

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","TestType","GLP","Year","Species","Strain","Sex","Numberof Males","NumberofFemales","Route","Doses","ExposPeriod","StatMeth","MethodRem","EfficacyMitoticIdx","GenotoxicEff","StatResults","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%.","OECD Method 474","Micronucleus assay","Yes",2000,"mouse","NMRI","M",5,0,"Intraperitoneal","0, 500, 1000, 2000 mg/kg","Two doses administered 24 hrs apart.","Wilcoxon test","Hexabromocyclododecane (HBCD) was tested for clastogenicity and for the ability to induce spindle poison effects in NMRI mice (Charles River Deutschland GmbH) using the micronucleus method. HBCD, dissolved in DMSO, was administered twice intraperitoneally with a 24-hr interval between doses to male mice (n=5/group) at dose levels of 500, 1000 or 2000 mg/kg body weight in a volume of 4 ml/kg. DMSO (the vehicle) was administered to male mice by the same route and frequency. Cyclophosphamide was used as a positive control for clastogenic effects. Vincristine was used as a positive control for induction of spindle poison effects. Animals in the positive control groups were treated only once. The animals were sacrificed and the bone marrow of the two femora prepared 24 hours after the second administration. After staining, 2000 polychromatic erythrocytes were evaluated per animal and investigated for micronuclei. The normocytes with and without micronuclei occurring per 2000 polychromatic erythrocytes were also counted.","PCE/NCE 0, 500, 1000, 2000 mg/kg = 3.74, 2.89, 2.67, 2.49, respectively.","Negative","No statistical differences between the treatment and vehicle control group were observed ($p \leq 0.05$).","The two intraperitoneal administrations of DMSO in a volume of 4 ml/kg body weight led to 1.4% polychromatic erythrocytes containing micronuclei. In the 2000 mg HBCD/kg body weight group, 0.9% micronuclei were found. In the 1000 and 500 mg HBCD/kg body weight groups, 1.0 and 1.1% micronuclei were detected. The two positive control substances performed as expected. The number of normochromatic erythrocytes containing micronuclei did not differ to any appreciable extent in the negative control or various dose groups.","HBCD treatment did not increase numbers of micronuclei. The number of normochromatic or polychromatic erythrocytes containing small micronuclei did not deviate from the vehicle control value and was within the historical control range. Large micronuclei were not observed. HBCD had no chromosome-damaging (clastogenic) effect in this study and did not impair chromosome distribution during mitosis.","High","This study was performed according to current guidelines under Good Laboratory Practices by an experienced laboratory.","Engelhardt, G and Hoffmann, H. (2000) Cytogenetic Study in vivo with Hexabromocyclododecane in the Mouse Micronucleus Test After Two Intraperitoneal Administrations. Laboratory Project Identification: 26M0100/004018. Experimental Toxicology and Ecology, BASF Aktiengesellschaft, Ludwigshafen, Germany.","Y"

201-15678B

"DSN", "TestNo", "Rev_Date", "TestSubstRem", "ChemCat", "Method", "TestType", "GLP", "Year", "Species", "Strain", "Sex", "NumberofMales", "NumberofFemales", "Route", "Doses", "ExposPeriod", "StatMeth", "MethodRem", "EfficacyMitoticIdx", "GenotoxicEff", "StatResults", "ResultsRem", "ConcludingRem", "Reliability", "ReliRem", "GeneralRem", "RefRem", "Completed"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%.", "OECD Method 474", "Micronucleus assay", "Yes", 2000, "mouse", "NMRI", "M", 5, 0, "Intraperitoneal", "0, 500, 1000, 2000 mg/kg", "Two doses administered 24 hrs apart.", "Wilcoxon test", "Hexabromocyclododecane (HBCD) was tested for clastogenicity and for the ability to induce spindle poison effects in NMRI mice (Charles River Deutschland GmbH) using the micronucleus method. HBCD, dissolved in DMSO, was administered twice intraperitoneally with a 24-hr interval between doses to male mice (n=5/group) at dose levels of 500, 1000 or 2000 mg/kg body weight in a volume of 4 ml/kg. DMSO (the vehicle) was administered to male mice by the same route and frequency. Cyclophosphamide was used as a positive control for clastogenic effects. Vincristine was used as a positive control for induction of spindle poison effects. Animals in the positive control groups were treated only once. The animals were sacrificed and the bone marrow of the two femora prepared 24 hours after the second administration. After staining, 2000 polychromatic erythrocytes were evaluated per animal and investigated for micronuclei. The normocytes with and without micronuclei occurring per 2000 polychromatic erythrocytes were also counted.", "PCE/NCE 0, 500, 1000, 2000 mg/kg = 3.74, 2.89, 2.67, 2.49, respectively.", "Negative", "No statistical differences between the treatment and vehicle control group were observed ($p \leq 0.05$).", "The two intraperitoneal administrations of DMSO in a volume of 4 ml/kg body weight led to 1.4% polychromatic erythrocytes containing micronuclei. In the 2000 mg HBCD/kg body weight group, 0.9% micronuclei were found. In the 1000 and 500 mg HBCD/kg body weight groups, 1.0 and 1.1% micronuclei were detected. The two positive control substances performed as expected. The number of normochromatic erythrocytes containing micronuclei did not differ to any appreciable extent in the negative control or various dose groups.", "HBCD treatment did not increase numbers of micronuclei. The number of normochromatic or polychromatic erythrocytes containing small micronuclei did not deviate from the vehicle control value and was within the historical control range. Large micronuclei were not observed. HBCD had no chromosome-damaging (clastogenic) effect in this study and did not impair chromosome distribution during mitosis.", "High", "This study was performed according to current guidelines under Good Laboratory Practices by an experienced laboratory.", "Engelhardt, G and Hoffmann, H. (2000) Cytogenetic Study in vivo with Hexabromocyclododecane in the Mouse Micronucleus Test After Two Intraperitoneal Administrations. Laboratory Project Identification: 26M0100/004018. Experimental Toxicology and Ecology, BASF Aktiengesellschaft, Ludwigshafen, Germany.", "Y"

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","TestType","GLP","Year","Species","AnalyMonit","ExposPeriod","StatMethod","MethodRem","NominalConc","MeasuredConc","Prec","EndpointType","EndpointVal","Unit","Conctype","EndpointTime","StatResults","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6022001145747.00,1,12/10/01 0:00:00,"A tetrabromobisphenol A (TBBPA) commercial product (FMBP4A).","Pre-dates OECD and EPA Guidelines","static","Unknown",1975,"Daphnia magna","No.",48 hrs,"Spearman-Karber Estimator","Daphnia magna were obtained from a laboratory stock culture which was originally obtained from the National Water Quality Laboratory, Duluth, MN. Stock cultures were maintained at 19-21 degrees C in 350 L stainless steel tanks. Twenty hours prior to the starting the bioassay, appr. 15 adults with full brood chambers were isolated into soft lake water. The following morning the newly released instars (< 20 hrs old) were removed and distributed to the test beakers. Test temperature was maintained at 17 +/- 1 degree C. The bioassay was conducted at five concentrations of TBBPA: 0.32, 0.56, 1.0, 1.8 and 3.2 mg/L plus a control and a solvent (acetone) control. Four replicates were run. Five organisms were introduced into each test beaker. Mortality was recorded every 24 hrs. Dilution water: lake water. pH=7.32. Total hardness = 64 mg/L as CaCO3. Total alkalinity of 32 mg/L as CaCO3. Specific conductance of 130 umhos/cm.",0,0.32,0.56,1.0,1.8,3.2 mg/L,"Not measured.",=","LC50",1,"mg/L","Nominal",48,"see results.",The 48 hr LC50 of TBBPA to D. Magna was 0.96 mg/L (based on nominal concentration). The 95% confidence interval was 0.81 - 1.13 mg/L. The no effect concentration was 0.32 mg/L. These concentrations are greater than TBBPA's water solubility.",The 48 hr LC50 of TBBPA to D. Magna was 0.96 mg/L (based on nominal concentration).,"Reasonable.",,"Study sponsored by Velsicol Chemical Corporation.All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and (prior to 2002) measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for Daphnia magna is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)",Velsicol Chemical Company. The acute toxicity of FMBP4-A to the water flea Daphnia magna Straus. Testing facility: Union Carbide Corp. Environmental Services, Tarrytown Technical Center, Tarrytown, NY. Study No.: UCES 11506-03-52. 1978.",Y"6022001145747.00,3,12/18/01 0:00:00,"TBBPA obtained from Great Lakes Chemical Corporation.",,"Not stated",flow-through",Unknown",1988,"Mysid shrimp","GC/ECD",96 hrs",see results",Mysids of three ages (n=20/treatment) were exposed during a flow-through 96-hr acute test. The age of the mysids were <=1, 5 and 10 days old at initiation. Test article concentrations were 535, 445 or 84 ug/L (nominal). Seawater for the test was pumped from Santa Rosa Sound, FL, filtered and diluted to a nominal 20% using freshwater from a chlorinated municipal supply. Temperature was 21 +/- 1 degree C. Mysids were fed live Artemia nauplii twice daily during the test. The photoperiod was 14L:10D. A mixture of triethylene glycol and acetone was used a carrier solvent. Test article concentration was determined twice during the test (GC-ECD). Detection limit = 1 ug/L. Mortality data analyzed by the moving average method, the binomial test or the probit method. Mean Salinity test water = 20.6%. pH = 7.96-8.16. Dissolved O2 mean = 6.9.",0,84,445,535,1150 ug/L",x",=","LC50",1,"mg/L","Measured",96,"see results",The mysid age groups selected for testing encompassed the entire juvenile stage of M. Bahia. At the end of the 96 hr test, those <= 1 day old at test initiation were appr. 5 d old, the initial 5 d olds were 9 d old, and the initial 10 d olds were 14 d old adults. Survival of the mysids in the control treatments were >= 94%. The 95 hr LC50 values for the initial <= 1, 5, and 10 d old Mysids were 860, 1100 and 1200 ug/L, respectively. The 95% confidence interval for the 1 day old encompassed the LC50 values for the 5 and 10 d olds. Only 5% of the 5 d old mysids and 45% of the 10 d olds died during exposure to 1150 ug/L, the highest concentration tested. Solubility problems were encountered in concentrations higher than those reported so further testing to obtain more definitive LC50 values for the 5 and 10 day old age groups was not conducted.",The 95 hr LC50 values for the initial <= 1, 5, and 10 d old Mysids were 860, 1100 and 1200 ug/L, respectively. The 95% confidence interval for the 1 day old encompassed the LC50 values for the 5 and 10 d olds.",,"Study performed in EPA's Gulf Breeze Laboratory.",All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and (prior to 2002) measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for Daphnia magna

is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)", "Goodman et al. 1988. Acute toxicity of malathion, tetrabromobisphenol A and tributyltin chloride to mysids (*Mysidopsis bahia*) of three ages. Bull. Environ. Contam. Toxicol. 41:746-753.", "Y"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%. Impurities were isobutanol 0.1 wt%, other unknowns 6.3 wt %. Tetrabromocyclododecane was not detected.", "OECD Method 202; TSCA Title 40 CFR, Part 797, Section 1300", "flow-through", "Yes", 1997, "Daphnia magna", "HPLC; Limit of Quantitation=0.4 ug/L", "48 Hours", "None - no dose response pattern", "Daphnids were exposed to one of five test concentrations, a solvent control or the negative (well water) control. Two replicate test chambers were maintained for each treatment and control group. Ten daphnids were used in each test chamber for a total of 20 daphnids per test concentration. Nominal test concentrations were based upon the solubility of the test substance in water (3.4 ug/L) and the results of an exploratory rangefinding toxicity test. Nominal test concentrations were 1.5, 2.2, 3.2, 4.6 and 6.8 ug/L. Mean measured test concentrations were analytically determined (HPLC with UV/VIS detector) from samples of test water collected from each treatment and control group at the beginning and end of the test. Quantitation was based on the gamma isomer. Delivery of the test substance was initiated approximately 4 days prior to the introduction of the daphnids to the test water in order to achieve equilibrium of the test substance in the test chambers. Daphnids were indiscriminately assigned to exposure chambers at test initiation. Observations of mortality/immobility and other clinical signs were made approximately 2, 24 and 48 hours after test initiation. Cumulative percent mortality and immobility observed in the treatment groups were used to estimate EC50 values at 24 and 48 hours. The no mortality/immobility concentration and the no-observed-effect concentration (NOEC) were determined by visual interpretation of the mortality, immobility and clinical observation data. Daphnid neonates used in the test were less than 24 hours old and were obtained from cultures maintained by Wildlife International Ltd, Easton, MD. Adult daphnids were cultured in water from the same source and at approximately the same temperature as that used during the test except supplemented with selenium. Daphnids in the cultures were held for 15-29 days prior to collection of the juveniles for testing. The progeny of 7 adults were used in the test. The adults were fed prior to test initiation, but neonates were not fed during the test. During the 14-day holding period preceding the test, water temperatures ranged from 20.2 to 21.4 degrees C. The pH of the water ranged from 8.0 to 8.5. Dissolved oxygen ranged from 8.2 to 9.0 mg/L. A continuous-flow diluter was used to deliver each concentration of the test substance, a solvent control, and a negative (dilution water) control. Syringe pumps (Harvard Apparatus) were used to deliver the five test substance stock solutions and the solvent for the solvent control into mixing chambers assigned to each treatment level and the solvent control. The stock solutions were diluted with well water in the mixing chambers in order to obtain the desired test concentrations. The flow of dilution water to the mixing chambers was controlled by rotameters. Rotameters were calibrated prior to test initiation. The flow of test water from each mixing chamber was split and allowed to flow into replicate test chambers. The proportion of test water that was split into each replicate was checked prior to the test to ensure that flow rates varied by no more than +/- 10% of the mean for the two replicates. The diluter was adjusted so that each test chamber received ~14 volume additions of test water every 24 hours. The stock solution delivery pumps were calibrated before the test, and the general operation of the diluter was checked visually at least two times daily during the test and once at the end of the test. Test compartments were constructed from 300 mL glass beakers ~ 8 cm in diameter and 13 cm in height. The beakers were suspended in 8-L stainless steel test chambers filled with ~6.5 L of test water. Test chambers were indiscriminately positioned in a temperature-controlled water bath designed to maintain a temperature of 20 +/- 1 degree C. The water bath was enclosed in a plexiglass ventilation hood. Test chambers were labeled with the project number, test concentration, and replicate. The water used for culturing and testing was freshwater obtained from a well ~45 meters deep located on the Wildlife International Ltd. Site. The well water is characterized as moderately-hard water. The dissolved oxygen content of the water ranged from 8.8-

8.9, 9.0-9.1, and 8.8-8.9 mg/L at 0, 24, and 48 hours, respectively. The pH of the water was 8.1, 8.2-8.4, and 8.2-8.3 at 0, 24 and 48 hours, respectively. The temperature of the water ranged from 19.8-19.9 and 19.9-20.0 at 0 and 48 hours, respectively. The 0-hour dilution water measurements for hardness, alkalinity and specific conductance were 132 mg/L as CaCO₃, 176 mg/L as CaCO₃ and 320 umhos/cm, respectively. Lighting was provided by fluorescent tubes that emitted wavelengths similar to natural sunlight. A photoperiod of 16 hours of light and 8 hours of darkness was controlled with an automatic timer. Light intensity at test initiation was ~ 242 lux at the surface of the water. ", "0, 0.0015, 0.0022, 0.0032, 0.0046, 0.0068 mg/L", "0, 0.0024, 0.0018, 0.0021, 0.0023, 0.0032 mg/L", ">", "LC0", "0", "mg/L", "Nominal", "48", "Statistics not performed due to lack of dose response.", "The selection of exposure concentrations took into consideration the water solubility limit (3.4 ug/L) and a finding of no acute toxicity from an exploratory range finding test. However, there was a potential to have a slight enhancement of HBCD's water solubility due to the use of dimethyl formamide (DMF) as a vehicle in the diluter system. For this reason, the highest test concentration selected was twice the defined solubility limit (i.e., 6.8 ug/L). The series of nominal test concentrations bracketed the solubility limit of HBCD by five concentrations. Two sets of pretest samples were collected from the highest and lowest test concentrations and analyzed. The Day -3 and -2 samples indicated that the test concentrations were stable, but somewhat lower than expected. Measurements of HBCD concentration in all test chambers were made at the beginning and end of the test. These measurements indicated that HBCD concentrations were generally similar across all treatment levels, and may reflect a phenomenon in the delivery system whereby HBCD adsorbed to the physical surfaces of the diluter system. This could be due to the hydrophobic nature of HBCD as evidenced by its nonpolar alkane structure and extremely low water solubility. This characteristic could have enabled the inert surfaces (e.g. Stainless steel and Teflon) of the diluter system to eventually become saturated with HBCD. As this process progressed, an equilibrium was established. The result of this new equilibrium was that concentrations of HBCD in the dilution water were approximately the solubility of HBCD in well water under flow-through conditions. Dissolved oxygen concentrations of > or = 97% of saturation were observed throughout the test. Water pH ranged from 8.1-8.4. Total organic carbon in the dilution water at test initiation was <1.0 mg C/L. Daily observations during the test showed that daphnids in the negative control and solvent control groups appeared healthy and normal. With the exception of one aberrant mortality in the 4.6 ug/L (nominal) treatment group, all daphnids in all treatment groups appeared normal throughout the test with no mortalities or overt signs of toxicity. Based on these results, EC50 values for 24 and 48 hours were estimated to be > 6.8 ug/L (nominal), the highest concentration tested.", "HBCD was not acutely toxic to *Daphnia magna*. The 48-hour EC50 value for daphnids exposed to HBCD was > 6.8 ug/L (nominal) (>3.2 ug/L mean measured concentration), the highest concentration tested and twice HBCD's water solubility (3.4 ug/L). Based on the mortality, immobility and observation data, the 48-hour no mortality/immobility concentration and the no-observed-effect concentration was 6.8 ug/L (nominal) (3.2 ug/L mean measured concentration).", "High", "This study was performed according to current guidelines and Good Laboratory Practices by a laboratory with considerable experience with these studies. Extensive attention was paid to analytical method development and performance.", "Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel.", "Graves, W and Swigert, J. (1997) Hexabromocyclododecane (HBCD): a 48-hour flow-through acute toxicity test with the cladoceran (*Daphnia magna*). Project Number: 439A-102. Wildlife International Ltd., Easton, MD.", "N"6022001145747.00,4,12/9/01 0:00:00,"14C-TBBPA, specific activity of 12.2 mCi/mole; obtained from Chemsyn Science Laboratories. Non-labelled composite of commercial TBBPA products produced by Great Lakes Chemical Corporation, Ethyl Corporation, and Bromine Compounds, Ltd.", "EPA Environmental Effects Guidelines, Fed. Reg. 1985, and the EPA/OTS guidelines.", "flow-through", "Yes", 1989, "Crassostrea virginica", "Yes", "96 hrs", "See Results", "Eastern oysters were exposed to concentrations of TBBPA for 96 hrs and shell deposition was observed. The EC50 is defined as that concentration resulting in a 50% reduction in shell deposition. Forty organisms were exposed in duplicate test aquaria (20 per aquaria) in a flow-through system to five concentrations of TBBPA, a dilution (seawater) water control and a solvent (acetone) control. Each replicate was radiometrically analyzed for 14C-TBBPA on days 0, 1, 4. The TBBPA concentration in the highest dose level was also confirmed using HPLC at test initiation and termination. Nominal test concentrations were 0, 19, 32, 54, 90 and 150 ug AI/L. Measured concentrations were 0, 18, 32, 51, 87 and 150 ug/L. Confirmation of the high dose by HPLC: 110 ug/L.", "0, 19, 32, 54, 90 and 150 ug AI/L.", "0, 18, 32, 51, 87 and 150

ug/L.", "=", "EC50", 98, "micrograms/L", "Measured", 96, "See results", "Results of this study are based on mean measured concentrations determined by radiometric analyses. Reduction in shell deposition was 60% among oysters exposed to the highest test concentration (150 ug/L). Shell growth was reduced by 47 or 33% in the remaining test concentrations (87-18 ug/L) and showed a concentration-effect relationship. Based on these data the 96-hr EC50 for TBBPA in eastern oysters was calculated to be 98 ug/L. The no observed effect concentration (NOEC) was < 18 ug/L, the lowest measured concentration of TBBPA tested. An estimated NOEC of 2.6 ug/L was calculated from the observed dose-response curve.", "Based on these data the 96-hr EC50 for TBBPA in eastern oysters for shell deposition was calculated to be 98 ug/L.", "Study performed under a TSCA test rule.", "Sponsored by the Brominated Flame Retardant Industry Panel All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and (prior to 2002) measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for Daphnia magna is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)", "Surprenant D. 1988. Acute toxicity of tetrabromobisphenol A to eastern oysters (*Crassostrea virginica*) under flow-through conditions. SLS Report #89-1-2898. Springborn Life Sciences, Wareham, Mass. Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995.", "Y" 16122003094258.0, 1, 2/2/04 0:00:00, "1,2-benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, 2-(2-hydroxyethoxy)ethyl 2-hydroxypropyl ester", "Estimated", "static", "No", 2003, "Daphnia sp.", "Not applicable", "48 Hours", "Not applicable", "The ECOSAR module of EPIWIN was used to estimate the EC50 in Daphnid for this substance. Only the chemical structure was entered into the software program. The ECOSAR calculated the water solubility to be 37.96 mg/L. This is very different from the water solubility calculated by WSKOW, another module in EPIWIN, 0.5697 mg/L at 25 deg C.", "Not applicable", "Not applicable", "=", "LC50", 11, "mg/L", "Nominal", 48, "Not applicable", "The 48 Hour EC50 in Daphnids was estimated to be 10.779 mg/L.", "All estimations were performed using EPI WIN Suite, V.3.04, Syracuse Research Corporation, North Syracuse, New York.", "Y"

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The following morning the newly released instars (< 20 hrs old) were removed and distributed to the test beakers. Test temperature was maintained at 17 +/- 1 degree C. The bioassay was conducted at five concentrations of TBBPA: 0.32, 0.56, 1.0, 1.8 and 3.2 mg/L plus a control and a solvent (acetone) control. Four replicates were run. Five organisms were introduced into each test beaker. Mortality was recorded every 24 hrs. Dilution water: lake water. pH=7.32. Total hardness = 64 mg/L as CaCO3. Total alkalinity of 32 mg/L as CaCO3. Specific conductance of 130 umhos/cm.",0,0.32,0.56,1.0,1.8,3.2 mg/L,"Not measured.",=","LC50",1,"mg/L","Nominal",48,"see results.",The 48 hr LC50 of TBBPA to D. Magna was 0.96 mg/L (based on nominal concentration). The 95% confidence interval was 0.81 - 1.13 mg/L. The no effect concentration was 0.32 mg/L. These concentrations are greater than TBBPA's water solubility.",The 48 hr LC50 of TBBPA to D. 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Study No.: UCES 11506-03-52. 1978.",Y"6022001145747.00,3,12/18/01 0:00:00,"TBBPA obtained from Great Lakes Chemical Corporation.",,"Not stated","flow-through","Unknown",1988,"Mysid shrimp","GC/ECD",96 hrs,"see results","Mysids of three ages (n=20/treatment) were exposed during a flow-through 96-hr acute test. The age of the mysids were <=1, 5 and 10 days old at initiation. Test article concentrations were 535, 445 or 84 ug/L (nominal). Seawater for the test was pumped from Santa Rosa Sound, FL, filtered and diluted to a nominal 20% using freshwater from a chlorinated municipal supply. Temperature was 21 +/- 1 degree C. Mysids were fed live Artemia nauplii twice daily during the test. The photoperiod was 14L:10D. A mixture of triethylene glycol and acetone was used a carrier solvent. Test article concentration was determined twice during the test (GC-ECD). Detection limit = 1 ug/L. Mortality data analyzed by the moving average method, the binomial test or the probit method. Mean Salinity test water = 20.6%. pH = 7.96-8.16. Dissolved O2 mean = 6.9.",0,84,445,535,1150 ug/L,"x",=","LC50",1,"mg/L","Measured",96,"see results",The mysid age groups selected for testing encompassed the entire juvenile stage of M. Bahia. At the end of the 96 hr test, those <= 1 day old at test initiation were appr. 5 d old, the initial 5 d olds were 9 d old, and the initial 10 d olds were 14 d old adults. Survival of the mysids in the control treatments were >= 94%. The 95 hr LC50 values for the initial <= 1, 5, and 10 d old Mysids were 860, 1100 and 1200 ug/L, respectively. The 95% confidence interval for the 1 day old encompassed the LC50 values for the 5 and 10 d olds. Only 5% of the 5 d old mysids and 45% of the 10 d olds died during exposure to 1150 ug/L, the highest concentration tested. Solubility problems were encountered in concentrations higher than those reported so further testing to obtain more definitive LC50 values for the 5 and 10 day old age groups was not conducted.",The 95 hr LC50 values for the initial <= 1, 5, and 10 d old Mysids were 860, 1100 and 1200 ug/L, respectively. The 95% confidence interval for the 1 day old encompassed the LC50 values for the 5 and 10 d olds.",High",Study performed in EPA's Gulf Breeze Laboratory.",All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for Daphnia magna is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster

was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)", "Goodman et al. 1988. Acute toxicity of malathion, tetrabromobisphenol A and tributyltin chloride to mysids (*Mysidopsis bahia*) of three ages. Bull. Environ. Contam. Toxicol. 41:746-753.", "Y"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%.", "OECD Method 202; TSCA Title 40 CFR, Part 797, Section 1300", "flow-through", "Yes", 1997, "Daphnia magna", "HPLC; Limit of Quantitation=0.4 ug/L", "48 Hours", "None - no dose response pattern", "Daphnids were exposed to one of five test concentrations, a solvent control or the negative (well water) control. Two replicate test chambers were maintained for each treatment and control group. Ten daphnids were used in each test chamber for a total of 20 daphnids per test concentration. Nominal test concentrations were based upon the solubility of the test substance in water (3.4 ug/L) and the results of an exploratory rangefinding toxicity test. Nominal test concentrations were 1.5, 2.2, 3.2, 4.6 and 6.8 ug/L. Mean measured test concentrations were analytically determined (HPLC with UV/VIS detector) from samples of test water collected from each treatment and control group at the beginning and end of the test. Delivery of the test substance was initiated approximately 4 days prior to the introduction of the daphnids to the test water in order to achieve equilibrium of the test substance in the test chambers. Daphnids were indiscriminately assigned to exposure chambers at test initiation. Observations of mortality/immobility and other clinical signs were made approximately 2, 24 and 48 hours after test initiation. Cumulative percent mortality and immobility observed in the treatment groups were used to estimate EC50 values at 24 and 48 hours. The no mortality/immobility concentration and the no-observed-effect concentration (NOEC) were determined by visual interpretation of the mortality, immobility and clinical observation data. Daphnid neonates used in the test were less than 24 hours old and were obtained from cultures maintained by Wildlife International Ltd, Easton, MD. Adult daphnids were cultured in water from the same source and at approximately the same temperature as that used during the test except supplemented with selenium. Daphnids in the cultures were held for 15-29 days prior to collection of the juveniles for testing. The progeny of 7 adults were used in the test. The adults were fed prior to test initiation, but neonates were not fed during the test. During the 14-day holding period preceding the test, water temperatures ranged from 20.2 to 21.4 degrees C. The pH of the water ranged from 8.0 to 8.5. Dissolved oxygen ranged from 8.2 to 9.0 mg/L. A continuous-flow diluter was used to deliver each concentration of the test substance, a solvent control, and a negative (dilution water) control. Syringe pumps (Harvard Apparatus) were used to deliver the five test substance stock solutions and the solvent for the solvent control into mixing chambers assigned to each treatment level and the solvent control. The stock solutions were diluted with well water in the mixing chambers in order to obtain the desired test concentrations. The flow of dilution water to the mixing chambers was controlled by rotameters. Rotameters were calibrated prior to test initiation. The flow of test water from each mixing chamber was split and allowed to flow into replicate test chambers. The proportion of test water that was split into each replicate was checked prior to the test to ensure that flow rates varied by no more than +/- 10% of the mean for the two replicates. The diluter was adjusted so that each test chamber received ~14 volume additions of test water every 24 hours. The stock solution delivery pumps were calibrated before the test, and the general operation of the diluter was checked visually at least two times daily during the test and once at the end of the test. Test compartments were constructed from 300 mL glass beakers ~ 8 cm in diameter and 13 cm in height. The beakers were suspended in 8-L stainless steel test chambers filled with ~6.5 L of test water. Test chambers were indiscriminately positioned in a temperature-controlled water bath designed to maintain a temperature of 20 +/- 1 degree C. The water bath was enclosed in a plexiglass ventilation hood. Test chambers were labeled with the project number, test concentration, and replicate. The water used for culturing and testing was freshwater obtained from a well ~45 meters deep located on the Wildlife International Ltd. Site. The well water is characterized as moderately-hard water. The dissolved oxygen content of the water ranged from 8.8-8.9, 9.0-9.1, and 8.8-8.9 mg/L at 0, 24, and 48 hours, respectively. The pH of the water was 8.1, 8.2-8.4, and 8.2-8.3 at 0, 24 and 48 hours, respectively. The temperature of the water ranged from 19.8-19.9 and 19.9-20.0 at 0 and 48 hours,

respectively. The 0-hour dilution water measurements for hardness, alkalinity and specific conductance were 132 mg/L as CaCO₃, 176 mg/L as CaCO₃ and 320 umhos/cm, respectively. Lighting was provided by fluorescent tubes that emitted wavelengths similar to natural sunlight. A photoperiod of 16 hours of light and 8 hours of darkness was controlled with an automatic timer. Light intensity at test initiation was ~ 242 lux at the surface of the water.", "0, 0.0015, 0.0022, 0.0032, 0.0046, 0.0068 mg/L", "0, 0.0024, 0.0018, 0.0021, 0.0023, 0.0032 mg/L", ">", "LC0", "0, mg/L", "Nominal", "48", "Statistics not performed due to lack of dose response.", "The selection of exposure concentrations took into consideration the water solubility limit (3.4 ug/L) and a finding of no acute toxicity from an exploratory range finding test. However, there was a potential to have a slight enhancement of HBCD's water solubility due to the use of dimethyl formamide (DMF) as a vehicle in the diluter system. For this reason, the highest test concentration selected was twice the defined solubility limit (i.e., 6.8 ug/L). The series of nominal test concentrations bracketed the solubility limit of HBCD by five concentrations. Two sets of pretest samples were collected from the highest and lowest test concentrations and analyzed. The Day -3 and -2 samples indicated that the test concentrations were stable, but somewhat lower than expected. Measurements of HBCD concentration in all test chambers were made at the beginning and end of the test. These measurements indicated that HBCD concentrations were generally similar across all treatment levels, and may reflect a phenomenon in the delivery system whereby HBCD adsorbed to the physical surfaces of the diluter system. This could be due to the hydrophobic nature of HBCD as evidenced by its nonpolar alkane structure and extremely low water solubility. This characteristic could have enabled the inert surfaces (e.g. Stainless steel and Teflon) of the diluter system to eventually become saturated with HBCD. As this process progressed, an equilibrium was established. The result of this new equilibrium was that concentrations of HBCD in the dilution water were approximately the solubility of HBCD in well water under flow-through conditions. Dissolved oxygen concentrations of > or = 97% of saturation were observed throughout the test. Water pH ranged from 8.1-8.4. Total organic carbon in the dilution water at test initiation was <1.0 mg C/L. Daily observations during the test showed that daphnids in the negative control and solvent control groups appeared healthy and normal. With the exception of one aberrant mortality in the 4.6 ug/L (nominal) treatment group, all daphnids in all treatment groups appeared normal throughout the test with no mortalities or overt signs of toxicity. Based on these results, EC50 values for 24 and 48 hours were estimated to be > 6.8 ug/L (nominal), the highest concentration tested.", "HBCD was not acutely toxic to *Daphnia magna*. The 48-hour EC50 value for daphids exposed to HBCD was > 6.8 ug/L (nominal) (>3.2 ug/L mean measured concentration), the highest concentration tested and twice HBCD's water solubility (3.4 ug/L). Based on the mortality, immobility and observation data, the 48-hour no mortality/immobility concentration and the no-observed-effect concentration was 6.8 ug/L (nominal) (3.2 ug/L mean measured concentration).", "High", "This study was performed according to current guidelines and Good Laboratory Practices by a laboratory with considerable experience with these studies. Extensive attention was paid to analytical method development and performance.", "Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel.", "Graves, W and Swigert, J. (1997) Hexabromocyclododecane (HBCD): a 48-hour flow-through acute toxicity test with the cladoceran (*Daphnia magna*). Project Number: 439A-102. Wildlife International Ltd., Easton, MD.", "N"6022001145747.00,4,12/9/01 0:00:00,"14C-TBBPA, specific activity of 12.2 mCi/mole; obtained from Chemsyn Science Laboratories. Non-labelled composite of commercial TBBPA products produced by Great Lakes Chemical Corporation, Ethyl Corporation, and Bromine Compounds, Ltd.", "EPA Environmental Effects Guidelines, Fed. Reg. 1985, and the EPA/OTS guidelines.", "flow-through", "Yes", 1989, "Crassostrea virginica", "Yes", "96 hrs", "See Results", "Eastern oysters were exposed to concentrations of TBBPA for 96 hrs and shell deposition was observed. The EC50 is defined as that concentration resulting in a 50% reduction in shell deposition. Forty organisms were exposed in duplicate test aquaria (20 per aquaria) in a flow-through system to five concentrations of TBBPA, a dilution (seawater) water control and a solvent (acetone) control. Each replicate was radiometrically analyzed for 14C-TBBPA on days 0, 1, 4. The TBBPA concentration in the highest dose level was also confirmed using HPLC at test initiation and termination. Nominal test concentrations were 0, 19, 32, 54, 90 and 150 ug AI/L. Measured concentrations were 0, 18, 32, 51, 87 and 150 ug/L. Confirmation of the high dose by HPLC: 110 ug/L.", "0, 19, 32, 54, 90 and 150 ug AI/L.", "0, 18, 32, 51, 87 and 150 ug/L.", "=", "EC50", "98", "micrograms/L", "Measured", "96", "See results", "Results of this study are based on mean measured concentrations determined by radiometric analyses. Reduction in shell deposition was 60% among oysters exposed to the highest test concentration (150 ug/L). Shell growth was

reduced by 47 or 33% in the remaining test concentrations (87-18 ug/L) and showed a concentration-effect relationship. Based on these data the 96-hr EC50 for TBBPA in eastern oysters was calculated to be 98 ug/L. The no observed effect concentration (NOEC) was < 18 ug/L, the lowest measured concentration of TBBPA tested. An estimated NOEC of 2.6 ug/L was calculated from the observed dose-response curve.", "Based on these data the 96-hr EC50 for TBBPA in eastern oysters was calculated to be 98 ug/L.", "High", "Study performed under a TSCA test rule.", "Sponsored by the Brominated Flame Retardant Industry Panel All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for *Daphnia magna* is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)", "Surprenant D. 1988. Acute toxicity of tetrabromobisphenol A to eastern oysters (*Crassostrea virginica*) under flow-through conditions. SLS Report #89-1-2898. Springborn Life Sciences, Wareham, Mass. Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995.", "Y"

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","TestType","GLP","Year","Species","AnalyMonit","ExposPeriod","StatMethod","MethodRem","NominalConc","MeasuredConc","Prec","EndpointType","EndpointVal","ConcType","Unit","EndpointTime","StatResults","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6022001145747.00,1,12/18/01 0:00:00,"The test article was a combination of the non-labeled commercial TBBPA product and 14C-TBBPA (12.9 mCi/mole, tested as 100% active ingredient). The non-labeled product was a composite sample made from the commercial products supplied by Ethyl Corporation, Bromine Compunds Ltd, and Great Lakes Chemical Corp.",,"Guideline No. Not stated.",,"flow-through","Yes",1988,"Fathead Minnow","14C-activity","144 hrs (6 days)","See Results","Twenty organisms were exposed in duplicate test aquaria to five concentrations of TBBPA, a solvent (acetone) control and a dilution water control. During the test, nominal concentrations of 0.18, 0.27, 0.42, 0.65, and 1.0 mg active ingrediant (AI)/L were maintained by introducing appr. 9.8 aquarium volumes per day of newly prepared test solution via a continuous flow proportional diluter appratus. The duration of exposure was 6 days (144 hrs). Each replicate solution was sampled and analyzed for TBBPA concentration (based on radiometric analyses for 14C-labeled TBBPA) at test initiation, on day 4 of the exposure period and at test termination (day 6). Based on the results of these analyses, the mean measured test concentrations were 0.19, 0.26, 0.32, 0.45, and 0.63 mg AI/L. The TBBPA concentration at the highest dose level was confirmed using high pressure liquid chromatography at test initiation and termination. Throughout the exposure period a small amount of precipitated test material was present in the diluter system's mixing chamber; however, no undissolved TBBPA (e.g. precipitate, film on the solution's surface) was observed in any of the exposure vessels. Biological observations were made and recorded at test initiation and every 24 hrs thereafter until the test was terminated.",,"0, 0.18, 0.27, 0.65, and 1.0 mg AI/L","0, 0.19, 0.26, 0.32, 0.45, and 0.63 mg AI/L","=","LC50",1,"Measured","mg/L",96,"Nonlinear interpolation","Following 6 days (144 hrs) of exposure, 100% mortality was observed in the highest mean measured concentration of TBBA tested (0.63 mg AI/L). The percent mortality in the remaining treatment levels ranged from 0 to 30% and followed the concentration gradient established and decreased as the concentration of test material decreased. The 96 hr LC50 value was 0.54 mg/L. The 48 and 24 hr LC50 values were 0.63 mg/L. The No Observed Effect Concentration (NOEC) through 6 days of exposure was 0.26 mg/L.Over the course of the study, the pH ranged from 7.1-7.3, and the dissolved oxygen from 6.8-8.6. The temperature was 23 degrees C. Maximum organism loading concentration was 0.046 g of biomass per liter of flowing test solution per day.",,"The 96 hr LC50 of TBBPA in the fathead minnow was 0.54 mg/L. This is higher than TBBPA's water solubilty.",,"This test was performed under a TSCA test rule.",,"Sponsored by the Brominated Flame Retardant Industry Panel (BFRIP).All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and (prior to 2002) measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for Daphnia magna is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)",,"Surprenant, D. Acute toxicity of tetrabromobisphenol A to fathead minnow (Pimephales promelas) under flow-through conditions. SLS Report #88-10-2834. 1988. Springborn Life Sciences, Inc. Wareham, Mass.Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995.",,"Y"6022001145747.00,2,12/10/01 0:00:00,"A tetrabromobisphenol A (TBBPA) commercial product (FMBP4A).",,"Pre-dates OECD and EPA Guidelines","static","Unknown",1978,"Salmo gairdneri","None.",,"96 hr","Spearman-Kaber Estimator.",,"Five concentrations (0.1, 0.18, 0.32, 0.56, and 1.0 mg/L) a control and a solvent (acetone) control were tested. Rainbow trout used in this study were cultured in the laboratory from eggs obtained from a commercial hatchery. The fish were maintained at 13 degrees C. Rainbow trout at the time of testing were appr. 3 months old and had a mean length of 41 mm and a mean weight of 0.51 grams. Fish used in the test were randomly selected from the stock culture and acclimated to the test water for 24 hrs prior to testing. Forty-eight hrs before initiation, the fish were taken off feed. Ten fish were placed in each of the 5 gallon test vessels. Biological loading was 0.34 g/L.",,"0, 0.1, 0.18, 0.32, 0.56, 1.0 mg/L","Not measured.",,"=","LC50",0,"Nominal","mg/L",96,"See results.",,"The 96 hr LC50 value in rainbow trout was 0.40 mg/L. The 95% confience interval was 0.36-0.45 mg/L. 100% mortality occurred at 0.56 and 1.0 mg/L at 96 hrs. 10% mortality occurred at 0.32 mg/L at 96 hrs. The 96 hr no effect level was 0.1

mg/L. Water: temperature = 12.3 +/- 0.3 degrees C; pH = 7.48; Total hardness as CaCO₃ = 40 mg/L.", "The 96 hr LC50 value in rainbow trout was 0.40 mg/L. All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for Daphnia magna is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (Studies performed by the Brominated Flame Retardant Industry Panel, 1989, as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)", "Reasonable.", "Sponsored by Velsicol Corporation. All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and (prior to 2002) measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for Daphnia magna is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)", "Velsicol Chemical Corporation. The acute toxicity of FMBP-4 (tetrabromobisphenol A) to the rainbow trout, *Salmo gairdneri*. Testing Facility: Union Carbide Corp. Environmental Services, Tarrytown Technical Center; Tarrytown, NY. Project#: 11506-03-51. 1978.", "N"6022001145747.00,3,12/10/01 0:00:00,"A tetrabromobisphenol A (TBBPA) commercial product (FMBP4A).", "Pre-dates OECD and EPA Guidelines.", "static", "Unknown", 1978, "Lepomis macrochirus", "None.", "96 Hrs", "Not specified.", "Five concentrations (0.18, 0.32, 0.56, 1.0, 1.8 mg/L), a control and a solvent (acetone) control were tested. Bluegill sunfish used in this study were obtained from a commercial hatchery. Fish at the time of testing were approx. 6 months old and had a mean length of 38 mm and a mean weight of 0.59 grams. Fish used in the test were randomly selected from the stock culture and acclimated to the test water for 24 hrs prior to testing. Forty-eight hrs before initiation, the fish were taken off feed. Ten fish were placed in each of the 5 gallon test vessels. Biological loading was 0.39 g/L.", "0, 0.18, 0.32, 0.56, 1.0, 1.8 mg/L", "Not measured.", "=", "LC50", 0, "Nominal", "mg/L", 96, "Not specified.", "The 96 hr LC50 for TBBPA in bluegill sunfish was 0.51 mg/L. The 95% confidence interval was 0.43-0.61 mg/L. There was 100% mortality at 1.0 and 1.8 mg/L, and 70% at 0.56 mg/L. There was no mortality or adverse effects at 0.18 mg/L. Dilution water = pH of 7.47, total hardness = 44 mg/L as CaCO₃, total alkalinity of 33 mg/L as CaCO₃, and a specific conductance of 150 umhos/cm.", "The 96 hr LC50 for TBBPA in bluegill sunfish was 0.51 mg/L.", "Reasonable.", "Sponsored by Velsicol Chemical Corporation. All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and (prior to 2002) measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for Daphnia magna is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)", "Velsicol Chemical Corporation. The acute toxicity of FMBP-4 (Tetrabromobisphenol A) to the sunfish, *Lepomis macrochirus rafinesque*. Testing Facility: Union Carbide Corp Environmental Services, Tarrytown Technical Center, Tarrytown, NY. Study No: UCES 11506-03-50. 1978.", "N"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%. Impurities were isobutanol 0.1 wt%, other unknowns 6.3 wt %. Tetrabromocyclododecane was not detected.", "OECD Method 203", "flow-through", "Yes", 1997, "Oncorhynchus mykiss", "HPLC/UV/VIS Detector; LOQ=0.04 ug/l", "96 hours", "None needed - no mortality observed.", "This study was performed according to OECD Method 203 and TSCA Title 40 of CFR, Part 797, Section 1400. Rainbow trout were exposed to one of five test concentrations, a solvent control, or the negative (well water) control. Two replicate test chambers were maintained in each treatment and control group. Ten rainbow trout were used in each test chamber for a total of 20 rainbow trout per test concentration. Nominal test concentrations were

selected in consultation with the Sponsor, and were based on the solubility of the test compound in water (3.4 ug/L) and the results of an exploratory rangefinding test. Due to co-eluting artifacts at 96 hrs, mean measured test concentrations were determined analytically from samples of test water collected from each treatment and control group at the beginning of the test and at approximately 48 hrs. The selection of exposure concentrations took into consideration the water solubility limit and a finding of no acute toxicity from an exploratory rangefinding test. The water solubility limit was determined in a generator column elution study to be 3.4 ug/L. However, there was a potential to have a slight enhancement of HBCD's water solubility due to the use of dimethylformamide (DMF) as a vehicle in the diluter system. For this reason, the highest test concentration selected for the acute toxicity test was twice the defined solubility limit (i.e., 6.8 ug/L). The series of 5 nominal test concentrations used in the test were 1.5, 2.2, 3.2, 4.6 and 6.8 ug/L. In this way, the solubility limit of HBCD was bracketed by the five concentrations. Delivery of the test substance was initiated approximately 6 days prior to the introduction of the fish to the test water in order to achieve equilibrium of the test substance in the test chambers. The fish were indiscriminately assigned to exposure chambers at test initiation. Observations of mortality and other clinical signs were made approximately 1, 24, 48, 72 and 96 hrs after test initiation. The no mortality concentration and no observed effect concentration (NOEC) were determined by visual interpretation of the mortality and clinical observation data. All fish were from the same source and year class, and the total length of the longest fish was no more than twice the length of the shortest. The average length of 10 negative control fish at the end of the test was 55 mm with a range of 50-61 mm. The wet weight of 10 negative control fish at the end of the test was 2.4 g with a range of 1.6-3.6 g. Loading, defined as the total wet weight of fish per liter of test water that passed through the test chamber in 24 hrs, was 0.27 g fish/L/day. Temperature, dissolved oxygen, and pH were measured. Temperatures were within the limits of the 12 +/- 2 degrees C range established for the test. Dissolved oxygen concentrations were greater than or = 78% of saturation throughout the test. Water pH ranged from 8.2-8.3. Total organic carbon values were <1.0 mg C/L at test initiation and termination. Test substance concentrations were determined via HPLC using a UV/VIS detector. Quantitation was based on the gamma isomer.,"0, 0.0015, 0.0022, 0.0032, 0.0046, 0.0068","0, 0.00075, 0.0015, 0.0023, 0.0023, 0.0025",">","LC0",0,"Nominal","mg/L",96,"None needed - no mortality observed.", "One set of pretest water samples was collected from the highest and lowest test concentrations and analyzed for HBCD concentrations. All pretest samples yielded concentrations that were considerably lower than the expected concentrations. The toxicity test was initiated and measurements of the HBCD concentrations in all test chambers were made at the beginning, middle and end of the test. In general, concentrations of HBCD made on samples collected at Day 0 and Day 2 were variable and failed to correspond to the dilution series expected from the nominal concentrations. All diluter operational records were checked and no evidence of any malfunctions or errors were found. Concentrations measured in the Day 4 samples were artificially high due to co-eluting artifacts at the retention time of HBCD. Attempts were made to separate the co-eluting artifacts during a reanalysis of the original Day 4 sample extracts, but the resulting chromatography showed those same interferences. While the pattern of measured HBCD was unexpected, the results suggest that the exposure solutions were at the solubility limit of HBCD in the diluter system. The variability in the measured concentrations could have been influenced by the temperature of the exposure water (12 degrees C), the flow-through design, or the hydrophobic nature of HBCD (as evidenced by its nonpolar alkane structure and extremely low water solubility). These factors could explain both the failure of the measured values to correspond to the nominal concentrations and the variability observed in the measured concentrations. Overall, it appears that the solubility limit of HBCD, under the conditions that it was applied in this test, is within the range of 2.0 - 3.0 ug/L. The values obtained in the Day 4 samples were not reflective of the true conditions due to the co-eluting artifacts, and therefore, were not used in the study. Temperatures were within the limits of the 12 +/- 2 degrees C range established for the test. Dissolved oxygen concentration of > or = 78% of saturation were observed throughout the test. Water pH was consistent with values for moderately-hard water and ranged from 8.2 to 8.3. Total organic carbon values were < 1.0 mg C/L at test initiation and termination. Observations for mortality and other signs of toxicity were made daily. Rainbow trout in the negative control and solvent control groups appeared healthy and normal throughout the test. All rainbow trout in the 1.5, 2.2, 3.2, 4.6 and 6.8 ug/L (nominal) treatment groups also appeared normal throughout the test with no mortalities or overt signs of toxicity. Based on these results, the LC50 values at 24, 48, 72 and 96 hours were estimated to be >6.8 ug/L, the highest concentration tested.", "The 96-hour LC50 value for rainbow trout exposed to HBCD was >6.8

ug/L (nominal) (>2.5 ug/L mean measured concentration), the highest concentration tested and twice HBCD's water solubility (3.4 ug/L). Based on the mortality and observation data, the 96-hour no mortality concentration and the no-observed-effect-concentration were 6.8 ug/L (nominal) (2.5 ug/L mean measured concentration) and was higher than the water solubility of HBCD.", "High", "This study was performed according to current guidelines and Good Laboratory Practices by a laboratory with considerable experience with these studies. Extensive attention was paid to analytical method development and performance.", "Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel, Arlington, VA.", "Graves, W and Swigert, J. (1997) Hexabromocyclododecane (HBCD): A 96-Hour Flow-Through Acute Toxicity Test with the Rainbow Trout (*Oncorhynchus mykiss*). Project Number: 439A-101. Wildlife International LTD, Easton, MD.", "N"6022001145747.00,4,12/10/01 0:00:00,"TBBPA", "Japan's MITI Guideline", "static", "Unknown", 1992, "Orange-red Killifish", "None.", "48 hrs", "The 48 LC50 in orange-red killifish was determined as a part of a fish bioconcentration test.", "8.2 mg/L", "Not known.", "=", "LC50", 8, "Nominal", "mg/L", 48,, "The 48 hr LC50 was reported as 8.2 mg/L.", "High", "All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and (prior to 2002) measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for *Daphnia magna* is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)", "Biodegradation and Bioaccumulation Data of Existing Chemicals, Based on the CSCL Japan. Edited by the Chemicals Inspection and Testing Institute - Japan. 1992. P4-14. Tokyo.", "N"16122003094258.0,1,12/16/03 0:00:00,"1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, mixed esters with diethylene glycol and propylene glycol", "Conducted prior to established guidelines.", "static", "No", 1979, "Lepomis macrochirus", "No data", "96 hours", "Not known", "Bluegill sunfish were exposed to concentrations of 10, 18, 32, 56 and 100 mg/L. Acetone was the vehicle. All test concentrations were cloudy with the top 2 doses completely opaque.", "10, 18, 32, 56, 100", "No data", "=", "LC50", 12, "Nominal", "mg/L", 96, "The 95% confidence interval limits were 1-18 mg/L.", "The 96 hr LC50 in bluegill sunfish was 12 mg/L.",,,, "Thompson, C, Forbis A. 1979. Acute toxicity of FM PHT-4 Diol (EX-1) to Bluegill sunfish (*Lepomis macrochirus*). Analytical Bio Chemistry Laboratories, Inc.", "Y"16122003094258.0,2,2/2/04 0:00:00,"1,2-benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, 2-(2-hydroxyethoxy)ethyl 2-hydroxypropyl ester", "Estimated", "static", "No", 2003, "Not applicable", "Not applicable", "96 Hours", "Not applicable", "The ECOSAR module of EPIWIN was used to estimate the EC50 in fish for this substance. Only the chemical structure was entered into the software program. The ECOSAR calculated the water solubility to be 37.96 mg/L. This is very different from the water solubility calculated by WSKOW, another module in EPIWIN, 0.5697 mg/L at 25 deg C.", "Not applicable", "Not applicable", "=", "LC50", 10, "Nominal", "mg/L", 96, "Not applicable", "The 96 Hour LC50 was estimated to be 9.973 mg/L.",,,, "All estimations were performed using EPI WIN Suite, V.3.04, Syracuse Research Corporation, North Syracuse, New York.", "Y"

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","TestType","GLP","Year","Species","AnalyMonit","ExposPeriod","StatMethod","MethodRem","NominalConc","MeasuredConc","Prec","EndpointType","EndpointVal","ConcType","Unit","EndpointTime","StatResults","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6022001145747.00,1,12/18/01 0:00:00,"The test article was a combination of the non-labeled commercial TBBPA product and 14C-TBBPA (12.9 mCi/mmole, tested as 100% active ingredient). The non-labeled product was a composite sample made from the commercial products supplied by Ethyl Corporation, Bromine Compunds Ltd, and Great Lakes Chemical Corp.",,"Guideline No. Not stated.",,"flow-through","Yes",1988,"Fathead Minnow","14C-activity","144 hrs (6 days)","See Results","Twenty organisms were exposed in duplicate test aquaria to five concentrations of TBBPA, a solvent (acetone) control and a dilution water control. During the test, nominal concentrations of 0.18, 0.27, 0.42, 0.65, and 1.0 mg active ingredient (AI)/L were maintained by introducing appr. 9.8 aquarium volumes per day of newly prepared test solution via a continuous flow proportional diluter apparatus. The duration of exposure was 6 days (144 hrs). Each replicate solution was sampled and analyzed for TBBPA concentration (based on radiometric analyses for 14C-labeled TBBPA) at test initiation, on day 4 of the exposure period and at test termination (day 6). Based on the results of these analyses, the mean measured test concentrations were 0.19, 0.26, 0.32, 0.45, and 0.63 mg AI/L. The TBBPA concentration at the highest dose level was confirmed using high pressure liquid chromatography at test initiation and termination. Throughout the exposure period a small amount of precipitated test material was present in the diluter system's mixing chamber; however, no undissolved TBBPA (e.g. precipitate, film on the solution's surface) was observed in any of the exposure vessels. Biological observations were made and recorded at test initiation and every 24 hrs thereafter until the test was terminated.",,"0, 0.18, 0.27, 0.65, and 1.0 mg AI/L","0, 0.19, 0.26, 0.32, 0.45, and 0.63 mg AI/L","=","LC50",1,"Measured","mg/L",96,"Nonlinear interpolation","Following 6 days (144 hrs) of exposure, 100% mortality was observed in the highest mean measured concentration of TBBA tested (0.63 mg AI/L). The percent mortality in the remaining treatment levels ranged from 0 to 30% and followed the concentration gradient established and decreased as the concentration of test material decreased. The 96 hr LC50 value was 0.54 mg/L. The 48 and 24 hr LC50 values were 0.63 mg/L. The No Observed Effect Concentration (NOEC) through 6 days of exposure was 0.26 mg/L.Over the course of the study, the pH ranged from 7.1-7.3, and the dissolved oxygen from 6.8-8.6. The temperature was 23 degrees C. Maximum organism loading concentration was 0.046 g of biomass per liter of flowing test solution per day.",,"The 96 hr LC50 of TBBPA in the fathead minnow was 0.54 mg/L. This is higher than TBBPA's water solubilty.",,"High","This test was performed under a TSCA test rule.",,"Sponsored by the Brominated Flame Retardant Industry Panel (BFRIP).All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for Daphnia magna is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)",,"Surprenant, D. Acute toxicity of tetrabromobisphenol A to fathead minnow (Pimephales promelas) under flow-through conditions. SLS Report #88-10-2834. 1988. Springborn Life Sciences, Inc. Wareham, Mass.Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995.",,"Y"6022001145747.00,2,12/10/01 0:00:00,"A tetrabromobisphenol A (TBBPA) commercial product (FMBP4A).",,"Pre-dates OECD and EPA Guidelines","static","Unknown",1978,"Salmo gairdneri","None.",,"96 hr","Spearman-Kaber Estimator.",,"Five concentrations (0.1, 0.18, 0.32, 0.56, and 1.0 mg/L) a control and a solvent (acetone) control were tested. Rainbow trout used in this study were cultured in the laboratory from eggs obtained from a commercial hatchery. The fish were maintained at 13 degrees C. Rainbow trout at the time of testing were appr. 3 months old and had a mean length of 41 mm and a mean weight of 0.51 grams. Fish used in the test were randomly selected from the stock culture and acclimated to the test water for 24 hrs prior to testing. Forty-eight hrs before initiation, the fish were taken off feed. Ten fish were placed in each of the 5 gallon test vessles. Biological loading was 0.34 g/L.",,"0, 0.1, 0.18, 0.32, 0.56, 1.0 mg/L","Not measured.",,"=","LC50",0,"Nominal","mg/L",96,"See results.",,"The 96 hr LC50 value in rainbow trout was 0.40 mg/L. The 95% confience interval was 0.36-0.45 mg/L. 100% mortality occurred at 0.56 and 1.0 mg/L at 96 hrs. 10% mortality occurred at 0.32 mg/L at 96 hrs. The 96 hr no effect level was 0.1 mg/L.Water: temperature = 12.3 +/- 0.3 degrees C; pH

= 7.48; Total hardness as CaCO₃ = 40 mg/L.", "The 96 hr LC50 value in rainbow trout was 0.40 mg/L. All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for Daphnia magna is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (Studies performed by the Brominated Flame Retardant Industry Panel, 1989, as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)", "Reasonable.", "Sponsored by Velsicol Corporation. All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for Daphnia magna is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)", "Velsicol Chemical Corporation. The acute toxicity of FMBP-4 (tetrabromobisphenol A) to the rainbow trout, *Salmo gairdneri*. Testing Facility: Union Carbide Corp. Environmental Services, Tarrytown Technical Center; Tarrytown, NY. Project#: 11506-03-51. 1978.", "N"6022001145747.00,3,12/10/01 0:00:00,"A tetrabromobisphenol A (TBBPA) commercial product (FMBP4A).", "Pre-dates OECD and EPA Guidelines.", "static", "Unknown", 1978, "Lepomis macrochirus", "None.", "96 Hrs", "Not specified.", "Five concentrations (0.18, 0.32, 0.56, 1.0, 1.8 mg/L), a control and a solvent (acetone) control were tested. Bluegill sunfish used in this study were obtained from a commercial hatchery. Fish at the time of testing were approx. 6 months old and had a mean length of 38 mm and a mean weight of 0.59 grams. Fish used in the test were randomly selected from the stock culture and acclimated to the test water for 24 hrs prior to testing. Forty-eight hrs before initiation, the fish were taken off feed. Ten fish were placed in each of the 5 gallon test vessels. Biological loading was 0.39 g/L.", "0, 0.18, 0.32, 0.56, 1.0, 1.8 mg/L", "Not measured.", "=", "LC50", 0, "Nominal", "mg/L", 96, "Not specified.", "The 96 hr LC50 for TBBPA in bluegill sunfish was 0.51 mg/L. The 95% confidence interval was 0.43-0.61 mg/L. There was 100% mortality at 1.0 and 1.8 mg/L, and 70% at 0.56 mg/L. There was no mortality or adverse effects at 0.18 mg/L. Dilution water = pH of 7.47, total hardness = 44 mg/L as CaCO₃, total alkalinity of 33 mg/L as CaCO₃, and a specific conductance of 150 umhos/cm.", "The 96 hr LC50 for TBBPA in bluegill sunfish was 0.51 mg/L.", "Reasonable.", "Sponsored by Velsicol Chemical Corporation. All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for Daphnia magna is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old Mysid shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)", "Velsicol Chemical Corporation. The acute toxicity of FMBP-4 (Tetrabromobisphenol A) to the sunfish, *Lepomis macrochirus rafinesque*. Testing Facility: Union Carbide Corp Environmental Services, Tarrytown Technical Center, Tarrytown, NY. Study No: UCES 11506-03-50. 1978.", "N"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%.", "OECD Method 203", "flow-through", "Yes", 1997, "Oncorhynchus mykiss", "HPLC/UV/VIS Detector; LOQ=0.04 ug/l", "96 hours", "None needed - no mortality observed.", "This study was performed according to OECD Method 203 and TSCA Title 40 of CFR, Part 797, Section 1400. Rainbow trout were exposed to one of five test concentrations, a solvent control, or the negative (well water) control. Two replicate test chambers were maintained in each treatment and control group. Ten rainbow trout were used in each test chamber for a total of 20 rainbow trout per test concentration. Nominal test concentrations were selected in consultation with the Sponsor, and were based on the solubility of the test compound in water (3.4 ug/L) and the results of an exploratory rangefinding test.

Due to co-eluting artifacts at 96 hrs, mean measured test concentrations were determined analytically from samples of test water collected from each treatment and control group at the beginning of the test and at approximately 48 hrs. The selection of exposure concentrations took into consideration the water solubility limit and a finding of no acute toxicity from an exploratory rangefinding test. The water solubility limit was determined in a generator column elution study to be 3.4 ug/L. However, there was a potential to have a slight enhancement of HBCD's water solubility due to the use of dimethylformamide (DMF) as a vehicle in the diluter system. For this reason, the highest test concentration selected for the acute toxicity test was twice the defined solubility limit (i.e., 6.8 ug/L). The series of 5 nominal test concentrations used in the test were 1.5, 2.2, 3.2, 4.6 and 6.8 ug/L. In this way, the solubility limit of HBCD was bracketed by the five concentrations. Delivery of the test substance was initiated approximately 6 days prior to the introduction of the fish to the test water in order to achieve equilibrium of the test substance in the test chambers. The fish were indiscriminately assigned to exposure chambers at test initiation. Observations of mortality and other clinical signs were made approximately 1, 24, 48, 72 and 96 hrs after test initiation. The no mortality concentration and no observed effect concentration (NOEC) were determined by visual interpretation of the mortality and clinical observation data. All fish were from the same source and year class, and the total length of the longest fish was no more than twice the length of the shortest. The average length of 10 negative control fish at the end of the test was 55 mm with a range of 50-61 mm. The wet weight of 10 negative control fish at the end of the test was 2.4 g with a range of 1.6-3.6 g. Loading, defined as the total wet weight of fish per liter of test water that passed through the test chamber in 24 hrs, was 0.27 g fish/L/day. Temperature, dissolved oxygen, and pH were measured. Temperatures were within the limits of the 12 +/- 2 degrees C range established for the test. Dissolved oxygen concentrations were greater than or = 78% of saturation throughout the test. Water pH ranged from 8.2-8.3. Total organic carbon values were <1.0 mg C/L at test initiation and termination. Test substance concentrations were determined via HPLC using a UV/VIS detector. ", "0, 0.0015, 0.0022, 0.0032, 0.0046, 0.0068", "0, 0.00075, 0.0015, 0.0023, 0.0023, 0.0025", ">", "LC0", "0", "Nominal", "mg/L", "96", "None needed - no mortality observed.", "One set of pretest water samples was collected from the highest and lowest test concentrations and analyzed for HBCD concentrations. All pretest samples yielded concentrations that were considerably lower than the expected concentrations. The toxicity test was initiated and measurements of the HBCD concentrations in all test chambers were made at the beginning, middle and end of the test. In general, concentrations of HBCD made on samples collected at Day 0 and Day 2 were variable and failed to correspond to the dilution series expected from the nominal concentrations. All diluter operational records were checked and no evidence of any malfunctions or errors were found. Concentrations measured in the Day 4 samples were artificially high due to co-eluting artifacts at the retention time of HBCD. Attempts were made to separate the co-eluting artifacts during a reanalysis of the original Day 4 sample extracts, but the resulting chromatography showed those same interferences. While the pattern of measured HBCD was unexpected, the results suggest that the exposure solutions were at the solubility limit of HBCD in the diluter system. The variability in the measured concentrations could have been influenced by the temperature of the exposure water (12 degrees C), the flow-through design, or the hydrophobic nature of HBCD (as evidenced by its nonpolar alkane structure and extremely low water solubility). These factors could explain both the failure of the measured values to correspond to the nominal concentrations and the variability observed in the measured concentrations. Overall, it appears that the solubility limit of HBCD, under the conditions that it was applied in this test, is within the range of 2.0 - 3.0 ug/L. The values obtained in the Day 4 samples were not reflective of the true conditions due to the co-eluting artifacts, and therefore, were not used in the study. Temperatures were within the limits of the 12 +/- 2 degrees C range established for the test. Dissolved oxygen concentration of > or = 78% of saturation were observed throughout the test. Water pH was consistent with values for moderately-hard water and ranged from 8.2 to 8.3. Total organic carbon values were < 1.0 mg C/L at test initiation and termination. Observations for mortality and other signs of toxicity were made daily. Rainbow trout in the negative control and solvent control groups appeared healthy and normal throughout the test. All rainbow trout in the 1.5, 2.2, 3.2, 4.6 and 6.8 ug/L (nominal) treatment groups also appeared normal throughout the test with no mortalities or overt signs of toxicity. Based on these results, the LC50 values at 24, 48, 72 and 96 hours were estimated to be >6.8 ug/L, the highest concentration tested.", "The 96-hour LC50 value for rainbow trout exposed to HBCD was >6.8 ug/L (nominal) (>2.5 ug/L mean measured concentration), the highest concentration tested and twice HBCD's water solubility (3.4 ug/L). Based on the mortality and observation data, the 96-hour no mortality

concentration and the no-observed-effect-concentration were 6.8 ug/L (nominal) (2.5 ug/L mean measured concentration) and was higher than the water solubility of HBCD.", "High", "This study was performed according to current guidelines and Good Laboratory Practices by a laboratory with considerable experience with these studies. Extensive attention was paid to analytical method development and performance.", "Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel, Arlington, VA.", "Graves, W and Swigert, J. (1997) Hexabromocyclododecane (HBCD): A 96-Hour Flow-Through Acute Toxicity Test with the Rainbow Trout (*Oncorhynchus mykiss*). Project Number: 439A-101. Wildlife International LTD, Easton, MD.", "N"6022001145747.00,4,12/10/01 0:00:00,"TBBPA",,"Japan's MITI Guideline", "static", "Unknown", 1992, "Orange-red Killifish", "None.", "48 hrs", "The 48 LC50 in orange-red killifish was determined as a part of a fish bioconcentration test.", "8.2 mg/L", "Not known.", "=", "LC50", 8, "Nominal", "mg/L", 48,, "The 48 hr LC50 was reported as 8.2 mg/L.", "High", "All LC50 and EC50 values derived from acute tests in aquatic species are greater than TBBPA's estimated and measured water solubility. The 96 hour LC50 values for bluegill sunfish, rainbow trout and fathead minnow are 0.51, 0.40 and 0.54 mg/L, respectively. The 48 hour LC50 for *Daphnia magna* is 0.96 mg/L. The 96 hour EC50 for the Eastern oyster was 0.098 mg/L. The growth of freshwater green alga was not affected by 5.6 mg/L, the highest level tested. The 96 hour EC50 in <1, 5, or 10 day old *Mysid* shrimp was 0.86, 1.1, and 1.2 mg/L, respectively. (as reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)", "Biodegradation and Bioaccumulation Data of Existing Chemicals, Based on the CSCL Japan. Edited by the Chemicals Inspection and Testing Institute - Japan. 1992. P4-14. Tokyo.", "N"

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","TestType","GLP","Year","ContTime","Inoculum","MethodRem","Prec","DegValue","Upper","Unit","TimeFrame","BreakdownProd","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%. Impurities were isobutanol 0.1 wt%, other unknowns 6.3 wt %. Tetrabromocyclododecane was not detected.",,"EPA OPPTS Method 835.3200: Ready Biodegradability, Closed Bottle Test; OECD Guideline 301D","aerobic","Yes",1996,28,"activated sludge, domestic, adapted","The test contained an inoculum control group, a reference group and a treatment group. The blank control, reference, and treatment groups contained ten replicate test chambers. The inoculum control was used to measure the dissolved oxygen consumption of the inoculum and was not dosed with a carbon source. The reference chambers were dosed with sodium benzoate, a substance known to be biodegradable, at a concentration of 2 mg/L. The treatment group test chambers were used to evaluate the test substance at 7.7 mg/L. Measurements of oxygen consumption were performed on two test chambers from the control, reference and treatment groups on days 0, 7, 14, 21, and 28. The test inoculum was secondary clarifier supernatant collected from Prospect Bay Wastewater Treatment Facility, Grasonville, MD. The theoretical oxygen demand value used to calculate the percent degradation of the test substance was 0.75 mg O₂/mg.",,"=",0,0,"Days",28,"No","The temperature range recorded during the test was 18-20 degrees C. The result of the standard plate count performed on the inoculum was 3.7 x 10⁴ CFU/ml. The average oxygen uptake exhibited by the control, reference, and treatment groups was measured at 0, 7, 14, 21 and 28 days. The oxygen depletion of the inoculum control was less than or equal to 1.5 mg O₂/L. Degradation of the test substance was not observed over the 28-day test period. The viability of the inoculum and validity of the test was supported by the results of the reference substance, sodium benzoate, degrading approximately 94%. An average percent biodegradation of > 60% was achieved by day 7, thereby fulfilling the criteria for a valid test.",,"Degradation of the test substance, HBCD, at 7.7 mg/L was not observed over the 28-day test period.",,"High","This study was performed according to current guidelines and Good Laboratory Practices by a laboratory with considerable experience with these studies. Extensive attention was paid to analytical method development and performance.",,"Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel.",,"Schaefer, E and Haberlein, D. (1996) Hexabromocyclododecane (HBCD): Closed Bottle Test. Project No.: 439E-102. Wildlife International Ltd. Easton, MD.",,"Y"6022001145747.00,1,12/10/01 0:00:00,"14C-Tetrabromobisphenol A (TBBPA) (specific activity 12.9 mCi/mmol). Synthesized by Chemsyn Science Laboratories, Lenexa, KS. TBBPA, 99.06% purity, obtained from Great Lakes Chemical Corp. 14C-O,O' dimethyl-TBBPA; 14C-O,O' diethyl-TBBPA (presumed metabolites). Synthesized by Chemsyn Science Laboratories, Lenexa, KS.",,"Not specified.",,"aerobic","Yes",1989,64,"Those present in the natural soils.",,"This study investigated the biodegradability of TBBPA in 3 different soil types under aerobic conditions. The three soil types were sandy loam, clay loam, and silty loam. Twelve test systems, four replicates for each soil type, were used. Each test system consisted of a 250 ml glass Erlenmeyer flask to which a 50 ml round bottom glass tube was fused. The study was conducted in the dark. About 50 mg (dry wt) of soil were added to each flask, and 100 uL of the test solution was added to each. After mixing, the flasks were sealed and incubated at 21.5 +/- 1 degree centigrade. Evolved gas was collected on a hydroxide trapping solution. On days 1,2,4,8,16,32 and 64 the KOH solution was collected and aliquots quantitated. At test termination, the soil was combusted and the radioactive CO₂ trapped and counted via liquid scintillation. Prior to soil extraction, duplicate aliquots of each soil were analyzed for moisture determination. Two replicates from each soil type were extracted by Soxhlet extraction for at least 16 hrs. Thin layer chromatography was used in an attempt to identify metabolites. A mass balance was performed.",,"range",18,64,"Days",64,"Yes","The major portion of the applied radioactivity was recovered in the soil. No radioactivity was detected in the volatile plugs after Soxhlet extraction. The maximum radioactivity recovered in the CO₂ trap was 5.5% in the clay loam soil. After 64 days, the amount of TBBPA remaining in the soil was 74.3-81.9%, 35.9-40.1% and 41.1-43.2% for the sandy loam, silty loam, and clay loam, respectively. In all soil replicates, 2 biodegradation products were detected that resembled each other in TLC mobility characteristics, but not that of the dimethyl or

diethyl derivatives of TBBPA. In addition, a third unknown degradation product was detected in one replicate of the silty loam soil. A radiochemical mass balance showed appr. 80% recovery for the sandy and clay loams, and 60% for the silty loam. The lower recovery for the silty loam is probably due to inhomogeneity in the distribution of the radioactivity. Efficiency of extraction varied for each soil type. Recovered radioactivity after the Soxhlet extraction were 52.4 - 56.1%, 45.5 - 48.6%, and 10.1 - 18.6% for the sandy loam, the silty loam, and the clay loam, respectively.", "TBBPA was susceptible to biodegradation in soils under aerobic conditions with an estimated half-life of appr. 50 days. Twenty to 60% (depending on the soil type) of the initial TBBPA concentration was degraded. Some ¹⁴C-CO₂ was detected, indicating TBBPA was able to undergo complete mineralization. Two major metabolites were detected. These metabolites were not the O,O-dimethyl and O,O-diethyl derivatives of TBBPA, but their exact identity was not determined.", "High", "Study performed under a TSCA test rule.", "This study was sponsored by the Brominated Flame Retardant Industry Panel.", "Fackler, P. Determination of the biodegradability of tetrabromobisphenol A in soil under aerobic conditions. SLS Report: 88-11-2848. 1989. Springborn Life Sciences, Inc. Wareham, Mass. Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995.", "Y"6022001145747.00,2,12/10/01 0:00:00,"¹⁴C-Tetrabromobisphenol A (TBBPA) (specific activity 12.9 mCi/mmol). Synthesized by Chemsyn Science Laboratories, Lenexa, KS. TBBPA, 99.06% purity, obtained from Great Lakes Chemical Corp. ¹⁴C-O,O' dimethyl-TBBPA; ¹⁴C-O,O' diethyl-TBBPA (presumed metabolites). Synthesized by Chemsyn Science Laboratories, Lenexa, KS.", "Not specified.", "anaerobic", "Yes", 1989, 64, "Those organisms naturally present in soils.", "This study investigated the biodegradability of TBBPA in 3 different soil types under anaerobic conditions. The three soil types were sandy loam, clay loam, and silty loam. Twelve test systems, four replicates for each soil type, were used. Each test system consisted of a 250 ml glass Erlenmeyer flask to which a 50 ml round bottom glass tube was fused. The study was conducted in the dark. About 50 mg (dry wt) of soil were added to each flask, and 100 μ L of the test solution was added to each. After mixing, the soil was covered with water, purged with nitrogen and the flasks were sealed and incubated at 21.4 +/- 1 degree centigrade. Each flask was purged with nitrogen daily to maintain anaerobic conditions and to capture evolved methane and CO₂ or other volatile products. Evolved gas was collected on a hydroxide trapping solution. On days 1, 2, 4, 8, 16, 32 and 64 the KOH solution was collected and aliquots quantitated. At test termination, the soil was combusted and the radioactive CO₂ trapped and counted via liquid scintillation. Prior to soil extraction, duplicate aliquots of each soil were analyzed for moisture determination. Two replicates from each soil type were extracted by Soxhlet extraction for at least 16 hrs. Thin layer chromatography was used in an attempt to identify metabolites. A mass balance was performed.", "range", 9, 56, "Days", 64, "Yes", "The major portion of the applied radioactivity was recovered in the soil. Minimal radioactivity was recovered in the volatile traps. The recovered radioactivity in the traps was almost exclusively CO₂ and the maximum radioactivity recovered in the CO₂ trap was 0.35% in the silty loam soil. Minimal radioactivity was recovered in the water (maximum of 2.5% in the silty loam). After 64 days, the amount of TBBPA remaining in the soil was 43.7 - 57.0%, 53.4 to 65.0% and 89.5 to 90.6% in the sandy loam, silty loam, and clay loam, respectively. Three major degradation products were detected in the sandy loam and which did not resemble the dimethyl or diethyl presumed metabolites. In the other 2 soil types, 2 of these same unknown metabolites were observed. A radiochemical mass balance showed recovery ranged from 82-117%. Efficiency of extraction varied for each soil type. Recovered radioactivity after the Soxhlet extraction were 87.5 and 104.7% (mean) for the sandy and clay loam, respectively. In the silty loam soil, 48.3% was recovered.", "TBBPA was susceptible to biodegradation in soils under anaerobic conditions with an estimated half-life of approximately 50 days. ¹⁴C-CO₂ production was negligible. Two or 3 degradation products, depending on soil type, were detected. Although these degradation products were not definitively identified, the O,O-dimethyl and O,O-diethyl derivatives of TBBPA were ruled out.", "High", "This test was performed under a TSCA test rule.", "This study was sponsored by the Brominated Flame Retardant Industry Panel.", "Fackler, P. Determination of the biodegradability of tetrabromobisphenol A in soil under anaerobic conditions. SLS Report: 88-11-2849. 1989. Springborn Life Sciences, Inc. Wareham, Mass. Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995.", "Y"6022001145747.00,3,12/11/01 0:00:00,"¹⁴C-TBBPA (UL-14C), specific activity of 9.32 mCi/mole. Radiopurity of 96.0%. Synthesized by Midwest Research Institute, Kansas City, Missouri.", "OECD Guideline 209", "aerobic", "Yes", 1989, 56, "Those organisms naturally present in sediment.", "Each test system was an Erlenmeyer flask

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connected to a series of traps for evolved gases. The flasks were maintained in the dark and held at 25 +/- 2 degrees C in a water bath. Ninety three flask, three replicates for each concentration (10, 100 and 1000 ug/L) and sampling interval (days 0, 4, 7, 10, 14, 21, 28, 42 and 56) were established at test initiation. Additionally, triplicate sterile control vassles were established with addition of HgCl2 for sampling at alternate intervals. Sediment (obtained from a small spring-fed brook in Mass), appr. 40 ml corresponding to appr. 20 g dry wt, was added to each

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","TestType","GLP","Year","ContTime","Inoculum","MethodRem","Prec","DegValue","Upper","Unit","TimeFrame","BreakdownProd","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%.",,"EPA OPPTS Method 835.3200: Ready Biodegradability, Closed Bottle Test; OECD Guideline 301D","aerobic","Yes",1996,28,"activated sludge, domestic, adapted","The test contained an inoculum control group, a reference group and a treatment group. The blank control, reference, and treatment groups contained ten replicate test chambers. The inoculum control was used to measure the dissolved oxygen consumption of the inoculum and was not dosed with a carbon source. The reference chambers were dosed with sodium benzoate, a substance known to be biodegradable, at a concentration of 2 mg/L. The treatment group test chambers were used to evaluate the test substance at 7.7 mg/L. Measurements of oxygen consumption were performed on two test chambers from the control, reference and treatment groups on days 0, 7, 14, 21, and 28. The test inoculum was secondary clarifier supernatant collected from Prospect Bay Wastewater Treatment Facility, Grasonville, MD. The theoretical oxygen demand value used to calculate the percent degradation of the test substance was 0.75 mg O₂/mg.",,"=",0,0,"Days",28,"No","The temperature range recorded during the test was 18-20 degrees C. The result of the standard plate count performed on the inoculum was 3.7 x 10⁴ CFU/ml. The average oxygen uptake exhibited by the control, reference, and treatment groups was measured at 0, 7, 14, 21 and 28 days. The oxygen depletion of the inoculum control was less than or equal to 1.5 mg O₂/L. Degradation of the test substance was not observed over the 28-day test period. The viability of the inoculum and validity of the test was supported by the results of the reference substance, sodium benzoate, degrading approximately 94%. An average percent biodegradation of > 60% was achieved by day 7, thereby fulfilling the criteria for a valid test.",,"Degradation of the test substance, HBCD, at 7.7 mg/L was not observed over the 28-day test period.",,"High","This study was performed according to current guidelines and Good Laboratory Practices by a laboratory with considerable experience with these studies. Extensive attention was paid to analytical method development and performance.",,"Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel.",,"Schaefer, E and Haberlein, D. (1996) Hexabromocyclododecane (HBCD): Closed Bottle Test. Project No.: 439E-102. Wildlife International Ltd. Easton, MD.",,"Y"6022001145747.00,1,12/10/01 0:00:00,"14C-Tetrabromobisphenol A (TBBPA) (specific activity 12.9 mCi/mmol). Synthesized by Chemsyn Science Laboratories, Lenexa, KS. TBBPA, 99.06% purity, obtained from Great Lakes Chemical Corp. 14C-O,O' dimethyl-TBBPA; 14C-O,O' diethyl-TBBPA (presumed metabolites). Synthesized by Chemsyn Science Laboratories, Lenexa, KS.",,"Not specified.",,"aerobic","Yes",1989,64,"Those present in the natural soils.",,"This study investigated the biodegradability of TBBPA in 3 different soil types under aerobic conditions. The three soil types were sandy loam, clay loam, and silty loam. Twelve test systems, four replicates for each soil type, were used. Each test system consisted of a 250 ml glass Erlenmeyer flask to which a 50 ml round bottom glass tube was fused. The study was conducted in the dark. About 50 mg (dry wt) of soil were added to each flask, and 100 uL of the test solution was added to each. After mixing, the flasks were sealed and incubated at 21.5 +/- 1 degree centigrade. Evolved gas was collected on a hydroxide trapping solution. On days 1,2,4,8,16,32 and 64 the KOH solution was collected and aliquots quantitated. At test termination, the soil was combusted and the radioactive CO₂ trapped and counted via liquid scintillation. Prior to soil extraction, duplicate aliquots of each soil were analyzed for moisture determination. Two replicates from each soil type were extracted by Soxhlet extraction for at least 16 hrs. Thin layer chromatography was used in an attempt to identify metabolites. A mass balance was performed.",,"range",18,64,"Days",64,"Yes","The major portion of the applied radioactivity was recovered in the soil. No radioactivity was detected in the volatile plugs after Soxhlet extraction. The maximum radioactivity recovered in the CO₂ trap was 5.5% in the clay loam soil. After 64 days, the amount of TBBPA remaining in the soil was 74.3-81.9%, 35.9-40.1% and 41.1-43.2% for the sandy loam, silty loam, and clay loam, respectively. In all soil replicates, 2 biodegradation products were detected that resembled each other in TLC mobility characteristics, but not that of the dimethyl or diethyl derivatives of TBBPA. In addition, a third unknown degradation product was detected in one replicate of the silty loam soil. A radiochemical mass

balance showed appr. 80% recovery for the sandy and clay loams, and 60% for the silty loam. The lower recovery for the silty loam is probably due to inhomogeneity in the distribution of the radioactivity. Efficiency of extraction varied for each soil type. Recovered radioactivity after the Soxhlet extraction were 52.4 - 56.1%, 45.5 - 48.6%, and 10.1 - 18.6% for the sandy loam, the silty loam, and the clay loam, respectively.", "TBBPA was susceptible to biodegradation in soils under aerobic conditions with an estimated half-life of appr. 50 days. Twenty to 60% (depending on the soil type) of the initial TBBPA concentration was degraded. Some ^{14}C -CO₂ was detected, indicating TBBPA was able to undergo complete mineralization. Two major metabolites were detected. These metabolites were not the O,O-dimethyl and O,O-diethyl derivatives of TBBPA, but their exact identity was not determined.", "High", "Study performed under a TSCA test rule.", "This study was sponsored by the Brominated Flame Retardant Industry Panel.", "Fackler, P. Determination of the biodegradability of tetrabromobisphenol A in soil under aerobic conditions. SLS Report: 88-11-2848. 1989. Springborn Life Sciences, Inc. Wareham, Mass. Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995.", "Y"6022001145747.00,2,12/10/01 0:00:00," ^{14}C -Tetrabromobisphenol A (TBBPA) (specific activity 12.9 mCi/mmol). Synthesized by Chemsyn Science Laboratories, Lenexa, KS. TBBPA, 99.06% purity, obtained from Great Lakes Chemical Corp. ^{14}C -O,O' dimethyl-TBBPA; ^{14}C -O,O' diethyl-TBBPA (presumed metabolites). 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On days 1, 2, 4, 8, 16, 32 and 64 the KOH solution was collected and aliquots quantitated. At test termination, the soil was combusted and the radioactive CO₂ trapped and counted via liquid scintillation. Prior to soil extraction, duplicate aliquots of each soil were analyzed for moisture determination. Two replicates from each soil type were extracted by Soxhlet extraction for at least 16 hrs. Thin layer chromatography was used in an attempt to identify metabolites. A mass balance was performed.", "range", 9, 56, "Days", 64, "Yes", "The major portion of the applied radioactivity was recovered in the soil. Minimal radioactivity was recovered in the volatile traps. The recovered radioactivity in the traps was almost exclusively CO₂ and the maximum radioactivity recovered in the CO₂ trap was 0.35% in the silty loam soil. Minimal radioactivity was recovered in the water (maximum of 2.5% in the silty loam). After 64 days, the amount of TBBPA remaining in the soil was 43.7 - 57.0%, 53.4 to 65.0% and 89.5 to 90.6% in the sandy loam, silty loam, and clay loam, respectively. Three major degradation products were detected in the sandy loam and which did not resemble the dimethyl or diethyl presumed metabolites. In the other 2 soil types, 2 of these same unknown metabolites were observed. A radiochemical mass balance showed recovery ranged from 82-117%. Efficiency of extraction varied for each soil type. Recovered radioactivity after the Soxhlet extraction were 87.5 and 104.7% (mean) for the sandy and clay loam, respectively. In the silty loam soil, 48.3% was recovered.", "TBBPA was susceptible to biodegradation in soils under anaerobic conditions with an estimated half-life of approximately 50 days. ^{14}C -CO₂ production was negligible. Two or 3 degradation products, depending on soil type, were detected. 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The flasks were maintained in the dark and held at 25 +/- 2 degrees C in a water bath. Ninety three flask,

three replicates for each concentration (10, 100 and 1000 ug/L) and sampling interval (days 0, 4, 7, 10, 14, 21, 28, 42 and 56) were established at test initiation. Additionally, triplicate sterile control vessels were established with addition of HgCl₂ for sampling at alternate intervals. Sediment (obtained from a small spring-fed brook in Mass), appr. 40 ml corresponding to appr. 20 g dry wt, was added to each flask followed by 135 ml river water. The hydroxide trapping solution, was added to each 14C-CO₂ trap. The vessels were then dosed by delivering 10 ul of each stock solution into the aqueous phases of respective flasks. After stirring, the flasks were sealed and kept at a temperature of 25 +/- 2

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","LightSource","LightSpectr","RelIntensity","SpectrofSubst","GLP","Year","MethodRem","ConcVal","Unit","Temp","DirPrec","DirectPhotolysis","DirUpper","DirUnit","IndirPrec","IndirectPhotolysis","IndirUpper","IndirUnit","Sensitizer","SensitizerConc","SensUnit","RateConstant","BreakdownProd","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6022001145747.00,1,12/10/01 0:00:00,"14C-TBBPA [tetrabromobisphenol A (phenyl-UL-carbon 14)] with a specific activity of 9.32 mCi/mM at a radiochemical purity of > 98% synthesized by Midwest Research Institute, Kansas City, Mo.",,"Not specified.",,"UV light source",254,"two 15 watt lights",,"Unknown",1979,"Photolysis:Eight marks were evenly spaced on one side of a 20x20 cm silica gel thin layer chromatography (TLC) plate (without fluorescence dye, 0.25 mm thickness). Five ml of an acetone solution containing 2.68 mg of 14C-TBBPA were applied to each mark. The first spot was covered with aluminum foil. The plate was exposed to short wave UV light in a Chromoato-Vuea TLC viewing box. The UV light source inside the box provided a wavelength of 254 nm generated from two 15-watt lamps through a filter. The distance between the lamps and TLC plate was 23 cm. Each spot was covered with aluminum foil after a predetermined time of exposure. After all spots had been exposed the plate was developed in solvent system A (methylene chloride/n-propanol 95:5) and subjected to radioautography using Kodak no-screen X-ray film. Product Isolation: To isolate sufficient amounts of degradation products for analysis, larger amounts of 14C-TBBPA with low specific activity (~400 dpm/mg) were applied to 5 TLC plates. Thirty-six marks were evenly spaced on one side of each TLC plate (without fluorescence dye, 20 x 20 cm, 0.25 mm thickness). About 30 ug of 14C-TBBPA were applied to each spot. The plates were irradiated with UV light as previously described for a period of 5 days and then developed. After radioautography, 14C-bands were scraped, eluted with acetone and subjected to TLC analysis. The products were analyzed by mass spectrometry. Radioassay: 14C-spots on TLC plates were scraped into scintillation vials, and counted. Mass Spectrometry: direct inlet probe in the electron impact mode (EI, 70 eV) and chemical ionization mode (CI, methane). HP Model 5982A Mass Spectrometer.",3,"mg",,"Ambient",,"=",3,0,"Hours",,0,0,,,,,"14C-TBBPA was degraded rapidly and extensively by 254 nm of UV light. Its disappearance followed a biphasic curve with an initial half-life of appr. 0.12 d (2.88 hr). After exposure for 6 hrs (0.25 d) the rate of degradation decreased, and the half-life of the second phase was 1.1 d. At least 8 degradation products were detected by TLC analysis. The parent molecule and 4 of the degradation products were identified by MS. After 5 days, appr. 46% of the applied 14C-activity was recovered with the majority of the recovered 14C-activity remaining at the origin. Presumably, the remainder of the applied 14C-material volatilized from the plate surface. All degradation products were transitory, and reached a maximum after ~1d of UV irradiation and then gradually decreased upon further irradiation.",,"14C-TBBPA was degraded rapidly and extensively by 254 nm of UV light with a half-life of appr. 0.12 d (2.88 hr).",,"Reasonable.",,"Study sponsored by Velsicol Corporation.",,"Velsicol Chemical Corporation. Photolysis of Firemaster BP-4A. Testing facility: Velsicol Chemical Corporation. Project No.: 484058, Report #3. 1979.",,"N"6022001145747.00,2,12/14/01 0:00:00,"TBBPA, source not identified.",,"Not specified",,"HB 171/A (Philips)",290,,,"Not provided",,"No",1998,"Part 1. TBBPA (100 ug) was dissolved in dichloromethane and ""placed on one of the surfaces in quartz cuvette"". The solvent was evaporated and an aluminium cylinder containing hydrogen peroxide (0.5 ml) was placed in the cuvette. A glass plate covered the cuvette, and the cuvette was placed 15 cm from the light source. Eight cuvettes were illuminated for 0, 5, 21, 34, 49, 58, 72 and 100 h. The aluminium cylinder was removed and the the cuvettes were placed in a dichloromethane solution containing the internal standard, heptachlorobifenyl. The solution was analyzed by GC-MS. Part 2. To trap products from any photochemical reactions, a polyurethane foam filter was placed on top of the reaction apparatus. TBBPA was dissolved in dichloromethane (10 ml). The solution was coated on the walls of the sample compartment by rotation. The solvent was evaporated to dryness. Nitrogen was introduced over the hydrogen peroxide surface and hydroxyl radicals were formed by illumination of the hydrogen peroxide vapor. After illumination, both the PUF foam plug and the sample compartment were extracted with acetone and the solution analyzed by GC/MS.",100,"micrograms",,"Ambient",,"<",40,0,"Hours",,0,0,,,,,"The decomposition of TBBPA by UV illumination (>290 nm) in the presence of hydroxyl radicals was studied. Complete decomposition was reported over a 5-6 day period. 2,4,6-Tribromophenol (TBP) was identified as a major decomposition product. At least 20 other decomposition products containing bromine were indicated. The concentration of hydroxyl radicals was not measured, which influences the rate of decomposition. The direct photolysis half-life given above (< 40 hr) was estimated (by the person preparing this

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","LightSource","LightSpectr","RelIntensity","SpectrofSubst","GLP","Year","MethodRem","ConcVal","Unit","Temp","DirPrec","DirectPhotolysis","DirUpper","DirUnit","IndirPrec","IndirectPhotolysis","IndirUpper","IndirUnit","Sensitizer","SensitizerConc","SensUnit","RateConstant","BreakdownProd","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6022001145747.00,1,12/10/01 0:00:00,"14C-TBBPA [tetrabromobisphenol A (phenyl-UL-carbon 14)] with a specific activity of 9.32 mCi/mM at a radiochemical purity of > 98% synthesized by Midwest Research Institute, Kansas City, Mo.",,"Not specified.",,"UV light source",254,"two 15 watt lights",,"Unknown",1979,"Photolysis:Eight marks were evenly spaced on one side of a 20x20 cm silica gel thin layer chromatography (TLC) plate (without fluorescence dye, 0.25 mm thickness). Five ml of an acetone solution containing 2.68 mg of 14C-TBBPA were applied to each mark. The first spot was covered with aluminum foil. The plate was exposed to short wave UV light in a Chromoato-Vuea TLC viewing box. The UV light source inside the box provided a wavelength of 254 nm generated from two 15-watt lamps through a filter. The distance between the lamps and TLC plate was 23 cm. Each spot was covered with aluminum foil after a predetermined time of exposure. After all spots had been exposed the plate was developed in solvent system A (methylene chloride/n-propanol 95:5) and subjected to radioautography using Kodak no-screen X-ray film. Product Isolation: To isolate sufficient amounts of degradation products for analysis, larger amounts of 14C-TBBPA with low specific activity (~400 dpm/mg) were applied to 5 TLC plates. Thirty-six marks were evenly spaced on one side of each TLC plate (without fluorescence dye, 20 x 20 cm, 0.25 mm thickness). About 30 ug of 14C-TBBPA were applied to each spot. 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After illumination, both the PUF foam plug and the sample compartment were extracted with acetone and the solution analyzed by GC/MS.",100,"micrograms",,"Ambient",,"<",40,0,"Hours",,0,0,,,,,"The decomposition of TBBPA by UV illumination (>290 nm) in the presence of hydroxyl radicals was studied. Complete decomposition was reported over a 5-6 day period. 2,4,6-Tribromophenol (TBP) was identified as a major decomposition product. At least 20 other decomposition products containing bromine were indicated. The concentration of hydroxyl radicals was not measured, which influences the rate of decomposition. The direct photolysis half-life given above (< 40 hr) was estimated (by the person preparing this

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document) from a graph included in the publication.", "TBBPA was degraded upon UV illumination (>290 nm). Complete decomposition was reported over a 5-6 day period.", "Unknown", "This study is only briefly reported, and the materials and method section of the paper are missing significant details.", "Eriksson, J. And Jakobsson, E. 1998. Decomposition of Tetrabromobisphenol A in the presence of UV-light and hydroxyl radicals. Organohalogen Compounds, Vol. 23, pp 419-422.", "N"

"DSN", "TestNo", "Rev_Date", "TestSubstRem", "ChemCat", "Method", "TestType", "GLP", "Year", "MethodRem", "NominalConc", "MeasuredConc", "Prec", "HydrolysisResult", "Upper", "Unit", "pHVal", "Temp", "BreakdownProd", "ResultsRem", "ConcludingRem", "Reliability", "ReliRem", "GeneralRem", "RefRem", "Completed"6022001145747.00,1,6/18/03 0:00:00,"A hydrolysis study has not been conducted on TBBPA, and the EPIWIN software is unable to make a prediction for this chemical structure. However, if it occurs, hydrolysis is unlikely to be a significant route of environmental degradation for TBBPA due to its low water solubility.TBBPA is predicted to partition to soil and sediment if released to the environment. Based on a release of 1,000 kg/hr to air, water and soil, the predicted partitioning is: air - 0.0000004%, water - 1.13%, soil - 44.9%, and sediment - 53.9% (Level III Fugacity Model, EPIWIN V3.04, Syracuse Research Corporation). The majority would be reacted in sediment and soil (83.9%) with only 16.1% of the total able to undergo advection. TBBPA is expected to be essentially immobile in soil, where it can undergo degradation." ,,,,,,,0,0,,0,, "State the percent degradation at a specified pH and temperature after specified time." ,,,,,,"N"16122003094258.0,1,1/8/04 0:00:00,"1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, 2-(2-hydroxyethoxy)ethyl 2-hydroxypropyl ester", "Estimated", "Abiotic", "No",2003,"The aqueous hydrolysis rate constants were estimated by the HYDROWIN module of EPIwin. Only the molecular structure was entered into the program.", "Not applicable", "Not applicable", "=",1,0,"Days",8,"25 degrees C", "Unknown", "The program selected the chemical class 'esters' for the estimation. HYDROWIN calculates a base-catalyzed rate constant for esters. For most esters, the base-catalyzed rate constant is dominant.", "The estimated hydrolysis rate constant (Kb) for pH > 8 is 5.886 L/mol-sec. The estimated half-life at pH 8 is 1.363 days. The estimated half-life at pH 7 is 13.629 days." ,,"Fragments(s) on this compound were not available from the fragment library and substitute(s) were used. Also, ortho-position fragment(s) on phenyl ring were not considered by the model." ,,"All estimations were performed using EPI WIN Suite, V.3.04, Syracuse Research Corporation, North Syracuse, New York." , "Y"6042001084614.00,1,3/1/04 0:00:00,"HBCD is not expected to undergo hydrolysis nor would hydrolysis be a significant route of environmental degradation due to HBCD's negligible water solubility (3.4 ug/L) and its minimal partitioning to this media (2.1%)." ,,,,,,,0,0,,0,,,,,,,"N"

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"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","TestType","GLP","Year","MethodRem","NominalConc","MeasuredConc","Prec","HydrolysisResult","Upper","Unit","pHVal","Temp","BreakdownProd","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","TestType","Year","MethodRem","Media","DistributionConc","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6042001084614.00,1,12/18/01 0:00:00,"Hexabromocyclododecane (HBCD)","","Developed by D. Mackay and co-workers","Level III fugacity model",2001,"Model Used: Level III Fugacity Model (Full-Output), EPIWIN V3.04Input parameters: chemical structure only; model default parameters accepted; model based on emissions of 1000 kg/hr each to air, water and soil.", "Air: 0.000685%; Water: 2.06%; Soil: 40.1%; Sediment: 57.9%","Not provided by model.", "Estimated by model:Soil Koc: 2.25 x 10+7Vapor Pressure: 1.68 x 10-8 mmHgLiquid VP: 5.74 x 10-7 mm Hg (super-cooled)Melting Pt: 180 deg CLog Kow: 7.74Henry's LC: 6.43 x 10-11 atm-m3/mole", "If released at equal rates to air, water and soil, HBCD is predicted to partition primarily to sediment (appr. 58%) and soil (appr. 40%). Only appr. 2% would partition to water with only trace (appr. 0.0007%) amounts to air. Appr. 90% would be reacted with only appr. 11% advected. The model was also run 7 times using all permutations of air, water and soil emission rates as either 0 or 1000 kg/hr. The results were as follows. If released solely to air, the model predicted HBCD would partition appr. two-thirds to soil and one-third to sediment; 97% reacted. If released solely to water, HBCD would partition to sediment; total reacted = 71%. If released solely to soil, HBCD would remain in soil; total reacted = 100%. If released at equal rates to both air and water, HBCD would partition two-thirds to sediment and one-third to soil; total reacted = 84%. If released at equal rates to both air and soil, HBCD would partition appr. 80% to soil and 12% to sediment; total reacted = 98%. If released to water and soil, HBCD would partition two-thirds to sediment and one-third to soil; total reacted = 86%.Based on the above, HBCD is not expected to move from water, soil or sediment to air. Furthermore, HBCD is not expected to move from soil into water.", "High",,, "Level III Fugacity Model, EPIWIN V3.04, Syracuse Research Corporation, Syracuse, NY.", "Y"6022001145747.00,1,12/19/01 0:00:00,"Tetrabromobisphenol A (TBBPA)","","Developed by D. Mackay and co-workers","Level III fugacity model",2001,"Model Used: Level III Fugacity Model (Full- Output), EPIWIN V3.04Input Parameters: chemical structure only; model default parameters accepted; model based on emissions of 1000 kg/Hr each to air, water and soil", "Air: 4.34 x 10-7%; Water: 1.13%; Soil: 44.9%; Sediment: 53.9%","Not provided by model.", "Estimated by model:Soil Koc: 6.5 x 10+6Vapor Pressure: 0.000135 mm HgLiquid VP: 0.00838 mm Hg (super-cooled)Melting Pt: 206 deg CLog Kow: 7.2Henry's LC: 2.31 x 10-13 atm-m3/mole", "If released at equal rates to air, water, and soil, TBBPA is predicted to partition primarily to sediment (appr. 54%) and soil (appr. 45%). Only trace amounts would partition to water (1%) and air (4 x 10-7%). Approximately 84% would be reacted with only 16% advected. The model was also run 7 times using all permutations of air, water and soil emission rates as either 0 or 1000 kg/hr. The results were as follows. If released solely to air, the model predicted TBBPA would partition appr. 80% to soil and 20% to sediment; total reacted = 96%. If released solely to water, TBBPA would partition 98% to sediment and 2% to water; total reacted = 56%. If released solely to soil, TBBPA would partition to soil (99.9%); total reacted = 100%. If released at equal rates to both air and water, TBBPA would partition 73% to sediment and 24% to soil; total reacted = 76%. If released at equal rates to both air and soil, TBBPA would partition 88% to soil and 12% to sediment; total reacted = 98%. If released at equal rates to both water and soil, TBBPA would partition 70% to sediment, 28% to soil, and 3% to water; total reacted = 78%.Based on the above, TBBPA is not expected to move from water, soil or sediment to air. Furthermore, TBBPA is not expected to move from soil to water.", "High",,, "Level III Fugacity Model, EPIWIN V3.04, Syracuse Research Corporation, Syracuse, NY.", "Y"16122003094258.0,1,12/16/03 0:00:00,"1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, 2-(2-hydroxyethoxy)ethyl 2-hydroxypropyl ester",, "Estimated", "Level III fugacity model",2003,"The transport between environmental compartments and environmental partitioning was estimated using a Level III Fugacity Model, EPIwin. Only the molecule structure was entered into the program.Emissions to air, water, soil and sediment set at 1000, 1000, 1000 and 0 kg/hr, respectively", "Air 0.0008%, Water 15.6%; Soil 82.3%; Sediment 2.04%", "Fugacity (atm): Air 4.39 x 10-20, Water 1.6 x 10-21, Soil 1.4 x 10-21, Sediment 1.6 x 10-21Reaction (kg/hr): Air 3.27, Water 358, Soil 1.9 x10+3, Sediment 12Advection (kg/hr): Air 0.4, Water 743, Soil 0, Sediment 2Reaction (%): Air 0.1, Water 12, Soil 63, Sediment 0.4Advection (%): Air 0.01, Water 25, Soil 0, Sediment 0.06", "Henry's LC: 2.74 x 10 (-16) atm-m3/moleVapor Presss: 2.37 x 10 (-14) mm HgLiquid VP: 2.53 x 10 (-12) mm Hg (super-cooled)Melting Pt: 230 deg CLog Kow: 3.83 Soil Koc: 2.77 x 10 (+3)", "If released to the environment, the molecule is expected to partition to soil (82%). Predicted partitioning to water (15%) and sediment (2%) are much less. Negligible partitioning is anticipated to air

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","TestType","Year","MethodRem","Media","DistributionConc","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6042001084614.00,1,12/18/01 0:00:00,"Hexabromocyclododecane (HBCD)",,"Developed by D. Mackay and co-workers","Level III fugacity model",2001,"Model Used: Level III Fugacity Model (Full-Output), EPIWIN V3.04Input parameters: chemical structure only; model default parameters accepted; model based on emissions of 1000 kg/hr each to air, water and soil.", "Air: 0.000685%; Water: 2.06%; Soil: 40.1%; Sediment: 57.9%","Not provided by model.", "Estimated by model:Soil Koc: $2.25 \times 10^{+7}$ Vapor Pressure: 1.68×10^{-8} mmHgLiquid VP: 5.74×10^{-7} mm Hg (super-cooled)Melting Pt: 180 deg CLog Kow: 7.74Henry's LC: 6.43×10^{-11} atm-m³/mole", "If released at equal rates to air, water and soil, HBCD is predicted to partition primarily to sediment (appr. 58%) and soil (appr. 40%). Only appr. 2% would partition to water with only trace (appr. 0.0007%) amounts to air. Appr. 90% would be reacted with only appr. 11% advected.The model was also run 7 times using all permutations of air, water and soil emission rates as either 0 or 1000 kg/hr. The results were as follows. If released solely to air, the model predicted HBCD would partition appr. two-thirds to soil and one-third to sediment; 97% reacted. If released solely to water, HBCD would partition to sediment; total reacted = 71%. If released solely to soil, HBCD would remain in soil; total reacted = 100%. If released at equal rates to both air and water, HBCD would partition two-thirds to sediment and one-third to soil; total reacted = 84%. If released at equal rates to both air and soil, HBCD would partition appr. 80% to soil and 12% to sediment; total reacted = 98%. If released to water and soil, HBCD would partition two-thirds to sediment and one-third to soil; total reacted = 86%.Based on the above, HBCD is not expected to move from water, soil or sediment to air. Furthermore, HBCD is not expected to move from soil into water.", "High",,"Level III Fugacity Model, EPIWIN V3.04, Syracuse Research Corporation, Syracuse, NY.", "Y"6022001145747.00,1,12/19/01 0:00:00,"Tetrabromobisphenol A (TBBPA)",,"Developed by D. Mackay and co-workers", "Level III fugacity model",2001,"Model Used: Level III Fugacity Model (Full- Output), EPIWIN V3.04Input Parameters: chemical structure only; model default parameters accepted; model based on emissions of 1000 kg/Hr each to air, water and soil", "Air: 4.34×10^{-7} %; Water: 1.13%; Soil: 44.9%; Sediment: 53.9%","Not provided by model.", "Estimated by model:Soil Koc: $6.5 \times 10^{+6}$ Vapor Pressure: 0.000135 mm HgLiquid VP: 0.00838 mm Hg (super-cooled)Melting Pt: 206 deg CLog Kow: 7.2Henry's LC: 2.31×10^{-13} atm-m³/mole", "If released at equal rates to air, water, and soil, TBBPA is predicted to partition primarily to sediment (appr. 54%) and soil (appr. 45%). Only trace amounts would partition to water (1%) and air (4×10^{-7} %). Approximately 84% would be reacted with only 16% advected.The model was also run 7 times using all permutations of air, water and soil emission rates as either 0 or 1000 kg/hr. The results were as follows. If released solely to air, the model predicted TBBPA would partition appr. 80% to soil and 20% to sediment; total reacted = 96%. If released solely to water, TBBPA would partition 98% to sediment and 2% to water; total reacted = 56%. If released solely to soil, TBBPA would partition to soil (99.9%); total reacted = 100%. If released at equal rates to both air and water, TBBPA would partition 73% to sediment and 24% to soil; total reacted = 76%. If released at equal rates to both air and soil, TBBPA would partition 88% to soil and 12% to sediment; total reacted = 98%. If released at equal rates to both water and soil, TBBPA would partition 70% to sediment, 28% to soil, and 3% to water; total reacted = 78%.Based on the above, TBBPA is not expected to move from water, soil or sediment to air. Furthermore, TBBPA is not expected to move from soil to water.", "High",,"Level III Fugacity Model, EPIWIN V3.04, Syracuse Research Corporation, Syracuse, NY.", "Y"

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ted"

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6042001084614.00,1,4/6/01 0:00:00,"The test substance consisted of various commercial products.",,"Not specified.",,"Unknown",1994,,,"range",175,195,"§C","Yes","No",,"Various melting points have been reported for different products: 175-183 degrees C (Saytex HBCD-LM); 187-195 degrees C (Saytex-HM), 190 degrees C (GLCC product).",,"HBCD is a solid at room temperature whose melting point varies with composition.",,"Good",,"The melting point data was provided by commercial manufacturers of the substance.",,"IUCALID Dataset. Substance ID: 25637-99-4. 18-Feb-2000.",,"Y"6022001145747.00,1,12/11/01 0:00:00,"The commercial TBBPA product supplied by Albemarle Corporation.",,"Not specified.",,"Unknown",2000,,,"=",181,0,"§C","No","No",,"TBBPA's melting point is 181 degrees C.",,"Albemarle Corporation Technical Data Sheet. Available on-line at <http://www.albemarle.com>.",,"Y"16122003094258.0,1,1/8/04 0:00:00,"1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, 2-(2-hydroxyethoxy)ethyl 2-hydroxypropyl ester",,"Estimated","No",2003,"The melting point was estimated by the MPBPWIN module of EPIwin (v3.04). Only the molecular structure was entered into the program.",,"=",230,0,"§C","No","No",,"The estimated melting point is 230.13 degrees C.",,"All estimations on this substance were performed using EPI WIN Suite, V.3.04, Syracuse Research Corporation, North Syracuse, New York.",,"Y"

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specified.",,"Unknown",1994,,,"range",175,195,"§C","Yes","No","Various melting points have been reported for different products:
175-183 degrees C (Saytex HBCD-LM); 187-195 degrees C (Saytex-HM), 190 degrees C (GLCC product).","HBCD is a solid at
room temperature whose melting point varies with composition.",,"Good","The melting point data was provided by commercial
manufacturers of the substance.",,"IUCLID Dataset. Substance ID: 25637-99-4. 18-Feb-2000.",,"Y"6022001145747.00,1,12/11/01
0:00:00,"The commercial TBBPA product supplied by Albemarle Corporation.",,"Not
specified.",,"Unknown",2000,,,"=",181,0,"§C","No","No",,"TBBPA's melting point is 181 degrees C.",,"Albemarle Corporation
Technical Data Sheet. Available on-line at <http://www.albemarle.com>.",,"Y"

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","GLP","Year","MethodRem","Prec","LogVal","Upper","Temp","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%. Impurities were isobutanol 0.1 wt%, other unknowns 6.3 wt %. Tetrabromocyclododecane was not detected.",,"OPPTS 830.7560 Partition Coefficient (n-Octanol/Water), Generator Column Method","Yes",1997,"A single generator column was prepared for the definitive test. The column was packed with Chromosorb W HP support and loaded with an approximate 0.2% solution of the test substance in octanol. Dilutions of the test substance solution in octanol were analyzed. The column temperature was maintained at 25 +/- 0.05 degrees C and reagent water saturated with octanol was pumped through it at approximately 1 mL per min to elute the test substance. Samples of the eluate were collected and analyzed to determine the concentration of the test substance in the aqueous fractions. The analytical method consisted of extracting the aqueous samples with dichloromethane (DCM), evaporating the DCM, and reconstituting the sample residues in acetonitrile/water (50:50, v/v). Quantitation was based on the gamma isomer.", "=",5.62,0.00,"25 degrees C","HBCD's water solubility was previously determined to be 0.0034 mg/L (Stenzel and Markley, 1997). No interferences were observed at or above the limit of quantitation in the matrix blank sample. The percent recovery of the 1.00 and 10.0 ug HBCD/L matrix fortifications were 104 and 85%. The mean recovery was calculated at 95% of nominal. The nominal flow rate of reagent water through the generator column was measured prior to the start of sample collection. Flow rates were also calculated based on the volume and collection time of each sample that was analyzed. The pump setting was 1.0 mL/min and the flow rate was measured at 1.0 mL/min. The calculated flow rates for samples averaged 0.87 mL/min and ranged from 0.86 to 0.87 mL/min. The mean concentration of HBCD measured in the aqueous samples eluted from the generator column was 3.97 ug HBCD/L or 6.19 x 10⁻⁹ M (molecular weight of HBCD is 641.7 g/mole). The mean concentration of HBCD measured in the octanol stock solution samples was 1.67 g HBCD/L or 2.61 x 10⁻³ M (molecular weight of HBCD is 641.7 g/mole).","The octanol/water partition (Kow) coefficient was calculated from the following equation:
$$\text{Kow} = \frac{\text{Measured Concentration in Octanol (M)}}{\text{Measured Concentration in Aqueous Samples (M)}}$$
 Based on the results from octanol samples collected from the stock solution and aqueous samples collected from the generator column, the mean octanol/water partition coefficient (Kow) for HBCD was determined to be 4.22 x 10⁻⁵ (log Kow = 5.625).","High","This study was performed according to current guidelines and Good Laboratory Practices by a laboratory with considerable experience with these studies. Extensive attention was paid to analytical method development and performance.",,"Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel, Arlington, VA.",,"MacGregor, J and Nixon, W. (1997) Hexabromocyclododecane (HBCD): Determination of n-Octanol/Water Partition Coefficient. Project Number: 439C-104. Wildlife International LTD, Easton, MD.",,"Y"6022001145747.00,1,12/11/01 0:00:00,"The test article was a composite of the commercial TBBPA products produced by Albemarle Corp., Dead Sea Bromine Group, and Great Lakes Chemical Corp. Its composition was TBBPA 98.91%, o,p'-TBBPA 0.05%, 2,4,6-tribromophenol <0.01%, tribromobisphenol A 1.04%.",,"OPPTS 830.7560 Generator Column Method","Yes",2001,"A single generator column was prepared. The column was packed with Chromosorb W HP support and loaded with a nominal 1.0% (w/w) solution of the test substance in octanol. Dilutions of the final test substance solution in octanol were analyzed to determine the concentration of the test substance in octanol. The column temperature was maintained at 25 +/- 0.05 degrees C and reagent water saturated with octanol was pumped through it at approximately 1.0 mL per minute to elute the test substance. Samples of the eluate were collected and analyzed via HPLC/MS (single quadrupole MS detector operated in the negative, selective ion mode) to determine the concentration of the substance in the aqueous solute fraction. Chromatographic separations were achieved using a Keystone Betaqsil C-18 column.", "=",5.90,0.00,"25 degrees C","The octanol/water partition coefficient (Kow) of TBBPA was determined to 8.024 x 10E5 at 25 +/- 0.05 degrees C using the generator column method. The log Kow was calculated to be 5.903.",,"The octanol/water partition coefficient (Kow) of TBBPA was determined to 8.024 x 10E5 at 25 +/- 0.05 degrees C using the generator column method. The log Kow was calculated to be

5.903.", "High", "This study was performed according to current guidelines by a laboratory with considerable expertise.", "This study was sponsored by the ACC Brominated Flame Retardant Industry Panel.", "MacGregor, J. and Noxon, W. Determination of the n-Octanol/water partition coefficient of tetrabromobisphenol A. Project Number: 439C-129. 2001. Wildlife International, Ltd. Easton, MD.", "Y"6022001145747.00,2,12/11/01 0:00:00,"14C-TBBPA (phenyl -UL-carbon 14), Synthesized by Midwest Research Institute, Kansas City, MO. Radiochemical purity > 98%. Specific activity 9.32 mCi/mM.", "Other, Predates OECD and EPA Guidelines", "Unknown", 1978, "14C-TBBPA, n-octanol, and distilled water were added to a centrifuge tube. The tube was centrifuged at 3000 rpm for 15 minutes. Duplicate samples of the organic and aqueous phases were analyzed by liquid scintillation. The method followed that of Leo, Hansch and Elkins (1971).", "=", 4.54, 0.00, "Ambient", "The average partition coefficient of TBBPA was 34,644 (log Kow = 4.54).", "The average partition coefficient of TBBPA was 34,644 (log Kow = 4.54).", "Reasonable.", "This study is old and is not performed according to current guideline. Nonetheless, it does provide an indication of TBBPA's partition coefficient.", "Sponsored by Velsicol Company", "Velsicol Chemical Company. Partition Coefcient of Several Flame Retardants and Industrial Chemicals. Testing faciltiy: Velsicol Chemical Company. Project No. 484058, Report #3. 1979.", "Y"16122003094258.0,1,12/16/03 0:00:00,"1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, 2-(2-hydroxyethoxy)ethyl 2-hydroxypropyl ester", "Estimated", "No", 2003, "The partition coefficient was estimated by the KOWWIN module of EPIwin (v3.04). Only the moecular structure was entered into the program.", "=", 3.82, 0.00, "25", "The log Kow was estimated to be 3.82.", "All estimations on this substance were performed using EPI WIN Suite, V.3.04, Syracuse Research Corporation, North Syracuse, New York.", "Y"

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","GLP","Year","MethodRem","Prec","LogVal","Upper","Temp","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%.", "OPPTS 830.7560 Partition Coefficient (n-Octanol/Water), Generator Column Method","Yes",1997,"A single generator column was prepared for the definitive test. The column was packed with Chromosorb W HP support and loaded with an approximate 0.2% solution of the test substance in octanol. Dilutions of the test substance solution in octanol were analyzed. The column temperature was maintained at 25 +/- 0.05 degrees C and reagent water saturated with octanol was pumped through it at approximately 1 mL per min to elute the test substance. Samples of the eluate were collected and analyzed to determine the concentration of the test substance in the aqueous fractions. The analytical method consisted of extracting the aqueous samples with dichloromethane (DCM), evaporating the DCM, and reconstituting the sample residues in acetonitrile/water (50:50, v/v).", "=",5.62,0.00,"25 degrees C","HBCD's water solubility was previously determined to be 0.0034 mg/L (Stenzel and Markley, 1997). No interferences were observed at or above the limit of quantitation in the matrix blank sample. The percent recovery of the 1.00 and 10.0 ug HBCD/L matrix fortifications were 104 and 85%. The mean recovery was calculated at 95% of nominal. The nominal flow rate of reagent water through the generator column was measured prior to the start of sample collection. Flow rates were also calculated based on the volume and collection time of each sample that was analyzed. The pump setting was 1.0 mL/min and the flow rate was measured at 1.0 mL/min. The calculated flow rates for samples averaged 0.87 mL/min and ranged from 0.86 to 0.87 mL/min. The mean concentration of HBCD measured in the aqueous samples eluted from the generator column was 3.97 ug HBCD/L or 6.19 x 10⁻⁹ M (molecular weight of HBCD is 641.7 g/mole). The mean concentration of HBCD measured in the octanol stock solution samples was 1.67 g HBCD/L or 2.61 x 10⁻³ M (molecular weight of HBCD is 641.7 g/mole).", "The octanol/water partition (Kow) coefficient was calculated from the following equation:
$$\text{Kow} = \frac{\text{Measured Concentration in Octanol (M)}}{\text{Measured Concentration in Aqueous Samples (M)}}$$
 Based on the results from octanol samples collected from the stock solution and aqueous samples collected from the generator column, the mean octanol/water partition coefficient (Kow) for HBCD was determined to be 4.22 x 10⁻⁵ (log Kow = 5.625).", "High", "This study was performed according to current guidelines and Good Laboratory Practices by a laboratory with considerable experience with these studies. Extensive attention was paid to analytical method development and performance.", "Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel, Arlington, VA.", "MacGregor, J and Nixon, W. (1997) Hexabromocyclododecane (HBCD): Determination of n-Octanol/Water Partition Coefficient. Project Number: 439C-104. Wildlife International LTD, Easton, MD.", "Y"6022001145747.00,1,12/11/01 0:00:00,"The test article was a composite of the commercial TBBPA products produced by Albemarle Corp., Dead Sea Bromine Group, and Great Lakes Chemical Corp. Its composition was TBBPA 98.91%, o,p'-TBBPA 0.05%, 2,4,6-tribromophenol <0.01%, tribromobisphenol A 1.04%.", "OPPTS 830.7560 Generator Column Method","Yes",2001,"A single generator column was prepared. The column was packed with Chromosorb W HP support and loaded with a nominal 1.0% (w/w) solution of the test substance in octanol. Dilutions of the final test substance solution in octanol were analyzed to determine the concentration of the test substance in octanol. The column temperature was maintained at 25 +/- 0.05 degrees C and reagent water saturated with octanol was pumped through it at approximately 1.0 mL per minute to elute the test substance. Samples of the eluate were collected and analyzed via HPLC/MS (single quadrupole MS detector operated in the negative, selective ion mode) to determine the concentration of the substance in the aqueous solute fraction. Chromatographic separations were achieved using a Keystone Betaqsil C-18 column.", "=",5.90,0.00,"25 degrees C", "The octanol/water partition coefficient (Kow) of TBBPA was determined to 8.024 x 10⁵ at 25 +/- 0.05 degrees C using the generator column method. The log Kow was calculated to be 5.903.", "The octanol/water partition coefficient (Kow) of TBBPA was determined to 8.024 x 10⁵ at 25 +/- 0.05 degrees C using the generator column method. The log Kow was calculated to be 5.903.", "High", "This study was performed according to current guidelines by a laboratory with considerable expertise.", "This study was sponsored by the

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ACC Brominated Flame Retardant Industry Panel.", "MacGregor, J. and Noxon, W. Determination of the n-Octanol/water partition coefficient of tetrabromobisphenol A. Project Number: 439C-129. 2001. Wildlife International, Ltd. Easton, MD.", "Y"6022001145747.00,2,12/11/01 0:00:00,"14C-TBBPA (phenyl -UL-carbon 14), Synthesized by Midwest Research Institute, Kansas City, MO. Radiochemical purity > 98%. Specific activity 9.32 mCi/mM.", "Other, Predates OECD and EPA Guidelines", "Unknown", 1978, "14C-TBBPA, n-octanol, and distilled water were added to a centrifuge tube. The tube was centrifuged at 3000 rpm for 15 minutes. Duplicate samples of the organic and aqueous phases were analyzed by liquid scintillation. The method followed that of Leo, Hansch and Elkins (1971).", "=", 4.54, 0.00, "Ambient", "The average partition coefficient of TBBPA was 34,644 (log Kow = 4.54).", "The average partition coefficient of TBBPA was 34,644 (log Kow = 4.54).", "Reasonable.", "This study is old and is not performed according to current guideline. Nonetheless, it does provide an indication of TBBPA's partition coefficient.", "Sponsored by Velsicol Company", "Velsicol Chemical Company. Partition Coefcient of Several Flame Retardants and Industrial Chemicals. Testing faciltiy: Velsicol Chemical Company. Project No. 484058, Report #3. 1979.", "Y"

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"DSN", "TestNo", "Rev_Date", "TestSubstRem", "ChemCat", "Method", "GLP", "Year", "MethodRem", "Prec", "VapourPresVal", "Upper", "Unit", "Temp", "Decomposition", "ResultsRem", "ConcludingRem", "Reliability", "ReliRem", "GeneralRem", "RefRem", "Completed"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%. Impurities were isobutanol 0.1 wt%, other unknowns 6.3 wt %. Tetrabromocyclododecane was not detected.", "OECD Method 104; U.S. EPA OPPTS 830.7950 Vapor Pressure", "Yes", 1997, "The objective of this study was to determine the vapor pressure of HBCD at ambient temperature using a spinning rotor gauge (SRG). The SRG method was chosen due to the extremely low vapor pressure anticipated for this substance. The SRG system was configured with an empty 10 mL beaker in the sample chamber to make control measurements. The system baseline pressure and out-gassing rate were each measured twice. A sample of the test substance in a 10 mL beaker was placed in the sample chamber. The SRG system was used to monitor the steady-state pressure of the sample while the system was open to the vacuum pumps, and the pressure increase from the sample while the valve was closed to the pumps. The steady-state pressure and pressure increase measurements were repeated three times.", "= ", 6.27e-05, 0.00, "Pascals", "21 degrees C", "No", "The baseline pressure of the system containing an empty beaker was determined to be less than 1×10^{-7} Pa for both measurements. The technical specifications of the SRG indicated the low end of the measurement range to be 1×10^{-5} Pa. The baseline pressure was considered to be essentially zero, and indicated the system was free of contamination. The out-gassing rate (slope) was $< 1 \times 10^{-7}$ Pa/sec for both measurements. The out-gassing rate indicated there were no leaks in the system. The mean steady-state pressure of the HBCD sample was 6.166×10^{-5} based on three separate determinations. The slope of the line fit to the pressure increase data was less than the out-gassing rate of the empty system for each determination, indicating the system had achieved saturation of the gas from the HBCD sample and was leak-free. The intercept was only slightly greater than the steady-state pressure. The temperature of the system averaged 21 degrees C. The vapor pressure for each determination of the HBCD sample was calculated from the following equation: Vapor Pressure = intercept of sample - mean intercept of empty system. The mean vapor pressure of HBCD was determined to be 6.27×10^{-5} Pa with a standard deviation of 0.21×10^{-5} . The vapor pressures of di(2-ethyl-hexyl)phthalate and hexachlorobenzene were measured using the same SRG system and determined to be 4.3×10^{-5} Pa and 1.6×10^{-3} Pa, respectively. Both of these measurements were consistent with ranges found in the literature.", "Based on the results from three sets of measurements collected from the spinning rotor gauge, the vapor pressure of HBCD was determined to be 6.27×10^{-5} Pa at 21 degrees C.", "High", "This study was performed according to current guidelines and Good Laboratory Practices by a laboratory with considerable experience with these studies. Extensive attention was paid to method development and performance.", "Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel.", "Stenzel, J and Nixon, W. (1997) Hexabromocyclododecane (HBCD): Determination of the Vapor Pressure Using a Spinning Rotor Gauge. Project Number: 439C-117. Wildlife International LTD, Easton, MD.", "Y"6022001145747.00,1,12/11/01 0:00:00,"The test article was a composite of the commercial TBBPA products produced by Albemarle Corp., Dead Sea Bromine Group, and Great Lakes Chemical Corp. Its composition was TBBPA 98.91%, o,p'-TBBPA 0.05%, 2,4,6-tribromophenol <0.01%, tribromobisphenol A 1.04%.", "OECD Method 104, US EPA OPPTS 830.7950", "Yes", 2001, "The spinning rotor gauge (SRG) system was used to determine vapor pressure. The SRG measured the rotational frequency of a stainless steel ball that was magnetically suspended within a vacuum chamber. In the presence of a sample, the deceleration rate of ball rotation was proportional to the vapor pressure of the sample. Initially, the background pressure and out-gassing rate of an empty sample chamber were determined a minimum of two times in the absence of sample. The vapor pressures of a reference material and the test material were then sequentially determined at 20 ± 1.0 degrees C by measuring the pressure increase over background with the respective material loaded in the test chamber.", "< ", 1.0e-05, 0.00, "Pascals", "20 degrees c", "No", "The vapor pressure of TBBPA was determined to be $< 1.19 \times 10^{-5}$ Pa at 20 degrees C using the spinning rotor gauge method.", "The vapor pressure of TBBPA was determined to be $< 1.19 \times 10^{-5}$ Pa at 20 degrees C using the spinning rotor gauge method.", "High", "This study was performed by a laboratory with considerable expertise using current guidelines. The spinning

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rotor gauge was validated by the US National Institute of Standards and Technology.", "This study was sponsored by the ACC Brominated Flame Retardant Industry Panel.", "Lezotte, F. and Nixon, W. Determination of the vapor pressure of tetrabromobisphenol A using the spinning rotor gauge method. Project Number 439C-128. 2001. Wildlife International, Ltd, Easton, MD.", "Y"16122003094258.0,1,12/16/03 0:00:00,"1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, 2-(2-hydroxyethoxy)ethyl 2-hydroxypropyl ester", "Estimated", "No", 2003, "The vapor pressure was estimated by the MPBPWIN module of EPIwin (v3.04). Only the molecular structure was entered into the program.", "=", 2.37e-14, 0.00, "mm Hg", "25", "No", "The vapor pressure was estimated to be 2.37 x 10-14 mm Hg using the Modified Grain Method.", "All estimations were performed using EPI WIN Suite, V.3.04, Syracuse Research Corporation, North Syracuse, New York.", "Y"

"DSN", "TestNo", "Rev_Date", "TestSubstRem", "ChemCat", "Method", "GLP", "Year", "MethodRem", "Prec", "VapourPresVal", "Upper", "Unit", "Temp", "Decomposition", "ResultsRem", "ConcludingRem", "Reliability", "ReliRem", "GeneralRem", "RefRem", "Completed"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%.", "OECD Method 104; U.S. EPA OPPTS 830.7950 Vapor Pressure", "Yes", 1997, "The objective of this study was to determine the vapor pressure of HBCD at ambient temperature using a spinning rotor gauge (SRG). The SRG method was chosen due to the extremely low vapor pressure anticipated for this substance. The SRG system was configured with an empty 10 mL beaker in the sample chamber to make control measurements. The system baseline pressure and out-gassing rate were each measured twice. A sample of the test substance in a 10 mL beaker was placed in the sample chamber. The SRG system was used to monitor the steady-state pressure of the sample while the system was open to the vacuum pumps, and the pressure increase from the sample while the valve was closed to the pumps. The steady-state pressure and pressure increase measurements were repeated three times.", "=", 6.27e-05, 0.00, "Pascals", "21 degrees C", "No", "The baseline pressure of the system containing an empty beaker was determined to be less than 1×10^{-7} Pa for both measurements. The technical specifications of the SRG indicated the low end of the measurement range to be 1×10^{-5} Pa. The baseline pressure was considered to be essentially zero, and indicated the system was free of contamination. The out-gassing rate (slope) was $< 1 \times 10^{-7}$ Pa/sec for both measurements. The out-gassing rate indicated there were no leaks in the system. The mean steady-state pressure of the HBCD sample was 6.166×10^{-5} based on three separate determinations. The slope of the line fit to the pressure increase data was less than the out-gassing rate of the empty system for each determination, indicating the system had achieved saturation of the gas from the HBCD sample and was leak-free. The intercept was only slightly greater than the steady-state pressure. The temperature of the system averaged 21 degrees C. The vapor pressure for each determination of the HBCD sample was calculated from the following equation: Vapor Pressure = intercept of sample - mean intercept of empty system. The mean vapor pressure of HBCD was determined to be 6.27×10^{-5} Pa with a standard deviation of 0.21×10^{-5} . The vapor pressures of di(2-ethyl-hexyl)phthalate and hexachlorobenzene were measured using the same SRG system and determined to be 4.3×10^{-5} Pa and 1.6×10^{-3} Pa, respectively. Both of these measurements were consistent with ranges found in the literature.", "Based on the results from three sets of measurements collected from the spinning rotor gauge, the vapor pressure of HBCD was determined to be 6.27×10^{-5} Pa at 21 degrees C.", "High", "This study was performed according to current guidelines and Good Laboratory Practices by a laboratory with considerable experience with these studies. Extensive attention was paid to analytical method development and performance.", "Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel.", "Stenzel, J and Nixon, W. (1997) Hexabromocyclododecane (HBCD): Determination of the Vapor Pressure Using a Spinning Rotor Gauge. Project Number: 439C-117. Wildlife International LTD, Easton, MD.", "Y"6022001145747.00,1,12/11/01 0:00:00,"The test article was a composite of the commercial TBBPA products produced by Albemarle Corp., Dead Sea Bromine Group, and Great Lakes Chemical Corp. Its composition was TBBPA 98.91%, o,p'-TBBPA 0.05%, 2,4,6-tribromophenol $< 0.01\%$, tribromobisphenol A 1.04%.", "OECD Method 104, US EPA OPPTS 830.7950", "Yes", 2001, "The spinning rotor gauge (SRG) system was used to determine vapor pressure. The SRG measured the rotational frequency of a stainless steel ball that was magnetically suspended within a vacuum chamber. In the presence of a sample, the deceleration rate of ball rotation was proportional to the vapor pressure of the sample. Initially, the background pressure and out-gassing rate of an empty sample chamber were determined a minimum of two times in the absence of sample. The vapor pressures of a reference material and the test material were then sequentially determined at ± 1.0 degrees C by measuring the pressure increase over background with the respective material loaded in the test chamber.", "<", 1.0e-05, 0.00, "Pascals", "20 degrees c", "No", "The vapor pressure of TBBPA was determined to be $< 1.19 \times 10^{-5}$ Pa at 20 degrees C using the spinning rotor gauge method.", "The vapor pressure of TBBPA was determined to be $< 1.19 \times 10^{-5}$ Pa at 20 degrees C using the spinning rotor gauge method.", "High", "This study was performed by a laboratory with considerable expertise using current guidelines. The spinning rotor gauge was validated by

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the US National Institute of Standards and Technology.", "This study was sponsored by the ACC Brominated Flame Retardant Industry Panel.", "Lezotte, F. and Nixon, W. Determination of the vapor pressure of tetrabromobisphenol A using the spinning rotor gauge method. Project Number 439C-128. 2001. Wildlife International, Ltd, Easton, MD.", "Y"

"DSN", "TestNo", "Rev_Date", "TestSubstRem", "ChemCat", "Method", "GLP", "Year", "MethodRem", "Prec", "WatrSolVal", "Upper", "Unit", "Temp", "Descripof Sol", "PHVal", "PKAVal", "ResultsRem", "ConcludingRem", "Reliability", "ReliRem", "GeneralRem", "RefRem", "Completed"6022001145747.00,1,12/11/01 0:00:00,"The tests article was a composite of the commercial TBBPA products produced by Albemarle Corp, Dead Sea Bromine Group, and Great Lakes Chemical Corp.", "OECD Method 105 (Column Elution)", "Yes", 2000, "Two columns, filled with test substance coated on an inert carrier material, were eluted with double distilled water at different flow rates. The test was performed at 21.5 +/- 1 degree C. At each flow rate, the concentration of TBBPA in the eluate was determined via HPLC at different time intervals.", "<=", 0, 0, "mg/L", "21.5", "Insoluble", 0, 0, "At a flow rate of 23-24 ml/hr, the mean concentration was 0.82, 0.0666, 0.81, and 0.07 mg/L in the two columns. At a flow rate of 10-12 ml/hr, the mean concentration was 0.058, 0.053, 0.069, 0.056 mg/L in the two columns. At a flow rate of 5-6 ml/hr the mean concentration was 0.046 and 0.048 in the two columns. The mean concentrations were flow dependent. The highest eluate concentrations analyzed were detected in samples taken at the high flow rates (22-24 mg/L). No explanation for the decrease in water solubility found at the lower flow rate was given. Therefore, an upper value for TBBPA's water solubility was reported <= 0.08 ml. The pH of the water fraction collected for determination of flow rate varied from 7.6-8.1. The pKa of TBBPA was not determined.", "TBBPA's water solubility was reported as <= 0.08 mg/L.", "Study sponsored by Bromine Science & Environmental Forum. TBBPA's water solubility was estimated to be 0.001 mg/L using Syracuse Research Corporation's modeling software (EPIwin V3.04).", "Brekelmans, J. 2000. Determination of the water solubility of tetrabromobisphenol A. Project No. 292804. NOTOX B.V., Hetogenbosch, the Netherlands.", "N"6022001145747.00,2,12/11/01 0:00:00,"14C-TBBPA (phenyl-UL-carbon 14), 9.32 mCi/mM. Synthesized by Pathfinder Labs, St. Louis, MO. Radiochemical purity > 98%", "Predates OECD and EPA Guidelines", "Unknown", 1978, "14C-TBBPA was diluted with reference standard to achieve a suitable specific activity, and placed in a centrifuge tube (a total of 6 tubes were prepared). The solvent was evaporated to dryness, and 20 ml of distilled water added. The tubes were placed in a water bath (35 degrees C) and shaken overnight. Next, the tubes were centrifuged (12,000G) for 1 hr at 15 (2 tubes), 25 (2 tubes) or 35 (2 tubes) degrees C. Solutions were analyzed in duplicate by liquid scintillation.", "range", 1, 4, "ppm", "15, 25, 35", "Slightly soluble", 0, 0, "14C-TBBPA's water solubility at 15, 25 and 35 degrees C was determined to be 0.72, 4.16, and 1.77 ppm, respectively. The pH at which this study was conducted was not reported. The pKa of TBBPA was not determined.", "14C-TBBPA was found to be slightly soluble (0.7 - 4 ppm) in water.", "Unknown.", "TBBPA's water solubility was estimated to be 0.001 mg/L using Syracuse Research Corporation's modeling software (EPIwin V3.04).", "Velsicol Chemical Company. Water solubility of several flame retardants and industrial chemicals. Testing facility: Velsicol Chemical Company. Project 428048, Report #1. 1978.", "N"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%. Impurities were isobutanol 0.1 wt%, other unknowns 6.3 wt%. Tetrabromocyclododecane was not detected.", "OECD Method 105, U.S. EPA 40 CFR Ch. 1 Section 796.1860 Water Solubility- Generator Column Method", "Yes", 1997, "This study was performed according to OECD Method 105 and U.S. EPA 40 CFR Ch. 1 Section 796.1860 Water Solubility- Generator Column Method. A generator column was prepared. The column temperature was maintained at 25.0 degrees C and reagent water was pumped through it at approximately 2 mL per minute to elute the test substance. Samples of the eluate were collected and analyzed to determine the saturation concentration of the test substance. The flow rate of reagent water through the column was reduced to approximately half the original flow rate and the saturation concentration determined again. A brief description of the analytical method is as follows: samples were extracted using dichloromethane (DCM). The DCM was evaporated to dryness and 1.0 ml of acetonitrile/water (50:50) was added. The samples were analyzed using HPLC/UV. Quantitation was based on the gamma isomer.", "<", 1, 0, "mg/L", "25 degrees C", "Insoluble", 8, 0, "No interferences were observed at or above the limit of detection (0.5 ug HBCD/L) in any of the matrix blank or reagent blank samples. The peak area response for the matrix blanks was always below the response of the lowest calibration standard. The mean recovery from 10 matrix samples fortified at 10 ug/L was 105% (standard deviation 2.0), and ranged from 103% to 108%. The mean recovery from 10 matrix samples

fortified at 1 ug/L was 104% (standard deviation 5.2), and ranged from 100% to 110%. The 1 ug/L concentration was considered the limit of quantitation. The nominal flow rate of reagent water through the generator column was initially set at 1.0 mL/min. The initial flow rate was measured at 2.0 mL/min prior to the start of sample collection. Samples were collected at this flow rate until the solubility plateau was achieved. The calculated flow rates for samples collected at the initial flow rate averaged 1.96 mL/min (range 1.88-1.98 mL/min). After the solubility plateau was achieved, the flow rate was reduced to ~half the initial flow rate. The reduced flow rate was measured at 1.0 mL/min prior to resuming sample collection. The calculated flow rates averaged 0.92 mL/min (range 0.91-0.93). All samples collected at a nominal flow rate of 2.0 mL/min were analyzed and the solubility limit was considered to have been achieved when at least 5 consecutive samples gave similar results. The mean concentration in samples meeting this criteria was 0.0034 mg/L with a standard deviation of 0.00023. The results from analyses of samples eluted at a nominal flow rate of 1.0 mL/min found a mean HBCD concentration of 0.0033 mg/L with a standard deviation of 0.0002. The pH of the water obtained from Wildlife International Ltd's well in February/March 1997 had a mean pH of 8.3 (range 8.2-8.4). NOTE: HBCD has no ionizable groups and therefore the pKa value does not apply. A value of 0 was entered in the "pka value" field because this was a mandatory numeric field.,"The solubility of HBCD in water was determined to be 0.0034 +/- 0.0002 mg/L at 25 degrees C.,"High","This study was performed according to current guidelines and Good Laboratory Practices by a laboratory with considerable experience with these studies. Extensive attention was paid to analytical method development and performance.,"Study sponsored by the Chemical Manufacturer's Association Brominated Flame Retardant Industry Panel, Arlington, VA.,"Stenzel, J. And Markley, B. (1997) Hexabromocyclododecane (HBCD): Determination of the Water Solubility. Project Number: 439C-105. Wildlife International LTD, Easton, MD.,"N"6022001145747.00,3,10/9/03 0:00:00,"The tests article was a composite of the commercial TBBPA products produced by Albemarle Corp, Dead Sea Bromine Group, and Great Lakes Chemical Corp. The test article contained the following components: tetrabromobisphenol A 99.17%, o,p-tetrabromobisphenol A 0.05%, 2,4,6-tribromophenol - not detected, and tribromobisphenol A 0.79%.","EPA OPPTS Number 830.7860, OECD 105","Yes",2002,"The water solubility of TBBPA was determined in pH 5.0, pH 7.0, pH 9.0 buffer solutions, and in un-buffered NANOpure reagent water at a test temperature of 25.0 +/- 0.1 degrees C using the generator column method. Separate generator columns were prepared for each determination during the definitive test. The definitive generator column test consisted of generating aqueous solutions of the test substance at 3 pH's and in non-buffered reagent water by pumping water through a generator column packed with solid support material coated with the test substance. The concentration of the test substance in the saturated aqueous solutions eluted from the columns represented the water solubility at the test temperature for each determination. The flow rates on the generator columns were 1.0 and 0.5 ml/minute. The analytical method involved a direct injection HPLC/UV analysis. One matrix blank and two matrix fortifications were prepared and analyzed along with the aqueous solute samples collected from the generator column for each solubility determination.,"range",0,2,"mg/L",25 +/- 0.1,"Slightly soluble",5,9,"The mean aqueous TBBPA saturation concentrations for the pH 5.0 generator column samples collected a 1.0 and 0.5 ml/minute flow rates were 0.149 +/- 0.0039 mg TBBPA/L and 0.146 +/- 0.0057 mg TBBPA/L, respectively. The mean aqueous TBBPA saturation concentrations for the pH 7.0 generator column samples collected a 1.0 and 0.5 ml/minute flow rates were 1.27 +/- 0.0060 mg TBBPA/L and 1.26 +/- 0.0055 mg TBBPA/L, respectively. The mean aqueous TBBPA saturation concentrations for the pH 9.0 generator column samples collected a 1.0 and 0.5 ml/minute flow rates were 2.41 +/- 0.0701 mg TBBPA/L and 1.27 +/- 0.196 mg TBBPA/L, respectively. The mean aqueous TBBPA saturation concentrations for the non-buffered reagent water generator column samples collected a 1.0 and 0.5 ml/minute flow rates were 0.239 +/- 0.0024 mg TBBPA/L and 0.241 +/- 0.0008 mg TBBPA/L, respectively.,"TBBPA's mean measured water solubility in pH 5, 7 or 9 buffer were 0.148, 1.26, and 2.34 mg/L, respectively. TBBPA's water solubility in non-buffered reagent water was 0.240 mg/L.,"High","This study was performed by a laboratory experienced in performing water solubility studies with highly insoluble substances. Considerable attention was paid to analytical method development.,"This study was sponsored by the American Chemistry Council's Brominated Flame Retardant Industry Panel (BFRIP).","MacGregor J and Nixon W. 2002. Determination of water solubility of tetrabromobisphenol A. Wildlife International Ltd. Project Number: 439C-132. Wildlife International, Ltd. Easton, MD.,"N"16122003094258.0,1,12/16/03 0:00:00,"1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, 2-(2-hydroxyethoxy)ethyl 2-hydroxypropyl

file__A__HPV_Export_TBBPA_PCWatrSol_03112004125510.doc

ester", "Estimation", "No", 2003, "The water solubility was estimated by the WSKOW model of EPIwin (v3.04). Only the molecular structure was entered into the program.", "=", 0,0,"mg/L", "25", "Insoluble", 55,55, "pH and pKa are not applicable. The water solubility was estimated using a computer program.", "The estimated water solubility is 0.05697 mg/L.", "", "All estimations were performed using EPI WIN Suite, V.3.04, Syracuse Research Corporation, North Syracuse, New York.", "N"

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","GLP","Year","MethodRem","Prec","WatrSolVal","Upper","Unit","Temp","Descripof Sol","PHVal","PKAVal","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6022001145747.00,1,12/11/01 0:00:00,"The tests article was a composite of the commercial TBBPA products produced by Albemarle Corp, Dead Sea Bromine Group, and Great Lakes Chemical Corp.",,"OECD Method 105 (Column Elution)","Yes",2000,"Two columns, filled with test substance coated on an inert carrier material, were eluted with double distilled water at different flow rates. The test was performed at 21.5 +/- 1 degree C. At each flow rate, the concentration of TBBPA in the eluate was determined via HPLC at different time intervals.", "<=",0,0,"mg/L","21.5","Insoluble",0,0,"At a flow rate of 23-24 ml/hr, the mean concentration was 0.82, 0.0666, 0.81, and 0.07 mg/L in the two columns. At a flow rate of 10-12 ml/hr, the mean concentration was 0.058, 0.053, 0.069, 0.056 mg/L in the two columns. At a flow rate of 5-6 ml/hr the mean concentration was 0.046 and 0.048 in the two columns. The mean concentrations were flow dependent. The highest eluate concentrations analyzed were detected in samples taken at the high flow rates (22-24 mg/L). No explanation for the decrease in water solubility found at the lower flow rate was given. Therefore, an upper value for TBBPA's water solubility was reported <= 0.08 ml. The pH of the water fraction collected for determination of flow rate varied from 7.6-8.1. The pKa of TBBPA has not been determined.", "TBBPA's water solubility was reported as <= 0.08 mg/L.",,"Study sponsored by Bromine Science & Environmental Forum. TBBPA's water solubility was estimated to be 0.001 mg/L using Syracuse Research Corporation's modeling software (EPIwin V3.04).", "Brekelmans, J. 2000. Determination of the water solubility of tetrabromobisphenol A. Project No. 292804. NOTOX B.V., Hetogenbosch, the Netherlands.", "N"6022001145747.00,2,12/11/01 0:00:00,"14C-TBBPA (phenyl-UL-carbon 14), 9.32 mCi/mM. Synthesized by Pathfinder Labs, St. Louis, MO. Radiochemical purity > 98%",,"Predates OECD and EPA Guidelines","Unknown",1978,"14C-TBBPA was diluted with reference standard to achieve a suitable specific activity, and placed in a centrifuge tube (a total of 6 tubes were prepared). The solvent was evaporated to dryness, and 20 ml of distilled water added. The tubes were placed in a water bath (35 degrees C) and shaken overnight. Next, the tubes were centrifuged (12,000G) for 1 hr at 15 (2 tubes), 25 (2 tubes) or 35 (2 tubes) degrees C. Solutions were analyzed in duplicate by liquid scintillation.", "range",1,4,"ppm","15, 25, 35","Slightly soluble",0,0,"14C-TBBPA's water solubility at 15, 25 and 35 degrees C was determined to be 0.72, 4.16, and 1.77 ppm, respectively. The pH at which this study was conducted was not reported. The pKa of TBBPA has not been determined.", "14C-TBBPA was found to be slightly soluble (0.7 - 4 ppm) in water.", "Unknown.",,"TBBPA's water solubility was estimated to be 0.001 mg/L using Syracuse Research Corporation's modeling software (EPIwin V3.04).", "Velsicol Chemical Company. Water solubility of several flame retardants and industrial chemicals. Testing facility: Velsicol Chemical Company. Project 428048, Report #1. 1978.", "N"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%.", "OECD Method 105, U.S. EPA 40 CFR Ch. 1 Section 796.1860 Water Solubility- Generator Column Method", "Yes",1997,"This study was performed according to OECD Method 105 and U.S. EPA 40 CFR Ch. 1 Section 796.1860 Water Solubility- Generator Column Method. A generator column was prepared. The column temperature was maintained at 25.0 degrees C and reagent water was pumped through it at approximately 2 mL per minute to elute the test substance. Samples of the eluate were collected and analyzed to determine the saturation concentration of the test substance. The flow rate of reagent water through the column was reduced to approximately half the original flow rate and the saturation concentration determined again.", "<",1,0,"mg/L","25 degrees C","Insoluble",8,0,"No interferences were observed at or above the limit of detection (0.5 ug HBCD/L) in any of the matrix blank or reagent blank samples. The peak area response for the matrix blanks was always below the response of the lowest calibration standard. The mean recovery from 10 matrix samples fortified at 10 ug/L was 105% (standard deviation 2.0), and ranged from 103% to 108%. The mean recovery from 10 matrix samples fortified at 1 ug/L was 104% (standard deviation 5.2), and ranged from 100% to 110%. The 1 ug/L concentration was considered the limit of quantitation. A brief description of the analytical method is as follows: samples were extracted using dichloromethane (DCM). The DCM was evaporated to dryness and 1.0 ml of acetonitrile/water (50:50) was added. The samples were analyzed using

HPLC/UV. The nominal flow rate of reagent water through the generator column was initially set at 1.0 mL/min. The initial flow rate was measured at 2.0 mL/min prior to the start of sample collection. Samples were collected at this flow rate until the solubility plateau was achieved. The calculated flow rates for samples collected at the initial flow rate average 1.96 mL/min (range 1.88-1.98 mL/min). After the solubility plateau was achieved, the flow rate was reduced to ~half the initial flow rate. The reduced flow rate was measured at 1.0 mL/min prior to resuming sample collection. The calculated flow rates averaged 0.92 mL/min (range 0.91-0.93). All samples collected at a nominal flow rate of 2.0 mL/min were analyzed and the solubility limit was considered to have been achieved when at least 5 consecutive samples gave similar results. The mean concentration in samples meeting this criteria was 0.0034 mg/L with a standard deviation of 0.23. The results from analyses of samples eluted at a nominal flow rate of 1.0 mL/min found a mean HBCD concentration of 0.0033 mg/L with a standard deviation of 0.20. The pH of the water obtained from Wildlife International Ltd's well in February/March 1997 had a mean pH of 8.3 (range 8.2-8.4). NOTE: HBCD has no ionizable groups and therefore the pKa value does not apply. A value of 0 was entered in the "pka value" field because this was a mandatory numeric field.,"The solubility of HBCD in water was determined to be 0.0034 +/- 0.2 mg/L at 25 degrees C.,"High","This study was performed according to current guidelines and Good Laboratory Practices by a laboratory with considerable experience with these studies. Extensive attention was paid to analytical method development and performance.,"Study sponsored by the Chemical Manufacturer's Association Brominated Flame Retardant Industry Panel, Arlington, VA.,"Stenzel, J. And Markley, B. (1997) Hexabromocyclododecane (HBCD): Determination of the Water Solubility. Project Number: 439C-105. Wildlife International LTD, Easton, MD.,"N"

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","GLP","Year","Species","Strain","Sex","NumberofMales","NumberofFemales","Vehicle","Route","MethodRem","Prec","Value","Unit","DeathsperDose","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"16122003094258.0,3,2/4/04 0:00:00,"1,2-Benzenedicarboxylic acid, 3,4,5-tetrabromo-, mixed esters with diethylene glycol and propylene glycol",,"Other","Unknown",1978,"rabbit","New Zealand white","Both",2,2,"None","Dermal","The test substance was applied to clipped sites on the backs of 2 male and female albino rabbits. Just prior to dosing the sites on one male and one female were abraded; those of the other two remained intact. The test material was applied at a dose of 20,000 mg/kg and the application sites were wrapped with gauze bandaging and overwrapped with Saran Wrap and several layers of Elastoplast tape. After 24 hours, the bandages were removed and the sites washed with water and examined. Examinations were repeated daily for 14 days.", ">", 20000, "mg/kg-bw", "No animals died on test.", "No animals died, and all appeared normal during the 14-day observation period. Very slight to slight erythema, edema and atonia were noted during the observation period.", "The dermal LD50 was > 20,000 mg/kg, the highest dose tested.",,,, "Sponsored by Velsicol", "Dean W. Acute toxicity studies in rabbits and rats - PM PHT-4Diol. International Research and Development Corp. # 163-592. 29 June 1978.", "Y"6042001084614.00,1,4/10/01 0:00:00,"A form of hexabromocyclododecane (HBCD) supplied as test article by Saytex Inc. No further details are available.", "Not known.", "Unknown", 1978, "rat", "no data", "Both", 5, 5, "Corn oil", "Oral", "Albino rats in groups of ten (5M:5F), 192-260 g, were administered a single dose (10 g/kg) orally and observed for 14 days. The highest volume used was 40 ml/kg. The vehicle was corn oil", ">", 10000, "mg/kg-bw", "One of five males died on test. No females died on test.", "The oral LD50 of HBCD in the rat was > 10,000 mg/kg body weight.", "Acceptable", "This study is old and not performed according to current guidelines. Nonetheless, the results are consistent with the general lack of toxicity associated with this material in other mammalian studies. Thus, it was found acceptable.", "Sponsored by Saytex, Inc., Sayreville, NJ.", "Lewis, C and Palanker, A. (1978) Final Report. Oral LD50 (Rat). Experiment Reference No.: 78385-1. Consumer Product Testing Company Incorporated, Fairfield, NJ.", "Y"6042001084614.00,2,12/5/01 0:00:00,"A form of hexabromocyclododecane (HBCD) supplied as test article by Saytex Inc. No further details are available.", "Not known.", "Unknown", 1978, "rabbit", "New Zealand White", "Both", 3, 3, "None", "Dermal", "Method was described as that of Hagen (1959). Albino rabbits in groups of six (3M:3F), one half with abraded skin, 1.88-2.07 kg, highest dose level mechanically possible, single application dermally under occluded patch, observed for 14 days. Material used as received. Upper limit possible due to mechanical and physical limitations is 8 g/kg body weight.", ">", 8000, "mg/kg-bw", "No animals died on test.", "The dermal LD50 of HBCD in rabbits was > 8,000 mg/kg body weight.", "Acceptable.", "This study is old and not performed according to current guidelines. Nonetheless, the results are consistent with the general lack of toxicity associated with this material in other mammalian studies. Thus, it was found acceptable.", "Sponsored by Saytex, Inc., Sayreville, NJ.", "Lewis, C and Palanker, A. (1978) Final Report. Dermal LD50 (Rabbit). Experiment Reference No.: 78385-2. Consumer Product Testing Company Incorporated, Fairfield, NJ.", "Y"6042001084614.00,3,4/11/01 0:00:00,"A form of hexabromocyclododecane (HBCD) supplied as test article by Saytex Inc. No further details are available.", "Not known.", "Unknown", 1978, "rat", "no data", "Both", 5, 5, "None", "Inhalation", "Albino rats in groups of 10 (5M:5F), 233-292 g, exposed to concentrations of 200 mg/L (highest possible chamber concentration) for one hour, observed two weeks. Material used as received.", ">", 200, "mg/L(air)", "No animals died on test.", "The inhalation LC50 of HBCD in rats was > 200 mg/L for a 1 hour exposure.", "Acceptable.", "This study is old and not performed according to current guidelines. Nonetheless, the results are consistent with the general lack of toxicity associated with this material in other mammalian studies. Thus, it was found acceptable.", "Sponsored by Saytex, Inc., Sayreville, NJ.", "Lewis, C and Palanker, A. (1978) Final Report. Inhalation LC50 (Rat). Experiment Reference No.: 78385-2. Consumer Product Testing Company Incorporated, Fairfield, NJ.", "Y"6022001145747.00,1,12/9/01 0:00:00,"The test article was the commercial tetrabromobisphenol A (TBBPA) product known as Saytex RB-100 produced by Ethyl Corporation.", "Not specified", "Yes", 1981, "rat", "Sprague-Dawley", "Both", 5, 5, "methylcellulose (15 ml/kg)", "Oral", "TBBPA was administered orally by gavage in methylcellulose to 5 males and 5 female Sprague Dawley rats in a single dose of 5,000 mg/kg body weight and observed for 14 days. The rats weighed 180-280 g at initiation, and were obtained from Charles River Breeding Laboratories, Wilmington, Massachusetts. The rats were observed immediately after dosing and at 2, 4 and 24-hrs after dosing, and daily for 14 days. The rats were then sacrificed by CO2

inhalation.", ">", "5000", "mg/kg-bw", "No rats died on test.", "None of the rats died during the 14 day study. No clinical signs of toxicity were observed over the 14 day study. No gross lesions attributable to the test article were observed on necropsy.", "The oral LD50 of TBBPA in rats was > 5,000 mg/kg-bw.", "High", "This study was performed according to guidelines (EPA and GLP) current at the time of study performance by a laboratory with considerable expertise.", "This study was sponsored by Ethyl Corporation, Baton Rouge, LA. The results of this test are consistent with earlier tests. Tests performed in 1958, 1966, 1967 in Holtzman, Dublin and Wistar rats, respectively, produced acute oral LD50 values of > 50 mg/kg, > or = 10,000 mg/kg, and >50,000 mg/kg, respectively. A 1978 test in mice reported an oral LD50 of > 10,000 mg/kg. (as reported in the 1995 Environmental Health Criteria Document #173, World Health Organization, Geneva)", "Mallory, V. Acute Oral Toxicity Study in Rats (14 Day). PH 402-ET-001-81. Tetrabromo Bisphenol-A. Lot #R6/FD2. 1981.", "Y"6022001145747.00,2,12/9/01 0:00:00,"The test article was the commercial tetrabromobisphenol A (TBBPA) product known as Saytex RB-100 produced by Ethyl Corporation.", "EPA OPPTS Method", "Yes", 1981, "rabbit", "New Zealand white", "Both", 5,5, "None", "Dermal", "TBBPA was applied at 2000 mg/kg-bw to 10 rabbits (5 males, 5 females). The test article was administered directly on the skin which was abraded within 2 hrs prior to application. Twenty-four hrs prior to testing the trunk of the animals was shaved so that no less than 10% of the dorsal body surface area was available for application of the test article. Immediately prior to dosing, the skin was abraded by making 4 epidermal incisions with a clean needle through the stratum corneum, but not deep enough to disturb the derma or to produce bleeding. The test article was applied directly onto the exposed skin taking care to spread the substance evenly over the entire abraded area. Gauze followed with a rubber dam was wrapped around the application site, and the test article was held in contact with the skin for 24 hrs after which the wrapping was removed and the site washed. Observations were recorded at 2 and 4 hrs after the 24 hr exposure period, and twice daily thereafter for 14 days. All rabbits were sacrificed by intravenous sodium pentobarbital on day 14 and a gross necropsy performed.", ">", "2000", "mg/kg-bw", "None", "All animals survived through the 14 day observation period. Slight erythema and edema were observed in 1 of 10 rabbits on day 1. No other signs were visible during the 14 day study. No visible lesions were detected on gross necropsy.", "The dermal LD50 of TBBPA in rabbits was > 2000 mg/kg-bw.", "High", "This study was performed according to guidelines (EPA and GLP) current at the time of study performance by a laboratory with considerable expertise.", "This study was sponsored by Ethyl Corporation, Baton Rouge, LA. The results of this study are consistent with earlier studies conducted in female albino rabbits which reported a dermal LD50 values of >10,000 mg/kg-bw (1966) and >200 mg/kg-bw (1958) (highest dose tested). (as reported in the 1995 Environmental Health Criteria Document #173, World Health Organization, Geneva)", "Mallory, V. Acute Dermal Toxicity Study in Rabbits (14 Day). PH 422-ET-001-81. Tetrabromo Bisphenol-A. Lot #R6/FD2. 1981.", "Y"6022001145747.00,3,12/10/01 0:00:00,"TBBPA.", "Predates EPA and OECD Guidelines.", "Unknown", 1966, "rat", "Dublin", "M", 10,0, "None", "Inhalation", "A single concentration of 1,267 ppm was administered to rats in a glass exposure chamber. Test material was introduced into the test chamber by bubbling air through molten test material, maintained at 180-185 degrees C, and into the chamber at 10 L/min for 1 hr. The nominal concentration was calculated from the ratio of the weight of the material vaporized to the total volume of air bubbled through the material during the entire exposure period. Rats were weighed prior to testing and the end of the two week post-exposure. After the 14 day observation period, all rats were sacrificed.", ">", "1267", "ppm(air)", "No mortality occurred.", "There was no mortality and body weight gain was not affected.", "The 1 hr inhalation LC50 of TBBPA in rats was >1267 ppm.", "Reasonable.", "Sponsored by Michigan Chemical Co. The results of this study are consistent with other studies conducted (1967) in male and female Wistar rats, NMDI mice and guinea pigs. Five males and 5 females of each species were exposed to 50 mg TBBPA /L (aerosol) for 8 hrs in a stainless steel inhalation chamber. Animals were observed for 48 hrs and sacrificed. No mortality and no signs of toxicity occurred, and the 8 hr LC50 was reported as > 50 mg/L. (reported in World Health Organization EHC # 172, 1995, Geneva). These results are also consistent with a 1958 study in female albino rabbits (n=10) which reported an inhalation LC50 value of > 200 mg/kg-bw.", "Michigan Chemical Co., St. Louis, MI. Acute toxicity and irritation studies on tetrabromobisphenol A. Testing Facility: Hill Top Research, Inc., Miamiville, OH. Study No.: Q-38D. 1966.", "Y"6022001145747.00,4,12/14/01 0:00:00,"TBBPA", "Pre-dates OECD and EPA Guideline", "Unknown", 1967, "rats, mice, guinea pig", "Wistar rats, NMDI mice", "Both", 5,5, "none", "Inhalation", "Groups of rats, mice and guinea pigs (n=30) were exposed for 8 hours to a concentration of 50 mg/L in a stainless steel inhalation chamber. An aerosol was produced by an aerosol apparatus,

and administered into the chamber under continuous air flow throughout the 8 hr exposure period. Animals were maintained for an additional 48 hrs and then sacrificed.", ">", 50, "mg/L air", "None", "No adverse findings were detected at necropsy, and no signs of toxicity were observed throughout the study.", "The 8 hr inhalation LC50 of TBBPA in three species was > 50 mg/L air.", "High", "Sponsored by Great Lakes Chemical Corporation", "Great Lakes Chemical Corp. Acute inhalation toxicity study of tetrabromobisphenol A to rats. Testing Facility: international Bio Research, Inc., St. Louis, MO. 1967.", "Y"16122003094258.0,1,12/16/03 0:00:00,"1,2-Benzenedicarboxylic acid, 3,4,5-tetrabromo-, mixed esters with diethylene glycol and propylene glycol", "Other", "No", 1978, "rat", "Sprague-Dawley", "Both", 5,5, "corn oil", "Oral", "Observations were recorded during the first 4 hours post-dosing, at 24 hours and daily thereafter for 14 days.", ">", 10000, "mg/kg-bw", "No deaths occurred.", "The LC50 oral was > 10,000 mg/kg.", "Sponsored by Velsicol.", "Dean W. Acute toxicity studies in rabbits and rats - PM PHT-4Diol. International Research and Development Corp. # 163-592. 29 June 1978.", "Y"16122003094258.0,2,2/4/04 0:00:00,"1,2-Benzenedicarboxylic acid, 3,4,5-tetrabromo-, mixed esters with diethylene glycol and propylene glycol", "Other", "Unknown", 1978, "rat", "Charles River CD", "Both", 5,5, "Not applicable", "Inhalation", "Five male and five female rats were exposed for one hour to a saturated vapor concentration of the test substance. The concentration of the vapor was calculated to be 0.008 mg/L.", ">", 0, "mg/L(air)", "No deaths occurred during the exposure or the 14-day observation period.", "All rats were sacrificed at the end of the study and necropsied. No gross lesions were observed.", "The one hour LC50 was greater than the highest concentration tested, 0.008 mg/L. This represented a saturated concentration.", "Sponsored by Velsicol.", "Leong, B. Acute inhalation toxicity study in rats - FM PHT-4 DIOL. International Research and Development Corp. #163-599, 30 Aug 1978.", "N"

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","GLP","Year","Species","Strain","Sex","NumberofMales","NumberofFemales","Vehicle","Route","MethodRem","Prec","Value","Unit","DeathsperDose","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6042001084614.00,1,4/10/01 0:00:00,"A form of hexabromocyclododecane (HBCD) supplied as test article by Saytech Inc. No further details are available.",,"Not known.",,"Unknown",1978,"rat","no data","Both",5,5,"Corn oil","Oral","Albino rats in groups of ten (5M:5F), 192-260 g, were administered a single dose (10 g/kg) orally and observed for 14 days. The highest volume used was 40 ml/kg. The vehicle was corn oil",,">",10000,"mg/kg-bw",,"One of five males died on test. No females died on test.",,"The oral LD50 of HBCD in the rat was > 10,000 mg/kg body weight.",,"Acceptable",,"This study is old and not performed according to current guidelines. Nonetheless, the results are consistent with the general lack of toxicity associated with this material in other mammalian studies. Thus, it was found acceptable.",,"Sponsored by Saytech, Inc., Sayreville, NJ.",,"Lewis, C and Palanker, A. (1978) Final Report. Oral LD50 (Rat). Experiment Reference No.: 78385-1. Consumer Product Testing Company Incorporated, Fairfield, NJ.",,"Y"6042001084614.00,2,12/5/01 0:00:00,"A form of hexabromocyclododecane (HBCD) supplied as test article by Saytech Inc. No further details are available.",,"Not known.",,"Unknown",1978,"rabbit","New Zealand White",,"Both",3,3,"None",,"Dermal",,"Method was described as that of Hagen (1959). Albino rabbits in groups of six (3M:3F), one half with abraded skin, 1.88-2.07 kg, highest dose level mechanically possible, single application dermally under occluded patch, observed for 14 days. Material used as received. Upper limit possible due to mechanical and physical limitations is 8 g/kg body weight.",,">",8000,"mg/kg-bw",,"No animals died on test.",,"The dermal LD50 of HBCD in rabbits was > 8,000 mg/kg body weight.",,"Acceptable.",,"This study is old and not performed according to current guidelines. Nonetheless, the results are consistent with the general lack of toxicity associated with this material in other mammalian studies. Thus, it was found acceptable.",,"Sponsored by Saytech, Inc., Sayreville, NJ.",,"Lewis, C and Palanker, A. (1978) Final Report. Dermal LD50 (Rabbit). Experiment Reference No.: 78385-2. Consumer Product Testing Company Incorporated, Fairfield, NJ.",,"Y"6042001084614.00,3,4/11/01 0:00:00,"A form of hexabromocyclododecane (HBCD) supplied as test article by Saytech Inc. No further details are available.",,"Not known.",,"Unknown",1978,"rat","no data","Both",5,5,"None",,"Inhalation",,"Albino rats in groups of 10 (5M:5F), 233-292 g, exposed to concentrations of 200 mg/L (highest possible chamber concentration) for one hour, observed two weeks. Material used as received.",,">",200,"mg/L(air)",,"No animals died on test.",,"The inhalation LC50 of HBCD in rats was > 200 mg/L for a 1 hour exposure.",,"Acceptable.",,"This study is old and not performed according to current guidelines. Nonetheless, the results are consistent with the general lack of toxicity associated with this material in other mammalian studies. Thus, it was found acceptable.",,"Sponsored by Saytech, Inc., Sayreville, NJ.",,"Lewis, C and Palanker, A. (1978) Final Report. Inhalation LC50 (Rat). Experiment Reference No.: 78385-2. Consumer Product Testing Company Incorporated, Fairfield, NJ.",,"Y"6022001145747.00,1,12/9/01 0:00:00,"The test article was the commercial tetrabromobisphenol A (TBBPA) product known as Saytech RB-100 produced by Ethyl Corporation.",,"Not specified",,"Yes",1981,"rat",,"Sprague-Dawley",,"Both",5,5,"methylcellulose (15 ml/kg)",,"Oral",,"TBBPA was administered orally by gavage in methylcellulose to 5 males and 5 female Sprague Dawley rats in a single dose of 5,000 mg/kg body weight and observed for 14 days. The rats weighed 180-280 g at initiation, and were obtained from Charles River Breeding Laboratories, Wilmington, Massachusetts. The rats were observed immediately after dosing and at 2, 4 and 24-hrs after dosing, and daily for 14 days. The rats were then sacrificed by CO2 inhalation.",,">",5000,"mg/kg-bw",,"No rats died on test.",,"None of the rats died during the 14 day study. No clinical signs of toxicity were observed over the 14 day study. No gross lesions attributable to the test article were observed on necropsy.",,"The oral LD50 of TBBPA in rats was > 5,000 mg/kg-bw.",,"High",,"This study was performed according to guidelines (EPA and GLP) current at the time of study performance by a laboratory with considerable expertise.",,"This study was sponsored by Ethyl Corporation, Baton Rouge, LA. The results of this test are consistent with earlier tests. Tests performed in 1958, 1966, 1967 in Holtzman, Dublin and Wistar rats, respectively, produced acute oral LD50 values of > 50 mg/kg, > or = 10,000 mg/kg, and >50,000 mg/kg, respectively. A 1978 test in mice reported an oral LD50 of > 10,000 mg/kg. (as reported in the 1995 Environmental Health Criteria Document #173, World Health Organization, Geneva)",,"Mallory, V. Acute Oral Toxicity Study in Rats (14 Day). PH 402-ET-001-81. Tetrabromo Bisphenol-A. Lot #R6/FD2. 1981.",,"Y"6022001145747.00,2,12/9/01 0:00:00,"The test article was the commercial tetrabromobisphenol A (TBBPA) product known as

Saytech RB-100 produced by Ethyl Corporation.", "EPA OPPTS Method", "Yes", 1981, "rabbit", "New Zealand white", "Both", 5, 5, "None", "Dermal", "TBBPA was applied at 2000 mg/kg-bw to 10 rabbits (5 males, 5 females). The test article was administered directly on the skin which was abraded within 2 hrs prior to application. Twenty-four hrs prior to testing the trunk of the animals was shaved so that no less than 10% of the dorsal body surface area was available for application of the test article. Immediately prior to dosing, the skin was abraded by making 4 epidermal incisions with a clean needle through the stratum corneum, but not deep enough to disturb the derma or to produce bleeding. The test article was applied directly onto the exposed skin taking care to spread the substance evenly over the entire abraded area. Gauze followed with a rubber dam was wrapped around the application site, and the test article was held in contact with the skin for 24 hrs after which the wrapping was removed and the site washed. Observations were recorded at 2 and 4 hrs after the 24 hr exposure period, and twice daily thereafter for 14 days. All rabbits were sacrificed by intravenous sodium pentobarbital on day 14 and a gross necropsy performed.", ">", 2000, "mg/kg-bw", "None", "All animals survived through the 14 day observation period. Slight erythema and edema were observed in 1 of 10 rabbits on day 1. No other signs were visible during the 14 day study. No visible lesions were detected on gross necropsy.", "The dermal LD50 of TBBPA in rabbits was > 2000 mg/kg-bw.", "High", "This study was performed according to guidelines (EPA and GLP) current at the time of study performance by a laboratory with considerable expertise.", "This study was sponsored by Ethyl Corporation, Baton Rouge, LA. The results of this study are consistent with earlier studies conducted in female albino rabbits which reported a dermal LD50 values of >10,000 mg/kg-bw (1966) and >200 mg/kg-bw (1958) (highest dose tested). (as reported in the 1995 Environmental Health Criteria Document #173, World Health Organization, Geneva)", "Mallory, V. Acute Dermal Toxicity Study in Rabbits (14 Day). PH 422-ET-001-81. Tetrabromo Bisphenol-A. Lot #R6/FD2. 1981.", "Y"6022001145747.00, 3, 12/10/01 0:00:00, "TBBPA.", "Predates EPA and OECD Guidelines.", "Unknown", 1966, "rat", "Dublin", "M", 10, 0, "None", "Inhalation", "A single concentration of 1,267 ppm was administered to rats in a glass exposure chamber. Test material was introduced into the test chamber by bubbling air through molten test material, maintained at 180-185 degrees C, and into the chamber at 10 L/min for 1 hr. The nominal concentration was calculated from the ratio of the weight of the material vaporized to the total volume of air bubbled through the material during the entire exposure period. Rats were weighed prior to testing and the end of the two week post-exposure. After the 14 day observation period, all rats were sacrificed.", ">", 1267, "ppm(air)", "No mortality occurred.", "There was no mortality and body weight gain was not affected.", "The 1 hr inhalation LC50 of TBBPA in rats was >1267 ppm.", "Reasonable.", "Sponsored by Michigan Chemical Co. The results of this study are consistent with other studies conducted (1967) in male and female Wistar rats, NMDI mice and guinea pigs. Five males and 5 females of each species were exposed to 50 mg TBBPA /L (aerosol) for 8 hrs in a stainless steel inhalation chamber. Animals were observed for 48 hrs and sacrificed. No mortality and no signs of toxicity occurred, and the 8 hr LC50 was reported as > 50 mg/L. (reported in World Health Organization EHC # 172, 1995, Geneva). These results are also consistent with a 1958 study in female albino rabbits (n=10) which reported an inhalation LC50 value of > 200 mg/kg-bw.", "Michigan Chemical Co., St. Louis, MI. Acute toxicity and irritation studies on tetrabromobisphenol A. Testing Facility: Hill Top Research, Inc., Miamiville, OH. Study No.: Q-38D. 1966.", "Y"6022001145747.00, 4, 12/14/01 0:00:00, "TBBPA", "Pre-dates OECD and EPA Guideline", "Unknown", 1967, "rats, mice, guinea pig", "Wistar rats, NMDI mice", "Both", 5, 5, "none", "Inhalation", "Groups of rats, mice and guinea pigs (n=30) were exposed for 8 hours to a concentration of 50 mg/L in a stainless steel inhalation chamber. An aerosol was produced by an aerosol apparatus, and administered into the chamber under continuous air flow throughout the 8 hr exposure period. Animals were maintained for an additional 48 hrs and then sacrificed.", ">", 50, "mg/L air", "None", "No adverse findings were detected at necropsy, and no signs of toxicity were observed throughout the study.", "The 8 hr inhalation LC50 of TBBPA in three species was > 50 mg/L air.", "High", "Sponsored by Great Lakes Chemical Corporation", "Great Lakes Chemical Corp. Acute inhalation toxicity study of tetrabromobisphenol A to rats. Testing Facility: international Bio Research, Inc., St. Louis, MO. 1967.", "Y"

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","GLP","Year","Species","Strain","Sex","NumberofMales","NumberofFemales","Route","ExposPeriod","Frequency","Doses","ControlGroup","StatMeth","MethodRem","MatNPrec","MatNOEL","MatNUnit","MatNEffect","MatLPrec","MatLOEL","MatLUnit","MatLEffect","DevNPrec","DevNOEL","DevNUnit","DevNEffect","DevLPrec","DevLOEL","DevLUnit","DevLEffect","ActualDose","MaternalData","FetalData","StatResults","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6022001145747.00,1,12/10/01 0:00:00,"The test substance was a composite of the commercial TBBPA products produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation.",,"EPA OPPTS Method 870.3700, OECD 414","Yes",2001,"rat","CD","F",0,25,"Oral, gavage in corn oil","0-19","once/day","0, 100, 300, 1000 mg/kg-bw","Yes","See results.", "This study consisted of 3 treatment groups and 1 vehicle (corn oil) control group (25 mated female rats/group). Female CD rats were mated in-house and received TBBPA at dose levels of 0, 100, 300 and 1000 mg/kg/d by gavage in corn oil once daily at a constant volume of 5 ml/kg. The control animals received the vehicle at the same volume and dosing regimen as the treated groups. Dosing initiated on Day 0 of gestation and continued through to include Day 19 of gestation. The day on which evidence of mating was observed was considered Day 0 of gestation. Observations of the dams included clinical signs, gestational body weights, food consumption. Females were euthanized on Day 20 of gestation and given a postmortem macroscopic examination. Gross lesions were saved in 10% neutral buffered formalin for possible future examination. Gravida uterine weights and liver weights were recorded. Litters were delivered by cesarean section. The total number of corpora lutea, uterine implantations, early and late resorption, viable and nonviable fetuses, and the sex and individual weights of fetuses were recorded. All fetuses were given a gross external examination for malformations and variations. Approximately one-half of the fetuses in each litter were fixed in Bouin's solution, and the remaining fetuses were skinned and preserved in alcohol. Bouin's-fixed fetuses from control and all treated groups were examined for visceral abnormalities (freehand razor blade sectioning procedure), and the remaining fetuses from all groups were stained with Alizarin Red S and Alcian Blue and evaluated for skeletal/cartilaginous malformations and ossification variations. The maternal Day 20 gestation examinations and cesarean sections and subsequent fetal evaluations were performed blind to treatment.", "=",1000,"mg/kg-bw","Salivation due to taste of test article.", ">",1000,"mg/kg-bw","No adverse effects noted.", "=",1000,"mg/kg-bw","No adverse effects noted.", ">",1000,"mg/kg-bw","No adverse effects noted.", "As given above.", "Only effect noted was salivation, believed due to method of administration (gavage) and taste of the test article.", "No effects noted.", "See results.", "Pretest analyses confirmed that the suspensions as prepared were homogeneous and stable for at least 14 days when stored refrigerated. Periodic analysis of dosing suspensions used in the study ranged from 88 to 113% of nominal and confirmed that animals received the appropriate dose levels.No treatment-related mortality was seen. The death of 1 animal in the 300 mg/kg/d group on Gestation Day 5 was attributed to an intubation injury. All other animals survived to scheduled euthanasia.Salivation was seen among the TBBPA-treated animals, occurring most frequently at the 300 and 1000 mg/kg/d dose levels. Because of its sporadic occurrence, this was not considered to represent a direct effect of treatment with TBBPA, but more likely was in response to the taste of residual amounts of test article on the dosing catheter. No other effects of treatment were seen from the clinical examinations, and no effect of treatment was evident from gestational parameters (body weight, body weight gain, or food consumption), uterine implantation data, liver weights, or necropsy findings. Likewise, no effect of treatment was evident from fetal body weights, fetal sex distribution, or from fetal external, visceral, or skeletal examinations.Statistical methods included group pair-wise comparisons, Fisher's Exact Test, Arcsin-square-root transformation, descriptive statistics, and covariate analysis. The exact statistical test utilized was dependent on the end-point in question.", "The NOAEL for maternal and developmental toxicity was 1000 mg TBBPA/kg/d, the highest dose level evaluated, administered on gestation days 0-19.", "High", "This study was conducted according to current guidelines by a laboratory with considerable expertise.", "Study sponsored by the American Chemistry Council Brominated Flame Retardant Industry Panel.", "Schroeder, R. An oral prenatal developmental toxicity study with tetrabromobisphenol A in rats. Study No. 474-005. 2001. MPI Research, Mattawan, MI.",6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following

components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%. Impurities were as follows: Tetrabromocyclododecane 0.7%, isobutanol 0.1%, Other unknowns 9.2%.", "EPA OPPTS Method 870.3700; OECD 414", "Yes", 1999, "rat", "Sprague-Dawley", "F", 0, 25, "Oral", "6-19", "Once daily", "0, 250, 500, 1000 mg/kg body weight", "Yes", "See Remarks for Method.", "Hexabromocyclododecane (HBCD) was administered by gavage in corn oil to three groups of 25 bred Crl:CD(SD)IGS BR (Charles River Laboratories, Raleigh, NC) rats once daily from gestation days 6 through 19. Dosage levels were 250, 500 and 1000 mg/kg/day administered in a dose volume of 5 ml/kg. A concurrent control group composed of 25 bred females received the vehicle, corn oil, on a comparable regimen. Clinical observations, body weights and food consumption were recorded. On gestation day 20, a laparohysterectomy was performed on all animals. The uteri and ovaries were examined and the numbers of fetuses, early and late resorptions, total implantations and corpora lutea were recorded. Mean gravid uterine weights and net body weight changes were calculated for each group. The fetuses were weighed, sexed and examined for external soft tissue and skeletal malformations and variations. Appropriate statistical tests were used for each end point and included a one-way ANOVA with Dunnett's test, and Kruskal Wallis test with Mann-Whitney U test.", "=", 1000, "mg/kg-bw", "None", ">", 1000, "mg/kg-bw", "None", "=", 1000, "mg/kg-bw", "None", ">", 1000, "mg/kg-bw", "None", "As given above.", "No adverse effects detected.", "No adverse detected.", "See Methods.", "All maternal animals survived to the scheduled necropsy on gestation day 20. One female in the 500 mg/kg/day group delivered on gestation day 20 and was examined at the scheduled laparohysterectomy. No treatment-related clinical signs were observed at any dose level. Body weight gain and food consumption were not adversely affected at any dose level. At necropsy, no treatment-related findings were observed. Intrauterine growth and survival were unaffected by test article administration at any dose level. No treatment-related fetal malformations or developmental variations were observed in any of the treated groups.", "The no-observed-adverse-effect level for maternal toxicity and developmental toxicity was 1000 mg HBCD/kg/day administered on days 6-19 of gestation.", "High", "This study was performed according to current guidelines for repeated dose studies under Good Laboratory Practices by a laboratory experienced in the performance of studies of this type.", "Sponsored by Chemical Manufacturers Association Brominated Flame Retardant Industry Panel.", "Stump, D. (1999) A Prenatal Developmental Toxicity Study of Hexabromocyclododecane (HBCD) in Rats. Laboratory Study No.: WIL-186009. WIL Research Laboratories, Inc., Ashland, OH.", "6042001084614.00,2,12/5/01 0:00:00", "The test article was manufactured by Daiichi Kogyo Seiyaku K.K. No further information on its composition is known.", "Not specified.", "Unknown", 1985, "rat", "Wistar", "F", 0, 20, "Oral", "0-20", "Daily", "0, 0.01, 0.1 and 1% of the Diet", "Yes", "Not specified.", "The Murai et al study consisted of a 7 day dose range finding study (n=5 rats/dose group) and a combined teratogenicity-developmental study (n=20/dose group). Doses in the 7 day range finding study were 0, 0.3, 1, 3 or 10 g/kg/day. Doses as high as 10 g/kg/day produced no evidence of toxicity. A statistically significant (P<0.01) increase in liver weight was noted in groups receiving > 1 g/kg/day. Doses for the combined teratogenicity-developmental study were based on this increase in liver weight. In the combined teratogenicity-developmental study, pregnant female rats were fed diets containing 0, 0.01, 0.1, or 1% HBCD on days 0-20 of gestation. Daily doses were estimated by the authors to be 0, 5, 50 or 500 mg/kg/day and the average total dose/rat/group was estimated to be 0, 0.13, 1.28 or 12.0 g/kg. Rats were observed daily and body weight and food consumption measured. Fourteen rats from each group were sacrificed on day 20 of gestation and their fetuses were examined for toxicity or teratogenicity. Approximately 150 fetuses/dose level were examined for evidence of teratogenicity. All fetuses from all litters were examined for signs of external anomalies. Approximately 2/3 of the fetuses/dam were examined for skeletal abnormalities; the remaining fetuses from each dam were examined for any abnormalities of the internal organs. In addition, six rats from each group were allowed to deliver their litters and growth of the litters was observed until the 7th week post-parturition.", ">", 1000, "mg/kg in feed", "No adverse effects, increased liver wt at 1% dose.", ">", 1000, "mg/kg in feed", "No adverse effects.", ">", 1000, "mg/kg in feed", "No adverse effects.", "Estimated as 0, 5, 50, 500 mg HBCD /kg bd wt/day", "Only effect detected in dams was an increase in liver weight at the 1% dose level.", "No effects detected in fetuses.", "See results remarks.", "The authors' estimated the doses in the feed were equivalent to 0, 5, 50 or 500 mg HBCD /kg body weight /day. No adverse effects were detected in any treatment group with respect to maternal weight gain, food consumption, or gross appearance of internal organs. The mean liver (absolute and relative to body weight) weight in the 1% group was statistically different (higher) from the control mean. Normal development was seen in neonates carried through

to six weeks of age. There was no adverse effect of treatment on the number of corpora lutea, implants, resorptions, live fetuses, sex ratio, or body or placental weight. No fetal deaths occurred in any group. No external, skeletal or visceral malformations were detected. A few skeletal variations were detected but were of similar types and numbers in the control and treated groups. There was no significant differences between the control and treated groups in the number of implantation, live newborns, dead newborns, live newborn parturition index. The weaning and survival index was comparable in the control and treated groups. Body weight changes in the newborns was comparable in all groups.", "No reproductive or developmental effects were detected in rats at HBCD doses up to 1% in the diet (~500 mg/kg/d) administered from days 0-20 of gestation. Further, normal development was seen in neonates carried through to six weeks of age. Dose levels: 0, 0.01, 0.1, or 1% HBCD on days 0-20 of gestation [Murai estimate: 0, 5, 50 or 500 mg/kg/day]. No teratogenic effects. Normal development in neonates carried through age 6 wks. NOEL = 1% of diet.", "Good.", "One author of this study was associated with the National Institute of Hygienic Science, Osaka branch.", "Funding for this study was provided by Japan's Ministry of Health and Welfare.", "Murai, T. Kawasaki, H., Kanoh, S. 1985. Studies on the toxicity of insecticides and food additives in pregnant rats - Fetal toxicity of Hexabromocyclododecane. Pharmacometrics (Japan) 29(6):981-986.", "6022001145747.00,2,12/10/01 0:00:00,"TBBPA", "Pre-dates OECD and EPA guidelines", "Unknown", 1978, "rat", "CD", "F", 0, 5, "Oral", "6-15", "once daily", "0, 30, 100, 300, 1000, 3000 or 10,000 mg/kg-bw", "Yes", "Not specified.", "TBBPA was administered by gavage at dose levels of 0, 30, 300, 1000, 3000 or 10,000 mg/kg/d on gestation days 6-15 to groups of 5 Charles River CD female rats (15 weeks old). The rats were sacrificed on gestation day 20.", "=", 3000, "mg/kg-bw", "None.", "=", 5000, "mg/kg-bw", "Death, loose stools.", "=", 3000, "mg/kg-bw", "None.", "=", 3000, "mg/kg-bw", "None.", "As above.", "See Results", "See Results", "See Results", "Three of 5 rats in the 10,000 mg/kg/d group died, while the remaining rats in this group showed a slight decrease in body weight gain between gestation days 6 and 15; green, soft stools; and an increase in matted hair in the anogenital area. There were no signs of toxicity in rats administered doses up to and including 3000 mg/kg/d. There were no differences in the mean numbers of viable or nonviable fetuses, resorptions, implantations or corpora lutea compared with the controls.", "The maternal and fetal NOAEL for TBBPA in this study was 3000 mg/kg/d administered on gestation days 6-15.", "Reasonable.", "This study is old and likely does not conform to today's guidelines. However, TBBPA's lack of toxicity in this study at doses <= 3,000 mg/kg-bw is consistent with the 2001 BFRIP study.", "Sponsored by Great Lakes Chemical Corp.", "Godenthal EI, Jessup DC and Roadwell DE (1978). Tetrabromobisphenol A (FMBP-4A) pilot teratology study in rats. IRDC, Mattawan, MI. As described in the 1995 WHO IPCS EHC Document No. 172., Geneva.", "6022001145747.00,3,12/10/01 0:00:00,"TBBPA", "Not specified", "Unknown", 1985, "rat", "Wistar", "F", 0, 25, "Oral", "0-19", "once daily", "0, 280, 830, 2500 mg/kg/d", "Yes", "Not available.", "Pregnant Wistar rats were treated with TBBPA at dose levels of 0, 280, 830 or 2500 mg/kg/d on days 0-19 of gestation for fetal examination or to parturition for postnatal examination (21 days post-birth). Cesarean sections were performed on day 20 of gestation.", "=", 2500, "mg/kg-bw", "None.", ">", 2500, "mg/kg-bw", "None.", "=", 2500, "mg/kg-bw", "None.", ">", 2500, "mg/kg-bw", "None.", "As above.", "See results", "See results", "See results", "In dams, TBBPA did not affect the rate of pregnancy or parturition. In fetuses, TBBPA did not induce embryo/fetal toxicity, and no external, skeletal or visceral anomalies were detected. No adverse change was observed in the postnatal development (21 days post birth) of the offspring of any group.", "The maternal, fetal and neonatal NOAEL was 2,500 mg TBBPA /kg/d, the highest dose tested.", "Reasonable.", "The publication is written in Japanese, with only the data tables and abstract available in English. The lack of toxicity in this study at 2,500 mg/kg-bw is consistent with the 2001 BFRIP study.", "Noda, T., Morita, S., Ohgaki, S., Shimizu, M. And Yamada, A. Safety evaluation of chemicals for use in house-hold products (VII) - teratological studies on tetrabromobisphenol A in rats. 1985. Annual Report, 48, pp 106-12. Osaka City Institute of Public Health and Environmental Sciences.", "6022001145747.00,4,12/14/01 0:00:00,"Tetrabromo-bis-phenol A, purchased from Aldrich and recrystallized from chloroform.", "Other", "No", 1998, "mice", "NMRI", "M", 0, 0, "Oral", "single dose on postnatal day 10", "0.75 and 11.5 mg", "Yes", "ANOVA. Pairwise testing between treated and control groups: Tukey's honestly significant difference test.", "Methodology developed by the paper's authors. TBBPA (0.75 or 11.5 mg) was administered as a single oral dose to neonatal mice (n=8) on postnatal day 10. The vehicle was a 20% fat emulsion. At 2 and 4 months of age, the mice were evaluated for spontaneous behavior: locomotion (horizontal movement), rearing (vertical movement) and total activity (all types of vibration within the

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","GLP","Year","Species","Strain","Sex","NumberofMales","NumberofFemales","Route","ExposPeriod","Frequency","Doses","ControlGroup","StatMeth","MethodRem","MatNPrec","MatNOEL","MatNUnit","MatNEffect","MatLPrec","MatLOEL","MatLUnit","MatLEffect","DevNPrec","DevNOEL","DevNUnit","DevNEffect","DevLPrec","DevLOEL","DevLUnit","DevLEffect","ActualDose","MaternalData","FetalData","StatResults","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6022001145747.00,1,12/10/01 0:00:00,"The test substance was a composite of the commercial TBBPA products produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation.",,"EPA OPPTS Method 870.3700, OECD 414","Yes",2001,"rat","CD","F",0,25,"Oral, gavage in corn oil","0-19","once/day","0, 100, 300, 1000 mg/kg-bw","Yes","See results.",,"This study consisted of 3 treatment groups and 1 vehicle (corn oil) control group (25 mated female rats/group). Female CD rats were mated in-house and received TBBPA at dose levels of 0, 100, 300 and 1000 mg/kg/d by gavage in corn oil once daily at a constant volume of 5 ml/kg. The control animals received the vehicle at the same volume and dosing regimen as the treated groups. Dosing initiated on Day 0 of gestation and continued through to include Day 19 of gestation. The day on which evidence of mating was observed was considered Day 0 of gestation. Observations of the dams included clinical signs, gestational body weights, food consumption. Females were euthanized on Day 20 of gestation and given a postmortem macroscopic examination. Gross lesions were saved in 10% neutral buffered formalin for possible future examination. Gestational uterine weights and liver weights were recorded. Litters were delivered by cesarean section. The total number of corpora lutea, uterine implantations, early and late resorption, viable and nonviable fetuses, and the sex and individual weights of fetuses were recorded. All fetuses were given a gross external examination for malformations and variations. Approximately one-half of the fetuses in each litter were fixed in Bouin's solution, and the remaining fetuses were skinned and preserved in alcohol. Bouin's-fixed fetuses from control and all treated groups were examined for visceral abnormalities (freehand razor blade sectioning procedure), and the remaining fetuses from all groups were stained with Alizarin Red S and Alcian Blue and evaluated for skeletal/cartilaginous malformations and ossification variations. The maternal Day 20 gestation examinations and cesarean sections and subsequent fetal evaluations were performed blind to treatment.",,"=",1000,"mg/kg-bw","Salivation due to taste of test article.",,">",1000,"mg/kg-bw","No adverse effects noted.",,"=",1000,"mg/kg-bw","No adverse effects noted.",,">",1000,"mg/kg-bw","No adverse effects noted.",,"As given above.",,"Only effect noted was salivation, believed due to method of administration (gavage) and taste of the test article.",,"No effects noted.",,"See results.",,"Pretest analyses confirmed that the suspensions as prepared were homogeneous and stable for at least 14 days when stored refrigerated. Periodic analysis of dosing suspensions used in the study ranged from 88 to 113% of nominal and confirmed that animals received the appropriate dose levels.No treatment-related mortality was seen. The death of 1 animal in the 300 mg/kg/d group on Gestation Day 5 was attributed to an intubation injury. All other animals survived to scheduled euthanasia.Salivation was seen among the TBBPA-treated animals, occurring most frequently at the 300 and 1000 mg/kg/d dose levels. Because of its sporadic occurrence, this was not considered to represent a direct effect of treatment with TBBPA, but more likely was in response to the taste of residual amounts of test article on the dosing catheter. No other effects of treatment were seen from the clinical examinations, and no effect of treatment was evident from gestational parameters (body weight, body weight gain, or food consumption), uterine implantation data, liver weights, or necropsy findings. Likewise, no effect of treatment was evident from fetal body weights, fetal sex distribution, or from fetal external, visceral, or skeletal examinations.Statistical methods included group pair-wise comparisons, Fisher's Exact Test, Arcsin-square-root transformation, descriptive statistics, and covariate analysis. The exact statistical test utilized was dependent on the end-point in question.",,"The NOAEL for maternal and developmental toxicity was 1000 mg TBBPA/kg/d, the highest dose level evaluated, administered on gestation days 0-19.",,"High",,"This study was conducted according to current guidelines by a laboratory with considerable expertise.",,"Study sponsored by the American Chemistry Council Brominated Flame Retardant Industry Panel.",,"Schroeder, R. An oral prenatal developmental toxicity study with tetrabromobisphenol A in rats. Study No. 474-005. 2001. MPI Research, Mattawan, MI.",6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following

components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%.", "EPA OPPTS Method 870.3700; OECD 414", "Yes", 1999, "rat", "Sprague-Dawley", "F", 0, 25, "Oral", "6-19", "Once daily", "0, 250, 500, 1000 mg/kg body weight", "Yes", "See Remarks for Method.", "Hexabromocyclododecane (HBCD) was administered by gavage in corn oil to three groups of 25 bred CrI:CD(SD)IGS BR (Charles River Laboratories, Raleigh, NC) rats once daily from gestation days 6 through 19. Dosage levels were 250, 500 and 1000 mg/kg/day administered in a dose volume of 5 ml/kg. A concurrent control group composed of 25 bred females received the vehicle, corn oil, on a comparable regimen. Clinical observations, body weights and food consumption were recorded. On gestation day 20, a laparohysterectomy was performed on all animals. The uteri and ovaries were examined and the numbers of fetuses, early and late resorptions, total implantations and corpora lutea were recorded. Mean gravid uterine weights and net body weight changes were calculated for each group. The fetuses were weighed, sexed and examined for external soft tissue and skeletal malformations and variations. Appropriate statistical tests were used for each end point and included a one-way ANOVA with Dunnett's test, and Kruskal Wallis test with Mann-Whitney U test.", "=", 1000, "mg/kg-bw", "None", ">", 1000, "mg/kg-bw", "None", "=", 1000, "mg/kg-bw", "None", ">", 1000, "mg/kg-bw", "None", "As given above.", "No adverse effects detected.", "No adverse detected.", "See Methods.", "All maternal animals survived to the scheduled necropsy on gestation day 20. One female in the 500 mg/kg/day group delivered on gestation day 20 and was examined at the scheduled laparohysterectomy. No treatment-related clinical signs were observed at any dose level. Body weight gain and food consumption were not adversely affected at any dose level. At necropsy, no treatment-related findings were observed. Intrauterine growth and survival were unaffected by test article administration at any dose level. No treatment-related fetal malformations or developmental variations were observed in any of the treated groups.", "The no-observed-adverse-effect level for maternal toxicity and developmental toxicity was 1000 mg HBCD/kg/day administered on days 6-19 of gestation.", "High", "This study was performed according to current guidelines for repeated dose studies under Good Laboratory Practices by a laboratory experienced in the performance of studies of this type.", "Sponsored by Chemical Manufacturers Association Brominated Flame Retardant Industry Panel.", "Stump, D. (1999) A Prenatal Developmental Toxicity Study of Hexabromocyclododecane (HBCD) in Rats. Laboratory Study No.: WIL-186009. WIL Research Laboratories, Inc., Ashland, OH.", "6042001084614.00,2,12/5/01 0:00:00", "The test article was manufactured by Daiichi Kogyo Seiyaku K.K. No further information on its composition is known.", "Not specified.", "Unknown", 1985, "rat", "Wistar", "F", 0, 20, "Oral", "0-20", "Daily", "0, 0.01, 0.1 and 1% of the Diet", "Yes", "Not specified.", "The Murai et al study consisted of a 7 day dose range finding study (n=5 rats/dose group) and a combined teratogenicity-developmental study (n=20/dose group). Doses in the 7 day range finding study were 0, 0.3, 1, 3 or 10 g/kg/day. Doses as high as 10 g/kg/day produced no evidence of toxicity. A statistically significant (P<0.01) increase in liver weight was noted in groups receiving > 1 g/kg/day. Doses for the combined teratogenicity-developmental study were based on this increase in liver weight. In the combined teratogenicity-developmental study, pregnant female rats were fed diets containing 0, 0.01, 0.1, or 1% HBCD on days 0-20 of gestation. Daily doses were estimated by the authors to be 0, 5, 50 or 500 mg/kg/day and the average total dose/rat/group was estimated to be 0, 0.13, 1.28 or 12.0 g/kg. Rats were observed daily and body weight and food consumption measured. Fourteen rats from each group were sacrificed on day 20 of gestation and their fetuses were examined for toxicity or teratogenicity. Approximately 150 fetuses/dose level were examined for evidence of teratogenicity. All fetuses from all litters were examined for signs of external anomalies. Approximately 2/3 of the fetuses/dam were examined for skeletal abnormalities; the remaining fetuses from each dam were examined for any abnormalities of the internal organs. In addition, six rats from each group were allowed to deliver their litters and growth of the litters was observed until the 7th week post-parturition.", ">", 1000, "mg/kg in feed", "No adverse effects, increased liver wt at 1% dose.", ">", 1000, "mg/kg in feed", "No adverse effects.", ">", 1000, "mg/kg in feed", "No adverse effects.", ">", 1000, "mg/kg in feed", "No adverse effects.", "Estimated as 0, 5, 50, 500 mg HBCD /kg bd wt/day", "Only effect detected in dams was an increase in liver weight at the 1% dose level.", "No effects detected in fetuses.", "See results remarks.", "The authors' estimated the doses in the feed were equivalent to 0, 5, 50 or 500 mg HBCD /kg body weight /day. No adverse effects were detected in any treatment group with respect to maternal weight gain, food consumption, or gross appearance of internal organs. The mean liver (absolute and relative to body weight) weight in the 1% group was statistically different (higher) from the control mean. Normal development was seen in neonates carried through

to six weeks of age. There was no adverse effect of treatment on the number of corpora lutea, implants, resorptions, live fetuses, sex ratio, or body or placental weight. No fetal deaths occurred in any group. No external, skeletal or visceral malformations were detected. A few skeletal variations were detected but were of similar types and numbers in the control and treated groups. There was no significant differences between the control and treated groups in the number of implantation, live newborns, dead newborns, live newborn parturition index. The weaning and survival index was comparable in the control and treated groups. Body weight changes in the newborns was comparable in all groups." "No reproductive or developmental effects were detected in rats at HBCD doses up to 1% in the diet (~500 mg/kg/d) administered from days 0-20 of gestation. Further, normal development was seen in neonates carried through to six weeks of age. Dose levels: 0, 0.01, 0.1, or 1% HBCD on days 0-20 of gestation [Murai estimate: 0, 5, 50 or 500 mg/kg/day]. No teratogenic effects. Normal development in neonates carried through age 6 wks. NOEL = 1% of diet." "Good." "One author of this study was associated with the National Institute of Hygienic Science, Osaka branch." "Funding for this study was provided by Japan's Ministry of Health and Welfare." "Murai, T. Kawasaki, H., Kanoh, S. 1985. Studies on the toxicity of insecticides and food additives in pregnant rats - Fetal toxicity of Hexabromocyclododecane. Pharmacometrics (Japan) 29(6):981-986." "6022001145747.00,2,12/10/01 0:00:00," "TBBPA" "Pre-dates OECD and EPA guidelines," "Unknown", 1978, "rat", "CD", "F", 0,5, "Oral", "6-15", "once daily", "0, 30, 100, 300, 1000, 3000 or 10,000 mg/kg-bw", "Yes", "Not specified." "TBBPA was administered by gavage at dose levels of 0, 30, 300, 1000, 3000 or 10,000 mg/kg/d on gestation days 6-15 to groups of 5 Charles River CD female rats (15 weeks old). The rats were sacrificed on gestation day 20." "3000," "mg/kg-bw", "None." "5000," "mg/kg-bw", "Death, loose stools." "3000," "mg/kg-bw", "None." "3000," "mg/kg-bw", "None." "As above." "See Results", "See Results", "See Results", "Three of 5 rats in the 10,000 mg/kg/d group died, while the remaining rats in this group showed a slight decrease in body weight gain between gestation days 6 and 15; green, soft stools; and an increase in matted hair in the anogenital area. There were no signs of toxicity in rats administered doses up to and including 3000 mg/kg/d. There were no differences in the mean numbers of viable or nonviable fetuses, resorptions, implantations or corpora lutea compared with the controls." "The maternal and fetal NOAEL for TBBPA in this study was 3000 mg/kg/d administered on gestation days 6-15." "Reasonable." "This study is old and likely does not conform to today's guidelines. However, TBBPA's lack of toxicity in this study at doses <= 3,000 mg/kg-bw is consistent with the 2001 BFRIP study." "Sponsored by Great Lakes Chemical Corp." "Godenthal EI, Jessup DC and Roadwell DE (1978). Tetrabromobisphenol A (FMBP-4A) pilot teratology study in rats. IRDC, Mattawan, MI. As described in the 1995 WHO IPCS EHC Document No. 172., Geneva." "6022001145747.00,3,12/10/01 0:00:00," "TBBPA." "Not specified", "Unknown", 1985, "rat", "Wistar", "F", 0,25, "Oral", "0-19", "once daily", "0, 280, 830, 2500 mg/kg/d", "Yes", "Not available." "Pregnant Wistar rats were treated with TBBPA at dose levels of 0, 280, 830 or 2500 mg/kg/d on days 0-19 of gestation for fetal examination or to parturition for postnatal examination (21 days post-birth). Caesarian sections were performed on day 20 of gestation." "2500," "mg/kg-bw", "None." ">2500," "mg/kg-bw", "None." "2500," "mg/kg-bw", "None." ">2500," "mg/kg-bw", "None." "As above." "See results", "See results", "See results", "In dams, TBBPA did not affect the rate of pregnancy or parturition. In fetuses, TBBPA did not induce embryo/fetal toxicity, and no external, skeletal or visceral anomalies were detected. No adverse change was observed in the postnatal development (21 days post birth) of the offspring of any group." "The maternal, fetal and neonatal NOAEL was 2,500 mg TBBPA /kg/d, the highest dose tested." "Reasonable." "The publication is written in Japanese, with only the data tables and abstract available in English. The lack of toxicity in this study at 2,500 mg/kg-bw is consistent with the 2001 BFRIP study." "Noda, T., Morita, S., Ohgaki, S., Shimizu, M. And Yamada, A. Safety evaluation of chemicals for use in house-hold products (VII) - teratological studies on tetrabromobisphenol A in rats. 1985. Annual Report, 48, pp 106-12. Osaka City Institute of Public Health and Environmental Sciences." "6022001145747.00,4,12/14/01 0:00:00," "Tetrabromo-bis-phenol A, purchased from Aldrich and recrystallized from chloroform." "Other", "No", 1998, "mice", "NMRI", "M", 0,0, "Oral", "single dose on postnatal day 10", "0.75 and 11.5 mg", "Yes", "ANOVA. Pairwise testing between treated and control groups: Tukey's honestly significant difference test." "Methodology developed by the paper's authors. TBBPA (0.75 or 11.5 mg) was administered as a single oral dose to neonatal mice (n=8) on postnatal day 10. The vehicle was a 20% fat emulsion. At 2 and 4 months of age, the mice were evaluated for spontaneous behavior: locomotion (horizontal movement), rearing (vertical movement) and total activity (all types of vibration within the

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","GLP","Year","Species","Strain","Sex","NumberofMales","NumberofFemales","Route","ExposPeriod","Frequency","Doses","ControlGroup","PostObsPeriod","StatMeth","MethodRem","NPrec","NOAEL","NUnit","NEffect","LPrec","LOAEL","LUnit","LEffect","ActualDose","ToxicResp","StatResults","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6022001145747.00,1,12/13/01 0:00:00,"The test article was described as tetrabromobisphenol A, a white powder.",,"Pre-dates OECD and EPA test guidelines","Unknown",1972,"rat","Charles River CD","Both",25,25,"Oral, in the diet",28,"daily","0, 1, 10, 100 or 1000 ppm in the diet","Yes","yes - 2, 6, 12 weeks","Not described.",,"Groups of 25 female and 25 male Charles River CD rats (males 260-341 g, femals 183-232 g) were fed TBBPA in the diet at 0, 1, 10, 100 or 1000 ppm for 28 days. After 4 weeks, 5 rats/sex per group were sacrificed and the remaining rats placed on control diets for 2, 6 or 12 weeks. Animals were housed individually with food and water available ad libitum and observed daily. Body weights were determined once/wk. Mean food consumption was measured weekly. At the 28 day sacrifice and at the 3 recovery sacrifices, organ weights were measured and tissues collected for microscopic exam. Bromine levels were measured in liver and adipose of the control and high dose animals (5M/5F) at 28 days.Organs weighed were spleen, liver, adrenals, kidneys, testes, ovaries, heart, thyroid/parathyroid, brain and pituitary. Histopathology of the liver, kidneys and thyroids were performed on all animals at 28 days. Hematology, clinical chemistry, urinalysis were not performed.",,">=",1000,"ppm in feed","None.",,">",1000,"ppm in feed","None.",,"appr. 0, 1, 10, 100 or 1000 mg/kg bw","None.",,"See results.",,"In a 28-day oral study, no toxicity was observed in rats treated with up to 1,000 ppm TBBPA in the diet. Rat were fed at dietary dose levels of 0, 1, 10, 100 or 1000 ppm TBBPA for 28 days after which one group was sacrificed and the remaining rats placed on untreated diets for 2, 6 or 12 weeks. No effects on general appearance, behavior, body weight, food consumption or mortality were observed. No compound related gross or microscopic lesions or variations in organ weights were observed at any dose level. Liver and adipose bromine levels were comparable in rats of the control and high dose groups sacrificed at the end of the 28 day treatment period.",,"The no effect level in this 28 day study was > 1000 ppm TBBPA in the diet. Further, the bromine content of liver and adipose tissue in the control and high dose animals after 28 days of treatment were comparable.",,"Reasonable.",,"This study is old and not conducted according to current guidelines. However, it demonstrates TBBPA's lack of toxicity, and the comparable bromine content in tissues of the control and high dose groups is consistent with TBBPA's rapid metabolism and elimination (Haak et al., Xenobiotica, 2000, 30,9,881-890).",,"This study was sponsored by Great Lakes Chemical Corporation.",,"Goldenthal and Geil, 1972. Tetrabromobisphenol A. Twenty-eight day toxicity studye in ratws. Study NO. 274-010. International Research and Development Corporation, Mattawan, MI. Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)",,"Y"6022001145747.00,2,12/13/01 0:00:00,"The test article was described as tetrabromobisphenol A.",,"Pre-dates OECD and EPA guidelines","Unknown",1975,"rat","Sprague-Dawley",,"Both",5,5,"Oral, in the diet",90,"daily","0, 0.3, 3, 30, 100 mg/kg bwt","Yes","None",,"ANOVA, Dunnett's test",,"TBBPA was administered to male and female rats in their diet for 90 days. The concentrations of TBBPA in the diet were adjusted so that rats were administered 0, 0.3, 3, 30 or 100 mg/kg-bw/d. The parameters evaluated included: appearance, demeanor, body weights, food consumption, routine hematology measurements, clinical chemistry determinations (serum urea nitrogen, alkaline phosphatase activity and serum glutamic pyruvic transaminase activity), routine urinalyses, organ weights, organ-to-body weight ratios, and gross and microscopic pathological examination of tissues. Organs weighed: brain, heart, liver, kidney, testes.Histopathology in control and high dose: heart, liver, kidney, thyroid, trachea, parathyroid, lung, adrenal, spleen, pancreas, stomach, small intestine (3 levels) large intestin, gonads, uterus, urinary bladder, accessory sex glands, skeletal muscle, spinal cord, brain, eye, pituitary gland, thymus, aorta, peripheral nerve, mesenteric and mediastinal lymph nodes.The total bromine content in liver, kidney, skeletal muscle, fat and serum of rats in the control and 3 mg/kg dose group was determined at the end of the 90 day treatment period.",,">",100,"mg/kg-bw","None.",,">",100,"mg/kg-bw","None.",,"0, 0.3, 3, 30 or 100 mg/kg-bw/d","None.",,"See results",,"In a 90-day oral study, no toxicity was found in rats treated with up to 100 mg/kg bwt in the feed. No toxicological effects were detected at any dose level for appearance, demeanor, body weight gain, food consumption, hematology, clinical chemistry values, urinalysis, organ weights, and gross and microscopic examinations. The total bromine content in liver, kidney, skeletal muscle, fat and serum of rats in the 3 mg/kg dose group did not differ from that of the controls. (The 3 mg/kg group was the only group tested for total bromine content.)",,"The NOEL in this 90 day oral

toxicity study of TBBPA in the rat was greater than 100 mg/kg-bw/day, the highest dose tested. The total bromine content in liver, kidney, skeletal muscle, fat and serum of rats in the control and 3 mg/kg dose group were comparable.", "High", "This study is old and not conducted according to current guidelines. Nonetheless, the study was well conducted, and demonstrates TBBPA's lack of toxicity. Further, the comparable bromine content in tissues of the control and 3 mg/kg-bwt group is consistent with the 1972 28 day study (Goldenthal and Geil, 1972) and TBBPA's rapid metabolism and elimination (Haak et al., Xenobiotica, 2000, 30,9,881-890).", "This study was sponsored by Dow Chemical Company.", "Quast, J and Humiston, C. 1975. Results of a 90-day toxicological study in rats given tetrabromobisphenol A in the diet. Toxicology Research Laboratory, The Dow Chemical Company, Midland, MI. Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)", "Y"6022001145747.00,3,12/13/01 0:00:00,"Tetrabromobisphenol A", "Not specified", "Unknown", 1986, "mice", "B6C3F1", "Both", 10, 10, "Oral, in the diet", 90, "daily", "0, 500, 4,900, 15,600 or 50,000 ppm in the diet", "Yes", "no", "not specified", "Mice (10/sex/group) were fed TBBPA in the diet at 0, 500, 4900, 15600 or 50000 ppm in the diet for 90 days.", "=", 4900, "ppm in feed", "None.", "=", 15600, "ppm in feed", "Decreased body weight gain, red blood cells, hemoglobin, hematocrit, serum triglycerides and total serum protein.", "Not available.", "see results", "not described", "All animals in the highest dose died during the study, possibly because of malnutrition and anemia. No deaths occurred at the lower doses. Body weight gains were decreased at the 15,600 ppm dose level, although food consumption was not. Red blood cells, hemoglobin, hematocrit, serum triglycerides and total serum protein were decreased at the 15,600 ppm dose level. Organ weights were not affected, except for an increase in spleen weight at 15,600 ppm. Histopathological changes were not observed.", "The no adverse effect level in this 90 day mouse study was 4,900 ppm in the diet.", "Reasonable", "The lack of toxicity observed in mice in this 90-day study at dose of 4900 ppm (diet) and less is consistent with the lack of toxicity observed repeated dose studies in rats and rabbits.", "Tobe et al. 1986. Subchronic toxicity study of tetrabromobispheno-A: report to the Ministry of Health and Welfare (in Japanese). Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995.", "Y"6022001145747.00,4,12/13/01 0:00:00,"micronized Tetrabromobisphenol A", "Pre-dates OECD and EPA guidelines", "Unknown", 1975, "rat", "Charles River CD", "Both", 5, 5, "Inhalation", 14, "5 d/wk; 4 hr/d", "0, 2, 6 and 18 mg/L (0, 2000, 6,000, 18,000 mg/m3)", "Yes", "no", "not specified", "Rats were exposed to micronized TBBPA via whole body inhalation exposures at concentrations of 0, 2, 6, or 18 mg/L for 4 hr/d, 5 d/wk for a total of 10 exposures. Air flow and introduction of test material was dynamic and controlled by a Wright dust feeder and regulated by a flow meter. Animals were observed during each exposure, and daily for 2 weeks for general toxicity, appearance, behavior, and mortality. Body weights and food consumption were recorded weekly. At the end of the study, routine hematology, serum chemistry (BUN, glucose, SAP, SGOT, SGPT) and urinalysis was performed. Organs weighed at sacrifice were spleen, liver, adrenals, kidneys, testes, ovaries, heart, thyroid/parathyroid, and brain. Absolute and relative organ weights were determined. A gross necropsy was performed on all animals. Histopathology was performed on tissues from the control, 6 and 18 mg/L groups. Treatment groups were statistically compared to the control group by sex.", "=", 2, "mg/l air", "none", "=", 6, "mg/l air", "salivation, lacrimation, nasal discharge", "0, 2000, 6000, 18,000 mg/m3 micronized TBBPA", "see results", "see results", "No effect of treatment was found on mortality, morbidity, body weight, hematology, serum chemistries, urinalysis, gross necropsy or microscopic exams. Excessive salivation, red or clear nasal discharge and lacrimation were observed in animals at the 6 or 18 mg/L doses. Liver weights, in the absence of a dose response, were decreased in the females of all exposure concentrations compared to the control females (control = 14.45 g; 2 mg/L = 12.48 g; 6 mg/L = 12.53 g; 18 mg/L = 12.5 g).", "The no effect level for this 14 d inhalation study of micronized TBBPA in rats was 6 mg/L (2,000 mg/m3). Effects seen at higher doses were limited to salivation, lacrimation and nasal discharge.", "Reasonable", "Sponsored by Great Lakes Chemical Corporation.", "Goldenthal et al. 1975. 14-Day inhalation toxicity study in rats. Study No. 274-021. International Research and Development Corporation. Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995.", "Y"6022001145747.00,5,12/13/01 0:00:00,"Tetrabromobisphenol A", "Pre-dates OECD and EPA Guidelines", "Unknown", 1979, "rabbit", "New Zealand white", "Both", 4, 4, "Dermal", 21, "6 hr/d; 5 d/wk", "0, 100, 500 or 2500 mg/kg-bw", "Yes", "none", "Bartlett's test, Dunnett's", "TBBPA was applied dermally as a paste in saline to the clipped backs of rabbits for 6 hr/d for 5 d/wk for 3 weeks for a total of 15 applications. Sites were non-occluded. Half of the rabbits per dose had abraded test sites, the others were non-abraded. Animals

were restrained with the use of a collar during the 6 hr exposure period, after which the collars were removed and the test sites wiped clean. Test sites were scored for irritation at the end of each exposure period. Body weights were measured weekly. Hematology, biochemistry and urinalysis measurements were determined pre-treat and at 3 weeks. Gross necropsies were performed on all rabbits at sacrifice. Histopathology was performed on control and high dose. Statistical analyses were performed. Organs weighed were spleen, liver, adrenals, kidneys, testes, ovaries, heart, thyroid/parathyroid and brain.", "=", 2500, "mg/kg-bw", "Very slight erythema at site of application.", ">", 2500, "mg/kg-bw", "none", "as above", "see results", "see results", "No difference between treated and control in: mortality, moribundity, appearance, body weight, organ weight, hematology, biochemistry, urinalysis, gross necropsy or microscopic comparisons. Very slight erythema was detected in the high dose group throughout the study.", "The no adverse effect level in this 21-day dermal repeated dose study in rabbits was 2500 mg/kg-bw.", "Reasonable.", "Sponsored by Velsicol Corporation.", "Goldenthal et al., 1979. Three week dermal toxicity study in rabbits. Study No. 163-549. International Research and Development Corporation. Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995.", "Y"6042001084614.00,1,12/5/01 0:00:00, "The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%. Impurities were as follows: Tetrabromocyclododecane 0.7%, isobutanol 0.1%, Other unknowns 9.2%.", "OECD Method 407", "Yes", 1997, "rat", "Sprague-Dawley", "Both", 6, 6, "Oral", 28, "Once per day", "0, 125, 350, 1000 mg/kg/day; dosage volume=5 ml/kg", "Yes", "14 Days", "See Remarks for Method section.", "Hexabromocyclododecane (HBCD) was administered orally by gavage in corn oil to three groups of Sprague-Dawley Crl:CD BR (Charles River Laboratories, Inc., Portage, MI) rats for a period of 28 consecutive days at doses of 125, 350 or 1000 mg/kg/day administered in a dosage volume of 5 ml/kg. The test groups consisted of 6 males and 6 females in the 125 and 350 mg/kg/day groups, and 12 males and 12 females in the 1000 mg/kg/day group. A concurrent control group (n=12 males and females) was treated in a similar manner with the vehicle, corn oil. At the end of the dosing period, 6 animals/sex/group were euthanized and necropsied. The remaining 6 animals/sex in the control and 1000 mg/kg/day groups remained on test untreated for a 14 day recovery period. At the end of the recovery period, all animals were euthanized and necropsied. Animals were 6 weeks of age at study initiation. Animals were observed twice daily for mortality and morbidity. Clinical signs were recorded daily. Body weights and food consumption were measured weekly. Functional observational battery and motor activity evaluations were performed during weeks 1 (pretest), 3, and 5 (recovery). Samples for hematology and serum chemistry evaluations were collected at the primary (28 day) and recovery (42 day) necropsies. Complete necropsies were performed on all rats. The brain, liver, kidney, heart, spleen, testes and epididymus or ovaries, adrenal glands, and thymus from all animals were weighted at each necropsy. Approximately 40 tissues were collected and preserved at each necropsy from each animal. The following tissues were examined microscopically from the control and high dose animals: liver, kidney, heart, spleen, testes (males), prostate (males), seminal vesicles (males), epididymus (males), ovaries (females), adrenal glands, thymus, bone with marrow (sternbra), brain, stomach, cecum, duodenum, ileum, jejunum, lymph node, peripheral nerve (sciatic), spinal cord, lung, trachea, uterus (females), urinary bladder, and all gross lesions. The lungs, liver, kidney, stomach, gross lesions and target organs were examined in all dose levels. Body weights, weight gain, food consumption, functional observation battery and motor activity results of treated animals were compared statistically by sex and treatment day to their respective control groups ($p < 0.05$ or < 0.01). Concentrations of the dosing suspensions were confirmed. Homogeneity determinations were performed on study days 0, 13, and 27. All statistical analyses were conducted using two-tailed tests for minimum significance levels of 1% and 5% comparing the treatment groups to the vehicle control group by sex. Analysis of body weight change, food consumption, clinical pathology values, continuous functional observational battery data and absolute and relative organ weight data were analyzed with a one-way analysis of variance followed by Dunnett's test. Discontinuous (ordinal or descriptive) functional observational battery data were analyzed using Fisher's exact test. Statistical tests for locomotor activity data were performed using SAS/STAT statistical software. Clinical laboratory values for cell types that occur at a low incidence (i.e., monocytes, eosinophils and basophils) were not subjected to statistical analysis.", ">=", 1000, "mg/kg-

bw", "Increase in liver weight in the absence of histopathologic or clinical chemistry changes.", ">", 1000, "mg/kg-bw", "None noted.", "Test article administered by gavage.", "No evidence of toxicity was observed at any dose level.", "See Results Remarks section.", "Survival was not affected by administration of the test article. All animals survived to the scheduled necropsy. Clinical signs observed during the study were nonspecific, low in incidence, non-dose-related, and not considered related to test article. Body weights, weight gain and food consumption were not affected by treatment. No statistically significant differences in mean body weight between control and treated animals were detected with the exception of an increase in mean female body weight in the 350 mg/kg/day group during week 2. Mean female body weight at that time point was 196 g in the 350 mg/kg/day group vs. 179 g in the control group. No statistically significant differences in body weight gain between the control and treated animals with the expectation of a decrease in mean male body weight gain in the 1000 mg/kg/day recovery group during week 1 of recovery. Mean male body weight gain at that time point was 21 g vs 31 g in the control group; mean male body weight was not statistically different from the control mean. No statistically significant differences in food consumption between control and treated animals were detected with the exception of an increase in mean female food consumption in the 350 mg/kg/day during weeks, -1, 1, and 2 of treatment. Mean female food consumption at those time points were 18, 17 and 17 g vs. 16, 15 and 15 g in the control group, respectively. Results of the functional observation battery and motor activity tests were not affected by treatment. No statistically significant differences were observed between the control and treated animals at any time point ($p < 0.05$). No statistically significant differences between control and treated animals were found for hematology parameters with the exception of an increase in mean activated partial thromboplastin time in the 1000 mg/kg/day males on week 4 and a decrease in the mean prothrombin time in the 1000 mg/kg/day females on week 4. These statistical differences were not of toxicological significance. No toxicologically significant effects on serum chemistry values related to test article administration were observed at the 28 day primary and 42 day recovery necropsies. Scattered instances of statistically significant differences between treated and control animals were detected for some serum chemistry parameters at the 28 day primary necropsy. These scattered statistical differences were not considered toxicologically significant because the statistical differences occurred in the absence of a dose response, in the absence of the accompanying clinical chemistry changes expected, in the opposite direction from what occurs in a toxic state, in a direction which is without physiologic significance, or due to potential interference with the laboratory method. No statistically significant differences in serum chemistry parameters were detected between groups at the 42 day recovery necropsy. No gross lesions attributable to test article administration were detected at either necropsy. Gross lesions were nonspecific, low in incidence, non-dose-related, and considered incidental. No microscopic lesions attributable to test article administration were detected on histopathologic exam. Microscopic changes were nonspecific, low in incidence, non-dose-related and considered incidental. No statistically significant differences in organ weight or organ to body weight ratios were detected between control and treated animals with one exception. Absolute liver weights were statistically significantly increased with respect to control mean at the 28 day necropsy in males in the 1000 mg/kg/day group and in females in the 350 and 1000 mg/kg/day groups. Liver to body weight ratios in the 350 and 1000 mg/kg/day male and female groups were statistically increased at the 28 day necropsy. At the recovery necropsy, male absolute and liver to body weight ratio were statistically comparable to the control mean. Female absolute liver weight and liver to body weight ratio were statistically increased compared to the control mean. The difference in absolute liver weight between control and treated females was less pronounced at the end of the recovery period, indicating the increase in liver weight was reversible in females as well as males. In the absence of test article related histologic and serum chemistry changes, increases in liver weight are considered an adaptive rather than toxic response, are not uncommon in the rat, and are most likely the result of microsomal induction.", "No systemic toxicity was observed at any dose level. The No Observed Adverse Effect Level of HBCD administered orally to male and female rats for 28 consecutive days was \geq 1000 mg/kg/day, the highest dose tested.", "High", "This study was performed according to current guidelines for repeated dose studies under Good Laboratory Practices by a laboratory experienced in the performance of studies of this type.", "Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel.", "Chengelis, C. (1997) A 28-Day Repeated Dose Oral Toxicity Study of HBCD in Rats. Laboratory Study Number: WIL-186004. WIL Research Laboratories, Inc., Ashland, OH.", "Y"6042001084614.00,2,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD)

commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%. Impurities were as follows: Tetrabromocyclododecane 0.7%, isobutanol 0.1%, Other unknowns 9.2%."., "OECDMethod 408, EPA OPPTS Method 870.3100", "Yes", 2001, "rat", "Sprague-Dawley", "Both", 15, 15, "Oral", 90, "Once daily by gavage", "0, 100, 300, 1000 mg/kg-bw; dose volume = 5 ml/kg", "Yes", "30 day recovery period", "ANOVA, Dunnett's test, Others", "The test article, a composite of three lots of commercial hexabromocyclododecane (HBCD), was administered by oral gavage in corn oil once daily to four groups of Crl:CD(SD)IGS BR rats (n=15/sex/group) at dose levels of 0 (control), 100 (low), 300 (mid) and 1000 (high) mg/kg/day seven days per week for 90 days. The dosage volume was 5 ml/kg. The control animals received the vehicle, corn oil, only. At the end of the 90-day treatment period, 10 animals/sex/group were euthanized and necropsied. The remaining rats continued on test untreated for a 28-day recovery period prior to necropsy. In addition to the main toxicology groups, two satellite groups of 20 animals/sex/group were treated concurrently in an identical manner at dose levels of 0 or 1000 mg HBCD/kg/day for up to 90 days. Body weights were recorded weekly. Two animals/sex/group were euthanized on study days 2, 6, 9, 13, 20, 27, 55, 89, 104 and 118, and blood and body fat (mesenteric and/or omental) were collected. The body fat was analyzed for HBCD content. Animals in the main toxicology groups were observed twice daily throughout the study for mortality and morbidity. Body weights and food consumption were measured weekly. Blood was collected at study weeks 3 (n=5/sex/group), 13 (n=10/sex/group) and 17 (n=5/sex/group) for hematology, serum chemistry and hormone (T3, T4 and TSH) measurements. Urine was collected prior to each necropsy, at study weeks 13 and 17, for urinalysis. Ocular examinations were performed prior to study initiation and during study weeks 12 and 15. Functional Observational Battery and Locomotor Activity evaluations were performed on 5 animals/sex/group prior to study initiation, during the last week of test article administration (study week 13), and during the recovery period. An examination of vaginal cytology (for estrus cycle determinations) was performed on study days 69-90. At each necropsy, sperm motility/viability, morphology, and number were assessed. Complete necropsies were performed on all animals. Approximately 40 organs or tissues/animal were collected and preserved. The adrenals, brain, epididymides, heart, kidneys, liver, ovaries, prostate, spleen, testes, thymus, thyroids with parathyroids, and uterus with cervix were weighed. Paraffin sections of tissues stained with hematoxylin and eosin from the control and 1000 mg/kg/day dose groups and the liver, lungs and thyroid glands in the 100 and 300 mg/kg/day doses, and gross lesions from all animals were examined under the light microscope. Livers from five randomly chosen animals/sex from the control and 1000 mg/kg/day dose groups were examined microscopically using Oil Red O or periodic acid Schiff's (PAS) reagent for evidence of lipid accumulation or glycogen accumulation/depletion, respectively. Statistical comparisons by sex and treatment day were made between the control and treated animals where indicated (p<0.05).", ">=", 1000, "mg/kg-bw", "See Results Remarks.", ">", 1000, "mg/kg-bw", "No adverse effects detected.", "As given under Doses.", "See Results Remarks.", "See Results Remarks.", "No test article-related effect on mortality occurred. Clinical signs were non-specific, low in incidence, non-dose-related and not related to test article administration. No test article-related changes occurred in body weight, food consumption, Functional Observational Battery or Locomotor Activity. No test article-related effects on hematologic parameters were noted. No test article-related ocular lesions were detected at the ophthalmic exams. No test article-related changes were noted on the estrus cycle as determined by vaginal cytology, or on sperm motility/viability, morphology, and number. Instances of statistically significant differences between control and some treatment groups were detected at study week 13 in the clinical chemistry data, hormone data, organ weight data and histology findings. They were generally secondary to the inducing effects on the liver or were otherwise not considered adverse effects of treatment as discussed further below. Statistically significant (p<0.05) test article-related clinical chemistry changes at week 13 include an increase in albumin (all dose levels for males), total protein (all dose levels for females and 1000 mg/kg/day for males), globulin (300 and 1000 mg/kg/day for females), and chloride (all doses for both sexes). In addition, increased gamma glutamyltransferase levels were noted in the 1000 mg/kg/day group (p<0.05). Thyroxine (T4) levels were decreased at study week 13 compared to the control mean in all male dose groups and the 300 and 1000 mg/kg/day dose females (p<0.05). There were no corresponding statistical effects on T3 and TSH. While potentially test article-related, the changes in serum chemistry parameters were not of sufficient

magnitude to be adverse, occurred in otherwise clinically normal animals, tended to be within or close to historical control values, and were not present at the end of the recovery period; furthermore, these serum albumin and gamma glutamyltransferase increases were probably secondary to the increases in liver weight. The increases in serum chloride were probably secondary to the presence of free bromide in the test article preparation which interfered with the chloride determination methodology. The decrease in T4, which was also reversible, was also probably secondary to increased liver weight (secondary to microsomal enzyme induction, known to cause increased metabolism and clearance of T4 in the rat). The incidence of observations noted at gross necropsy was low and there was no evidence of frank organ damage. On histopathologic examination of tissues, relatively mild findings occurred in both the control and treated groups. Potential test article-related histologic changes were identified in the liver and thyroid glands but these would not be considered indicative of frank toxicity. These organs were examined microscopically in all groups at both necropsies. The liver changes in male rats at the 90-day necropsy (Study Week 13) were characterized as minimal hepatocellular vacuolation and occurred in 10% of control males and ~50% of the males at 100, 300 and 1000 mg/kg/day. Minimal hepatocellular vacuolation was also detected in females in the control and test article treated groups without a clear dose response (3 to 4/10 animals per group) but, mild and moderate vacuolation was detected in females only in the 300 (1/10) and 1000 mg/kg/day (2/10) dose groups. Minimal to mild hepatocellular hypertrophy was also detected only in the 1000 mg/kg/day group (5/10) females. Minimal thyroid follicular cell hypertrophy was detected 1/10, 1/10, 5/10 and 7/10 males in the control, 100, 300 and 1000 mg/kg/day groups, respectively and in 4/10 and 3/10 females in the 300 and 1000 mg/kg/day groups respectively. In addition, mild thyroid follicular hypertrophy was detected in 4/10 females in the 1000 mg/kg/day group. The histologic changes in the liver were accompanied by an increase in liver weight. In contrast there were no statistically significant changes in thyroid weight (absolute, relative to body weight and relative to brain weight). At study week 13, mean liver weights in all dose levels of both sexes (absolute, relative to body weight and relative to brain weight) were increased compared to the male and female control means ($p < 0.05$). The increases in liver weight were a result of a microsomal enzyme inducing effect and were not typically considered indicative of toxicity in absence of frank organ damage. The reversible histologic changes (vacuolation and hypertrophy) are often found to accompany increased liver weight caused by liver enzyme induction. At week 17, the liver changes (weight and histology) had at least partially, if not fully, resolved in all treated groups without delayed or long-term toxic effects. The histologic changes in the thyroid had also nearly completely resolved except in the 1000 mg/kg/day group females, where partial recovery occurred. The mean prostate weight in the 1000 mg/kg/day group males was increased compared to the control mean at the primary necropsy. This increased weight did not appear to be of toxicological significance since the change was reversible and there were no correlating histologic findings. The testes, seminal vesicles, epididymus, ovaries, uterus and cervix were histologically normal in appearance. Semen analysis and estrus cycles were comparable in control and treated groups. HBCD was detected in the adipose tissue of male and female rats treated with 1000 mg/kg/day for up to 90 days. Isomer-specific analysis showed that the relative isomer concentrations in adipose tissue at all time points were $\alpha >> \gamma > \beta$ which is in contrast to the test article composition ($\gamma >> \alpha > \beta$). Steady state levels were achieved by study day 27. Levels in male and female rats were similar at all time points and declined during the recovery period.

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","GLP","Year","Species","Strain","Sex","NumberofMales","NumberofFemales","Route","ExposPeriod","Frequency","Doses","ControlGroup","PostObsPeriod","StatMeth","MethodRem","NPrec","NOAEL","NUnit","NEffect","LPrec","LOAEL","LUnit","LEffect","ActualDose","ToxicResp","StatResults","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6022001145747.00,1,12/13/01 0:00:00,"The test article was described as tetrabromobisphenol A, a white powder.",," Pre-dates OECD and EPA test guidelines","Unknown",1972,"rat","Charles River CD","Both",25,25,"Oral, in the diet",28,"daily","0, 1, 10, 100 or 1000 ppm in the diet","Yes","yes - 2, 6, 12 weeks","Not described.",,"Groups of 25 female and 25 male Charles River CD rats (males 260-341 g, femals 183-232 g) were fed TBBPA in the diet at 0, 1, 10, 100 or 1000 ppm for 28 days. After 4 weeks, 5 rats/sex per group were sacrificed and the remaining rats placed on control diets for 2, 6 or 12 weeks. Animals were housed individually with food and water available ad libitum and observed daily. Body weights were determined once/wk. Mean food consumption was measured weekly. At the 28 day sacrifice and at the 3 recovery sacrifices, organ weights were measured and tissues collected for microscopic exam. Bromine levels were measured in liver and adipose of the control and high dose animals (5M/5F) at 28 days.Organs weighed were spleen, liver, adrenals, kidneys, testes, ovaries, heart, thyroid/parathyroid, brain and pituitary. Histopathology of the liver, kidneys and thyroids were performed on all animals at 28 days. Hematology, clinical chemistry, urinalysis were not performed.",,">=",1000,"ppm in feed","None.",,">",1000,"ppm in feed","None.",,"appr. 0, 1, 10, 100 or 1000 mg/kg bw","None.",,"See results.",,"In a 28-day oral study, no toxicity was observed in rats treated with up to 1,000 ppm TBBPA in the diet. Rat were fed at dietary dose levels of 0, 1, 10, 100 or 1000 ppm TBBPA for 28 days after which one group was sacrificed and the remaining rats placed on untreated diets for 2, 6 or 12 weeks. No effects on general appearance, behavior, body weight, food consumption or mortality were observed. No compound related gross or microscopic lesions or variations in organ weights were observed at any dose level. Liver and adipose bromine levels were comparable in rats of the control and high dose groups sacrificed at the end of the 28 day treatment period.",,"The no effect level in this 28 day study was > 1000 ppm TBBPA in the diet. Further, the bromine content of liver and adipose tissue in the control and high dose animals after 28 days of treatment were comparable.",,"Reasonable.",,"This study is old and not conducted according to current guidelines. However, it demonstrates TBBPA's lack of toxicity, and the comparable bromine content in tissues of the control and high dose groups is consistent with TBBPA's rapid metabolism and elimination (Haak et al., Xenobiotica, 2000, 30,9,881-890).",,"This study was sponsored by Great Lakes Chemical Corporation.",,"Goldenthal and Geil, 1972. Tetrabromobisphenol A. Twenty-eight day toxicity studye in ratws. Study NO. 274-010. International Research and Development Corporation, Mattawan, MI. Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)",,"Y"6022001145747.00,2,12/13/01 0:00:00,"The test article was described as tetrabromobisphenol A.",,"Pre-dates OECD and EPA guidelines",,"Unknown",1975,"rat",,"Sprague-Dawley",,"Both",5,5,"Oral, in the diet",90,"daily","0, 0.3, 3, 30, 100 mg/kg bwt",,"Yes",,"None",,"ANOVA, Dunnett's test",,"TBBPA was administered to male and female rats in their diet for 90 days. The concentrations of TBBPA in the diet were adjusted so that rats were administered 0, 0.3, 3, 30 or 100 mg/kg-bw/d. The parameters evaluated included: appearance, demeanor, body weights, food consumption, routine hematology measurements, clinical chemistry determinations (serum urea nitrogen, alkaline phosphatase activity and serum glutamic pyruvic transaminase activity), routine urinalyses, organ weights, organ-to-body weight ratios, and gross and microscopic pathological examination of tissues. Organs weighed: brain, heart, liver, kidney, testes.Histopathology in control and high dose: heart, liver, kidney, thyroid, trachea, parathyroid, lung, adrenal, spleen, pancreas, stomach, small intestine (3 levels) large intestin, gonads, uterus, urinary bladder, accessory sex glands, skeletal muscle, spinal cord, brain, eye, pituitary gland, thymus, aorta, peripheral nerve, mesenteric and mediastinal lymph nodes.The total bromine content in liver, kidney, skeletal muscle, fat and serum of rats in the control and 3 mg/kg dose group was determined at the end of the 90 day treatment period.",,">",100,"mg/kg-bw",,"None.",,">",100,"mg/kg-bw",,"None.",,"0, 0.3, 3, 30 or 100 mg/kg-bw/d",,"None.",,"See results",,"In a 90-day oral study, no toxicity was found in rats treated with up to 100 mg/kg bwt in the feed. No toxicological effects were detected at any dose level for appearance, demeanor, body weight gain, food consumption, hematology, clinical chemistry values, urinalysis, organ weights, and gross and microscopic examinations. The total bromine content in liver, kidney, skeletal muscle, fat and serum of rats in the 3 mg/kg dose group did not differ from that of the controls. (The 3 mg/kg group was the only group tested for total bromine content).",,"The NOEL in this 90 day oral

toxicity study of TBBPA in the rat was greater than 100 mg/kg-bw/day, the highest dose tested. The total bromine content in liver, kidney, skeletal muscle, fat and serum of rats in the control and 3 mg/kg dose group were comparable." ,"High", "This study is old and not conducted according to current guidelines. Nonetheless, the study was well conducted, and demonstrates TBBPA's lack of toxicity. Further, the comparable bromine content in tissues of the control and 3 mg/kg-bwt group is consistent with the 1972 28 day study (Goldenthal and Geil, 1972) and TBBPA's rapid metabolism and elimination (Haak et al., Xenobiotica, 2000, 30,9,881-890)." ,"This study was sponsored by Dow Chemical Company." ,"Quast, J and Humiston, C. 1975. Results of a 90-day toxicological study in rats given tetrabromobisphenol A in the diet. Toxicology Research Laboratory, The Dow Chemical Company, Midland, MI. Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995)" ,"Y"6022001145747.00,3,12/13/01 0:00:00,"Tetrabromobisphenol A" ,"Not specified", "Unknown",1986,"mice", "B6C3F1", "Both",10,10,"Oral, in the diet",90,"daily", "0, 500, 4,900, 15,600 or 50,000 ppm in the diet", "Yes", "no", "not specified", "Mice (10/sex/group) were fed TBBPA in the diet at 0, 500, 4900, 15600 or 50000 ppm in the diet for 90 days." ,"=",4900,"ppm in feed", "None." ,"=",15600,"ppm in feed", "Decreased body weight gain, red blood cells, hemoglobin, hematocrit, serum triglycerides and total serum protein." ,"Not available." ,"see results", "not described", "All animals in the highest dose died during the study, possibly because of malnutrition and anemia. No deaths occurred at the lower doses. Body weight gains were decreased at the 15,600 ppm dose level, although food consumption was not. Red blood cells, hemoglobin, hematocrit, serum triglycerides and total serum protein were decreased at the 15,600 ppm dose level. Organ weights were not affected, except for an increase in spleen weight at 15,600 ppm. Histopathological changes were not observed." ,"The no adverse effect level in this 90 day mouse study was 4,900 ppm in the diet." ,"Reasonable", "The lack of toxicity observed in mice in this 90-day study at dose of 4900 ppm (diet) and less is consistent with the lack of toxicity observed repeated dose studies in rats and rabbits." ,"Tobe et al. 1986. Subchronic toxicity study of tetrabromobispheno-A: report to the Ministry of Health and Welfare (in Japanese).Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995." ,"Y"6022001145747.00,4,12/13/01 0:00:00,"micronized Tetrabromobisphenol A" ,"Pre-dates OECD and EPA guidelines", "Unknown",1975,"rat", "Charles River CD", "Both",5,5,"Inhalation",14,"5 d/wk; 4 hr/d", "0, 2, 6 and 18 mg/L (0, 2000, 6,000, 18,000 mg/m3)", "Yes", "no", "not specified", "Rats were exposed to micronized TBBPA via whole body inhalation exposures at concentrations of 0, 2, 6, or 18 mg/L for 4 hr/d, 5 d/wk for a total of 10 exposures. Air flow and introduction of test material was dynamic and controlled by a Wright dust feeder and regulated by a flow meter. Animals were observed during each exposure, and daily for 2 weeks for general toxicity, appearance, behavior, and mortality. Body weights and food consumption were recorded weekly. At the end of the study, routine hematology, serum chemistry (BUN, glucose, SAP, SGOT, SGPT) and urinalysis was performed. Organs weighed at sacrifice were spleen, liver, adrenals, kidneys, testes, ovaries, heart, thyroid/parathyroid, and brain. Absolute and relative organ weights were determined. A gross necropsy was performed on all animals. Histopathology was performed on tissues from the control, 6 and 18 mg/L groups. Treatment groups were statistically compared to the control group by sex." ,"=",2,"mg/l air", "none", "=",6,"mg/l air", "salivation, lacrimation, nasal discharge", "0, 2000, 6000, 18,000 mg/m3 micronized TBBPA", "see results", "see results", "No effect of treatment was found on mortality, morbidity, body weight, hematology, serum chemistries, urinalysis, gross necropsy or microscopic exams.Excessive salivation, red or clear nasal discharge and lacrimation were observed in animals at the 6 or 18 mg/L doses. Liver weights, in the absence of a dose response, were decreased in the females of all exposure concentrations compared to the control females (control = 14.45 g; 2 mg/L = 12.48 g; 6 mg/L = 12.53 g; 18 mg/L = 12.5 g)." ,"The no effect level for this 14 d inhalation study of micronized TBBPA in rats was 6 mg/L (2,000 mg/m3). Effects seen at higher doses were limited to salivation, lacrimation and nasal discharge." ,"Reasonable", "Sponsored by Great Lakes Chemical Corporation." ,"Goldenthal et al. 1975. 14-Day inhalation toxicity study in rats. Study No. 274-021. International Research and Development Corporation.Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995." ,"Y"6022001145747.00,5,12/13/01 0:00:00,"Tetrabromobisphenol A" ,"Pre-dates OECD and EPA Guidelines", "Unknown",1979,"rabbit", "New Zealand white", "Both",4,4,"Dermal",21,"6 hr/d; 5 d/wk", "0, 100, 500 or 2500 mg/kg-bw", "Yes", "none", "Bartlett's test, Dunnett's", "TBBPA was applied dermally as a paste in saline to the clipped backs of rabbits for 6 hr/d for 5 d/wk for 3 weeks for a total of 15 applications. Sites were non-occluded. Half of the rabbits per dose had abraded test sites, the others were non-abraded. Animals

were restrained with the use of a collar during the 6 hr exposure period, after which the collars were removed and the test sites wiped clean. Test sites were scored for irritation at the end of each exposure period. Body weights were measured weekly. Hematology, biochemistry and urinalysis measurements were determined pre-treat and at 3 weeks. Gross necropsies were performed on all rabbits at sacrifice. Histopathology was performed on control and high dose. Statistical analyses were performed. Organs weighed were spleen, liver, adrenals, kidneys, testes, ovaries, heart, thyroid/parathyroid and brain." ,"=" ,2500,"mg/kg-bw" ,"Very slight erythema at site of application." ,">" ,2500,"mg/kg-bw" ,"none" ,"as above" ,"see results" ,"see results" ,"No difference between treated and control in: mortality, moribundity, appearance, body weight, organ weight, hematology, biochemistry, urinalysis, gross necropsy or microscopic comparisons. Very slight erythema was detected in the high dose group throughout the study." ,"The no adverse effect level in this 21-day dermal repeated dose study in rabbits was 2500 mg/kg-bw." ,"Reasonable." ,"Sponsored by Velsicol Corporation." ,"Goldenthal et al., 1979. Three week dermal toxicity study in rabbits. Study No. 163-549. International Research and Development Corporation. Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995." ,"Y"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%." ,"OECD Method 407" ,"Yes" ,1997,"rat" ,"Sprague-Dawley" ,"Both" ,6,6,"Oral" ,28,"Once per day" ,"0, 125, 350, 1000 mg/kg/day; dosage volume=5 ml/kg" ,"Yes" ,"14 Days" ,"See Remarks for Method section." ,"Hexabromocyclododecane (HBCD) was administered orally by gavage in corn oil to three groups of Sprague-Dawley Crl:CD BR (Charles River Laboratories, Inc., Portage, MI) rats for a period of 28 consecutive days at doses of 125, 350 or 1000 mg/kg/day administered in a dosage volume of 5 ml/kg. The test groups consisted of 6 males and 6 females in the 125 and 350 mg/kg/day groups, and 12 males and 12 females in the 1000 mg/kg/day group. A concurrent control group (n=12 males and females) was treated in a similar manner with the vehicle, corn oil. At the end of the dosing period, 6 animals/sex/group were euthanized and necropsied. The remaining 6 animals/sex in the control and 1000 mg/kg/day groups remained on test untreated for a 14 day recovery period. At the end of the recovery period, all animals were euthanized and necropsied. Animals were 6 weeks of age at study initiation. Animals were observed twice daily for mortality and morbidity. Clinical signs were recorded daily. Body weights and food consumption were measured weekly. Functional observational battery and motor activity evaluations were performed during weeks 1 (pretest), 3, and 5 (recovery). Samples for hematology and serum chemistry evaluations were collected at the primary (28 day) and recovery (42 day) necropsies. Complete necropsies were performed on all rats. The brain, liver, kidney, heart, spleen, testes and epidymus or ovaries, adrenal glands, and thymus from all animals were weighted at each necropsy. Approximately 40 tissues were collected and preserved at each necropsy from each animal. The following tissues were examined microscopically from the control and high dose animals: liver, kidney, heart, spleen, testes (males), prostate (males), seminal vesicles (males), epididymus (males), ovaries (females), adrenal glands, thymus, bone with marrow (sternebra), brain, stomach, cecum, duodenum, ileum, jejunum, lymph node, peripheral nerve (sciatic), spinal cord, lung, trachea, uterus (females), urinary bladder, and all gross lesions. The lungs, liver, kidney, stomach, gross lesions and target organs were examined in all dose levels. Body weights, weight gain, food consumption, functional observation battery and motor activity results of treated animals were compared statistically by sex and treatment day to their respective control groups ($p < 0.05$ or < 0.01). Concentrations of the dosing suspensions were confirmed. Homogeneity determinations were performed on study days 0, 13, and 27. All statistical analyses were conducted using two-tailed tests for minimum significance levels of 1% and 5% comparing the treatment groups to the vehicle control group by sex. Analysis of body weight change, food consumption, clinical pathology values, continuous functional observational battery data and absolute and relative organ weight data were analyzed with a one-way analysis of variance followed by Dunnett's test. Discontinuous (ordinal or descriptive) functional observational battery data were analyzed using Fisher's exact test. Statistical tests for locomotor activity data were performed using SAS/STAT statistical software. Clinical laboratory values for cell types that occur at a low incidence (i.e., monocytes, eosinophils and basophils) were not subjected to statistical analysis." ,">" ,1000,"mg/kg-bw" ,"Increase in liver weight in the absence of histopathologic or clinical chemistry changes." ,">" ,1000,"mg/kg-bw" ,"None

noted.", "Test article administered by gavage.", "No evidence of toxicity was observed at any dose level.", "See Results Remarks section.", "Survival was not affected by administration of the test article. All animals survived to the scheduled necropsy. Clinical signs observed during the study were nonspecific, low in incidence, non-dose-related, and not considered related to test article. Body weights, weight gain and food consumption were not affected by treatment. No statistically significant differences in mean body weight between control and treated animals were detected with the exception of an increase in mean female body weight in the 350 mg/kg/day group during week 2. Mean female body weight at that time point was 196 g in the 350 mg/kg/day group vs. 179 g in the control group. No statistically significant differences in body weight gain between the control and treated animals with the expectation of a decrease in mean male body weight gain in the 1000 mg/kg/day recovery group during week 1 of recovery. Mean male body weight gain at that time point was 21 g vs 31 g in the control group; mean male body weight was not statistically different from the control mean. No statistically significant differences in food consumption between control and treated animals were detected with the exception of an increase in mean female food consumption in the 350 mg/kg/day during weeks, -1, 1, and 2 of treatment. Mean female food consumption at those time points were 18, 17 and 17 g vs. 16, 15 and 15 g in the control group, respectively. Results of the functional observation battery and motor activity tests were not affected by treatment. No statistically significant differences were observed between the control and treated animals at any time point ($p < 0.05$). No statistically significant differences between control and treated animals were found for hematology parameters with the exception of an increase in mean activated partial thromboplastin time in the 1000 mg/kg/day males on week 4 and a decrease in the mean prothrombin time in the 1000 mg/kg/day females on week 4. These statistical differences were not of toxicological significance. No toxicologically significant effects on serum chemistry values related to test article administration were observed at the 28 day primary and 42 day recovery necropsies. Scattered instances of statistically significant differences between treated and control animals were detected for some serum chemistry parameters at the 28 day primary necropsy. These scattered statistical differences were not considered toxicologically significant because the statistical differences occurred in the absence of a dose response, in the absence of the accompanying clinical chemistry changes expected, in the opposite direction from what occurs in a toxic state, in a direction which is without physiologic significance, or due to potential interference with the laboratory method. No statistically significant differences in serum chemistry parameters were detected between groups at the 42 day recovery necropsy. No gross lesions attributable to test article administration were detected at either necropsy. Gross lesions were nonspecific, low in incidence, non-dose-related, and considered incidental. No microscopic lesions attributable to test article administration were detected on histopathologic exam. Microscopic changes were nonspecific, low in incidence, non-dose-related and considered incidental. No statistically significant differences in organ weight or organ to body weight ratios were detected between control and treated animals with one exception. Absolute liver weights were statistically significantly increased with respect to control mean at the 28 day necropsy in males in the 1000 mg/kg/day group and in females in the 350 and 1000 mg/kg/day groups. Liver to body weight ratios in the 350 and 1000 mg/kg/day male and female groups were statistically increased at the 28 day necropsy. At the recovery necropsy, male absolute and liver to body weight ratio were statistically comparable to the control mean. Female absolute liver weight and liver to body weight ratio were statistically increased compared to the control mean. The difference in absolute liver weight between control and treated females was less pronounced at the end of the recovery period, indicating the increase in liver weight was reversible in females as well as males. In the absence of test article related histologic and serum chemistry changes, increases in liver weight are considered an adaptive rather than toxic response, are not uncommon in the rat, and are most likely the result of microsomal induction.", "No systemic toxicity was observed at any dose level. The No Observed Adverse Effect Level of HBCD administered orally to male and female rats for 28 consecutive days was $>$ or $=$ 1000 mg/kg/day, the highest dose tested.", "High", "This study was performed according to current guidelines for repeated dose studies under Good Laboratory Practices by a laboratory experienced in the performance of studies of this type.", "Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel.", "Chengelis, C. (1997) A 28-Day Repeated Dose Oral Toxicity Study of HBCD in Rats. Laboratory Study Number: WIL-186004. WIL Research Laboratories, Inc., Ashland, OH.", "Y"6042001084614.00,2,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was

analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%.", "OECD Method 408, EPA OPPTS Method 870.3100", "Yes", 2001, "rat", "Sprague-Dawley", "Both", 15, 15, "Oral", 90, "Once daily by gavage", "0, 100, 300, 1000 mg/kg-bw; dose volume = 5 ml/kg", "Yes", "30 day recovery period", "ANOVA, Dunnett's test, Others", "The test article, a composite of three lots of commercial hexabromocyclododecane (HBCD), was administered by oral gavage in corn oil once daily to four groups of Crl:CD(SD)IGS BR rats (n=15/sex/group) at dose levels of 0 (control), 100 (low), 300 (mid) and 1000 (high) mg/kg/day seven days per week for 90 days. The dosage volume was 5 ml/kg. The control animals received the vehicle, corn oil, only. At the end of the 90-day treatment period, 10 animals/sex/group were euthanized and necropsied. The remaining rats continued on test untreated for a 28-day recovery period prior to necropsy. In addition to the main toxicology groups, two satellite groups of 20 animals/sex/group were treated concurrently in an identical manner at dose levels of 0 or 1000 mg HBCD/kg/day for up to 90 days. Body weights were recorded weekly. Two animals/sex/group were euthanized on study days 2, 6, 9, 13, 20, 27, 55, 89, 104 and 118, and blood and body fat (mesenteric and/or omental) were collected. The body fat was analyzed for HBCD content. Animals in the main toxicology groups were observed twice daily throughout the study for mortality and morbidity. Body weights and food consumption were measured weekly. Blood was collected at study weeks 3 (n=5/sex/group), 13 (n=10/sex/group) and 17 (n=5/sex/group) for hematology, serum chemistry and hormone (T3, T4 and TSH) measurements. Urine was collected prior to each necropsy, at study weeks 13 and 17, for urinalysis. Ocular examinations were performed prior to study initiation and during study weeks 12 and 15. Functional Observational Battery and Locomotor Activity evaluations were performed on 5 animals/sex/group prior to study initiation, during the last week of test article administration (study week 13), and during the recovery period. An examination of vaginal cytology (for estrus cycle determinations) was performed on study days 69-90. At each necropsy, sperm motility/viability, morphology, and number were assessed. Complete necropsies were performed on all animals. Approximately 40 organs or tissues/animal were collected and preserved. The adrenals, brain, epididymides, heart, kidneys, liver, ovaries, prostate, spleen, testes, thymus, thyroids with parathyroids, and uterus with cervix were weighed. Paraffin sections of tissues stained with hematoxylin and eosin from the control and 1000 mg/kg/day dose groups and the liver, lungs and thyroid glands in the 100 and 300 mg/kg/day doses, and gross lesions from all animals were examined under the light microscope. Livers from five randomly chosen animals/sex from the control and 1000 mg/kg/day dose groups were examined microscopically using Oil Red O or periodic acid Schiff's (PAS) reagent for evidence of lipid accumulation or glycogen accumulation/depletion, respectively. Statistical comparisons by sex and treatment day were made between the control and treated animals where indicated (p<0.05).", ">=", 1000, "mg/kg-bw", "See Results Remarks.", ">", 1000, "mg/kg-bw", "No adverse effects detected.", "As given under Doses.", "See Results Remarks.", "See Results Remarks.", "No test article-related effect on mortality occurred. Clinical signs were non-specific, low in incidence, non-dose-related and not related to test article administration. No test article-related changes occurred in body weight, food consumption, Functional Observational Battery or Locomotor Activity. No test article-related effects on hematologic parameters were noted. No test article-related ocular lesions were detected at the ophthalmic exams. No test article-related changes were noted on the estrus cycle as determined by vaginal cytology, or on sperm motility/viability, morphology, and number. Instances of statistically significant differences between control and some treatment groups were detected at study week 13 in the clinical chemistry data, hormone data, organ weight data and histology findings. They were generally secondary to the inducing effects on the liver or were otherwise not considered adverse effects of treatment as discussed further below. Statistically significant (p<0.05) test article-related clinical chemistry changes at week 13 include an increase in albumin (all dose levels for males), total protein (all dose levels for females and 1000 mg/kg/day for males), globulin (300 and 1000 mg/kg/day for females), and chloride (all doses for both sexes). In addition, increased gamma glutamyltransferase levels were noted in the 1000 mg/kg/day group (p<0.05). Thyroxine (T4) levels were decreased at study week 13 compared to the control mean in all male dose groups and the 300 and 1000 mg/kg/day dose females (p<0.05). There were no corresponding statistical effects on T3 and TSH. While potentially test article-related, the changes in serum chemistry parameters were not of sufficient magnitude to be adverse, occurred in otherwise clinically normal animals, tended to be within or close to historical control values, and were not present at the end of the recovery period; furthermore, these serum albumin and gamma

glutamyltransferase increases were probably secondary to the increases in liver weight. The increases in serum chloride were probably secondary to be presence of free bromide in the test article preparation which interfered with the chloride determination methodology. The decrease in T4, which was also reversible, was also probably secondary to increased liver weight (secondary to microsomal enzyme induction, known to cause increased metabolism and clearance of T4 in the rat). The incidence of observations noted at gross necropsy was low and there was no evidence of frank organ damage. On histopathologic examination of tissues, relatively mild findings occurred in both the control and treated groups. Potential test article-related histologic changes were identified in the liver and thyroid glands but these would not be considered indicative of frank toxicity. These organs were examined microscopically in all groups at both necropsies. The liver changes in male rats at the 90-day necropsy (Study Week 13) were characterized as minimal hepatocellular vacuolation and occurred in 10% of control males and ~50% of the males at 100, 300 and 1000 mg/kg/day. Minimal hepatocellular vacuolation was also detected in females in the control and test article treated groups without a clear dose response (3 to 4/10 animals per group) but, mild and moderate vacuolation was detected in females only in the 300 (1/10) and 1000 mg/kg/day (2/10) dose groups. Minimal to mild hepatocellular hypertrophy was also detected only in the 1000 mg/kg/day group (5/10) females. Minimal thyroid follicular cell hypertrophy was detected 1/10, 1/10, 5/10 and 7/10 males in the control, 100, 300 and 1000 mg/kg/day groups, respectively and in 4/10 and 3/10 females in the 300 and 1000 mg/kg/day groups respectively. In addition, mild thyroid follicular hypertrophy was detected in 4/10 females in the 1000 mg/kg/day group. The histologic changes in the liver were accompanied by an increase in liver weight. In contrast there were no statistically significant changes in thyroid weight (absolute, relative to body weight and relative to brain weight). At study week 13, mean liver weights in all dose levels of both sexes (absolute, relative to body weight and relative to brain weight) were increased compared to the male and female control means ($p < 0.05$). The increases in liver weight were a result of a microsomal enzyme inducing effect and were not typically considered indicative of toxicity in absence of frank organ damage. The reversible histologic changes (vacuolation and hypertrophy) are often found to accompany increased liver weight caused by liver enzyme induction. At week 17, the liver changes (weight and histology) had at least partially, if not fully, resolved in all treated groups without delayed or long-term toxic effects. The histologic changes in the thyroid had also nearly completely resolved except in the 1000 mg/kg/day group females, where partial recovery occurred. Increases in mean prostate weight were noted in the 1000 mg/kg/day group males at the primary necropsy. However, the increases in prostate weight were probably not of toxicological significance since the increases did not persist to the recovery period, there were no correlating histologic findings and no change in sperm production. HBCD was detected in the adipose tissue of male and female rats treated with 1000 mg/kg/day for up to 90 days. Isomer-specific analysis showed that the relative isomer concentrations in adipose tissue at all time points were $\alpha \gg \gamma > \beta$ which is in contrast to the test article composition ($\gamma \gg \alpha > \beta$). Steady state levels were achieved by study day 27. Levels in male and female rats were similar at all time points and declined during the recovery period. All the test article-related changes at 100 and 300 mg/kg/day were mild, reversible, generally secondary to hepatic enzyme induction (which is an adaptive not a toxic change) and without effect on the clinical condition of the animals. The additional findings observed at 1000 mg/kg/day (increased gamma glutamyltransferase and additional increases in the size of the liver and prostate), were also reversible, not associated with specific target organ damage or diminished function and were, therefore, probably of limited, if any, toxicologic significance. On this basis the no-observed-adverse-effect level (NOAEL) of HBCD administered to CrI:CDr(SD)IGS BR rats by gavage in corn oil for 90 days is 1000 mg/kg/day.", "The no-observed-adverse-effect level (NOAEL) of HBCD administered to CrI:CDr(SD)IGS BR rats by gavage in corn oil for 90 days is 1000 mg/kg/day, the highest dose tested.", "High", "This study was performed according to current guideline under good laboratory practices by laboratory with considerable experience in this area.", "Sponsored by the American Chemistry Council's Brominated Flame Retardant Industry Panel (BFRIP).", "Chengelis, C. An Oral (Gavage) 90 Day Toxicity Study of HBCD in Rats. Laboratory Study No. WIL-186012. WIL Research Laboratories, Inc., Ashland, Ohio. 2001.", "Y"

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","TestType","GLP","Year","Species","Strain","Sex","NumberofMales","NumberofFemales","Route","ExposPeriod","Frequency","Doses","ControlGroup","PremExpFemale","PremExpMale","StatMeth","MethodRem","ParNPrec","ParNOEL","ParNUnit","ParNEffect","ParLPrec","ParLOEL","ParLUnit","ParLEffect","F1NPrec","F1NOEL","F1NUnit","F1NEffect","F1LPrec","F1LOEL","F1LUnit","F1LEffect","F2NPrec","F2NOEL","F2NUnit","F2NEffect","F2LPrec","F2LOEL","F2LUnit","F2LEffect","ActualDose","Parental_F1Data","OffspringData","StatResults","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6022001145747.00,1,2/27/04 0:00:00,"Several developmental toxicity studies on TBBPA are available, one of which was recently completed under current guidelines and Good Laboratory Practices using the TBBPA in commercial production and use at a top dose of 1,000 mg/kg/d. All studies are negative for developmental toxicity. Several repeated dose studies, in more than one mammalian species, are also available and none show evidence of an effect on the reproductive tract. This includes a 90-day study in rats conducted under current guidelines and Good Laboratory Practices using the TBBPA in commercial production and use at a top dose of 1,000 mg/kg/d. According to the OECD SIDS Manual, when teratology and 90-day studies show no effects on the reproductive system then the requirement for the reproductive endpoint is met. Nonetheless, a rat two-generation reproduction study was recently performed due environmental activists' focus on brominated compounds. The test article was composed of equal parts of the commercial product of Albemarle Corporation, Great Lakes Chemical Corporation and Dead Sea Bromine Group.", "EPA OPPTS Method 870.3800", "Two generation study", "Yes", 2002, "rat", "Sprague-Dawley", "Both", 30, 30, "Gavage in corn oil", 0, "Once daily, 7 d/wk", "10, 100, and 1,000 mg/kg body wt", "Yes", "Min 10 wks prior to mating to produce F1 & F2 gen", "As above", "Multiple, as appropriate to specific endpoint", "Note that the value given under Exposure period is 0. This is obviously incorrect. However, the program will not allow the field to be left blank, and the actual exposure period for the P, F1 and F2 animals cannot be described in this format. Further, it is not clear whether this field should be answered with the number of days the animals were dosed or the number of days over which the study was performed.", ">=", 1000, "mg/kg-bw", "Reproductive performance", ">", 1000, "mg/kg-bw", "No adverse effect on reproductive performance", ">=", 1000, "mg/kg-bw", "Reproductive performance", ">", 1000, "mg/kg-bw", "No adverse effect on reproductive performance", ">=", 1000, "mg/kg-bw", "Pup toxicity", ">=", 1000, "mg/kg-bw", "No pup toxicity observed; see Discussion", "Test article conc. measured in dosing suspensions", "This was a complex study. It is difficult to describe the study's conduct and results in this format. Please see the Data Summary and Test Plan, available on EPA's HPV website, for a detailed summary", "This was a complex study. It is difficult to describe the study's conduct and results in this format. Please see the Data Summary and Test Plan, available on EPA's HPV website, for a detailed summary", "This was a complex study. It is difficult to describe the study's conduct and results in this format. Please see the Data Summary and Test Plan, available on EPA's HPV website, for a detailed summary", "This was a complex study. It is difficult to describe the study's conduct and results in this format. Please see the Data Summary and Test Plan, available on EPA's HPV website, for a detailed summary. This detailed summary is 3.5 pages long.", "The NOEL for reproductive performance in this two generation rat reproduction study was 1000 mg/kg-bd wt, the highest dose level tested. The results of this two generation study are supported by a lack of effect on the reproductive system in a modern 90-day study in rats at 1000 mg/kg, and the lack of developmental effects in a modern teratology study in rats at 1000 mg/kg.", "High", "This study was performed by an experience laboratory using the latest techniques.", "Schroeder R. 2002. An oral two generation reproductive, fertility, and developmental neurobehavioral study of tetrabromobisphenol A in rats. Study ID Number: 474-004. MPI Research, Inc. Mattawan, MI. Sponsored by the ACC Brominated Flame Retardant Industry Panel (BFRIP). Schroeder R. 2002. A 90-day oral toxicity study of tetrabromobisphenol A in rats with a recovery group. Study Number: 474-006. MPI Research, Inc. Mattawan, MI. Sponsored by the ACC Brominated Flame Retardant Industry Panel (BFRIP). Schroeder R. 2001. An oral prenatal developmental toxicity study with tetrabromobisphenol A in rats. Study No. 474-005. MPI Research, Mattawan, MI. Sponsored by ACC Brominated Flame Retardant Industry Panel (BFRIP).", "N"6042001084614.00,1,3/1/04 0:00:00,"HBCD has not been tested in a one or two generation reproduction test. However, data is available from developmental and repeated dose studies. OECD guidelines indicate this data is sufficient with respect to the reproductive system. The results of these studies are discussed in other sections of this database and on this record specifically for the reproductive system. The test article was a composite of equal parts of the commercial

hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%. Impurities were as follows: Tetrabromocyclododecane 0.7%, isobutanol 0.1%, Other unknowns 9.2%." ,,"OECDMethod 408, EPA OPPTS Method 870.3100, EPA OPPTS Method 870.3700; OECD 414", "90-D and Developmental Toxicity", "Yes" ,,"rat", "Sprague-Dawley" ,,"0,0", "Oral by gavage in corn oil",0,,"See record for each study", "Yes" ,,"See record for each study", "See record for each study." ,,"0,,,,0,,,,0,,,,0,,,,0,,,,0,,,,,"In the 2001 90-day study in rats, doses as high as 1000 mg/kg/d had no effects on semen analysis or the estrus cycle compared to the control groups. The testes, prostate, seminal vesicles, epididymus, ovaries, uterus and cervix were histologically normal in appearance after 90 days of treatment at doses up to 1000 mg/kg/d. Mean teste and ovary weights were comparable to contol means in all dose groups. The mean prostate weight in the 1000 mg/kg/day group males after 90-days of treatment was increased compared to the control mean. This increased weight did not appear to be of toxicological significance since the change was reversible by the end of the 28-day recovery period and no correlating histopathologic findings were detected. The NOAEL on the reproductive system in this 90-day study was 1000 mg/kg/d, the highest dose tested.In the 1999 rat developmental toxicity study, all maternal animals survived to the scheduled necropsy on gestation day 20. One female in the 500 mg/kg/day group delivered on gestation day 20 and was examined at the scheduled laparohysterectomy. No treatment-related clinical signs were observed at any dose level. Body weight gain and food consumption were not adversely affected at any dose level. At necropsy, no treatment-related findings were observed. Intrauterine growth and survival were unaffected by test article administration at any dose level. No treatment-related fetal malformations or developmental variations were observed in any of the treated groups. The no-observed-adverse-effect level for maternal toxicity and developmental toxicity was 1000 mg HBCD/kg/day administered on days 6-19 of gestation." ,,"The NOAEL for the reproductive system in male and female rats and for developmental toxicity in rats was 1000 mg/kg/d, the highest dose tested." ,,"High", "Both studies were performed according to Good Laboratory Practices and current EPA guidelines." ,,"Both studies were sponsored by the American Chemistry Council's Brominated Flame Retardant Industry Panel (BFRIP)." ,,"Chengelis, C. An Oral (Gavage) 90 Day Toxicity Study of HBCD in Rats. Laboratory Study No. WIL-186012. WIL Research Laboratories, Inc., Ashland, Ohio. 2001.Stump, D. (1999) A Prenatal Developmental Toxicity Study of Hexabromocyclododecane (HBCD) in Rats. Laboratory Study No.: WIL-186009. WIL Research Laboratories, Inc., Ashland, OH." ,,"N"

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"DSN", "TestNo", "Rev_Date", "TestSubstRem", "ChemCat", "Method", "TestType", "GLP", "Year", "Species", "Strain", "Sex", "Numberof Males", "NumberofFemales", "Route", "ExposPeriod", "Frequency", "Doses", "ControlGroup", "PremExpFemale", "PremExpMale", "Stat Meth", "MethodRem", "ParNPrec", "ParNOEL", "ParNUnit", "ParNEffect", "ParLPrec", "ParLOEL", "ParLUnit", "ParLEffect", "F1NPREC", "F1NOEL", "F1NUnit", "FINEffect", "F1LPrec", "F1LOEL", "F1LUnit", "FILEffect", "F2NPREC", "F2NOEL", "F2NUnit", "F2NEffect", "F2LPrec", "F2LOEL", "F2LUnit", "F2LEffect", "ActualDose", "Parental_FIData", "OffspringData", "StatResults", "ResultsRem", "ConcludingRem", "Reliability", "ReliRem", "GeneralRem", "RefRem", "Completed"

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","TestType","TestSystem","GLP","Year","Species","MetabolicAct","Concentration","StatMeth","MethodRem","Result","CytotoxicConc","GenotoxicEff","StatResults","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%.",,"EPA OPPTS Method 870.5375 In vitro Mammalian Chromosome Aberration Test","Cytogenetic assay","Non-bacterial","Yes",1996,"Primary cultures - human lymphocytes","Arochlor 1254-induced rat liver S-9; prepared from male Sprague-Dawley rats","Initial: 75, 250, 750, 2500 ug/ml; Definitive: 10, 19, 38, 75, 150, 300, 600 ug/ml","Fisher's exact test","The test article, Hexabromocyclododecane (HBCD) was tested in the in vitro mammalian cytogenetic test using human peripheral blood lymphocytes (HPBL) in both the absence and presence of metabolic activation. The assay was performed in two phases. The first phase, the initial chromosome aberration assay, was conducted to establish the dose range for testing and to evaluate the clastogenic potential of the test article. The second phase, the independent repeat chromosome aberration assay, was performed to confirm the test system response to the test article seen in the initial assay. Dimethylsulfoxide (DMSO) was the solvent of choice based on the solubility of the test article and compatibility with the target cells. The test article was soluble in DMSO at ~500 mg/ml, the highest concentration tested. Initial. In the initial chromosome aberration assay, duplicate cultures of HPBL were exposed to 9 concentrations of the test article, and to positive, solvent and negative controls. The dividing cells were harvested at ~20 hours after initiation of treatment. The maximum dose tested was 2500 ug/ml. Dose levels greater than 2500 ug/ml were insoluble in the treatment medium and not tested. Visible precipitate was observed in treatment medium at dose levels of 750 and 2500 ug/ml and was soluble but cloudy (no visible precipitate) at dose levels 75 and 250 ug/ml. The test article was soluble in treatment medium at all other dose levels tested. In the non-activated portion of the test, HPBL cells were exposed to the test article continuously for 20 hours; in the S9-activated portion of the test, HPBL were exposed to the test article for 4 hours. Metaphase cells were collected for microscopic evaluation at 20 hours after the initiation of treatment. Second Phase. Duplicate cultures of HPBL were exposed to at least 4 concentrations of the test article, as well as solvent, positive, and untreated controls. The dose levels selected were based on the initial assay. The dividing cells were harvested at 2 time points: 20 and 44 hours after initiation of treatment. HBCD was tested in the absence and presence of an Arochlor-induced S9 metabolic activation system at dose levels of 10, 19, 38, 75, 150, 300 and 600 ug/ml. The test article was soluble but cloudy at 75 ug/ml and was workable in treatment medium at dose levels 150 ug/ml and higher. The test article was soluble in treatment medium at all other concentrations tested. In the independent repeat assay, HPBL cells were exposed to the test article continuously for 20 or 44 hours in the non-activated test system and for 4 hours in the S9-activated test system. Metaphase cells were collected for microscopic evaluation in both the non-activated and S9-activated studies at 20 and 44 hours after the initiation of treatment. Evaluation of Metaphase Cells. Metaphase cells with 46 centromeres were examined under oil immersion without knowledge of treatment groups. Whenever possible, a minimum of 200 metaphase spreads (100 per duplicate treatment condition) were examined and scored for chromatid-type and chromosome-type aberrations. The mitotic index was recorded as the percentage of cells in mitosis per 500 cells counted. In the delayed harvests, the percent polyploid cells was recorded per 100 metaphase cells. Controls. Mitomycin C was used as the positive control in the non-activated study. Cyclophosphamide was used as the positive control in the S-9 activated study. For both positive controls one dose with sufficient scorable metaphase cells was selected for analysis. The solvent vehicle for the test article was used as the solvent control at the same concentration as that found in the test article-treated groups. Growth medium or S9 reaction mixture was used in the untreated control. Evaluation of Results. Toxic effects of treatment were based on mitotic inhibition relative to the solvent-treated control. The number and types of aberrations, the percent aberrant cells, the percentage of numerically damaged cells and the frequency of structural aberrations per cell was reported for each treatment group.",,"Negative","Non-activated: toxicity at 750 ug/ml; S9-activated: toxicity at 250 ug/ml","Unconfirmed","No statistically significant differences were observed between the negative, solvent and treatment groups (p>0.05, Fisher's exact test). The positive controls performed as expected.",,"In the initial assay, dose levels of 2500 ug/ml in the non-

activated study and 750 and 2500 ug/ml in the S9-activated study were not analyzed from chromosome aberrations due to complete mitotic inhibition. Toxicity (mitotic inhibition) of ~56% was observed at the highest dose level (750 ug/ml) evaluated for chromosome aberrations, in the non-activated study. In the S9-activated study, 13% toxicity was observed at the highest dose level (250 ug/ml) evaluated for chromosome aberrations. No statistically significant increases in chromosome aberrations were observed in either the non-activated or S9-activated test systems relative to the solvent control group regardless of dose level ($p > 0.05$, Fisher's exact test). In the independent repeat chromosome aberration assay, toxicity, as measured by mitotic inhibition, was ~55% and 94% at the 20 and 44 hour harvest, respectively, at the highest dose levels (600 and 300 ug/ml) evaluated in the non-activated studies. In the S9-activated studies, toxicity was approximately 71% and 69% at the 20 and 44 hour harvest, respectively, at the highest dose levels (300 and 600 ug/ml) evaluated. The 600 ug/ml dose level in the non-activated 44 hour harvest and in the S9-activated 20 hour harvest was not analyzed for chromosome aberrations due to an insufficient number of scorable metaphase cells. No statistically significant increases in structural chromosome aberrations were observed in either the non-activated or S9-activated studies, regardless of dose level or harvest time ($p > 0.05$, Fisher's exact test). No statistically significant increases in numerical chromosome aberrations were observed in either the non-activated or S9-activated studies at the 44 hour harvest time, regardless of dose level ($p > 0.05$, Fisher's exact test).", "HBCD was negative for the induction of structural and numerical chromosome aberrations in human peripheral blood lymphocytes.", "High", "This study was performed using current techniques, under Good Laboratory Practices, by a laboratory with considerable experience performing this type of study.", "Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel.", "Gudi, R. And Schadly, E. (1996) Chromosome Aberrations in Human Peripheral Blood Lymphocytes. Hexabromocyclododecane. Laboratory Study Number G96AO61.342. Microbiological Associates, Inc., Rockville, MD.", "Y"6042001084614.00,2,12/5/01 0:00:00,"Exact composition of the test article is not known.", "Not specified", "Ames test", "Bacterial", "Unknown", 1976, "Salmonella typhimurium", "Arochlor induced rat liver S9", "0, 1, 10, 50, 100, 500, 1000, 5000 ug/plate", "Not known.", "Five strains of Salmonella typhimurium (TA1535, TA1537, TA1538, TA98 and TA100) were tested in the presence and absence of a metabolic activation system (Arochlor induced rat liver). Doses were 0, 1, 10, 50, 100, 500, 1000 or 5000 ug HBCD/plate.", "Negative", ">5000 ug HBCD/plate with or without metabolic activation", "Unconfirmed", "Not known.", "The test article was not mutagenic or toxic at any dose level when tested with or without metabolic activation.", "HBCD was not mutagenic in S. typhimurium at doses up to and including 5000 ug/plate when tested with or without metabolic activation. These results are consistent with other Ames test's performed on this material (Ogaswara S and Hanafusa T. (1993) Report on mutagenicity test on Pyroguard SR-103 using microorganisms; Baskin A and Phillips, B. (1977) Mutagenicity of two lots of FM-100, Lot 53 and residue of Lot 3322 in the absence and presence of metabolic activation. Industrial Biotest Laboratories, Sponsored by Velsicol Chemical Corporation; Anonymous. (1979) Mutagenicity test of GLS-S6-41A. Gulf South Research Institute, Sponsored by Ethyl Corporation; US Environmental Protection Agency (1990) Ames metabolic activation test to assess the potential mutagenic effect of Compound No. 49. Letter from BASF. EPA/OTS Doc #86-900000385.", "Acceptable", "Multiple Ames tests performed at different test laboratories using different commercial HBCD products as test article have all been negative. The consistency of the negative results increases the confidence in the results.", "Simmons V., Poole, D., Newell, G., and Skinner, W. (1976) In vitro microbiological mutagenicity studies for four CIBA-GEIGY Corporation compounds. SRI Project LSC-5702.", "Y"6042001084614.00,3,12/6/01 0:00:00,"HBCD, obtained from Aldrich Chemicals (Stockholm, Sweden)", "Non standard test methodology", "Mammalian cells in culture (Sp5 and SPD8 duplication cell lines)", "Non-bacterial", "No", 1999, "Not known.", "None", "See results.", "Student's t test", "HBCD was tested in vitro in hamster cells (Sp5/V79 and SPD8) in a recombination assay at five doses between 2 and 20 ug/ml plus a control. The Sp5 and SPD8 clones exhibit a spontaneous partial duplication of the HPRT gene, resulting in a non-functional HGPRT protein. The mutants revert spontaneously to a functional HPRT gene phenotype by recombination; an increase in reversion frequency is considered a positive response. Treatment with HBCD resulted in a ~ maximal 2-fold increase in revertant frequency, which was reported as statistically significant. This reliability of this genetic test is unknown. The reproducibility of the results, validation of the system, dose-effect response, and whether a maximal two-fold increase is evidence of a positive response are also unknown.", "Ambiguous", "Not known.", "Equivocal", "See Remarks Section.", "Treatment with HBCD

resulted in a ~ maximal 2-fold increase in revertant frequency, which was reported as statistically significant. This reliability of this genetic test is unknown. The reproducibility of the results, validation of the system, dose-effect response, and whether a maximal two-fold increase is evidence of a positive response are also unknown.", "Treatment with HBCD resulted in a ~ maximal 2-fold increase in revertant frequency, which was reported as statistically significant. The reliability of this test is unknown.", "Unknown.", "The reliability and predictive ability of this genetic test is unknown. The reproducibility of the results, validation of the system, dose-effect response, and whether a maximal two-fold increase is evidence of a positive response are unknown.", "Helleday et al, Mutat Res, 1999, 439(2): 137-147.", "Y"6022001145747.00,1,12/9/01 0:00:00,"The test article was the commercial tetrabromobisphenol A (TBBPA) product known as Saytech RB-100 produced by Ethyl Corporation.", "EPA/OECD Guideline No. Not specified.", "Ames test", "Bacterial", "Unknown", 1981, "Salmonella typhimurium", "S-9 from induced (A1254) male Sprague Dawley rats", "0.005, 0.015, 0.05, 0.15, and 0.5 mg/plate", "Not specified.", "The test article was tested with and without metabolic activation in S. Typhimurium strains TA1535, TA1537, TA1538, TA98, and TA100 in the standard Ames assay. Positive controls were sodium azide, 9-aminoacridine, 2-nitrofluorene, and 2-aminoanthracene.", "Negative", "No toxicity observed.", "Unconfirmed", "No statistically significant differences between treatment and negative control.", "With and without metabolic activation, all concentrations of the test article failed to induce an average number of revertants/plate three times greater than that found in the solvent controls. The positive controls performed as expected. The sterility controls were all negative for bacterial contamination.", "TBBPA was negative in the Ames test both with and without metabolic activation.", "High", "This study was performed according to standard practices by a laboratory with considerable expertise.", "Study sponsored by Ethyl Corporation, Baton Rouge, LA. The results of this study are consistent with earlier Ames tests performed on TBBPA. A 1977 study in the 5 standard strains plus *Saccharomyces cerevisiae* strain D4, with and without metabolic activation, at doses of 0.1 to 500 ug/plate was also negative (Study sponsored by Velsicol Corporation). A 1976 study also was negative (study sponsored by Great Lakes Chemical Corp). The results of this study are also consistent with those of Mortelmans et al. (Environmental Mutagens, 1986, 8(Suppl 7):1-119). TBBPA was tested in S. Typhimurium TA100, TA1535, TA1537 and TA98 in concentrations of 0, 100, 333, 1000, 3333 and 10,000 ug/plate with and without S9 mix of Arochlor 1254-treated male Sprague-Dawley rats and male Syrian hamsters. TBBPA was dissolved in DMSO. TBBPA was negative for mutagenic activity. (Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995.)", "Curren, R. Activity of T1685 in the Salmonella/microsomal assay for bacterial mutagenicity. Microbiological Associates, Bethesda, MD. 1981.", "Y"6022001145747.00,2,12/11/01 0:00:00,"The test article was a composite of the commercial TBBPA products produced by Albemarle Corp., Dead Sea Bromine Group, and Great Lakes Chemical Corp. The purity was 98.91%.", "Evans, H.J. 1976. In: A Hollaender (Ed.), Chemical Mutagens, Vol 4. Plenum Press, NY.", "Cytogenetic assay", "Non-bacterial", "Yes", 2001, "Primary cultures - human lymphocytes", "Arochlor-induced S9", "See Results.", "See Results.", "TBBPA was tested in the in vitro mammalian chromosome aberration test using human peripheral lymphocytes (HPBL) in both the absence and presence of an Arochlor-induced S9 activation system. A preliminary toxicity test was performed to establish the dose range in the cytogenetic test. The chromosome aberration assay was used to evaluate the clastogenic potential of the test article. Definitive assay in absence of exogenous metabolic activation: 4 hr treatment, 20 hr harvest. Test article concentrations: 6.25, 25, 100 ug/ml. Definitive assay in absence of exogenous metabolic activation: 20 hr treatment, 20 hr harvest. Test article concentrations: 6.25, 25, 75 ug/ml. Definitive assay in presence of exogenous metabolic activation: 4 hr treatment, 20 hr harvest. Test article concentrations: 3.125, 12.5, 50 ug/ml.", "Negative", "See Results.", "Unconfirmed", "See Results.", "The test article was soluble in treatment medium at all concentrations tested. Toxicity (mitotic inhibition) was apprx. 54 and 59% at the highest dose level evaluated for chromosome aberrations, 100 ug/ml and 75 ug/ml in the non-activated 4 hr and 20 hr exposure groups, respectively. Toxicity (mitotic inhibition) was 58% at the highest dose level evaluated for chromosome aberrations, 50 ug/ml, in the S9 activated study. No statistically significant increases in structural and numerical chromosome aberrations were observed in the non-activated or the S9 activated 4 hr exposure groups relative to the solvent control group, regardless of dose level (p>0.05, Fisher's exact test). In the absence of a positive response in the non-activated 4 hr exposure group, the non-activated 20 hr continuous exposure group was evaluated for structural and numerical chromosome aberrations. No statistically significant increases in structural and numerical chromosome aberrations were observed in the non-

activated 20 hr continuous exposure group relative to the solvent control group, regardless of dose level ($p > 0.05$, Fisher's exact test). The positive controls performed as expected.", "TBBPA was negative for the induction of structural and numerical chromosome aberrations in the in vitro chromosome aberration test using human peripheral lymphocytes.", "High", "This study was performed according to current guidelines by a laboratory with considerable expertise.", "This study was sponsored by the ACC Brominated Flame Retardant Industry Panel.", "Gudi, R. and Brown, C. In vitro chromosome aberration test. Test Article: Tetrabromobisphenol A (TBBPA). Study Number: AA47PV.341.BTL. 2001. BioReliance, Rockville, MD.", "Y"6022001145747.00,3,12/11/01 0:00:00,"TBBPA, obtained from Aldrich Chemical (Stockholm, Sweden)", "Other, Test and cell line developed by the paper's authors", "Intragenic recombination", "Non-bacterial", "No", 1999, "Mammalian cells in culture (Sp5 and SPD8 duplication cell lines)", "None", "0, 5, 10, 20, 30, 40 ug/ml", "Student's t test", "The Sp5 and SPD8 cell lines were developed by the publication's authors. The clones used in this study exhibit a spontaneous partial duplication of the hprt gene, resulting in a non-functional HGPRT protein. These mutants revert spontaneously to a functional hprt gene phenotype by recombination with a frequency of apprx. 1×10^5 reversions/cell generation. This reversion frequency is said to increase by exposure to chemical or physical agents.

"DSN","TestNo","Rev_Date","TestSubstRem","ChemCat","Method","TestType","TestSystem","GLP","Year","Species","MetabolicAct","Concentration","StatMeth","MethodRem","Result","CytotoxicConc","GenotoxicEff","StatResults","ResultsRem","ConcludingRem","Reliability","ReliRem","GeneralRem","RefRem","Completed"6042001084614.00,1,12/5/01 0:00:00,"The test article was a composite of equal parts of the commercial hexabromocyclododecane (HBCD) commercial product produced by Albemarle Corporation, Dead Sea Bromine Group, and Great Lakes Chemical Corporation. The test article composite was analyzed for characterization and homogeneity. The results of the analysis indicated the test article was homogeneous and contained the following components: HBCD beta isomer 8.5%, HBCD alpha isomer 6.0%, HBCD gamma isomer 79.1%.",,"EPA OPPTS Method 870.5375 In vitro Mammalian Chromosome Aberration Test","Cytogenetic assay","Non-bacterial","Yes",1996,"Primary cultures - human lymphocytes","Arochlor 1254-induced rat liver S-9; prepared from male Sprague-Dawley rats","Initial: 75, 250, 750, 2500 ug/ml; Definitive: 10, 19, 38, 75, 150, 300, 600 ug/ml","Fisher's exact test","The test article, Hexabromocyclododecane (HBCD) was tested in the in vitro mammalian cytogenetic test using human peripheral blood lymphocytes (HPBL) in both the absence and presence of metabolic activation. The assay was performed in two phases. The first phase, the initial chromosome aberration assay, was conducted to establish the dose range for testing and to evaluate the clastogenic potential of the test article. The second phase, the independent repeat chromosome aberration assay, was performed to confirm the test system response to the test article seen in the initial assay. Dimethylsulfoxide (DMSO) was the solvent of choice based on the solubility of the test article and compatibility with the target cells. The test article was soluble in DMSO at ~500 mg/ml, the highest concentration tested. Initial. In the initial chromosome aberration assay, duplicate cultures of HPBL were exposed to 9 concentrations of the test article, and to positive, solvent and negative controls. The dividing cells were harvested at ~20 hours after initiation of treatment. The maximum dose tested was 2500 ug/ml. Dose levels greater than 2500 ug/ml were insoluble in the treatment medium and not tested. Visible precipitate was observed in treatment medium at dose levels of 750 and 2500 ug/ml and was soluble but cloudy (no visible precipitate) at dose levels 75 and 250 ug/ml. The test article was soluble in treatment medium at all other dose levels tested. In the non-activated portion of the test, HPBL cells were exposed to the test article continuously for 20 hours; in the S9-activated portion of the test, HPBL were exposed to the test article for 4 hours. Metaphase cells were collected for microscopic evaluation at 20 hours after the initiation of treatment. Second Phase. Duplicate cultures of HPBL were exposed to at least 4 concentrations of the test article, as well as solvent, positive, and untreated controls. The dose levels selected were based on the initial assay. The dividing cells were harvested at 2 time points: 20 and 44 hours after initiation of treatment. HBCD was tested in the absence and presence of an Arochlor-induced S9 metabolic activation system at dose levels of 10, 19, 38, 75, 150, 300 and 600 ug/ml. The test article was soluble but cloudy at 75 ug/ml and was workable in treatment medium at dose levels 150 ug/ml and higher. The test article was soluble in treatment medium at all other concentrations tested. In the independent repeat assay, HPBL cells were exposed to the test article continuously for 20 or 44 hours in the non-activated test system and for 4 hours in the S9-activated test system. Metaphase cells were collected for microscopic evaluation in both the non-activated and S9-activated studies at 20 and 44 hours after the initiation of treatment. Evaluation of Metaphase Cells. Metaphase cells with 46 centromeres were examined under oil immersion without knowledge of treatment groups. Whenever possible, a minimum of 200 metaphase spreads (100 per duplicate treatment condition) were examined and scored for chromatid-type and chromosome-type aberrations. The mitotic index was recorded as the percentage of cells in mitosis per 500 cells counted. In the delayed harvests, the percent polyploid cells was recorded per 100 metaphase cells. Controls. Mitomycin C was used as the positive control in the non-activated study. Cyclophosphamide was used as the positive control in the S-9 activated study. For both positive controls one dose with sufficient scorable metaphase cells was selected for analysis. The solvent vehicle for the test article was used as the solvent control at the same concentration as that found in the test article-treated groups. Growth medium or S9 reaction mixture was used in the untreated control. Evaluation of Results. Toxic effects of treatment were based on mitotic inhibition relative to the solvent-treated control. The number and types of aberrations, the percent aberrant cells, the percentage of numerically damaged cells and the frequency of structural aberrations per cell was reported for each treatment group.",,"Negative","Non-activated: toxicity at 750 ug/ml; S9-activated: toxicity at 250 ug/ml","Unconfirmed","No statistically significant differences were observed between the negative, solvent and treatment groups (p>0.05, Fisher's exact test). The positive controls performed as expected.",,"In the initial assay, dose levels of 2500 ug/ml in the non-

activated study and 750 and 2500 ug/ml in the S9-activated study were not analyzed from chromosome aberrations due to complete mitotic inhibition. Toxicity (mitotic inhibition) of ~56% was observed at the highest dose level (750 ug/ml) evaluated for chromosome aberrations, in the non-activated study. In the S9-activated study, 13% toxicity was observed at the highest dose level (250 ug/ml) evaluated for chromosome aberrations. No statistically significant increases in chromosome aberrations were observed in either the non-activated or S9-activated test systems relative to the solvent control group regardless of dose level ($p > 0.05$, Fisher's exact test). In the independent repeat chromosome aberration assay, toxicity, as measured by mitotic inhibition, was ~55% and 94% at the 20 and 44 hour harvest, respectively, at the highest dose levels (600 and 300 ug/ml) evaluated in the non-activated studies. In the S9-activated studies, toxicity was approximately 71% and 69% at the 20 and 44 hour harvest, respectively, at the highest dose levels (300 and 600 ug/ml) evaluated. The 600 ug/ml dose level in the non-activated 44 hour harvest and in the S9-activated 20 hour harvest was not analyzed for chromosome aberrations due to an insufficient number of scorable metaphase cells. No statistically significant increases in structural chromosome aberrations were observed in either the non-activated or S9-activated studies, regardless of dose level or harvest time ($p > 0.05$, Fisher's exact test). No statistically significant increases in numerical chromosome aberrations were observed in either the non-activated or S9-activated studies at the 44 hour harvest time, regardless of dose level ($p > 0.05$, Fisher's exact test).", "HBCD was negative for the induction of structural and numerical chromosome aberrations in human peripheral blood lymphocytes.", "High", "This study was performed using current techniques, under Good Laboratory Practices, by a laboratory with considerable experience performing this type of study.", "Study sponsored by the Chemical Manufacturers Association Brominated Flame Retardant Industry Panel.", "Gudi, R. And Schadly, E. (1996) Chromosome Aberrations in Human Peripheral Blood Lymphocytes. Hexabromocyclododecane. Laboratory Study Number G96AO61.342. Microbiological Associates, Inc., Rockville, MD.", "Y"6042001084614.00,2,12/5/01 0:00:00, "Exact composition of the test article is not known.", "Not specified", "Ames test", "Bacterial", "Unknown", 1976, "Salmonella typhimurium", "Arochlor induced rat liver S9", "0, 1, 10, 50, 100, 500, 1000, 5000 ug/plate", "Not known.", "Five strains of Salmonella typhimurium (TA1535, TA1537, TA1538, TA98 and TA100) were tested in the presence and absence of a metabolic activation system (Arochlor induced rat liver). Doses were 0, 1, 10, 50, 100, 500, 1000 or 5000 ug HBCD/plate.", "Negative", ">5000 ug HBCD/plate with or without metabolic activation", "Unconfirmed", "Not known.", "The test article was not mutagenic or toxic at any dose level when tested with or without metabolic activation.", "HBCD was not mutagenic in S. typhimurium at doses up to and including 5000 ug/plate when tested with or without metabolic activation. These results are consistent with other Ames test's performed on this material (Ogaswara S and Hanafusa T. (1993) Report on mutagenicity test on Pyroguard SR-103 using microorganisms; Baskin A and Phillips, B. (1977) Mutagenicity of two lots of FM-100, Lot 53 and residue of Lot 3322 in the absence and presence of metabolic activation. Industrial Biotest Laboratories, Sponsored by Velsicol Chemical Corporation; Anonymous. (1979) Mutagenicity test of GLS-S6-41A. Gulf South Research Institute, Sponsored by Ethyl Corporation; US Environmental Protection Agency (1990) Ames metabolic activation test to assess the potential mutagenic effect of Compound No. 49. Letter from BASF. EPA/OTS Doc #86-900000385.", "Acceptable", "Multiple Ames tests performed at different test laboratories using different commercial HBCD products as test article have all been negative. The consistency of the negative results increases the confidence in the results.", "Simmons V., Poole, D., Newell, G., and Skinner, W. (1976) In vitro microbiological mutagenicity studies for four CIBA-GEIGY Corporation compounds. SRI Project LSC-5702.", "Y"6042001084614.00,3,12/6/01 0:00:00, "HBCD, obtained from Aldrich Chemicals (Stockholm, Sweden)", "Non standard test methodology", "Mammalian cells in culture (Sp5 and SPD8 duplication cell lines)", "Non-bacterial", "No", 1999, "Not known.", "None", "See results.", "Student's t test", "HBCD was tested in vitro in hamster cells (Sp5/V79 and SPD8) in a recombination assay at five doses between 2 and 20 ug/ml plus a control. The Sp5 and SPD8 clones exhibit a spontaneous partial duplication of the HPRT gene, resulting in a non-functional HGPRP protein. The mutants revert spontaneously to a functional HPRT gene phenotype by recombination; an increase in reversion frequency is considered a positive response. Treatment with HBCD resulted in a ~ maximal 2-fold increase in revertant frequency, which was reported as statistically significant. This reliability of this genetic test is unknown. The reproducibility of the results, validation of the system, dose-effect response, and whether a maximal two-fold increase is evidence of a positive response are also unknown.", "Ambiguous", "Not known.", "Equivocal", "See Remarks Section.", "Treatment with HBCD

resulted in a ~ maximal 2-fold increase in revertant frequency, which was reported as statistically significant. This reliability of this genetic test is unknown. The reproducibility of the results, validation of the system, dose-effect response, and whether a maximal two-fold increase is evidence of a positive response are also unknown.", "Treatment with HBCD resulted in a ~ maximal 2-fold increase in revertant frequency, which was reported as statistically significant. The reliability of this test is unknown.", "Unknown.", "The reliability and predictive ability of this genetic test is unknown. The reproducibility of the results, validation of the system, dose-effect response, and whether a maximal two-fold increase is evidence of a positive response are unknown.", "Helleday et al, Mutat Res, 1999, 439(2): 137-147.", "Y"6022001145747.00,1,12/9/01 0:00:00,"The test article was the commercial tetrabromobisphenol A (TBBPA) product known as Saytech RB-100 produced by Ethyl Corporation.", "EPA/OECD Guideline No. Not specified.", "Ames test", "Bacterial", "Unknown", 1981, "Salmonella typhimurium", "S-9 from induced (A1254) male Sprague Dawley rats", "0.005, 0.015, 0.05, 0.15, and 0.5 mg/plate", "Not specified.", "The test article was tested with and without metabolic activation in S. Typhimurium strains TA1535, TA1537, TA1538, TA98, adn TA100 in the standard Ames assay. Positive controls were sodium azide, 9-aminoacridine, 2-nitrofluorene, and 2-aminoanthracene.", "Negative", "No toxicity observed.", "Unconfirmed", "No statistically significant differences between treatment and negative control.", "With and without metabolic activation, all concentrations of the test article failed to induce an average number of revertants/plate three times greater than that found in the solvent controls. The positive controls performed as expected. The sterility controls were all negative for bacterial contamination.", "TBBPA was negative in the Ames test both with and without metabolic activation.", "High", "This study was performed according to standard practices by a laboratory with considerable expertise.", "Study sponsored by Ethyl Corporation, Baton Rouge, LA. The results of this study are consistent with earlier Ames tests performed on TBBPA. A 1977 study in the 5 standard strains plus Saccharomyces cerevisiae strain D4, with and without metabolic activation, at doses of 0.1 to 500 ug/plate was also negative (Study sponsored by Velsicol Corporation). A 1976 study also was negative (study sponsored by Great Lakes Chemical Corp). The results of this study are also consistent with those of Mortelmans et al. (Environmental Mutagens, 1986, 8(Suppl 7):1-119). TBBPA was tested in S. Typhimurium TA100, TA1535, TA1537 and TA98 in concentrations of 0, 100, 333, 1000, 3333 and 10,000 ug/plate with and without S9 mix of Arochlor 1254-treated male Sprague-Dawley rats and male Syrian hamsters. TBBPA was dissolved in DMSO. TBBPA was negative for mutagenic activity. (Reported in Environmental Health Criteria Document # 172, World Health Organization, Geneva, 1995.)", "Curren, R. Activity of T1685 in the Salmonella/microsomal assay for bacterial mutagenicity. Microbiological Associates, Bethesda, MD. 1981.", "Y"6022001145747.00,2,12/11/01 0:00:00,"The test article was a composite of the commercial TBBPA products produced by Albemarle Corp., Dead Sea Bromine Group, and Great Lakes Chemical Corp. The purity was 98.91%.", "Evans, H.J. 1976. In: A Hollaender (Ed.), Chemical Mutagens, Vol 4. Plenum Press, NY.", "Cytogenetic assay", "Non-bacterial", "Yes", 2001, "Primary cultures - human lymphocytes", "Arochlor-induced S9", "See Results.", "See Results.", "TBBPA was tested in the in vitro mammalian chromosome aberration test using human peripheral lymphocytes (HPBL) in both the absence and presence of an Arochlor-induced S9 activation system. A preliminary toxicity test was performed to establish the dose range in the cytogenetic test. The chromosome aberration assay was used to evaluate the clastogenic potential of the test article. Definitive assay in absence of exogenous metabolic activation: 4 hr treatment, 20 hr harvest. Test article concentrations: 6.25, 25, 100 ug/ml. Definitive assay in absence of exogenous metabolic activation: 20 hr treatment, 20 hr harvest. Test article concentrations: 6.25, 25, 75 ug/ml. Definitive assay in presence of exogenous metabolic activation: 4 hr treatment, 20 hr harvest. Test article concentrations: 3.125, 12.5, 50 ug/ml.", "Negative", "See Results.", "Unconfirmed", "See Results.", "The test article was soluble in treatment medium at all concentrations tested. Toxicity (mitotic inhibition) was apprx. 54 and 59% at the highest dose level evaluated for chromosome aberrations, 100 ug/ml and 75 ug/ml in the non-activated 4 hr and 20 hr exposure groups, respectively. Toxicity (mitotic inhibition) was 58% at the highest dose level evaluated for chromosome aberrations, 50 ug/ml, in the S9 activated study. No statistically significant increases in structural and numerical chromosome aberrations were observed in the non-activated or the S9 activated 4 hr exposure groups relative to the solvent control group, regardless of dose level (p>0.05, Fisher's exact test). In the absence of a positive response in the non-activated 4 hr exposure group, the non-activated 20 hr continuous exposure group was evaluated for structural and numerical chromosome aberrations. No statistically significant increases in structural and numerical chromosome aberrations were observed in the non-

activated 20 hr continuous exposure group relative to the solvent control group, regardless of dose level ($p > 0.05$, Fisher's exact test). The positive controls performed as expected.", "TBBPA was negative for the induction of structural and numerical chromosome aberrations in the in vitro chromosome aberration test using human peripheral lymphocytes.", "High", "This study was performed according to current guidelines by a laboratory with considerable expertise.", "This study was sponsored by the ACC Brominated Flame Retardant Industry Panel.", "Gudi, R. and Brown, C. In vitro chromosome aberration test. Test Article: Tetrabromobisphenol A (TBBPA). Study Number: AA47PV.341.BTL. 2001. BioReliance, Rockville, MD.", "Y"6022001145747.00,3,12/11/01 0:00:00,"TBBPA, obtained from Aldrich Chemical (Stockholm, Sweden)", "Other, Test and cell line developed by the paper's authors", "Intragenic recombination", "Non-bacterial", "No", 1999, "Mammalian cells in culture (Sp5 and SPD8 duplication cell lines)", "None", "0, 5, 10, 20, 30, 40 ug/ml", "Student's t test", "The Sp5 and SPD8 cell lines were developed by the publication's authors. The clones used in this study exhibit a spontaneous partial duplication of the hprt gene, resulting in a non-functional HGPRT protein. These mutants revert spontaneously to a functional hprt gene phenotype by recombination with a frequency of approx. 1×10^{-5} reversions/cell generation. This reversion frequency is said to increase by exposure to chemical or physical agents.