
28b	"	EPA Oregon 2,4,5-T Study Areas (Maps)	"
1529	"	Chart	"
1530a	"	Ltr to Mr. Andrew Gordon dtd Nov. 19, 1980 from Charles W. Warren, Ph.D. Dept of Health and Human Services, Public Health Service Center for Disease Control, Atlanta Georgia	"
1530b	"	Seasonal Variation In Spontaneous Abortions, Charles W. Warren, Ph.D., Julian Gold, MBBS. Carl W. Tyler, Jr., M.D., Jack C. Smith, MS, and Allen L. Paris, MD.	"
1531	12-3-80	Analytical Techniques for 2,3,7,8-Tetrachlorodibenzo-p-dioxin Detection In Environmental Samples after the Industrial Accident at Seveso	"
1532	"	Memo From the Ecological Monitoring Branch dtd Oct. 24, 1978 to Mr. Richard Reising SPRD in re Request for Review and Evaluation of Region X Deer and Elk Fat-TCDD Study Design	"

THE DOW CHEMICAL COMPANY EXHIBITS

	DATE	DESCRIPTION	STATUS
1533	12-4-80	1978 Elec. Row	
1534	"	Asplundh Crews - Potential Duration of Exposure to Spray Mixtures Containing Some 2,4,4-T (In Manhours)	
1535	12-5-80	Toxicology Research Laboratory Health and Environmental Research Dow Chemical Company U.S.A (Structure)	"
1536	"	Percutaneous Penetration of Some Pesticides and Herbicides In Man	"
1537	"	Letter to Federal Register dtd February 14, 1979 from John F. Hall, Director Forest Industry Resource and Environment Program, National Forest Products Association in re Rebuttable Presumption Against Registration and Continued Registration of Pesticide Products Containing 2,4,5-T	"
1538	"	Letter to J.D. Gnegy, Westvaco Corp. dtd July 5, 1978 from J.D. Walstad Weyerhaeuser Company	"
1539	"	Estimate Field Sampling Procedures	
1540	"	Interoffice Communication dtd June 29, 1979 from W.H. Lawrence, Weyerhaeuser in re to Experimental Design and Critical Path Work for 2,4,-D Exposure Study	"
1541	"	Solid Adsorbent Collection and Gas Chromatographic Determination of the propylene glycol butyl ether esters of 2,4,5-T in air	"
1542	"	Evaluation of 2,4,5-Trichlorophenoxy acetic Acity Butoxy Ethanol Ester During Field Application Northeast of Johnstown, Pennsylvania	"
1543	"	Letter to William H. McCredie dtd January 16, 1979 from Edward A. Kazamarek of Georgia Pacific Corporation	"
1544a	"	Exposure of Forest Herbicide Applicators to 2,4,5-T	"
1544b	"	Handwritten letter dated 6/30/79 to Dr. Levy from Scott Shepard	"
1545	"	Letter to Dr. Braun (handwritten) dated 7/6/79 from Scott Shepard	"
1546a	"	Ltr to FR Sec. dtd Feb. 14, 1979 in re 2,4,5-T RPAR	"
1546b	"	Ltr to EPA OPP(handwritten)dtd 9/14/78 from Frank Sed Sedmera	"
1547	"	Letter to Mr. Richard Wasserstrom, National Forest Products Association dated Feb. 5, 1979 from Werner H. Braun, Group Leader, Biotransformation Toxicology Research Laboratory	"

THE DOW CHEMICAL COMPANY EXHIBITS

	DATE	DESCRIPTION	STATUS
1548	12-5-80		
1549	12-8-80	Exposure Measurements of Applicators Spraying (2,4,5-Trichlorophenoxy) In Acetic Acid In the Forest	In
1550	"	The Metabolism and Sistribuition of 2,4,5-Trichlorophenoxyacetic Acid In Female Rats	"
1551	"	New Zealand Journal of Agricultural Research Vol. 15, No. 3 Hexachlorobenzene - Accumulation and Elimination HCB in sheep after oral dosing	"
1552	"	Pesticide Residues - Residues in Poultry Tissues from Low Level Feeding of Five Chlorinated Hydrocarbon Insecticides to Hens	"
1553	"	Pharmacokinetics of Mirex in Goats. 1 Effect on Reproduction and Lactation	"
1554	"	Ltr to Dr. Curt Mason dtd June 5, 1979 from T. L. Lavy Professor University of Arkansas Division of Agriculture	(Withdrawn)
1555	"	Letter to William H. McCredie, National Forest Products Association dated Feb. 28, 1978 from E.A. Kazmarek.	In
6	"	Analysis of Technical and Formulated Products of 2,4,-Dichlorophenoxy Acetic Acid for the Presence of Chlorinated Dibenzo-p-Dioxins	"
1557	"	Estimation of Risks of Irreversible, Delay Toxicity	"
1558	"	Journal of Business Administration - Resource Policy International Perspectives	"
1559	"	Fundamental Carcinogenic Processes and Their Implications for Low Dose Risk Assessment , K.S. Crump, D.G. Hoel, C.H. Langley and R. Peto	"
1560	"	OSU's Herbicide Connection by Phil Kesling	"
1561	12-11-80	Memo to M. Rupert Culter, dtd June 14, 1978 from John R. McGuire in re Draft Response to Affidavits--Herbicides in the Oakridge and Rigdon Ranger Districts of the Willamette National Forest	"
1562	"	Agriculture's Strange Bedfellows: CAST-Industry Tie Raises Credibility Concerns	"
1563	"	Letter to Michael Newton dtd May 16, 1973 from Robert A. Poss Chief, Pesticides Branch	"
1564	"	Herbicides and Their Place In Our Environment Dr. Mike Newton	"
1565	"	Photodecomposition of Chlorinated Dibenzo-p-Dioxins	"

THE DOW CHEMICAL COMPANY EXHIBITS

NO.	DATE	DESCRIPTION	STATUS
1566	12-11-80	Letter to Bill Parker dtd March 30, 1978 from Dean Branson, Environmental Sciences Research Dow Chemical U.S.A.	In
1567	"	Atmospheric Transport of Sprays from Helicopter Applications In Mountainous Terrain by W.E. Yates, N.B. Akesson, R.E. Cowden Agricultural Engineering Department U. Of California	"
1568	"	2,4,5-T Alternatives Silvex - Proceedings Southern Weed Science Society Vol. 25, 1972 - Drop Size Affects Absorption of 2,4,5-T by Six Hardwood Species, Homer A. Brady	"
1569	12-12-80	Analytical Report - Determination of Phenoxy Herbicides In Urine From Esteron 245 Sprayers	"
1570	"	Absorption of Silvex Esters Through The Skin of Human Volunteers	"
1571	"	Human Health Research Review Committee Meeting Minutes - Apr. 23, 1979	"
1572	"	Silvex Human Exposure Study - dated 2/15/79 (Handwritten)	"
1573	"	Survey of 2,4,5-T/Silvex Aerial Applicators Telephone Interview Questionnaires dated Oct.-Nov. 1980	"
1574	"	Women Applicators	"
1575	"	Computer Printout - 1970 Annual Averages, Current Population Survey (CPS)	"
1576	"	Weedone 2,4,-TP Weed and Wood Plant Herbicide (Labels) & Weedone 2,4,5-T Woody Plant Herbicide	"
1577	"	Letter to Arnie Schaffer dated June 26, 1979 in re Correlation of Urinary 2,4,5-T with Exposure from John C. Ramsey, Ph.D.	"
1578	12-16-80	TCDD Report by S. Hussain, L. Ehrenberg, G. Lofroth and T. Gejvall, Radiobiology Department, Wallenberg Laboratory, University of Stockholm Sweden	"
1579	"	A Survey on the Mutagenicity of Various Pesticides	"
1580	"	A Review of the Genetic Toxicology of Chlorinated Dibenzo-p-Dioxins by J.S. Wassom, J.E. Huff and N. Loprieno	"
1581	"	<u>Bladder Cancer</u> , A Symposium	"
1582	"	Thresholds for Environmental Cancer: Biologic and Statistical Consideration, Marvin A. Schneiderman, Pierre Decoufle, and Charles C. Brown	"
1583	"	Science, Vol. 202, No. 4372, (Dec. 8, 1978, "Models for Carcinogenic Risk Assessment	"

THE DOW CHEMICAL COMPANY EXHIBITS

NO.	DATE	DESCRIPTION	STATUS
1584	12-16-80	Hepatic Macromolecular Binding Following Exposure to Vinyl Chloride , P.G. Watanabe, J.A. Zempel, D.G. Pegg & P.J. Gehring	In
1585	"	Dose-Dependent Fate of Vinyl Chloride and Its Possible Relationship to Oncogenicity In Rats by P.G. Watanabe and P.J. Gehring	"
1586	"	Metabolic Thresholds in Assessing Carcinogenic Hazard, P.J. Gehring, P.G. Watanabe, J.D. Young and J.E. Lebeau	"
1587	"	<u>Orgins of Human Cancer</u> ; "The Relevance of Dose-dependent Pharmacokinetics in the Assessment of Carcinogenic Hazard of Chemicals, P.J. Gehring, P.G. Watanabe and J.D. Young	"
1588	"	<u>Toxicology and Applied Pharmacology</u> , "Resolution of Dose-Response Toxicity Data for Chemicals Requiring Metabolic Activation: Example-- Vinyl Chloride", P.J. Gehring, P.G. Watanabe, and C.N. Park	"
1589	"	<u>Proposed System for Food Safety Assessment</u> , "Final Report of the Scientific Committee of the Food Safety Council", June, 1980	"
1590	"	<u>The New England Journal of Medicine</u> , "Aryl Hydrocarbon Hydroxylase Inducibility and Bronchogenic Carcinoma"	"
1591	"	<u>Annals of Internal Medicine</u> , "Xeroderma Pigmentosum"	"
1592	"	Combination Effects in Chemical Carcinogenesis (Experimental Results)	"
1593	"	<u>Cancer Research</u> , "A Comparison of the Effects of 3-Methyl-4-dimethylaminoazobenzene, 2-Methyl-4-dimethylaminoazobenzene, and 2-Acetylaminofluorene on Rat Liver DNA Stability and New Synthesis	"
1594	"	The Function and Mechanism of Promoters of Carcinogenesis	"
1595	"	Induction and Repression of Microsomal Drug-metabolizing Enzymes by Polycyclic Hydrocarbons and Phenobarbital: Theoretical Models	"
1596	12-17-80	Handwritten notes dtd 10/15/73 in re Meeting to discuss Silvex	"
1597	"	Handwritten Memo to M. Levy & to D.D. McCollister dtd 7/8/74	"
1598	"	R. & D. Report titled Study of the Pharmacokinetics and Metabolism of 2,4,5-T (2,4,5-Trichlorophenoxyacetic Acid) in C57BL/6S and F2 Outcross Mice	"
1599	"	Letter dated Feb. 26, 1974 to Marguerite L. Leng from George E. Lynn	"

THE DOW CHEMICAL COMPANY EXHIBITS

NO.	DATE	DESCRIPTION	STATUS
1600	12-17-80	FIBRA Annual Scientific Meeting	In
1601	"	Comparative Studies on the Absorption of H-Thalidomide in Rabbits and Rats, George R. Keller and David A. Blake	"
1602	"	The Fate of 2,3,7,8-Tetrachlorodibenzo-p-dioxin following Single and Repeated Oral Doses to the Rat, J.Q. Rose, J.C. Ramsey, T.H. Wentzler, R.A. Hummel and P.J. Gehring	"
1603	"	Letter to P.J. Gehring dated July 10, 1972 from B.A. Schwetz	"
1604	"	Letter to The New York Academy of Sciences dated Aut. 8, 1978 from P.J. Gehring, D.V.M., Ph.D. & B.A. Schwetz, D.V.M., Ph.D.	"
1605	"	The Fate of 2,4,5-Trichlorophenoxyacetic Acid (2,4,5-T) Following Oral Administration to Man	"
1606	"	Letter to Dr. J.D. Kohli dated Sept. 21, 1972 in re Pharmacokinetics of the Oral Administration of 2,4,-D and 2,4,5-T To Man from James Q. Rose, Metabolism Unit Chemical Biology Research	"
1607	"	Environment and Birth Defects, James G. Wilson	"
1608	"	Casarett and Doull's Toxicology, "Teratogens" by Raymond D. Harbison	"
1609	"	Memo to M.L. Leng dated May 9, 1972 in re Telephone Conversation With Mr. Curtis Wherry from B.A. Schwetz, D.V.M., Ph.D.	"
1610	"	Letter to Dr. P.J. Gehring dated Aug. 12, 1977 from A.K. Aldridge	"
1611a	1-27-81	KRATOS MS50 Mass Spectrometer Servicing Manual	"
1611b	"	KRATOS MS50 Mass Spectrometer Operating Instructions	"
1612	"	Revised USFS Blodgett Forest Deer Study Summary dated Jan. 26, 1981	"
1613	"	Memo to Mike Dellarco, PO dtd May 12, 1989 from Robert Harless In re Results of Capillary Column GC/HRMS Analysis Performed on Extracts of Deer (USDA Study) for 2,3,7,8-TCDD Residues	"
1614	"	Ltr to Dr. Lyndon E. Lee, Jr. dated Aug. 29, 1979 signed by Prof. Michael L. Gross	"
1615	"	TCDD In Veterans Adipose Tissue	"
1616	"	Memo to Michael Dellarco, EPA, SPRD dated August 28, 1980 from Danny McDaniel Chemist, TAC in re Description of Sample Shipped to Robert Harless on 8/27/80.	"
1617	"	VA Extracts sent to Harless for Analysis	"

THE DOW CHEMICAL COMPANY EXHIBITS

NO.	DATE	DESCRIPTION	STATUS
1618	2-4-81	Memorandum to D.E. Van Ormer, Ph.D., H. Spencer, Ph.D., & J.E. Preston, Ph.D. from K.L. Bailey, Ph.D. & L. Anderson, Ph.D, dated Feb. 23, 1979 in re Rat Three-Generation Reproduction study Using 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) 99 Purity Submitted by the Dow Chemical Company in 1978 Dow Study (1)	In
1619	"	Memorandum of Conference dated Feb. 17,18,19 & 20, 1970 in re Teratology Study (2,4,5-T) being conducted on the contaminant 2,3,7,8-Tetrachlorodibenzo-p-dioxin	"
1620	"	Memo to Acting Director, Criteria & Evaluation Div & Director of OSPR dated May 31, 1977 from Pharmacologist, Metabolic Effects Branch In re Validation of 2,4,5-TCP, Reproductive Studies	"
1621	"	NTP Technical Bulletin, Vol. 1, Dec. 1980, Issue 3	"
1622	"	Handbook of Teratology, 4 Research Procedures and Data Analysis	"
1623	"	Environment and Birth Defects, James G. Wilson	"
1624a	"	Results of Surveillance GLP inspection Conducted for EPA by R.A. Korsakas	"
1624b	"	Memorandum to Eugene S. Spivak, from Acting Director, Field Investigations Branch dated Nov. 27, 1978 in re Request for Inspection of Dow Chemical, Mipland, MI	"
1624c	"	Ltr to Mr. Melvin Robinson, FDA Investigator (handwritten) by Larry Cheoupek	"
1624d	"	List of People present during final discussion	"
1624e	"	Evaluation and Lab Audit of the Analytical Laboratories of Dow Chemical Co.	"
1625	"	Environmental Protection Agency Review of TCDD Data on Dec. 12-14, 1978	"
1626	2-9-81	Multiple Risk Factors in Environmental Cancer, Irving J. Selikoff, MD & E. Cuyler Hammond, Sc.D.	"
1627	"	Abestos Volume 2: final report of the advisory committee papers commissioned by the committee	"
1628	"	Ltr dtd April 15, 1980 to Dr. Larsson, Sweden, from L. Tomatis, MD	"

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NO.	DATE	DESCRIPTION	STATUS
1629	2-9-81	Chart	"
1630	"	Chart	"
1631	"	Occupational Epidemiology- Richard R. Monson, M.D., Sc.D.	In
1632	2-11-81	2,4,5-T, Trichlorophenol, and Soft Tissue Sarcoma	"
1633	"	Editorials - News Reports of Medical Meetings: How Reliable are Abstracts? <u>The New England Journal of Medicine</u> Vol. 303, No. 5 p. 277 & 278	"
1634	"	Letter to Judge Finch dated December 2, 1980 from Irving Shain, Chancellor University of Wisconsin-Madison	"
1635	"	Advisory Committee on Pesticides - Report on 2,4,5-T	"
1635	"	Further Review of the Safety for Use In the U.K. of the Herbicide 2,4,5-T - Advisory Committee on Pesticides	"

THE DOW CHEMICAL COMPANY EXHIBITS - BENEFIT SEGMENT

4000	2-26-81	Effects of Weed Trees and Shrubs on Conifers--A bibliography With Abstracts prepared by Ronald E. Steward USDA Forest Service, Timber Management Research dated Dec. 17, 1979	"
4001a	"	The American Game Policy and its Development 1928-1930 - Wildlife Management Institute 1971	"
4002	"	<u>CEANOTHUS</u> In Douglas-Fir Clean-Cuts: Nitrogen Accretion and Impact on Regeneration	"
4003	"	Nutrient Losses in Leaching and Erosion by Intensive Forest Harvesting by John G. McColl and David F. Grigal	"
4004	3-4-81	Effects of Weed Trees and Shrubs on Conifers--A Bibliography with Abstracts	"
4005	"	An Analysis of Major Pesticides Used In Protection of Timber from Damage in The Lake States)	"
4006	3-5-81	First Year Report Cooperative Brush Control Study	"
4007	"	Herbicides For Shurb and Weed Tree Control In Western Oregon	"

THE DOW CHEMICAL COMPANY EXHIBITS

NO.	DATE	DESCRIPTION	STATUS
4008	3-13-81	Memo dated May 30, 1980 to Oregon NWFA Co-Operatives in re EPA Questionnaire from Rick Koven	In
4009a-d	"	Tabulations of Bids	"
4010	"	Forest Service - USDA Pacific Northwest Region Final Environmental Statement Vegetation Management With Herbicides	"
4011	"	Vegetation Management With Herbicides - Western Oregon - Final Environmental Statement 1978	"
4011a	3-17-81	Vegetation Management with Herbicides - Western Oregon	"
4012	3-13-81	Logging Work Injuries in Appalachia	"
4013	"	CPSC Draft Document	"
4014	"	Seven Immediate-Impact Consequences Resulting from The Use of A Chainsaw To Control Brush	"
4015	3-17-81	Snag Characteristics and Dynamics In Douglas-Fir Forests, Western Oregon	"
4016	3-19-81	Reforestation Efforts in Western Oregon - Hearing before the Subcommittee On Forests of the Committee on Agriculture House of Representatives July 8, 1977	"
4017	"	Plantation Damage Evaluation dated May 22, 1979 by Paul E. Buffam	"
4018	"	Letter to Ted Paulsen dtd July 22, 1980 from Cynthia McCain, Ground-Work, Inc.	"
4019	"	Silvicultural Use of Herbicides in Pacific Northwest Forests by H. Gratkowski	"
4020	"	Report by the U.S. Department of Interior Bureau of Land Management Medford District dated Feb. 22, 1980	"
4021	"	Timber Yields and Economic Analysis Technical Background Papers, 1978 Herbicide Environmental Statement	"
4022	3-20-81	Fire Analysis Report - Mack Lake Fire - May 5-8, 1980	"
4023	"	Memo to Regional Foresters dated Feb. 17, 1981 from Gary E. Cargill	"
4024	"	Opening Remarks to Prescribed Fire for Line Officers Workshop, Feb. 2, 1981, Marana, Az.	"
4025	"	FR. Vol. 45, No. 161 - Carbon Monoxide; Proposed Revisions To The National Ambient Air Quality Standards	"
4026	"	Petition of The Natural Resources Defense Council, Inc. For Control of Fine Particles	"

20137

Tittabawassee carp had most dioxin

MIDLAND DAILY NEWS MAY 14, 1986

Bottom-feeding fish in the Tittabawassee River showed the highest levels of chemical contamination in the Great Lakes, according to a recently released Environmental Protection Agency study.

Carp in the Tittabawassee showed levels of the suspected carcinogen dioxin ranging from 12 to 525 parts per trillion (ppt). The levels were found during sampling of the fish in 1985 during a national dioxin study conducted by the EPA.

2,3,7,8-TCDD, the most toxic form of dioxin, is a by-product of herbicide production. Dow Chemical Co. claims dioxin is created everywhere as a by-product of combustion.

An advisory warning people not to eat bottom feeding fish, such as carp and suckers, has been in force for the Tittabawassee River since 1978. The advisory on sport fish, such as walleye, was lifted earlier this year.

According to EPA spokeswoman Anne Rowan, fish monitoring will continue at some of the sites where

samples were taken and the EPA will attempt to identify the source of the dioxin contamination.

While she would not definitely say that the Tittabawassee will get continued EPA attention, she said, "It seems more than likely that our efforts would include the Tittabawassee."

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20138

Ballot box

SAGINAW NEWS

Is dioxin danger overblown?

MAY 14, 1986

Total votes: 29

Yes: 34% (10)

"It is enough and was enough a few years ago" . . . "The dioxin danger has been greatly overblown" . . . "You can bet on it."

No: 66% (19)

"We're just awakening from years of ignorance" . . . "Dow really shows their disregard for human health by building a boat launch down from where they discharge dioxin into the river" . . . "Once you've eaten all those walleyes, it's too late then, isn't it?" . . . "If you believe it is overblown, you've bought every lie Dow has done" . . . "If anything, it's covered up."

Today's question:

If television evangelist Pat Robertson runs for president, will you vote for him?

Call 754-3100 to vote yes and 754-6300 to vote no, before 7 a.m. tomorrow. Your vote automatically will be recorded. Add a comment if you wish.

Lottery

Tuesday daily lottery number: 645

Daily four: 5753



THE DOW CHEMICAL COMPANY

BENNETT BUILDING
2030 DOW CENTER
MIDLAND, MICHIGAN 48640

November 1, 1979

Dear Reverend Roos:

I really appreciate the fact that you, as a stockholder, would write and request information after seeing the article in the New York Times, and I am happy to respond to your request.

If you really want to understand why the implications are written about this product, you need to understand a little history. The product 2,4,5-T is an agricultural herbicide that we have manufactured for over thirty years. It has been a very effective product in killing noxious weeds and brush in roadways and under power lines, and in certain agricultural applications such as pasture land and rice. It is true that this product contains an impurity known as dioxin, but at a level below 0.1 ppm. In pure form, dioxin is quite toxic to guinea pigs. The only known effect on people who have been exposed to more concentrated doses is a skin rash, known as chloracne. Dilution of 2,4,5-T to its use concentration lowers the dioxin content to levels far below 0.1 ppm, and its effect is not perceptible.

There is no product that we manufacture that we have more toxicology and health data on than 2,4,5-T, and we consider it extremely safe. Unfortunately for the product, the U.S. government requisitioned its use in the Vietnam War to defoliate the jungles in the search for the Viet Cong. It, therefore, became a symbol of the Vietnam War that some people have become obsessed with destroying, along with anything else related to that unfortunate experience.

The hostility raised toward this product by the aftermath of the Vietnam War gave it a high profile. This was picked up by a lot of the extreme activists among the environmentalists who are opposed to using any kind of chemicals for agricultural purposes. You have undoubtedly seen many TV programs condemning the use of chemicals in agriculture.

These activists have learned the trick of the Hitler-type propaganda in Germany; that is, if you tell a lie often enough people will begin to believe it. The news media have been willing channels for certain quacks who make claims not backed by any data, because they are not con-

November 1, 1979

cerened with the truth and their only intent is in doing away with agricultural chemicals. Because 2,4,5-T is one of the oldest and safest one known, if it can be destroyed, the newer ones for which there is less data can be more easily destroyed.

Serious scientific scrutiny of the data allegedly supporting claims concerning miscarriages in northern California and Oregon, some months after spraying the forests, shows no valid relationship between the spraying and miscarriages.

There is one other piece of information you need to know. There is a flourishing business in northern California and other northwestern states in growing marijuana in open spaces and in the forests; in fact, it has been found that the marijuana plants grow to a greater height there than many other places. Single plants grow 12-15 feet in height and have a market value in the "dope" business of about \$1000. Law officials in California have estimated the value of the crop, in three northern California counties alone, at \$900 million.

Marijuana is very readily destroyed by 2,4,5-T, and the U.S. Forest Service has been using it to kill underbrush, and the marijuana is also killed. Less than three weeks after the EPA suspended the use of 2,4,5-T in forest application, a Sacramento newspaper noted in a feature story on March 18 that, "marijuana growers set for profitable '79 season." So, Reverend Roos, there is a lot that doesn't always meet the eye in a single newspaper article. There are some very strong forces combining to do away with our agricultural chemical business.

We are absolutely convinced that 2,4,5-T is a safe product, but these people will stop at nothing, for the reasons cited above, to prevent its use.

As a stockholder, I think you should be interested in understanding this situation. If you are interested in scientific documentation, we will be glad to furnish it to you. We would also be delighted, if you were interested in coming to Midland, Michigan to have you visit our toxicology labs and talk to our scientists about the safety of 2,4,5-T.

Sincerely,


Earle B. Barnes
Chairman
The Dow Chemical Company

kmd

20140

MIDLAND

7-9-66

Midland begins river water use

Midlanders began drinking and using a mixture of Lake Huron and Tittabawassee River water today.

The city water department went to the river Friday night for additional water to supplement the supply which the city obtains from the Saginaw - Midland Lake Huron pipeline.

William C. Ewing, water department superintendent, reported the pumps at the West Main Street treatment station went into operation at 6 p.m. Friday.

At 9 p.m., the first river water, after being treated with chemicals, was fed into the distribution system.

By 4 a.m. today, the water department was able to shunt the first river water into the reservoir on Bay City Road.

City officials decided Friday to go to the river for additional water after being unable to build up the reserve supply in the reservoir from the city's supply of the Lake Huron pipeline since heavy industrial demands kept the water consumption up.

Ewing said no appreciable change in the level of the reservoir had been noted at 7 a.m. today, the water in reserve total-

ling 66.9 million gallons, the same as for the same hours Friday and Thursday.

The water superintendent anticipates pumping and treatment operations at the West Main Street station will add two million gallons per day to help meet the city's water demands.

Ewing anticipates it will be late today or early Sunday before the river-lake water will spread throughout the entire city.

By then, he added, the mixture will be about one - half river water and one - half lake water.

"Midlanders should not be able to tell any difference as far as the taste of the water," he said.

"It might be a little harder water than they have been used to using," Ewing said in explaining the river water is harder than the lake water.

Ewing reported the quality of the river water was found good when pumping operations began.

"As far as taste is concerned, we ran into no problems."

Pumping and treatment of the water at the treatment plant will continue until Sunday night. Then, the treatment facilities will be shut down for eight hours
See WATER Page 9

Blanchard opens 2nd conference on Great Lakes

MACKINAC ISLAND (AP) —

More than 400 potentially toxic chemicals have been found in the Great Lakes, and hazardous substances have been found even in the pristine environment of Lake Superior, Michigan Gov. James J. Blanchard says.

Many of the chemicals are dangerous even when present in quantities too small to be detected, Blanchard said Sunday in a speech given at the opening of the Second World Conference on Large Lakes.

Blanchard is hosting the conference, at which some 400 scientists from 40 countries will present the latest research on the problem of toxic contaminants in fresh water lakes.

The first large lakes conference was held in 1984 in the Shiga prefecture of Japan. It was hosted by Shiga's governor, Masayoshi Takemura, who has come to Mackinac Island for this second conference.

(Related story page A3)

Zero discharge not attainable, Dow's Calvin tells confab

By KATHY GRAY
Daily News staff writer

As a part of the Second World Conference on the Great Lakes, Dow Chemical Co. made a presentation today on the waste management program at its Midland facility.

The three-day conference on Mackinac Island is designed to discuss the quality of the Great Lakes and contaminants which threaten the five lakes around Michigan.

Dow's waste management policy, according to Michigan Division Research and Development Director Donald Calvin, is made up of several elements including minimization or recycling, treatment and eventually long-term storage.

Dow's waste goes through a number of treatments before it is finally either burned, stored or discharged into the Tittabawassee River. Any liquid waste that is not recycled undergoes biological treatment before the solids are sent to the landfill and the liquid sent through a second filtration unit before being discharged into the river.

Dow's wastewater discharge permit issued by the state Department of Natural Resources allows the discharge of small concentrations of a number of compounds into the river, including a minute amount of dioxin (10 parts per quadrillion).

Another aspect of Dow's waste management program is its incinerator. Calvin told those attending the conference. The incinerator contains anti-pollution equipment such as a scrubber and electrostatic precipitators.

In addition to all burnable waste, Dow also burns some radioactive waste as well, primarily from the company's analytical labs. The resulting ash is buried at Dow's Salzburg landfill.

The last component of Dow's waste program is its landfill. As recently required by the Environmental Protection Agency and DNR, Dow now

lines the new cells in the landfill with a 100-millimeter thick polyethylene liner on top of three other protective layers of clay and sand and a pumping system underneath it all to catch any leakage from the cells.

"We minimize waste at the source whenever possible through upgraded processing, recycling or reclamation," Calvin said. "Secondly, we treat the waste that is produced with a fully integrated, on-site treatment and disposal system."

Calvin did point out that with all the advances made at Dow, there still is public concern about the amounts still discarded.

"Zero discharge is an unachievable goal because of our increasing ability to detect even minute quantities of compounds in the environment," he said. "What we must remember though ... that environmental protection is achievable only through thoughtful dialogue between all concerned parties."

He added that the public is being needlessly alarmed in many cases by reports of "trace quantities in the environment ... We need to focus on basic toxicology concepts such as no-effect levels, and the fact that it is the combination of toxicity and degree of exposure that creates the hazard."

In conclusion, Calvin showed a picture taken on the first day of the walleye fishing season at the crowded and newly dedicated Bob G. Caldwell boat launch, just a few hundred yards downstream from where Dow discharges into the Tittabawassee.

Even though restrictions on sport fishing on the Tittabawassee were lifted earlier this year, fishermen have been warned since 1978 not to eat bottom feeding fish on the Tittabawassee. According to data released last year by the EPA, the most dioxin-contaminated fish was found in a Tittabawassee River carp.

Businesses say liability trial costs staggering

MIDLAND DAILY NEWS - APRIL 3, '86

By ROB REHG
Daily News staff writer

Dow Chemical Co. spent more than \$1 million the past two years successfully defending 11 product liability lawsuits that went to trial.

"At these rates, a defendant cannot even afford to win," says Ronald Davis, manager of Dow's litigation section in its legal department.

Davis and several local business representatives formed a panel which met Wednesday at Saginaw's St. Luke's Hospital to discuss liability problems confronting their employers.

The program was arranged by a coalition of Saginaw County physi-

cians to demonstrate that doctors are not alone in their desire to alter the liability system.

Davis told the group that the average cost of successfully defending 11 product liability lawsuits that went to trial in 1984 and '85 was \$150,000.

The only other case that went to trial in the same two year period ended with an \$800,000 judgment against Dow.

In 1985, there were 423 product liability claims filed against Dow.

"That's roughly eight suits a week," Davis said.

"The vast majority" are claims that lack merit, Davis said, but still are expensive to defend and ul-

timately are settled "for much less than they cost to defend."

Besides the financial cost to companies, the litigious nature of today's society has "a very chilling effect on businessmen" and stifles entrepreneurs because, "The risk of litigation is allowed to override the benefit of the product," Davis said.

Several panel members said the legal system must be made less attractive for people to file frivolous claims, and over generous jury awards should be prevented.

One of the best remedies, the panel stressed, would be to place a maximum cap on what can be awarded injured parties in punitive or pain

and suffering damages.

Davis noted that is common for defendants to use structured settlements which are paid out over many years. In those cases, a \$250,000 award can actually mean a person will receive three times that much money because of compounding interest.

"The point is a person can get a lot of money without an astronomical jury award," Davis said.

Wednesday's panel included members of school districts, tavern owners, architectural firms, General Motors Saginaw Division and physicians.

G. William Sefton, press secretary for Citizen's Liability Action Committee, said his group is renewing a petition drive to limit how much money attorneys can receive from damage awards.

Michael Lefkiades, a Michigan delegate on the White House conference On Small Business Affairs, said it is important for doctors and businesses to apply constant pressure on lawmakers until changes are made to liability laws.

"Legislators understand things in numbers and pressure — plain and simple," Lefkiades said.

2 other releases - not reported
same day - per Dow worker

Dowfax plant releases sulfur trioxide vapors

About one pint of sulfur trioxide vapors was released at a Dow Chemical Co. plant building in Midland Thursday.

According to Dow spokesman Pat Goggin, the vapors were released at the Dowfax plant at about 5 a.m. Thursday. The material, which is a surfactant or water solubility enhancer, was released when a frangible (pressure release device) failed.

The material creates a thick fog and the repair and clean up was a slow process, Goggin said, because workers were having difficulty seeing the affected areas. Once the release was detected by a remote-controlled computer, the process was stopped and the scrubbers, which clean the area were activated. No workers were in the area when the release occurred.

The release was contained primarily within the Dowfax building although some got into the outside atmosphere because of the plant doors being opened and closed by workers cleaning up the area.

The city and fire department were alerted to the release and Dow gave the all clear to both departments at noon Thursday. MAY 23, 1986
MIDLAND

20144

Vinyl chloride leaks from Dow Sarnia plant

MIDLAND DAILY NEWS

MAY 14 1986

SARNIA, Ontario (AP) — Nearly 13,000 pounds of colorless toxic chemical vapor leaked into the atmosphere from a Dow Chemical Co. subsidiary plant here, Dow officials said.

The leak at the Dow Chemical Canada Inc. plant in Sarnia, across the St. Clair River from Port Huron, Mich., occurred about 10:30 p.m.

Monday, company officials said.

The leak, which lasted 24 minutes, included 7,700 pounds of vinyl chloride vapors and 5,280 pounds of hydrogen chloride vapors, The Detroit News reported today.

Dow spokeswoman Sandy Carlton said the vapor release posed no danger to Michigan and Canadian residents. Police and other disaster

officials in Michigan were not notified of the accident, the News said.

Dennis M. Drake, a compliance official in the state Department of Natural Resources' Air Quality Control Division, said Tuesday night he was unaware of the vapor leak.

The leak occurred when an instrument failed at the plant, causing a pressure upset in the vinyl chloride

finishing section of the plant, Ms. Carlton said.

A pressure safety valve dispersed the vapor, but the plant was shut down to minimize environmental impact, she said.

The leak "might have extended to the river, but if it did, its potency would have been diminished," the

spokeswoman said.

Vinyl chloride, a gas used in the production of chloride plastic resin, which is used to manufacture pipe and garden hoses.

Hydrogen chloride, a long-standing industrial solvent, is used to produce tetrachloroethane, an industrial solvent, and silicon for microprocessors.

20145

Vapors from leak within safe levels, Dow says

MAY 15, 1986 - Detroit Free Press

Free Press Staff and Wire Services

Any chemical vapors that hit Michigan after a leak at a Dow Chemical Canada Inc. plant in Sarnia, Ontario, would have been within safe levels, the company said Wednesday.

And the Ontario Ministry of Environment said it had no reports of ill effects from the leak.

But a spokesman for the American Lung Association of Michigan said, "Releasing 3½ tons of pollutant is not a minor thing."

The spokesman, Alex Sagady, referred to 7,700 pounds of vinyl chloride vapors that leaked intermittently for about 25 minutes Monday night at the

"Vinyl chloride is a carcinogen shown to cause a form of liver cancer," he said. "It is very tightly regulated in the United States. But without knowing the form and the temperature of the leak and the way it was released and the ground-level concentrations, I can't really evaluate it."

Dow said about 5,280 pounds of hydrogen chlo-

ride vapors leaked with the vinyl chloride from the plant, about 60 miles north of Detroit.

Dow said the vapors were leaked when equipment failure caused a pressure problem.

Jim Janfe, acting manager of the Sarnia office of the Ministry of Environment, said: "It was a problem which appears to have happened because of equipment failure, and some safety valves went off. The safety valves are there to help keep a major problem from happening."

Vinyl chloride is a colorless gas used in making plastic resin. Hydrogen chloride is a colorless gas used to make industrial solvent and silicon microprocessors.

Dow says in a statement that the American Conference of Governmental Industrial Hygienists puts the occupational short-term exposure limit for vinyl chloride at 10 parts per million parts of air, and that Dow calculations showed the highest concentration of vinyl chloride reached 22 parts per million over the plant. Peak concentrations over the St. Clair

River would have ranged from 17 parts on the Canadian side to nine parts on the west side, the Dow statement says.

"The levels determined would not be sufficient to cause any chronic or long-term results and an exposure of several thousand p.p.m. would be required for acute health effects," said Dr. Ian Arnold, medical director of Dow's health center, in Dow's statement. Dow said its guidelines for hydrogen chloride limit exposure to 25 parts per million in a one-hour period and that the peak concentration for the leak was 38 parts per million over the plant. Peak concentrations over the St. Clair River would have ranged from 30 parts per million on the east side to 16 parts per million on the west, Dow said.

No one monitors the air around the plant and there was no independent confirmation of the nature or amount of the leak. Dow and the ministry calculated how much pollutant was in the air from the amount of the chemical Dow said was released.

Dow loses bid to end 'flyover' surveillance

UPI and AP

WASHINGTON — The U.S. Supreme Court ruled Monday that use of airplanes to look for evidence, whether of a backyard marijuana patch or corporate pollution, does not violate the Constitution's ban on searches made without warrants.

In companion cases from Michigan and California, Dow Chemical Co. vs. United States and California vs. Ciraolo, the justices said the Fourth Amendment's guarantee of privacy does not extend to open areas that can be seen from a hill or an airplane with the naked eye or photographed with traditional types of cameras.

"The Fourth Amendment protection of the home has never been extended to require law enforcement officers to shield their eyes when passing by a home on public thoroughfares," the court said. "The Fourth Amendment simply does not require the police traveling in the public airways . . . to obtain a warrant in order to observe what is visible to the naked eye."

The cases dealt with aerial searches, one by police in Santa Clara, Calif., that turned up a backyard marijuana patch belonging to Dante Ciraolo, and the other by the Environmental Protection

Agency of a Dow plant in Midland.

Both cases made their way to the Supreme Court to test the contention that the flyovers were illegal under the Constitution's guarantee that people have the right to "be secure in their persons, houses, papers, and effects, against unreasonable searches."

IN THE DOW CASE, "open areas of an industrial plant complex with numerous plant structures spread over an area of 2,000 acres . . . (are) open to the view and observation of persons in aircraft lawfully in the public airspace," the court said.

Dow had argued that allowing such searches would make it impossible to protect its plant from corporate spies seeking trade secrets.

A Dow spokeswoman said the company's initial reaction was "disappointment."

"However, we are pleased the Supreme Court felt the case had enough merit to actually hear it," said Vicky Suazo. "The decision is extremely close, so we'll wait to hear what information we get from (reading) the actual decision."

Dissenting in both cases were Justices Lewis Powell, William Brennan, Thurgood Marshall and Harry Blackmun.

Also Monday:

- The court let stand a ruling that people applying for police jobs may be required to have a certain number of college credits, even if the rule hurts more blacks than whites. The justices, without comment, rejected a challenge to a requirement that applicants for the Dallas police force have at least 45 hours of college credits. The case is Davis vs. Dallas.

- The court upheld a former government policy of cutting off some Social Security benefits to divorced spouses over 60 who remarry. It ruled 6-3 that the policy did not violate the Constitution. The court ruled against a Los Angeles area couple who challenged the policy. The case is Bowen vs. Owens.

- The court granted the Reagan administration a hearing in its bid to limit eligibility for Social Security disability benefits. The court said it will review a Washington ruling that the government improperly denied benefits to disabled individuals. The case is Bowen vs. Yuckert.

Free Press Staff Writer Dolly Katz contributed to this report.

OUTGOING TELEGRAM Department of State

INDICATE ☐ COUNTRY
☐ CHANGE TO

SECRET

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53

SAIGON

RECEIVED
PRIORITY

ACTION: Amembassy SAIGON

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RPTD INFO: CINCPAC/POLAD

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JOINT STATE/DEFENSE MESSAGE

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Embtel 589.

DAC

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DOD looking into matter urgently.

P

USIA

In view probable DRV charges germ warfare request Embassy views

NSC

INR

how public relations aspect this program should best be handled. Dept

CIA

NSA

suggests you consider that following be undertaken prior use defoliant:

OSD

ARMY

1. Since planes must be flown by U.S. pilots, GVN might

NAVY

AIR

RMR

before operation commences, state publicly they have requested

it and that program under GVN direction and control.

2. This point to be made in context public notice to Viet-

namese citizens explaining defensive purpose program and advising

inhabitants of areas to be affected re necessary precautions.

Such notice should spell out that this drastic program necessi-

tated as one of steps defend Viet-Nam from VC attack, that it

will have no harmful effect on humans or livestock, etc.

3. Defoliant not be used near Cambodian border, and RKG should be informed in advance.

/Embassy comment requested. No final decision pending your reply,

but preparatory steps being taken.

RUSK

Shaded by:

FE:TF/VII:CB:food:em 11/7/61

Telegraphic transmission and

classification approved by:

FE - John M. Steeves

Comments:

DOL/ISA - Mr. Bundy

FE/P. - Mr. Manell

XXXX

SEA - Mr. Anderson

T7/VN - Mr. Cottrell

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E.O. 11652, Sec. 140 and 141 of (U)

State 3/17/73 NAL-75-71

AMFO DATE 3/27/75

DS-322

20148

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY OFFICE OF PESTICIDE PROGRAMS WASHINGTON, DC 20460 FREEDOM OF INFORMATION REQUEST RESPONSE	INITIAL RESPONSE X	REQUEST IDENT. NO. 3726-93
	ADD'L RESPONSE NO.	DATE NOV 30 1993

- ☒ 1. We are enclosing records you requested.
- ☐ We believe that they fully respond to your request.
- ☒ These records plus those that will be sent later fully respond to your request.
- ☐ See item 3.
- ☐ 2. Records you requested are not immediately available. We have ordered copies and will forward them to you as soon as we receive them. Please allow several weeks for delivery.
- ☐ 3. As explained in an attachment to this form, records you requested cannot be released to you. If item 2 above is not checked, we have enclosed all requested records available for public release at this time.
- ☐ 4. Records you requested are available from another agency. We have forwarded your request to that agency; a copy of our letter of transmittal is attached.
- ☐ 5. Records you requested have been published and are available from the source identified below.

RECORDS REQUESTED:

Records concerning 2,4-D, 2,4-DB, and 2,4-DP and dioxins.

RECORDS ENCLOSED (or source of public documents):

Items from the public docket concerning 2,4-D, 2,4-DB, and 2,4-DP and dioxins, four bibliographies of all product chemistry studies submitted on 2,4-D, 2,4-DB and 2,4-DP, and an Affirmation of Non-multinational Status. Please complete and return this form. See REMARKS below.

RECORDS THAT WILL BE FORWARDED LATER:

Additional records concerning 2,4-D, 2,4-DB, and 2,4-DP (approximately 3000-4000 pages) have been collected and are being reviewed in order to remove any confidential business information that these documents may contain as well as B docket items and selected studies from the bibliographies.

RECORDS THAT ARE NOT AVAILABLE FOR PUBLIC RELEASE:

REMARKS:

I will begin to process the B docket items (D-13956B through 13960B) and any items you select from the enclosed bibliographies after I receive a completed Affirmation of Non-multinational Status. Please note that it will take several months to process these studies. Studies are on microfiche. See the cover letter about fees relevant to your request.

Michael Yanchulis
 (703) 305-6440

EXPLANATION OF THE AFFIRMATION OF NON-MULTINATIONAL STATUS

Pesticide information that is responsive to your recent FOI request includes information that was submitted to EPA by pesticide applicants or registrants under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). In the 1978 amendments to FIFRA, Congress expressly limited who may receive this information and how it may be used by recipients. These limits, expressed in FIFRA section 10(g), were imposed by Congress to protect registrants of pesticides in the U.S. against unauthorized use of their health and safety data by competitors to obtain pesticide registrations in foreign countries. (Those who obtain pesticide registrations in foreign countries are called "Foreign or Multinational Pesticide Producers" in section 10(g), abbreviated "Multinational" herein.)

FIFRA section 10(g) therefore requires EPA to avoid knowingly disclosing this information to a Multinational, or to agents or employees of a Multinational. Numbered paragraphs (1) and (2) of the "Affirmation of Non-Multinational Status" are designed to allow EPA to implement this requirement. Section 10(g) also requires each person who seeks to obtain this information from EPA to affirm that he or she does not intend to, and will not purposefully or negligently deliver (or cause delivery of) the information to a Multinational. Numbered paragraph (3) of the Affirmation is designed to allow EPA to implement this requirement. The remainder of this explanation is provided to further assist you in understanding section 10(g) and the implications of signing the Affirmation.

Section 10(g) makes it unlawful for a person requesting registrant-submitted pesticide information to furnish a false or misleading Affirmation of Non-Multinational Status to EPA; such violations are punishable under 18 USC 1001. Thus, for example, it is EPA's position that it would be unlawful for a person to execute the Affirmation while having the intent to publish (or otherwise to deliver in any way to a Multinational in its entirety) a previously unpublished toxicity study submitted by a registrant. This is because the information delivered likely could be used to satisfy a data requirement imposed by a foreign country as a condition of producing, distributing, selling, shipping, or using the product in that country. However, section 10(g) would not restrict an intent to publish or deliver brief excerpts from such information or summaries or critiques of it, identified as such, since these likely would not be useful in satisfying data requirements imposed by other countries. Of course, the prohibition does not apply to publication or delivery of information that is already freely available to the public (such as data that has been published) or to publication of data with the consent of the registrant that submitted it to EPA.

It is less clear whether the statute imposes any other duties or prohibitions on persons once they have received the information from EPA, and EPA has taken no position on this issue. Some firms who have submitted data to EPA, however, argue vigorously that section 10(g) governs the use or disclosure of data by persons who have obtained it from EPA. Accordingly, you should be aware that if your disclosure of data obtained by you from EPA results in its becoming available to a Multinational (in a form that enables it to be used to satisfy foreign data requirements), it is possible that the firm that submitted it to EPA may seek relief against you in court, and may argue in court that you were required by section 10(g) to guard against disclosing data to a Multinational or allowing such disclosure. You may therefore wish to take steps to avoid inadvertent disclosure of the data by keeping it in a secure place. Before publishing it or deliberately disclosing it to others, you may wish to seek legal advice.

October 1984

20150

AFFIRMATION OF NON-MULTINATIONAL STATUS

This affirmation is required by the EPA interim procedures to implement Section 10(g) of the Federal Insecticide, Fungicide, and Rodenticide Act. Section 10(g) is reproduced on the reverse side for your reference.

I have requested access to information submitted by an applicant or registrant under the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.) to the Environmental Protection Agency. I hereby affirm that:

(1) I am not a business, or other entity engaged in the production, sale, or distribution of pesticides in countries other than the United States or in addition to the United States; and I am not an employee or agent of any such business or entity;

(2) I do not seek access to the information for purposes of delivering it or offering it for sale to any such business or entity or to any of its employee or agents;

(3) I will not purposefully deliver the information (or negligently cause it to be delivered) to any such entity or to any of its employees or agents.

I am aware that I may be subject to criminal penalties under 18 U.S.C. 1001 if I have made any statement of material facts knowing that such statement is false or if I willfully conceal any material fact.

Date _____ Signature _____

Name _____

Address _____

Organization _____

☐ I am not requesting access on behalf of someone else.

☐ I am requesting access on behalf of someone else. My client is:

Client _____ Organization _____

RETURN THIS FORM TO:

Freedom of Information (~~A-491~~), Office of Pesticide Programs, U.S. Environmental Protection Agency,
Washington, D.C. 20460 1105

For office use only:

RIN 3726-93 Date mailed NOV 30 1993 Caseworker Yenchu 13

(11/88)

20151

**The Federal Insecticide, Fungicide, and Rodenticide Act
as Amended**

Public Law 92-516 October 21, 1972 as amended by
Public Law 94-140 November 28, 1975
and Public Law 95-396 September 30, 1978

7 USC 136a

"SEC. 10. PROTECTION OF TRADE SECRETS AND OTHER INFORMATION.

P.L. 95-396;
92 Stat. 831.

"(g) Disclosure to Foreign and Multinational Pesticide Producers.—

"(1) The Administrator shall not knowingly disclose information submitted by an applicant or registrant under this Act to any employee or agent of any business or other entity engaged in the production, sale, or distribution of pesticides in countries other than the United States or in addition to the United States or to any other person who intends to deliver such data to such foreign or multinational business or entity unless the applicant or registrant has consented to such disclosure. The Administrator shall require an affirmation from any person who intends to inspect data that such person does not seek access to the data for purposes of delivering it or offering it for sale to any such business or entity or its agents or employees and will not purposefully deliver or negligently cause the data to be delivered to such business or entity or its agents or employees. Notwithstanding any other provision of this subsection, the Administrator may disclose information to any person in connection with a public proceeding under law or regulation, subject to restrictions on the availability of information contained elsewhere in this Act, which information is relevant to the determination by the Administrator with respect to whether a pesticide, or any ingredient of a pesticide, causes unreasonable adverse effects on health or the environment.

Records.

"(2) The Administrator shall maintain records of the names of persons to whom data are disclosed under this subsection and the persons or organizations they represent and shall inform the applicant or registrant of the names and affiliation of such persons.

"(3) Section 1001 of title 18 of the United States Code shall apply to any affirmation made under paragraph (1) of this subsection.

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- L 5091A 09/22/86
Campt, Douglas, D.
EPA
Letter to Gilfmore, Inc. 09/22/86. Notifies that EPA is considering initiating a Special Review of the use of pesticide products containing 2,4-D.
2 pages.
- D- 5129A 12/03/86
Tinsworth, Edwin F.
EPA
Letter to Union Carbide Agricultural. 12/03/86. Notifies that EPA is considering initiating a Special Review of the use of pesticide products containing 2,4-D; 2,4-DP & 2,4-DB.
3 pages.
- D- 5140A 07/01/86
EPA
Report. 07/86. Chemical Information Fact Sheet for 2,4-D.
5 pages.
- D- 5181A 05/18/87
Barrons, Keith
Pentwater, MI
Letter to Douglas G. McKinney, EPA. 05/18/87. Concerns how 2,4-D effects dog if exposed.
1 page.
- D- 5256A 08/01/86
EPA
Report. 08/86. Chemical Information Fact Sheet for 2,4-D.
5 pages.
- D- 5305A / /
EPA
Report. Undated. Tolerances For 2,4-Dichloropheoxyacetic Acid.
2 pages.
- D- 5306A 11/24/80
EPA
Report. 11/24/80. Preliminary Quantitative Usage Analysis of 2,4-D.
2 pages.

D- 5307A 09/09/86 Meeting Minutes

Meeting held on 09/09/86

Meeting requested by [Not given in minutes]

Subject: Discussed 2,4-D Research Data.

30 pages.

Participants: Hunt, Milt, EPA

Eisenbrandt, Dave, EPA

Cook, Ralph, EPA

Dr. Moore, EPA

Kimm, Vic, EPA

Barnes, Don, EPA

Conyers, Emory, Dow Chemical

Bomar, C.P., Industry Task Force

D- 5308A / /

Johnson, Stephen L.

EPA

Report. 07/08/87. A Set of Scientific Issues Being Considered by the Agency in Connection with the Peer Review Classification of 2,4-D as a Class C Oncogen.

2 pages.

D- 5309A 07/15/87

Gemert, Marcia van

EPA

Memorandum. 07/15/87. Forwards Review of the Pharmacokinetic study in mice on 2,4-D.

2 pages.

D- 6651A 01/09/87

Davis, Warren

Union Carbide Agricultural Products Co.

Letter. 1/9/87. Reply to 12/9/86 notice from EPA. States that including 2,4-DP and 2,4-DB with the proposed special review of 2,4-D is inappropriate. 4 pages.

From the author,

on 01/14/87

D- 6652A 12/30/86

Averbach, Ing. Aharon

Compania Quimica S.A.

Letter. 12/30/86. Notes that the company is a basic producer of 2,4-D. Inquires about the status of 2,4-D in the United States. 1 page.

From the author,

on 01/14/87

20154

- D- 6660A 11/12/86
Conner, John D.
McKenna, Conner & Cuneo
Letter. 11/12/86. Comments on the review of the Kansas epidemiology study by Dr. Brian MacMahon. 2 pages. Attachment: 9/29/86 "Review of Hoar et al and related literature" by Brian MacMahon, 7 pages.
From the author,
on 11/12/86
- D- 6867A 01/05/87
Kulakowski, Lois
Tucson, Arizona
Letter. 1/5/87. Asks for immediate halt to use of Atrazine and 2,4-D. 1 page.
- D- 6868A 12/15/86
Barrows, Keith
Bradenton, Florida
Letter. 12/10/86. Comments on recent 2,4-D data. 1 page.
Sent to the author,
on 12/15/86
- D- 6869A / /
Meeting held on 01/15/87
Meeting requested by -[information not in minutes]
Subject: Upcoming meeting of SAP to discuss oncogenicity of 2,4-D
Participants: Tinsworth, Edwin, EPA
Akerman, James, EPA
Hunt, Mel, Dow Chemical
Conyer, Emery, Dow Chemical
- D- 6877A 01/27/87
Baldi, A.
Aceto Agricultural Chemical Corporation
Response to EPA's letter concerning the Special Review of 2,4-D.
1 page.
From the author,
on 02/10/87
- D- 6941B 01/20/87
Hazleton Laboratories America
MRID 400618-00 and 01. 01/06/87. "Oncogenicity Study in Mice with 2,4-Dichlorophenoryactic Acid (2,4-D)", Volumes I through III.
1,797 pages.
From Conner, John D., McKenna, Conner and Cuneo
on 02/06/87

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- D- 6956A 01/13/87
Auerbach, Janet
EPA
Record of 1/13/87 telephone call to Milt Hunt, Dow Chemical, to announce that the Agency was willing to discuss more specifically the constortium's offer to make risk reduction proposals for 2,4-D. 1 pg.
- D- 6957A 01/15/87
Meeting held on 01/15/87
Meeting requested by -not given in minutes
Subject: Risk reduction proposal on 2,4-D.
Participants: Hunt, Milt, Dow Chemical Company
Conyer, Emery, Dow Chemical Company
Auerbach, Janet, EPA
- D- 6970A / /
Estetter, Dan
Arcata, California
Letter. No date. Requests cancellation of registration of pesticides containing 2,4-D and Atrazine. 1 page.
From the author,
on 02/27/87
- D- 6981A / /
Five form letters from individuals requesting cancellation of pesticides containing 2,4-D and Atrazine. 5 pages.
- D 6982A / /
Cox, William and Alice
Santa Clara, California
Letter. 01/01/87. Protests the use of 2,4-D by the National Forest Service. 1 page.
- D- 6994A / /
Published articles on 2,4-D and reviews of literature. 81 pages.
From the authors,
on 02/19/87
- D- 7043A 02/27/87
Nelsen, Joel
California Citrus Mutual
Letter. 02/27/87. Comments on 2, 4-D. 1 page.
From the author,
on 03/05/87

- D- 7176A / /
Agriculture Canada
Bulletins and reports. CAPCO Notes of 1/23/87, 1/26/87 & 3/4/87.
2 memoranda from Pesticides Directorate and 2 toxicological reports.
132 pages.
- D- 7188A / /
Clark, Rebecca
University of Cincinnati
2/87 "Critical Review of the Literature: Toxicological Properties of
2-Ethylhexanol." Literature Review, 23 pages, and Toxicological
Profile, 16 pages.
From Wilson, Ronald, Industry Task Force
on 03/19/87
- D- 7280A 03/12/87
Riley, Louis E. and Janice
Touchet, Washington
Letter. 03/12/87. Transmits copy of testimony submitted to a
Restricted-use herbicide hearing held at Pasco, Washington. 1 page.
Attachment: Testimony. 2 pages.
- D- 7956A 06/30/87
Boodee, Mark T.
EPA
Letter. 06/30/87. Transmits requested list of tolerances for 2,4-D.
1 page. Attachment: Incoming correspondence and list of tolerances.
3 pages.
Sent to Mider, R.H., New York State Electric & Gas Corp.
on 06/30/87
- D- 8161A / /
Conner, John D.
McKenna, Conner, and Cuneo
Letter. 07/21/87. "FIFRA Scientific Advisory Panel -- 2,4-D." 2 pages.
From the author,
on 08/19/87
- D- 9093A 03/23/88
EPA
Federal Register notice. 3/23/88. "2,4-D, 2,4-DB, and 2,4-DP; Notice
of Proposed Decision not to Initiate a Special Review." 6 pages.

- D- 9172A 05/18/88
Conner, John
McKenna, Conner, Cuneo
Letter. 05/18/88. Notes that comments addressing the requirement for additional oncogenicity testing will be submitted by the Industry Task Force on 06/03/88.
From the author,
on 05/23/88
- D- 9207A 06/03/88
Conner, John
McKenna, Conner & Cuneo
Letter. 6/3/88. Submits comments of the Industry Task Force on 2,4-D. 1 page. Attachments: 36 pages.
From the author,
on 06/03/88
- D-10669A 02/25/89
Dole, Jessica
Portland, Oregon
Letter. 2/25/89. Urges EPA to restrict the use of 2,4-D. 1 page.
Attachment: Article, "Restrict Risky Herbicides," 1 page.
- D-11031A / /
Meeting held on 08/25/89
Meeting requested by [not given in minutes]
Subject: To discuss possibility of joint sponsorship of meeting on weight of evidence of carcinogenicity of 2,4-D.
Participants: Graham, John, Harvard Symposium on 2,4-D
Page, Donald L., Industry Task Force II on 2,4-D
Yetzin, Jerry, Task Force II
Bond, Greg, Dow Chemical
Rees, Jerry, National Association of Wheat Growers
Stuckey, Richard, National Association of Wheat Growers
Williams, Margery, National Association of Wheat Growers
Hill, Richard, EPA
Farland, William H., EPA
Andersen, Janet, EPA
Bloom, Jill, EPA

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- D-11034A 08/31/89
Hill, Richard
EPA
Memorandum. 8/31/89. Subject: "Agency Position on 2,4-D Review."
Explains that the EPA will not co-sponsor a review of 2,4-D. 1 page.
- D-11134A 10/13/89
EPA
Federal Register Notice. 10/13/89. "2,4-D, 2,4-DB, 2,4-DP; Status of
Consideration for Special Review."
3 pages.
- D-11135A 09/01/89
EPA
Pesticide Fact Sheet on 2,4-D for Special Review.
10 pages.
- D-11136A 09/01/89
EPA
Pesticide Fact Sheet on 2,4-DB for Special Review of 2,4-D.
6 pages.
- D-11137A 09/01/89
EPA
Pesticide Fact Sheet on 2,4-DP for Special Review of 2,4-D.
5 pages.
- D-11165A 12/04/89
Conner, John D.
McKenna, Conner & Cuneo(Industry Task Force II)
Letter. 12/04/89. Letter committing to develop data for 07/06/89
Special Data Call-In.
1 page.
- D-11369A 02/05/90
Meeting held on 02/05/90
Meeting requested by John Graham
Harvard School of Public Health
Subject: Notes from the 2/5/90 Meeting with John Graham on Release of
Report from Harvard Workshop on 2,4-D.
Participants:

D-11369A Continued Graham, John, Harvard School of Public Health
Schiffrin, Emily, Harvard School of Public Health
Hill, Dick, EPA
Burnam, Bill, EPA
Blondell, Jerome, EPA
Auerbach, Jan, EPA
Andersen, Janet, EPA
Bloom, Jill, EPA
Bayliss, Dave, EPA
Hiremath, Charlie, EPA
Jill Bloom, EPA
Auerbach, Jan, EPA
Hill, Richard, EPA
Andersen, Janet, EPA
Blondell, Jerome, EPA
Burnam, William, EPA
Bayless, David, EPA
Hiremath, Charlie, EPA
Graham, John, Harvard School of Public Health
Schiffrin, Emily, Harvard School of Public Health

D-11370A 01/31/90
Harvard School of Public Health
Report. January, 1990. The Weight of the Evidence on the Human
Carcinogenicity of 2,4-D.
65 pages.

D-11533A 03/06/90
Conner, John D.
2,4-D Industry Task Force.
Letter to Bert Baker, EPA. 03/06/90. Request for extension of time to
submit aquatic plant growth studies. (2 pages). Submission of nine
mutagenicity studies. See D-11543B (MRID 414098-01 through -09).
2 pages.

D-11543B 03/07/90
2,4-D Industry Task Force
Reports. 1990. Nine mutagenicity studies.
MRID 414098-01 through -09 (Microfiche).
From Conner, John, 2,4-D Industry Task Force

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- D-11965A 06/08/90
Zumwalt, E.R.
U.S. Navy
Letter to Douglas D. Campt, EPA. 06/08/90. Discusses the potentially dangerous contaminants in 2,4-D formulations.
26 pages.
- D-11966A 08/15/90
Campt, Douglas D.
EPA
Letter to E.R. Zumwalt, U.S. Navy. 08/15/90. Responds to Admiral Zumwalt's 6/8/90 letter concerning potentially dangerous contaminants in 2,4-D formulations. See also D-11965.
2 pages.
- D-12232A 10/27/78
Krumel, K.L. and R.F. Arnold
Dow Chemical
Report. 10/27/78. "A Study Of The Formation And Removal Of Impurities In The Semi-Hydrous Process For 2,4-D". CBI has been deleted from this version.
57 pages.
- D-12233A 10/27/78
Krumel, K.L. and R.F. Arnold
Dow Chemical
Report. 10/27/78. "A Study of the Formation and Removal of Impurities in the Semi-Hydrous Process for 2,4-D."
61 pages
- D-12330A 12/04/90
Campt, Douglas D.
EPA
Letter to E.R. Zumwalt, U.S. Navy. 12/04/90. Transmits a new expurgated version of the Krumel Report (D-12232).
1 page.
- D-12766A 07/08/91
Bloom, Jill
EPA
Letter to S. Freeman. 07/08/91. Forwards National Cancer Institute's epidemiologic studies of pesticide use and cancer incidence in Nebraska.
1 page.

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D-13308A 12/11/91 Meeting Minutes

Meeting held on 12/11/91

Meeting requested by [Not given in minutes].

Subject: Discussed O.M. Scott's product registrations for the 1992 and 1993 growing season.

1 page.

Participants: Bloom, Jill, EPA
Waldrop, Walter, EPA
Kelty, Michael, O.M. Scott
Crow, David, D.C. Services

D-13310A 12/11/91 Meeting Minutes

Meeting held on 12/11/91

Meeting requested by EPA/Industry Task Force II

Subject: Discussed toxicology data requirements of the Special Data Call-In of July 6, 1989 and the 2,4-D Registration Standard.

Minutes: 2 pages. Attachments: 116 pages.

Participants: Dumas, Richard P., EPA
Bloom, Jill, EPA
Van Gemert, Marcia, EPA
Rowland, Jess, EPA
Swentzel, Clark, EPA
Brennecke, Lucas H., EPA
Protzel, Alberto, EPA
Waldrop, Walter, EPA
Coombs, Judith, EPA
Fenner-Crisp, Penny, EPA
Sette, Bill, EPA
Dorsey, Larry, EPA
Barolo, Dan, EPA
Rossi, Lois, EPA
Auerbach, Jan, EPA
Hammond, Larry, DowElanco
Quast, John, Dow Chemical
Armbruster, Jim, Agro-Gor
Wilson, Ron, John Wise & Assoc.
Akkari, Khalid H., BASF Corp.
Mahlburg, Bill, Nufarm USA
Charles, Jeff, JayMark
Cunney, Helen, Rhone Poulenc Ag. Co.

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- D-13314A 11/12/91
Conner, John D.
McKenna & Cuneo
Letter to Judy Coombs, EPA. 11/12/91. Requests a meeting to discuss issues which need to be resolved before the Task Force initiates certain 2,4-D toxicology studies. See D-13310 for meeting minutes.
3 pages.
- D-13335A 01/06/92
Bloom, Jill
EPA
Note to the Files. 01/06/92. Makes corrections, on behalf of Larry Hammond (DowElanco), to 12/11/91 meeting minutes (D-13310).
1 page.
- D-13383A 01/06/92
Conner, John D.
McKenna & Cuneo
Letter to Jill Bloom, EPA. 01/06/92. Supplements Agency's minutes from the 12/11/91 meeting with the EPA/Industry Task Force II.
See also D-13310.
3 pages.
- D-13384A 01/06/92
Conner, John D.
McKenna & Cuneo
Letter to Jill Bloom, EPA. 01/06/92. Requests an extension of time in which to submit mouse and rat studies.
4 pages.
- D-13439A 01/17/92
Housenger, Jack E.
EPA
Letter to John D. Conner, McKenna & Cuneo. 01/17/92. Responds in part to Mr. Conner's request for an extension of the deadline for submission of 2,4-D rodent carcinogenicity test data. See also D-13384.
2 pages.
- D-13445A 02/14/92
Housenger, Jack
EPA
Letter to John D. Conner, Jr., McKenna & Cuneo. 02/14/92. Requests information in support of the extension request for 2,4-D rodent carcinogenicity data.
4 pages.
- 2016/1

- D-13944A 10/30/92
Otten, Richard
Hunt-Wesson, Inc.
Cover letter. 10/30/92. Submits cover letter for regulatory action in support of reregistration of Para chlorophenoxy acetic acid.
1 page.
- D-13956B 10/01/90
Landvoigt, Dr.
CHEMSERV Industrie Service
Study. 10/90. Submits study entitled " Summary Analysis of 2,4-D Detailing the levels of substituted dioxins and benzfurans found in the samples.
3 pages.
For cover letter see D-13944.
- D-13957B 10/01/90
Landvoigt, Dr.
CHEMSERVE Industrie Service
Study. 10/90. Submits study entitled "Determination of Dioxins and Bensofurans in 2,4-D, 2,4-DCP, MCPA, 2,4-DP, CMPP and 2,4-DPB by GC/MS."
3 pages.
For cover letter see D-13944.
- D-13958B 10/05/90
Tiernan, Thomas
Wright State University
Study. 10/05/90. Submits study entitled "Analysis of Sample of 4-Chlorophenoyacetic Acid."
3 pages.
For cover letter see D-13944.
- D-13959B 05/23/90
Ruiz, Rennie
Hunt-Wesson, Inc.
Study. 05/23/92. Submits study entitled "4-CPA Magnitude of Residue Study."
3 pages.
For cover letter see D-13944.

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D-13960B 06/06/90

Ruiz, Rennie

Hunt-Wesson, Inc.

Study. 06/06/90. Submits study entitled " 4-CPA storage Stability Study."

3 pages.

For cover letter see D-13944.

D-13962A 11/12/92

Grant, Duane

Idaho Grain Producers Assn.

Letter to Linda Fisher, EPA. 11/2/92. Submits concerns with regard to ongoing review of 2,4-D.

2 pages.

D-13994A 09/30/92

Hein, N. D.

DowElanco

Letter to Anne Lindsay, EPA. 9/30/92. Submits request to amend 2,4-D registrations to incorporate as terms and conditions of those registrations the agreement reached between the task force and EPA.

8 page cover letter; 4 attachments, 80 pages.

D-13995A 09/30/92 Letter

Shearer, Karen

Rhone-Poulenc

Letter to Anne Lindsay, EPA. 9/30/92. Submits request to the EPA to amend its Technical/MUP 2,4-D registrations to incorporate terms and conditions as outlined between 2,4-D Task Force and EPA. 33 pages.

D-13996A 10/02/92 Letter

Shearer, Karen

Rhone-Poulenc

Letter to Anne Lindsay, EPA. 10/2/92. Requests amendment of registered 2,4-D products incorporating the indicated change on page 7 of attachment 4. 1 page letter; 47 page attachment.

D-13997A 09/30/92

Champion, James

Riverdale Chemical Company

Letter to Anne Lindsay, EPA. 9/30/92. Requests EPA to amend the company's technical and manufacturing use product 2, 4-D registration as per agreement reached between the Industry Task Force II and EPA.

Cover letter 5 pages; 5 attachments 72 pages.

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D-13998A 09/30/92

Champion, James
NuFarm USA, Inc.

Letter to Anne Lindsay, EPA. 9/30/92. Requests the EPA to amend NUFARM USA, Inc.'s technical and MUP registrations for 2,4-D. Cover letter 5 pages; 6 attachments, 71 pages.

D-13999A 10/01/92

Mealman, W. E.
Agro-Gor Corp.

Letter to Anne Lindsay, EPA. 10/1/92. Request to amend Agro-Gor Corporation's Technical/MUP registrations to incorporate as terms and conditions as per agreement between the Task Force and EPA. Cover letter 7 pages; 6 attachments totalling 76 pages.

D-14000A 10/01/92

Fisher, J. R.
OMV Gruppe Agrolinz, Inc.

Letter to Anne Lindsay, EPA. 10/1/92. Request the EPA to amend Agrolinz, Inc.'s Technical/MUP Registrations for 2,4-D. Cover letter 9 pages; 6 attachments, 67 pages.

D-14001A 10/05/92

Mealman, W.E.
PBI/Gordon Corp.

Letter to Anne Lindsay, EPA. 10/5/92. Requests EPA to amend PBI/Gordon 's technical/MUP registrations as per agreement reached between the Task Force and EPA. Cover letter 7 pages; 6 attachments, 73 pages.

D-14012A 12/28/92

Miller, Joanne
EPA

Letter to Larry Hammond, DowElanco. 12/28/92. Formalizes an agreement with the member companies of the Industry Task Force II on 2, 4-D Research Data which modifies a component of the registration amendments for Technical/MUP registration. 5 pages.

D-14015A 11/06/92

Conner, John D., Jr.
McKenna & Cuneo Law Offices

Letter to Daniel M. Barolo, EPA. 11/6/92. Submits three items from the Industry Task Force II on 2,4-D Research Data for forwarding to the SAB/FIFRA SAP 2,4-D Panel. 696 pages.

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- 4063A 01/18/93 Letter
Tice, Howard W.
Kansas Assoc. of Wheat Growers Hutchinson, Kansas
Letter to Dan Barolo, EPA. 1/18/93. Submits comments on
reregistration process for 2,4-D. 1 page.
- 4064A 02/19/93 Letter
Housenger, Jack E.
EPA
Letter to Howard W. Tice, Kansas Assoc. of Wheat Growers. 2/19/93.
Submits EPA's response to Mr. Tice's letter of 1/18/93 (D-14063).
3 pages.
- 4094A 03/15/93
Conner, John D., Jr.
McKenna & Cuneo
Letter to Jill Bloom, EPA. 3/15/93. Requests meeting with EPA
concerning a 2,4-D mouse study. 4 pages.
- 4095A 03/24/93
Conner, John D., Jr.
McKenna & Cuneo
Letter to Jill Bloom, EPA. 3/24/93. Submits summary of the EPA and
2,4-D Task Force March 18, 1993 Meeting, as prepared by Larry Hammond,
Chairman of the Technical Committee, Industry of Task Force II on
2,4-D Research Data. 5 pages
- 4096A 03/18/93 Meeting Minutes
Meeting held on 03/18/93
Meeting requested by Larry Hammond
2,4-D Task Force
Subject: Reduced weight gains in male mice carcinogenicity study.
15 pages.
Participants: Jill Bloom, EPA
Jess Rowland, EPA
Marcia Van Gemert, EPA
James Bus, not stated
Clark Swentzel, not stated
Ronald D. Wilson, not stated
Larry Hammond, 2,4-D Task Force

D-14096A Continued William Mahlburg, Nufarm USA
Jeffrey Charles, Nufarm/ Jay Mark Consulting
Karen S. Shearer, Rhone-Poulenc Legal
Judith Coombs, EPA
Richard P. Dumas, EPA

D-14113A 04/08/93
Conner, John D., Jr.
McKenna & Cuneo for 2,4-D Task Force II
Letter to Jill Bloom, EPA. 4/8/93. Submits male mouse bodyweight
data and proposal for initiation of the male mouse oncogenicity study.
55 pages.

D-14123A 04/27/93 Letter
EPA
Letter to Larry E. Hammond, DowElanco. 4/27/93. Transmits comments
on male mouse oncogenicity study. 4 pages.

*** END ***

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D- 9592A 09/01/88
EPA

Report. 9/88. Guidance for the Reregistration of Pesticide Products containing 2,4-Dichlorophenoxyacetic Acid (2,4-D) as the Active Ingredient. 105 pages. (Available from NTIS: PB89-102396).

D- 9651A 09/01/88
EPA

Report. 9/88. EPA Index to Pesticide Chemicals - 2,4-D

D- 9653A 09/01/88
EPA

Science chapters associated with the 2,4-D Registration Standards. 747 pages.

D- 9702A 09/01/88
EPA

9/88. Pesticide Fact Sheet. 12 pages.
(Available from NTIS: PB87-192712).

D- 9893A 09/01/88
EPA

Report. 9/88. Guidance for the Reregistration of Pesticide Products Containing 4- (2,4 - Dichlorophenoxy) Butyric Acid (2,4-DB) as the Active Ingredient. 105 pages. (Available from NTIS: PB89 114078).

D- 9901A 09/01/88
EPA

Science Chapters associated with the 9/88 Registration Standard, "Guidance for the Reregistration of Pesticide Products Containing 2,4-DB as the Active Ingredient." 341 pages.

D-10885A 10/03/88
EPA

Report. 10/3/88. Pesticide Fact Sheet No. 179. 6 pages.
(Available from NTIS: PB89-114078).

D- 9874A 09/01/88
EPA

Report. 9/88. Guidance for the Reregistration of Pesticide Products Containing 2- (2,4 Dichlorophenoxy) Propionic Acid (2,4-DP) as the Active Ingredient. 97 pages. (Available from NTIS PB89-114086).

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D 9902A 09/01/88

EPA

Science Chapters associated with the 9/88 2,4-DP Registration
Standard. 187 pages.

D-10711A 09/01/88

EPA

Report. 9/88. Pesticide Fact Sheet No. 180. 6 pages.
(Available from NTIS: PB89-114169).

*** END ***

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D- 9874A 09/01/88

EPA

Report. 9/88. Guidance for the Reregistration of Pesticide Products
Containing 2- (2,4 Dichlorophenoxy) Propionic Acid (2,4-DP) as the
Active Ingredient. 97 pages. (Available from NTIS PB89-114086).

D- 9902A 09/01/88

EPA

Science Chapters associated with the 9/88 2,4-DP Registration
Standard. 187 pages.

D-10711A 09/01/88

EPA

Report. 9/88. Pesticide Fact Sheet No. 180. 6 pages.
(Available from NTIS: PB89-114169).

*** END ***

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5/10/90
8-3-90



E. R. ZUMWALT, JR.
ADMIRAL, U. S. NAVY (RET.)

8 June 1990

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DEPUTY DIRECTOR OF PESTICIDE PROGRAMS

Douglas D. Campt, Director
Office of Pesticide Programs
United States Environmental
Protection Agency
Washington, D.C. 20460

RECEIVED

JUN 20 1990

DEPUTY DIRECTOR OF PESTICIDE PROGRAMS

Dear Mr. Campt:

Many thanks for your letter of March 23, 1990.

I attach copies of two documents which aver that Dow Chemical Company has never informed EPA or any other government agency of significant concentrations of potentially carcinogenic materials present in 2,4-D including other dioxins than 2,4,5-T and closely related furans and xanthenes.

If this is the case, should not EPA investigate and consider an emergency suspension of the use of 2,4-D?

Sincerely,

E. R. Zumwalt, Jr.
E. R. Zumwalt, Jr.

1500 Wilson Boulevard
Arlington, Virginia 22209
703/841-8960

Attachments

JUN 20 1990

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Daniel T. Teitelbaum, M.D., P.C.
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155 Madison Street
Denver, Colorado
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APR 23 1990

April 18, 1990

E. R. Zumwalt, Jr.
Admiral, U. S. Navy (Ret.)
1500 Wilson Boulevard
Arlington, Virginia 22209

Dear Admiral Zumwalt;

Thank you very much for your letter of 21 February, 1990. Please forgive me for the delay in my response. I wanted to wait until I received some confirmation in writing of the Supreme Court's decision not to review the appellate court ruling in *Peteet v. Dow*.

It is somewhat difficult for me to respond to your letter directly. The issues which were presented to me as a medical toxicologist in connection with Mr. Greenhill's illness were somewhat different than those which were originally presented during the Agent Orange cases. Thus, Mr. Greenhill's exposure was substantially more clearly characterized than was the exposure of most individuals to Agent Orange. His illness was one which fit more clearly into the category of those illnesses for which a reasonable probability of association with herbicides had been developed over a long period of years.

What I do think was important in connection with the Greenhill case and which may bear on the Agent Orange issue, is the fact that in review of Dow's 2, 4-D documentation I found that there are significant concentrations of potentially carcinogenic materials present in 2, 4-D which have never been made known to the EPA, FDA, or to any other agency. Thus, in addition to the problem of the TCDD which, more likely than not, was present in the 2, 4, 5-T component of Agent Orange, the finding of other dioxins and closely related furans and xanthenes in the 2, 4-D formulation was of compelling interest to me.

Issues which were not addressed in the Agent Orange cases, that is what the companies knew about chloracne and its association with the chlorphenoxy herbicides and when they knew this was very relevant to Mr. Greenhill's case.

I am sorry that I cannot address the issue of the Agent Orange cases and any illnesses which may be traceable to exposure to Agent Orange more directly. My association in the Agent Orange cases was

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April 19, 1990
Page 2

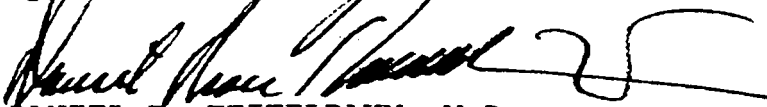
as a "non-causation" expert. In that litigation, I had occasion to review a large number of documents on the subject of knowledge, scientific information, and timing. I am convinced that the manufacturers of the chlorophenoxy herbicides have known for many years about the adverse effects of these materials on humans who were exposed to them. That knowledge was useful to me in formulating my opinions in connection with Mr. Greenhill's case. Whether it would be useful in other cases, remains to be seen.

I trust this information will be useful to you.

Sincerely yours,

DANIEL THAU TEITELBAUM, M.D., P.C.

by

A handwritten signature in dark ink, appearing to read "Daniel T. Teitelbaum", followed by a large, stylized flourish or checkmark.

DANIEL T. TEITELBAUM, M.D.
PRESIDENT

/mw

20175

LAW OFFICES OF
BALDWIN & BALDWIN

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SCOTT BALDWIN, JR.
HARRY L. (JIM) GILLAM
JACK BROWN BALDWIN

115 NORTH WELLINGTON
MARSHALL TEXAS
TELEPHONE (814) 936-4131

P. O. DRAWER 1349
MARSHALL, TEXAS 75671

April 10, 1990

Mr. Bill Lewis
New Jersey Agent Orange Commission
P. O. Box 1717
Trenton, New Jersey 08607

RE: Greenhill vs. Dow Chemical Co.

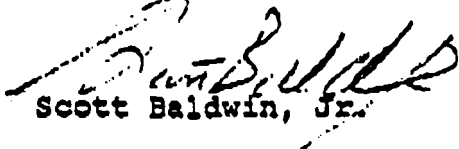
Dear Mr. Lewis:

Pursuant to your telephone conversation with my secretary, please find enclosed a copy of the internal Dow document (the Krumel report) which you requested. Since this document is under a protective order, portions of it have been expunged.

If we can be of any further assistance, please do not hesitate to contact us.

Kindest regards,

BALDWIN & BALDWIN


Scott Baldwin, Jr.

SBjr/ss
Enclosure

20176

R & D REPORT

DOW CHEMICAL U.S.A.

RESTRICTED: for use within The Dow Chemical Company only.

Still in File
W.H.H.

LABORATORY REPORT CASE
OC/78-88
DATE ISSUED
October 27, 1978
LAB. NO. PROBLEM NO.
0 6 0 9 0 0 0 0 0 0

DEPARTMENT

ORGANIC CHEMICALS RESEARCH

TITLE

A STUDY OF THE FORMATION AND REMOVAL OF IMPURITIES IN THE
PROCESS FOR 2,4-D

57

PAGES:
IN FULL
REPORT

AUTHOR(S)

K. L. Krumel & R. F. Arnold

AUTHOR(S) SIGNATURE(S)

K. L. Krumel *R. F. Arnold* (by *K. L. Krumel*)

REVIEWER'S SIGNATURE

W. W. Owen

This
report
is

☒ INTERIM
☐ FINAL

and mainly:

☒ NEW
☐ REVIEW

DESCRIPTIVE SUMMARY
WITH CONCLUSIONS:

(Include in this space references to data books, and to earlier related reports, patents and publications.)

Shortly after the startup of the 2,4-D process in 248 Building, a new and unexpected class of nonacidic impurities were isolated in which two of the major components were tetrachloroxanthone and octachlorospirobixanthene. These impurities were causing problems in the subsequent formulation of 2,4-D as amine salts.

A project was started to learn the source of these impurities and methods for controlling them. It was found that the impurities are formed mainly in the 2,4-D reaction step by several different routes.

A number of techniques were evaluated for removing the impurities
None of the treatments
were totally successful.

pjd

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2,4-D ADMINISTRATION

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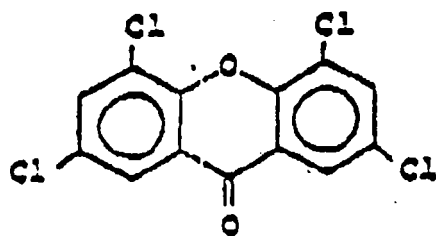
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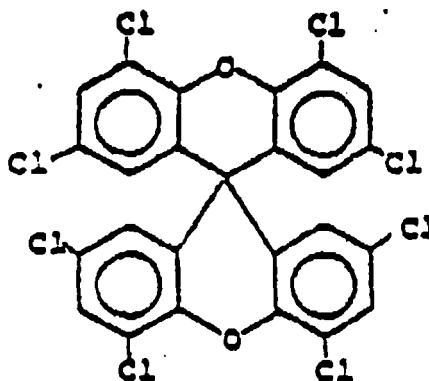
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INTRODUCTION

A process for preparing high purity 2,4-D was started in May 1977 at 943 Building. The high purity molten acid is transferred by pipeline from 948 Building to 489 Building where it is formulated into esters and water soluble amine salts. Starting in late October 1977, precipitates were observed regularly in diluted amines formulations that were found to be made up of a number of impurities associated with the process but that were never detected during laboratory or pilot plant development work. In addition, these impurities were not found in the old 489 Building 2,4-D process. R. McLachlan¹ analyzed the precipitates and found 1,3,6,8-tetrachloroxanthone (I: TCX), 1,1'3,3'6,6'8,8'-octachloro-9,9'-spirobixanthene (II: OCSX), and marginally soluble salts of 2,4-D.



(I)



(II)

A screening program in the plant showed TCX at levels of 200-500 ppm in the crude reaction mass, the recycle solution, and in the final product. Levels of 1000-2000 ppm were found in the solvent and as much as 10% in the still tars.

McLachlan¹ analyzed a sample of still tars and his results are summarized in Table 1.

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Table 1: An Analysis of One Tar Sample

<u>Structure</u>	<u>Approximate Percentage</u>	<u>Comment</u>
	60%	Main Component
	25%	From a heat exchanger leak (Dowtherm J)
DCP	0.5%	raw material
2,4-D	0.01%	Product
TCX (I)	1.5%	
OCSX (II)	1.1%	
Dichlorophenyl- dichlorovinyl ether	1.2%	Rxn product
Dichlorophenyl- trichlorovinyl ether	0.8%	

Plus:

at least eleven other minor components structurally similar to the above. See Ref. 1 for details.

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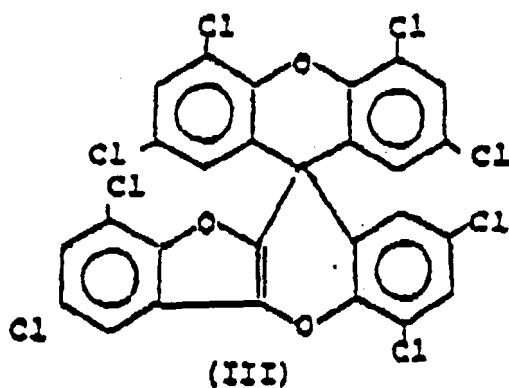
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A project was started to study the formation of TCX and OCSX in some detail to learn more about their formation and fate in the process because it is not obvious how they are made. Several months after starting this study, another significant impurity was found in the product and, to a lesser extent, in the tars. It was identified as (III: "8-5") 2,2',4,4',5',7,7',9-octachlorospiro-(benzofuro(3,2-b) benzopyran-11,9'-xanthene).

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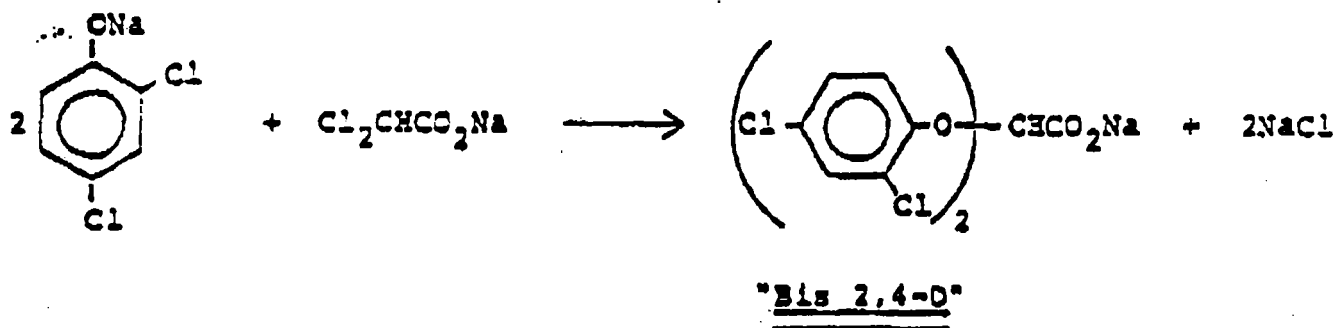
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Important Side Reactions



Glycolic Acid



The reaction is performed in two stages by first reacting 2.2 moles of DCP with 1.2 moles of caustic (added as 50% NaOH) to form a solution of NaDCP in DCP.

High purity 2,4-dichlorophenol (2,4-DCP) made by the chlorination of phenol with sulfuryl chloride in the presence of FeCl₃/Diphenyl sulfide catalyst is used with chloroacetic acid (MCAA) made by the oxidation of vinylidene chloride to make 2,4-D as shown above. The typical raw materials analyses for each is shown in Table 2.

Table 2: Typical Raw Material Analyses for the 2,4-D Process

	<u>DCP</u>		<u>MCAA</u>
2,4-DCP	98.5%	MCAA	99.0%
2,6-DCP	~0.8%	Dichloroacetic acid	0.3%
Other Chloro-phenols	~0.5%	Chloromaleic acid	~0.05%
		H ₂ O	<1.0%

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A rapid initial screening of the toxicity of purified TCX and tars gave the following results.

Oral LD₅₀
(single dose)

Skin/Eye

Tar (contains
3-5% TCX + OCSX)

>5g/Kg

slight transient
initiation. Chloracne
response after 10
applications of neat
tars.

Purified TCX

>4g/Kg

not irritating. Chlor-
acne response after 10
applications of 1%
solution in CHCl₃.

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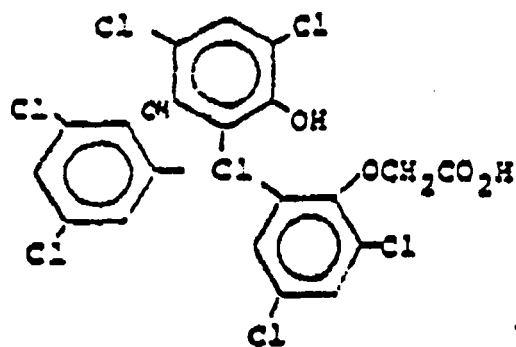
These results are encouraging from a plant hygiene standpoint, but more data is necessary regarding long term effects. When the impurities were first discovered in the plant the still was used very occasionally

The still was originally added to the process as a way of purging contaminants out of the stream to maintain high quality recycle solvent. At this point, tar impurities made up 60-75% of the precipitates formed in diluted amines formulations.

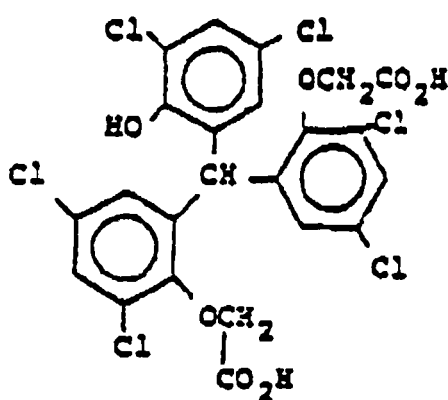
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About February 1978, the capacity of the still was increased and the average levels of TCX levels dropped to ~50 ppm in the crude reaction mass and product and to 200-500 ppm in the recycled. From the period of March-May 1978, the ability to produce quality 2,4-D continued to improve and the amount of tar impurities found in the dilution test precipitates dropped

The balance were sparingly soluble metal salts of 2,4-D and some new impurities called Complex 1 and Complex 2, two of which are shown below (IV & V).



IV



V

In July 1978, the still capacity was increased and efforts gained at understanding the parameters affecting formulation quality by S. Siegel (CCR), S. Schell (Production 489), and J. King (Formulation - 9001 Bldg) and their co-workers have greatly improved

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the consistency with which 948 Bldg. 2,4-D can be formulated. Based upon partition coefficients and data on the rate of formation of TCX to be discussed later in this report, K. E. First⁴ (Process Engineering) generated a computer program which predicted that by distilling of recycle the steady state level of TCX in the product would be 410 ppm and in the recycled perc the TCX level would be 410 ppm.

The purpose of this report is to present data on the formation and fate of the impurities in the 2,4-D process. In addition, the results of experiments aimed at reducing or eliminating the impurities by chemical and physical methods will be presented.

RESULTS AND DISCUSSION

This study was divided into the following sections and the results of each are discussed separately.

- (A) The mechanism of TCX formation.
- (B) The distribution of TCX in the process.
- (C) Reduction of TCX by chemical means.
- (D) Reduction of TCX by physical means.

Although there are many impurities formed in this process, it was decided to focus the research on TCX for several reasons: (1) The rate and mode of formation of TCX was the most predictable of the major multicyclic impurities; (2) it was a major impurity; (3) a pure sample was readily obtained (by D. Humbert, Anal. Lab); (4) the analysis is not complicated; and; (5) structurally, it is the simplest of the multicyclic impurities.

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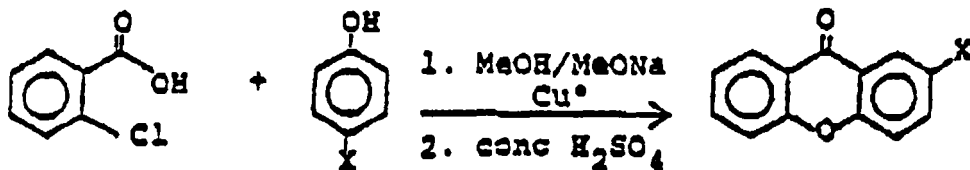
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(A) The Mechanism of TCX Formation

A brief search of the literature including Chemical Abstracts showed that the xanthone ring system is formed from a number of reactions.⁵

A common synthetic reaction is shown below in which the -X is included



to show the orientation of reaction. Xanthone is formed along with other products from the pyrolysis of o-chlorobenzoic acid, salicylic acid, aspirin, o-phenoxybenzoic acid, and salts of the carboxylic acids. Most of these cyclizations take place in the presence of acidic catalysts such as P₂O₅, AlCl₃, Acetic anhydride, or sulfuric acid. Xanthone is prepared in reasonable yield⁶ by the pyrolysis of phenol salicylate with or without a catalyst.

The ease of formation of ring systems that are structurally similar to xanthenes is most clearly shown by the formation of fluorescein and fluorescein dyes. Fluorescein⁷ is made by reaction of phthalic anhydride and resorcinol as shown on the following page.

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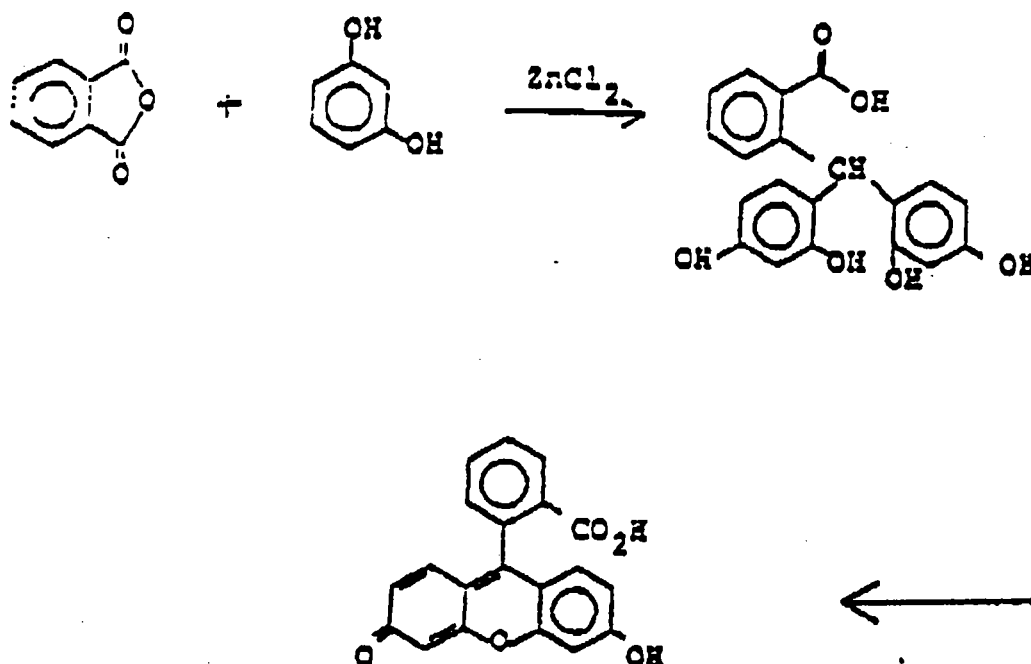
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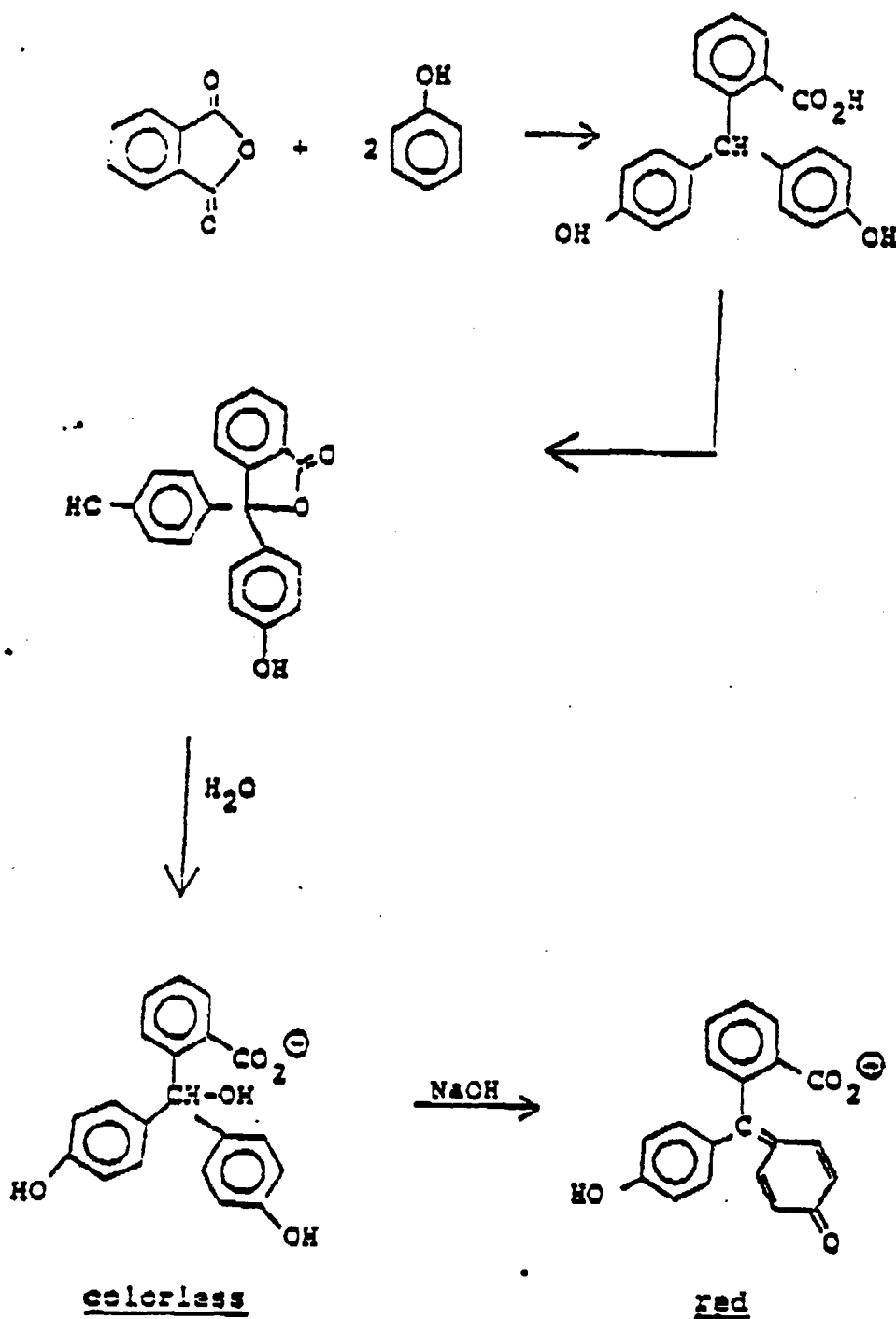
Phenolphthalein⁸ is also made by this process using phenol instead of resorcinol.

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These background data give some important clues as to reaction mechanisms as will be shown later in the report.

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IN ORDER TO UNDERSTAND THE PATHWAY OF TCX FORMATION, A SERIES OF ampoule tests were performed to determine which chemicals and/or combinations give rise to TCX. Table 3 summarizes the results of this study. A series of ampoules (25 ml capacity) were charged with 3-6 gms of mixtures in molar ratios as shown in Table 3 and were heated in an oil bath for 72 hours at 160°C. The sources of the chemicals were as follows:

2,4-D: High Purity Rhone-Progil Acid

DCP : Doubly distilled 948 Bldg material

Perc :

NaOH :

Glyoxal :

Glyoxylic acid :

Tetrachloroethane :

(50:50 1,1,2,2- & 1,1,1,2-isomers)

Reagent materials

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GENERAL CONCLUSIONS

TCX and other non-acidic impurities are formed chiefly in the reaction step of the 2,4-D by several routes.

A number of attempts to chemically and physically remove these species have met with limited success.

SAFETY & ECOLOGY

2,4-Dichlorophenol, 50% NaOH, and chloroacetic acid are highly toxic and corrosive raw materials. When handling, the protective clothing included lab coat, rubber gloves and goggles, and when possible, all operations were performed in a fume hood. A number of operations were carried out at elevated pressure which required the use of a face shield and secondary shielding in the hood. All waste samples and solutions were sent to the burner for disposal.

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EXPERIMENTALThe Preparation and Workup of 2,4-D

The following is a general description of the procedure used to prepare and isolate 2,4-D when simulating 948 Bldg. A 1 liter round bottom flask equipped with a bottom drain, two dropping funnels, a mechanical stirrer, a thermometer, and a distillation head was charged with 179g (1.1 moles) of 2,4-DCP and 48 g (0.6 moles) of 50% NaOH. The flask was heated with a heating mantle attached to an I²R Thermowatch controller.

The reactor contents were heated while stirring and a DCP-water azeotrope was distilled out. The distillation was continued until enough water was removed so that a temperature of 130°C could be achieved. Normally 9-10 ml of H₂O and 2-3 ml of DCP were removed. The DCP was returned to the pot. Then 47.3g (0.5 moles) of melted MMA and 40.0g (0.5 moles) of 50% caustic were con-added from the two dropping funnels during 50-60 minutes at 130°C. The rates of addition were carefully controlled so that neither added reactant was significantly in excess of the other. Water and DCP continuously distilled out during the con-add and the DCP was returned to the reactor. After the addition was complete, the reaction was heated an additional 60 minutes. About 43-47 gms of H₂O was recovered in the con-add step. At the end of the post reaction samples of the viscous crude reaction melt were taken into ampoules, if desired.

The work up procedure for isolating the 2,4-D is as follows: (The amounts used assumes no samples were taken after reaction). The reaction mass was diluted with about 500 ml of water, heated to boiling to ensure complete dissolution and the pH was adjusted to 5.2±0.2 with about 12 ml of conc HCl. The solution was then extracted with six 150 ml portions of perc at a temperature of >90°C to remove the DCP. Occasionally 50-100 ml of additional H₂O was necessary to keep all of the solids dissolved. The extracted mass was then dried.

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to boiling and any traces of perc were distilled off. The pH of the solution was then lowered to 0.5-0.7 with about 55 ml of conc HCl added rapidly and the molten 2,4-D layer was separated and drained into a beaker. The resulting brine was discarded. The 2,4-D was reslurried in 250 ml of hot distilled H₂O in the pot and washed in this manner two times. The final pH of the aqueous layer was 2.7-2.9. The 2,4-D was recovered and dried overnight at ambient temperatures.

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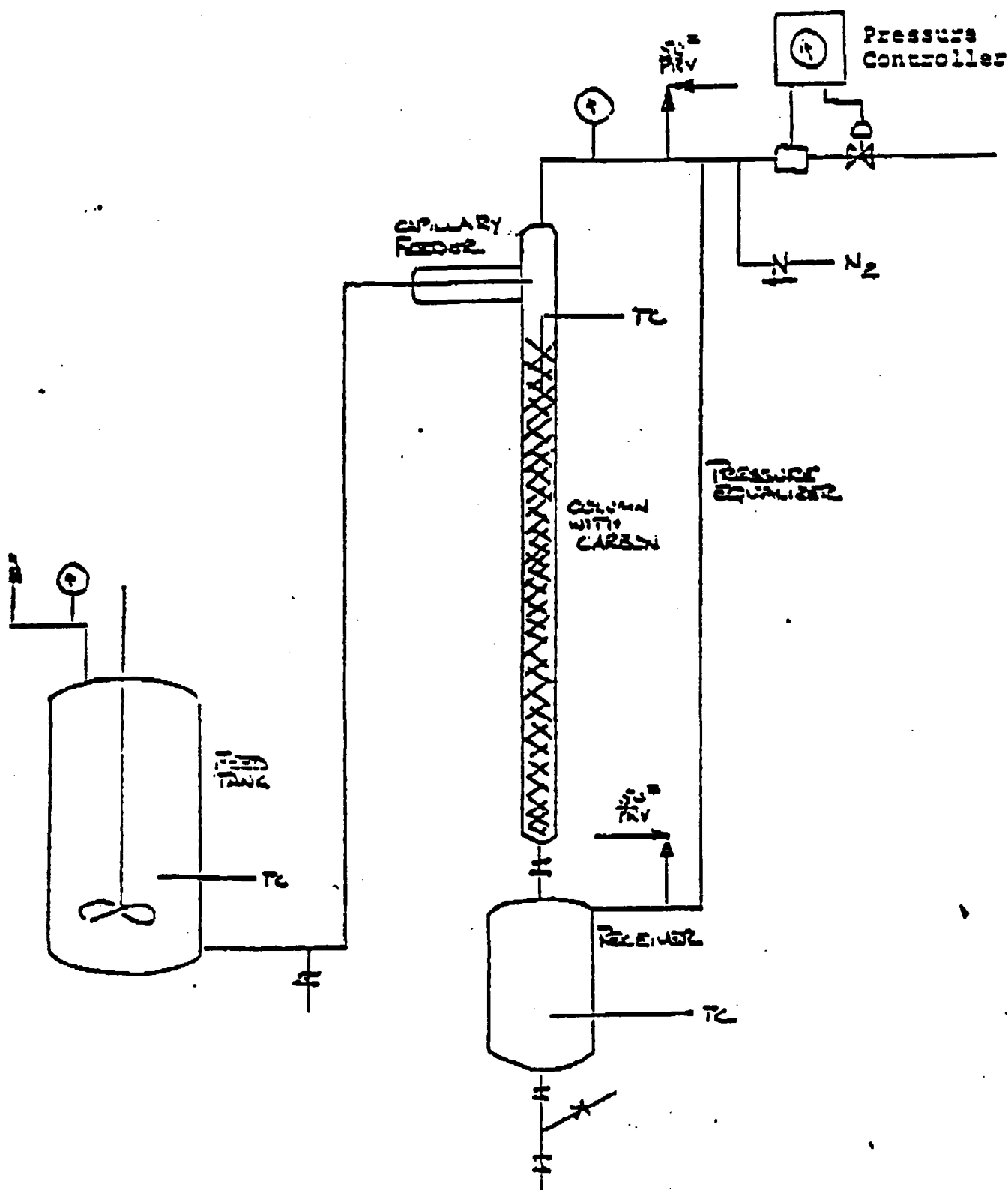
The analyses of product and intermediate streams were performed by personnel in the 948 Bldg quality control laboratory. The analyses for TCX, OCSX, and "8-5" were performed as described earlier⁸.

The Carbon Clean up of Molten 2,4-D

A glass pressure apparatus was assembled in which molten 2,4-D was pumped onto a carbon column (downflow). The apparatus is shown schematically in Figure 10. The flow of 2,4-D was controlled by controlling the pressure drop across a capillary tube. To handle

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Figure 10: A Schematic Drawing of the apparatus used to treat Molten 2,4-D with activated carbon



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molten 2,4-D reliably and effectively, required at least 10 psig/
~100-105°C to avoid flashing and freezing problems.

The 2,4-D and a slight excess of water were placed in the feed tank and heated to 110°C. When the entire contents were melted the valve on the bottom of the column was closed, the column was filled with molten acid to 1" above the top of the carbon, and the system stood for 60 min. The pressure drop across the capillary was adjusted to 7 psi (~10 ml/min flow) and the valve on the bottom of the column was adjusted so as to maintain the liquid level above the carbon bed. The results are shown in Table 10.

NW 267700

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DOW 267790

ACKNOWLEDGEMENTS

The authors wish to thank D. Humbert, R. MacLachlan, T. Evans, G. Jawetz, P. Schloemann, and their colleagues for their analytical support. The assistance of K. First and his process modeling efforts are also acknowledged.

CCR

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OC/78-35

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- R. F. Arnold OC 417, Pg. 109-150, OC 640 Pg. 1-73.
K. L. Krumel OC 559, Pg. 93-131.

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AUG 15 1990

E.R. Zumwalt, Jr.
Admiral, U.S. Navy (Ret.)
1500 Wilson Boulevard
Arlington, Virginia 22209

Dear Admiral Zumwalt:

Thank you for your inquiry about Agency consideration of the carcinogenicity of 2,4-D. The documents that you transmitted with your letter, which refer to the contamination of that herbicide with potentially harmful dioxins, furans, and xanthenes, are being reviewed by Agency personnel. The copy of the "Krumel Report" which documents the presence of xanthenes in 2,4-D and Dow Chemical Company's efforts to remove these impurities, while incomplete, is especially interesting, and the Agency will pursue efforts to obtain the unexpurgated report.

I would like to provide some background by way of explaining the Agency's responsibilities in evaluating the need for cancellation or suspension of pesticide registrations. As I mentioned in my letter of March 23, 1990, the Agency plans to make a decision on whether to initiate a Special Review of 2,4-D after it receives two important epidemiologic studies that will add to our understanding of the effects of 2,4-D use. The Special Review process is an intensive assessment of the risks and benefits related to the use of a particular pesticide, and is triggered by indications of an unreasonable adverse effect (i.e., evidence of carcinogenicity) arising from that use. A Special Review culminates with a determination on whether a change in the registration of the pesticide is necessary to mitigate any unreasonable risks. Possible changes to the registration include requiring that applicators of the pesticide wear protective clothing, placing restrictions on who may use the pesticide, or cancelling the registration altogether.

In the case of 2,4-D, the Agency has decided that an outside panel of experts should be convened to evaluate the body of evidence relating to carcinogenicity of 2,4-D. This approach is necessary because of the complexity of the issue, the lack of direct causal evidence, and the contradictory and nonspecific nature of previously reported human studies of 2,4-D exposure and cancer incidence. The panel's consensus on the cancer-causing ability of 2,4-D will be used by the Agency to determine whether a Special Review should be initiated.

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The Agency believes that the two new epidemiologic studies may yield information which is more specific for the association between 2,4-D and cancer than earlier epidemiologic studies. When the Agency published its decision to convene an external panel of experts to advise the Agency on 2,4-D's cancer-causing potential, the two studies, one from Nebraska and one from Minnesota and Iowa, were expected to be available in December 1989 and March 1990 respectively. The release of both publications was subsequently delayed, causing a setback in the Agency's schedule for the weight-of-evidence review. We have recently learned that the Nebraska study will be published in the journal Epidemiology in September 1990 and may be released to the Agency prior to that time. The Minnesota/Iowa study will be submitted for publication in September 1990. Depending on the policies of the journal to which the report is submitted, the Agency may be able to receive an advance copy after editorial changes are made. The advisory panel could be convened after that time.

Once the studies are available to the Agency, they can be distributed to the panel experts along with all the other information to be included in the review. Such materials include earlier epidemiologic studies, reports on animal testing, information on applicator exposure, and literature on the contamination and mixture of 2,4-D with potential cancer-causing agents. Evidence of early and present-day contamination of 2,4-D products is considered to be essential to the evaluation. The Agency will include whatever data it has received from required studies, along with published articles, and the Krumel Report if it is deemed applicable.

The panel will advise the Agency on its conclusions about the carcinogenicity of 2,4-D. The Agency will use that determination to decide whether or not a Special Review should be initiated. If a Special Review is initiated, the Agency would make an in-depth evaluation of the risks associated with use of 2,4-D and the benefits afforded society by its use. If risks are determined to outweigh benefits, the Agency will take steps to modify or cancel the registrations of 2,4-D products.

Under the Federal Insecticide, Fungicide, and Rodenticide Act, the Agency can effect the emergency suspension of a pesticide registration if it determines that such an action is necessary to prevent an imminent hazard during the time it would take to determine that the pesticide registration should be cancelled. The Agency has determined that the continued use of 2,4-D during the time that it will take to decide whether a Special Review is necessary, and the time that would elapse between initiation of a Special Review and a regulatory decision, does not pose an imminent hazard. Therefore, the Agency does not believe an emergency suspension of 2,4-D products is appropriate based upon available information.

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I hope that this information is useful to you. I appreciate your interest in the Agency's regulation of 2,4-D, and encourage you to contact me again if you have further questions or additional information.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Douglas D. Campt", with a long horizontal flourish extending to the right.

Douglas D. Campt, Director
Office of Pesticide Programs

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