



**ENFORCEABLE CONSENT AGREEMENT
FOR
ETHYLENE DICHLORIDE (EDC)**

CAS No. 107-06-2

Docket No. OPPTS - 42197C

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I. INTRODUCTION

Under the authority of section 4 of the Toxic Substances Control Act (TSCA), 15 U.S.C. 2603, the United States Environmental Protection Agency (EPA) and The Dow Chemical Company, Vulcan Materials Company, Occidental Chemical Corporation, Oxy Vinyls, LP, Georgia Gulf Corporation, Westlake Chemical Corporation, PPG Industries, Inc., Borden Chemicals & Plastics Operating Limited Partnership, and Formosa Plastics Corporation, U.S.A. (hereinafter collectively "the Companies") enter into this enforceable consent agreement (ECA). This ECA takes effect on the date of publication of the notice in the Federal Register announcing the issuance of the testing consent order (Order) that incorporates this ECA.

In EPA's proposed test rule for hazardous air pollutants (HAPs) published on June 26, 1996 (61 FR 33178), amended on December 24, 1997 (62 FR 67466) and on April 21, 1998 (63 FR 19694), EPA invited the submission of alternative testing proposals for HAPs that would apply pharmacokinetics studies and mechanistic data (PK/MECH) to inform route-to-route extrapolation of data from studies acceptable to EPA that were performed by a route of exposure other than inhalation. Such proposals would be used to develop a tailored testing program to provide the data needs identified by EPA in the proposed HAPs rulemaking via an ECA process. This ECA resulted from negotiations conducted as a part of an ECA process for the HAP ethylene dichloride (62 FR 66626; December 19, 1997). The official record for this ECA, including the public version, is established under EPA docket control number OPPTS-42197C. The procedures for ECA negotiations are described at 40 CFR 790.22(b).

On December 26, 2000 (65 FR 81700) EPA announced the Voluntary Children's Chemical Evaluation Program (VCCEP) which is intended to provide data to enable the public to understand the potential health risks to children associated with certain exposures to commercial chemicals. EDC and some 22 other chemicals have been selected for inclusion in a pilot of VCCEP. Under the VCCEP, EPA asks that companies which manufacture and/or import chemicals selected for this pilot of VCCEP volunteer to sponsor Tier 1 of the program. The VCCEP pilot consists of three tiers, which a sponsor may commit to separately. EDC producers (sponsors), as represented by the American Chemistry Council Vinyl Chloride Health Committee (Health Committee), intend to voluntarily sponsor EDC in Tier 1 of the VCCEP pilot. Part of this commitment is being executed and implemented via this ECA through the HAP Task Force. The relationship between the Health Committee and the HAP Task Force is described in the June 25, 2001 letter of commitment to the VCCEP Tier 1 for ethylene dichloride, which is available in the EPA OPPTS Docket No. 42197B.

In the commitment letter EDC producers proposed to complete this ECA testing program before submitting risk and exposure assessments under the VCCEP. Results from this HAPs ECA testing program would provide data needed for the VCCEP and, where possible, could avert some or all of the overlapping requirements between the two initiatives. A concern expressed by the EDC producers was whether scheduled deliverables for the VCCEP will be considered timely if, due to the time needed for completing the ECA testing, the VCCEP

deliverables extended beyond the expected VCCEP timelines. EPA has accepted that the VCCEP Tier 1 deliverables could be submitted within twelve months following the completion of all testing to be conducted under this ECA. EPA understands that the test schedule set forth in this ECA includes some higher tier VCCEP toxicity studies and may also depend in part on EPA performing certain actions in a timely manner during the course of the testing. Additionally, events could occur that would cause the ECA test schedule to be extended beyond what is contemplated in the ECA. Any schedule changes would occur via the ECA modification procedures at 40 CFR 790.68 (b), see also Part X. of this ECA. If the schedule for ECA testing is extended, the schedule for VCCEP commitments would be likewise extended.

II. CHEMICAL SUBJECT TO THE ECA

The subject of this ECA is the chemical substance ethylene dichloride (EDC), CAS No. 107-06-2. The ethylene dichloride to be tested must be as pure as can be reasonably attained, but must be at least 99.0 percent pure.

III. OBLIGATION OF SIGNATORY COMPANIES AND ROLE OF THE HAP TASK FORCE

A. Testing will be sponsored by the Companies, which are responsible for complying with this ECA.

B. The Companies recognize that to implement this ECA, EPA will issue an Order under section 4 of TSCA that incorporates the terms of this ECA. The Companies agree that all terms of this ECA will take effect on the date of publication of the notice in the Federal Register announcing the issuance of the Order that incorporates this ECA, and all applicable time periods will be treated as beginning on that publication date.

C. The Companies are members of the HAP Task Force, which represents the manufacturers of ethylene dichloride. The HAP Task Force will be responsible for coordinating and administering testing under this ECA and communicating with EPA about study plans, protocols, test standards, and other aspects of the testing program. In performing these functions, the HAP Task Force will be acting as the agent of the Companies for purposes of compliance and communication with EPA. EPA and the Companies recognize that, except for its role as agent as specified in this ECA, the HAP Task Force has no legal responsibility for complying with this ECA. Responsibility for complying with the ECA rests at all times with the individual Companies.

IV. PURPOSE OF THE TESTING PROGRAM

The purpose of the testing program specified in this ECA is to supplement available information in order to further characterize the potential for acute toxicity, subchronic toxicity, neurotoxicity, developmental toxicity and reproductive toxicity effects of ethylene dichloride from inhalation exposures. One component of this testing program will develop PK/MECH data directed at characterizing the mode of action of ethylene dichloride. Such information, along with data from health effects studies acceptable to EPA and/or from health effects studies to be conducted as part of this ECA testing program for ethylene dichloride, will be used to inform the route-to-route extrapolations that are specified in Table 1. EPA will also use the PK/MECH data to provide the basis for determining the feasibility and appropriateness of using a tailored approach to testing and whether route-to-route extrapolations can be used to meet inhalation testing requirements for ethylene dichloride that are identified in the proposed HAPs test rule, as amended.

EPA believes that the PK/MECH studies designed to construct quantitative dosimetric characterization of the disposition and relevant response mechanisms with regard to ethylene dichloride, in conjunction with the studies and route-to-route extrapolation reporting that are specified in Table 1 and described in Appendices C through E to this ECA, will generate data needed by EPA to determine whether ethylene dichloride presents an unreasonable risk of injury to human health from inhalation exposures. The data will also be used to implement several provisions of section 112 of the Clean Air Act, including determination of residual risk, estimation of the risks associated with accidental releases of ethylene dichloride, and determinations regarding whether substances should be removed from the Clean Air Act section 112(b)(1) list of hazardous air pollutants. In addition, the data will also be used by other Federal agencies (e.g., the Agency for Toxic Substances and Disease Registry (ATSDR), the National Institute for Occupational Safety and Health (NIOSH), the Occupational Safety and Health Administration (OSHA), and the Consumer Product Safety Commission (CPSC)) in assessing chemical risks and in taking appropriate actions within their programs. It is intended that the data generated under this ECA will satisfy the toxicological data needs for acute toxicity, subchronic toxicity, neurotoxicity, developmental toxicity and reproductive toxicity effects of ethylene dichloride identified in the amended proposed HAPs rulemaking.

V. SCOPE OF THE TESTING PROGRAM

The Companies, through the HAP Task Force, will jointly conduct or provide for the performance of the testing program specified in this ECA. This testing program will consist of: 1) conducting the testing listed in Table 1 in accordance with the test standards specified in Table 1 and described in Appendix B(1-4) as annotated in Appendix D(1-3) to this ECA ("Test Standards"), and performing the PBPK studies and route-to-route extrapolations specified in Table 1 and described in Appendix C(1-6) to this ECA; and 2) submitting the reports and documents specified in Table 1 in accordance with the deadlines set forth in Table 1.

The use of PK/MECH data to support quantitative route-to-route extrapolation is a new approach for EPA's Office of Pollution Prevention and Toxics (OPPT) in the TSCA section 4 Chemical Testing Program. It is essential to the success of this ECA testing program for EPA to ensure that the data used to inform the route-to-route extrapolations are of the highest quality. For this reason, a program review requirement has been incorporated into this ECA testing program (see Part VI. C. and Part VII. A. - D. of this ECA).

EPA notes that the generation of PK/MECH data to support development of dosimetry (e.g.; physiologically based pharmacokinetics --PBPK) models should be chemical-specific and based on an understanding, to the degree possible, of the mode of action for the various endpoint toxicities. Modeling is an iterative process. The nature of chemical reactions between a xenobiotic agent and biological tissues, and the degree to which they are understood, have a profound influence on the scope of the modeling effort. A degree of uncertainty regarding the model structure can be clarified by validation of the predications of the PBPK dosimetry model with appropriately designed experiments. New insights on important parameters and processes can then be additionally tested and used to further refine the model. Because these chemical and toxicity-specific attributes can affect both the type of PK/MECH data necessary to characterize disposition of a chemical and the type of model structure that would be adequate to describe it, EPA does not have guidelines available for the HAP Task Force to utilize. General guidance is available in a number of references (Woodruff *et al.*, 1992¹; Ultman, 1994²; Andersen *et al.*, 1995³; Kohn, 1997⁴; Buchanan *et al.*, 1997⁵). Key considerations for model structure include the degree of parameterization and whether the model is to be used to extrapolate (e.g., across species or across routes) versus interpolate data (Woodruff *et al.*, 1992).

The source of each model parameter value should be described, indicating whether it was: 1) obtained from prior literature (copy of references cited to be provided by the HAP Task Force), 2) determined directly by a separate experiment described in the submitted report or peer-reviewed paper, or 3) estimated by the fitting of model output to experimental data. Parameter estimates derived independently of tissue time-course or dose-response data are preferred (Andersen *et al.*, 1995). Determination by separate experiment is preferred, particularly for

¹ Woodruff, T.J., F.Y. Bois, D. Auslander and R. Spear. 1992. Structure and parameterization of pharmacokinetics models: Their impact on model predictions. *Risk Anal.* 12:189-201.

² Ultman, J.S. 1994. Dosimetry modeling: Approaches and issues. *Inhal. Toxicol.* 6: 59-71.

³ Andersen, M.E., H.J. Clewell, III and C.B. Frederick. 1995. Applying simulation modeling to problems in toxicology and risk assessment -- A short perspective. *Tox. Appl. Pharm.* 133-187.

⁴ Kohn, M.C. 1997. The importance of anatomical realism for validation of physiological models of disposition of inhaled toxicants. *Tox. Appl. Pharm.* 147: 448-458.

⁵ Buchanan, J.R., L.T. Burka, and R.L. Melnick. 1997. Purpose and guidelines for toxicokinetic studies within the National Toxicology Program. *Environ. Hlth. Perspect.* 105(5): 468-471.

critical target tissue parameters, such as partition coefficients. Model verification, the process of evaluating the sufficiency of the model for its intended purpose, should be demonstrated by showing the ability of the model to predict the behavior of experimental data different from those on which it was based. Model validation should demonstrate the ability of the model to predict the behavior of the system under conditions which test the principal aspects of the underlying hypothetical structure. Objective measures of variance (e.g., statistical goodness of fit) that can be compared to residual variance are preferred, but accurate prediction of the general behavior of the data for the intended application (e.g., a given range) may be a more important consideration. For this latter consideration, however, a factor of 2-fold (on average) will be a general criterion applied to determine “reasonable” agreement of the model with the experimental data.

The choice of which dose metric to use in the model to characterize a given endpoint toxicity should be based on some knowledge of the mode of action by which the toxic effects are induced. The mechanistic information does not necessarily have to be exhaustive but can rather be related to general aspects of the nature and causes of a particular toxic interaction. Certainly route-specific toxicity needs to be characterized, both the effects in the portal-of-entry as well as modulation of systemic dose at remote sites. PK/MECH data must be developed that correspond to the species, dose level, exposure regimen and vehicle (e.g., intermittent corn oil gavage versus drinking water ad lib versus diet) of the toxicity data that are the object of the extrapolation. For the extrapolation of the chronic endpoint data, demonstration of periodicity during the experiments used to generate the PK/MECH data is required. Periodicity, as defined in U.S. EPA (1994)⁶, is achieved when the internal concentration of the dose metric of interest (e.g., parent venous concentration) versus time profile is the same for 90% of the exposure period. The rationale for the choice of various dose metrics should be provided.

Andersen *et al.* (1995) published a table of characteristics of a good modeling paper and documentation; EPA will utilize these same reporting requirements. These include: (1) clear presentation of all equations; (2) clear definition of all variables and parameters; (3) clear definition of units to ensure proper dimensions; (4) definition of criteria to evaluate predictions or fits; (5) specification of the time, species, and exposure domain where the model is valid; and (6) discussion of the hypothesis testing and model discrimination as necessary. Graphical display of model fits to data are required; including both parent and metabolite(s) blood and target tissue time course data. A sensitivity analysis of the model must be conducted and documentation of model code with comment fields must be provided. Computer hardware and software actually used in the application must be described. If specialized software functions must be referred to, they should be described sufficiently to enable someone unfamiliar with the software to understand their operation. Standard mathematical forms are preferred to software language functional forms.

⁶ U.S. EPA. 1994. Methods for derivation of inhalation reference concentrations and application of inhalation dosimetry. Office of Research and Development. Environmental Criteria and Assessment Office, Research Triangle Park, NC. EPA/600/8-90/066F.

VI. DESCRIPTION OF THE TESTING PROGRAM

The testing program has four segments as follows: Tier I HAPs Testing; Tier I Program Review Testing; EPA Program Review; and Tier II Testing.

A. Tier I HAPs Testing: This testing will consist of the following endpoint testing, conducted by inhalation exposure, that EPA has deemed necessary to meet certain data needs identified in the proposed HAPs test rule, as amended: 1) acute toxicity testing with BAL and histopathology, and 2) acute neurotoxicity testing. EPA will not finalize the testing requirements for these Tier I HAPs Testing endpoints for ethylene dichloride as specified in the proposed HAPs test rule, as amended, because such testing will be conducted under this ECA. Furthermore, EPA considers the existing study by Sherwood *et al.* (1987), adequate to fulfill the macrophage function assay portion of the acute toxicity testing requirement (see Appendix E.1). In addition, EPA considers the existing studies by Rao *et al.* (1980) and Payan *et al.* (1995), adequate to characterize the developmental toxicity of ethylene dichloride under the proposed HAPs rulemaking, as amended (see Appendix E.3). Thus, EPA will not finalize the testing requirements for the developmental toxicity and macrophage function assay Tier I HAPs testing endpoints for EDC as specified in the HAPs proposed rule as amended, because available studies are acceptable for HAPs purposes. Tier 1 testing for acute toxicity and acute neurotoxicity and the extant data for macrophage function assay and developmental toxicity testing are specified in the "Tier I HAPs Testing" segment of Table 1 and described in Appendix B(1,2) as annotated in Appendix D(1), and Appendix E(1,3).

B. Tier I Program Review Testing: This testing, specified in the "Tier I Program Review Testing" segment of Table 1 and described in Appendix C.1, will develop PK/MECH data needed to inform about the acceptability of an alternate route to inhalation for Tier II testing. It will also develop and validate the dosimetry model of Gargas *et al.* (1987; 1988) in rats and verify the ability of the model to perform quantitative route-to-route extrapolations, as described in Appendix C(2-5) and as will be reported following guidance provided in Appendix C.6. Data from this testing will be the subject of discussions at the EPA Program Review. While EPA believes that it is best to obtain this type of PK/MECH data in conjunction with the testing specified in the Tier I HAPs Testing (see Part VI. A.), these PK/MECH data may also be obtained independently from stand-alone studies. Specifically, the PK/MECH data will support: 1) oral-to-inhalation extrapolation of existing subchronic toxicity data in rats administered ethylene dichloride via corn oil gavage (Daniel *et al.*, 1994)(see Appendix E.2); 2) oral-to-inhalation extrapolation of subchronic neurotoxicity data in rats administered ethylene dichloride via drinking water (see Tier II testing); and 3) oral-to-inhalation extrapolation of reproductive toxicity data in rats administered ethylene dichloride via drinking water (see Tier II testing) and each dosing paradigm of existing reproductive toxicity studies by Alumot *et al.* (1976), Rao *et al.* (1980), and Lane *et al.* (1982)(see Appendix E.4). The PK/MECH data will also support model simulations to demonstrate validation and verification of PBPK models for route-to-route extrapolation in order to evaluate acceptability of oral drinking water exposure in rats in the Tier II testing for subchronic neurotoxicity and reproductive toxicity.

C. EPA Program Review: A program review will be conducted by EPA to review the data collected from the Tier I Program Review Testing segment (see Part VI. B. of this ECA) and other studies acceptable to EPA that would be applied to route-to-route extrapolations, as indicated in footnotes 4, 6, and 8 of Table 1.

The purpose of the EPA Program Review will be to determine: (1) whether it is feasible and appropriate to apply Tier I Program Review Testing data and data from other studies acceptable to EPA to inform route-to-route extrapolations for endpoints listed in the Tier II Testing segment; (2) whether the data from the Tier I Program Review Testing segment (see Part VI. B. of this ECA) provide a sufficient basis for conducting the endpoint testing and/or the route-to-route extrapolations specified in the Tier II Testing segment; and/or (3) the nature and scope of any additional work that may be required prior to the commencement of Tier II Testing and extrapolation reporting (e.g., additional PK/MECH data as described in Part VII. of this ECA).

Opportunity for public participation in the EPA Program Review will be provided either by a request for written comments or through an announcement of a public meeting. EPA will publish the request for public comments and/or the announcement of a public meeting in the Federal Register. Following the EPA Program Review, EPA will place in the record for this action a summary describing the EPA Program Review meeting, if such a meeting is held, a copy of comments received, and a copy of the letter sent to the HAP TASK FORCE informing it of the conclusions of EPA's Program Review.

D. Tier II Testing: This segment will consist of additional endpoint testing not included in the Tier I HAPs Testing segment, as specified in Table 1 and described in Appendix B (3-4) as annotated in Appendix D(2-3). Specifically this testing will consist of oral subchronic neurotoxicity testing and oral reproductive effects testing. Tier II will also consist of route-to-route extrapolation reporting for existing subchronic toxicity data of Daniel *et al.* (1994), the subchronic neurotoxicity and reproductive toxicity data obtained from Tier II testing, and extant data from reproductive toxicity studies by Alumot *et al.* (1976), Rao *et al.* (1980), and Lane *et al.* (1982), as specified in Table 1 and Appendix C(2-4) and reported following guidance provided in Appendix C.6. Following a successful outcome of the EPA Program Review (see Section VII. A. and B.1.a.), EPA will not finalize inhalation testing requirements for these Tier II testing endpoints for ethylene dichloride, as specified in the amended proposed HAPs test rule, because the data required under the HAPs rulemaking will be developed under this ECA.

VII. EPA PROGRAM REVIEW OUTCOMES

The EPA Program Review segment can result in several possible outcomes, described below.

A. EPA Accepts Tier I Program Review Testing Data: EPA may determine that the Tier I Program Review Testing data can be used to inform and support Tier II testing for any or all of the endpoints and/or associated route-to-route extrapolation reporting for ethylene dichloride that are specified in Table 1. In such an instance, EPA will notify the Companies in writing that Tier II endpoint testing and route-to-route extrapolation reporting must be conducted for: subchronic toxicity, subchronic neurotoxicity, and reproductive toxicity for ethylene dichloride. In addition, EPA will not finalize the testing requirements for these endpoints for ethylene dichloride as specified in the proposed HAPs test rule, as amended.

B. EPA Identifies Limitations in the Tier I Program Review Testing Data: EPA may determine that additional Tier I Program Review Testing is needed before any or all of the Tier II endpoint testing and/or associated route-to-route extrapolation reporting that are specified in Table 1 for ethylene dichloride can be conducted. In such an instance, EPA will inform the Companies by letter that additional Tier I Program Review Testing is needed and a copy of this letter will be placed in the record for this action. EPA may initiate technical discussions with the Companies on this matter.

(1) Agreement on Additional Tier I Program Review Testing: If EPA and the Companies agree to the additional testing, modifications to the relevant Test Standards specified in the Tier I Program Review Testing section of Table 1 and described in the associated appendices for the relevant Test Standards may be made according to the procedures contained in 40 CFR 790.68 (see Part X of this ECA). The additional Tier I Program Review Testing will be conducted in accordance with these modifications. The data resulting from this additional testing will be reviewed to determine if such data meet EPA needs. This review may include one or more meeting(s) between the Companies and EPA. Opportunity for public participation will be provided either by a request for written comments and/or through an announcement of a public meeting. Following such meeting(s), EPA will place in the record for this action a summary of each meeting along with a copy of the comments received.

(a) Additional Tier I Program Review Testing Meets Data Needs: If and when the Tier I Program Review Testing data are determined to be acceptable to EPA, EPA will inform the Companies by letter that the data from the Tier I Program Review Testing can be used as a basis to inform and support Tier II Testing for any or all of the endpoints and associated route-to-route extrapolation reporting for ethylene dichloride that are specified in Table 1. In addition, the letter will indicate that EPA will not finalize the inhalation testing requirements for these Tier II Testing endpoints for ethylene dichloride as specified in the proposed HAPs test rule, as amended. A copy of the letter will be placed in the record for this action.

(b) Additional Tier I Program Review Testing Does Not Meet Data Needs: If, at any point, EPA determines that the Tier I Program Review Testing data, as supplemented by the additional Tier I Program Review Testing data, cannot be used to inform and support Tier II testing for any or all of the endpoints and/or associated route-to-route extrapolations for

ethylene dichloride that are specified in Table 1, then the outcome described in Part. VII .C. below will apply to these endpoints.

(2) Failure to Agree on Additional Needed Tier I Program Review Testing: If the Companies and EPA do not agree to the additional Tier I Program Review Testing that EPA has determined to be needed, the outcome described in Part VII. C. below will apply to these endpoints.

C. EPA Determines Tailored Approach to HAPs Testing is not Feasible: EPA may determine that the tailored approach to HAPs testing set forth in this ECA, for any or all Tier I Program Review Testing as applied to any or all Tier II endpoint testing and associated route-to-route extrapolations, is not feasible. In such an instance, EPA will notify the Companies by certified letter or Federal Register notice. The notification will include the reason(s) for the determination and will be placed in the record for this action. If EPA issues such a notification for any endpoint(s), the Companies' obligations to conduct testing or associated route-to-route extrapolations for that endpoint(s) as described under this ECA are terminated. EPA may pursue testing for such endpoint(s) under the HAPs rulemaking, a new rulemaking , or develop a separate ECA for the purpose of obtaining the needed data, as appropriate.

D. Other Possible Outcomes: If the EPA Program Review or Tier II endpoint testing and associated route-to-route extrapolations do not result in any of the outcomes described above, EPA and the Companies may modify this ECA according to the procedures contained in 40 CFR 790.68 (see Part X. of this ECA).

VIII. STANDARDS FOR CONDUCTING TESTING

A. Testing for specific toxicity endpoints (acute toxicity, neurotoxicity, and reproductive toxicity) must be conducted in accordance with the Test Standards listed in Table 1 and described in Appendix B(1-4) as annotated in Appendix D(1-3) to this ECA. Certain provisions of these Test Standards are considered to be mandatory and are referred to as "requirements". These requirements are identified by the use of the word "shall" in the text of the Test Standard.

Provisions that are not mandatory, and are therefore only recommended, are identified by the use of "should" statements. In the event such "should" provisions are not followed, the Companies will not be deemed by EPA to be in violation of this ECA and will not be subject to penalties or other enforcement actions, as described in Part XI. of this ECA. However, in such cases, EPA will use its professional judgement to determine the scientific adequacy and validity of the test results and any repeat testing that is determined by EPA to be necessary will be required either under a separate ECA or pursuant to a rule promulgated under section 4(a) of TSCA, 15 U.S.C. 2603(a).

For the purpose of this ECA, the words "will" and "must," if they appear in the Test Standards, are considered equivalent to the word "shall" and therefore delineate a test requirement to be followed or met.

B. The development of PK/MECH data to be used in this ECA testing program must be conducted in accordance with the guidance outlined in Appendix C(1-4) of this ECA. The development and application of PK/MECH data is expected to be an iterative process and, as such, the final details of the testing may not be included in the presently available Test Standard(s). For the purposes of this ECA, Appendix C(1-4) will be the "Test Standard(s)" for testing specified in Table 1 under Tier I Program Review Testing and Tier II Route-to-Route Extrapolation Reporting. The PK/MECH data development under this ECA will be the subject of discussions at the EPA Program Review, described in Part VI. C. and Part VII. A. - D. of this ECA.

C. The Companies, through the HAP Task Force, and EPA will consult in a good faith effort to consider the need for Test Standard modifications if either EPA or the Companies desire such modifications. Modifications to this ECA will be governed by 40 CFR 790.68 (see Part X. of this ECA).

D. All testing required by this ECA must be conducted in accordance with the EPA Good Laboratory Practice (GLP) Standards contained in 40 CFR part 792.

E. All final reports must be submitted by the Companies to EPA by the dates specified in Table 1 unless otherwise authorized by EPA pursuant to 40 CFR 790.68. Interim status reports describing the status of all studies to be performed under this ECA testing program must be submitted by the Companies to EPA every six months beginning six months from the effective date of this ECA and until the end of the ECA testing program. These interim reports should contain information such as a summary of the interim status of each study being performed under this ECA testing program, a description of significant activities and/or difficulties experienced during the interim, and an explanation of the actions taken in response to difficulties. See Part XIII. of this ECA regarding submissions to EPA.

IX. STUDY PLANS

The Companies, through the HAP Task Force, will submit a study plan to EPA for each test conducted pursuant to this ECA prior to the initiation of testing in accordance with 40 CFR 790.62. (For this ECA, EPA will not require the study plans to be submitted "no later than 45 days prior to the initiation of testing," as specified at 40 CFR 790.62(a)). The content of the study plans submitted to EPA will comply with 40 CFR 790.62(b). Modifications to the study plans will be governed by the procedures of 40 CFR 790.62(c). All study plans will become part of the official record (Docket Control Number OPPTS-42197C).

X. MODIFICATIONS TO ENFORCEABLE CONSENT AGREEMENT

EPA and the Companies recognize that in some instances modifications to the schedule in Table 1 may be needed in view of uncertainties in developing PK/MECH data. Modifications to this ECA, if any, will be made according to the procedures contained in 40 CFR 790.68.

XI. FAILURE TO COMPLY WITH THE ENFORCEABLE CONSENT AGREEMENT

The Companies acknowledge that a violation of the requirements of this ECA will constitute a "prohibited act" under section 15(1) of TSCA, 15 U.S.C. 2614(1), and will trigger all provisions applicable to a section 15 violation. In addition, noncompliance with any term of this ECA by any Company will constitute conduct "in violation of this Act" under section 20(a)(1) of TSCA, 15 U.S.C. 2619(a)(1), and could result in a citizen's civil action.

Under the penalty provisions of section 16 of TSCA, 15 U.S.C. 2615, and the Federal Civil Penalties Inflation Adjustment Act of 1990, 28 U.S.C. 2461 note, as amended by the Debt Collection Improvement Act of 1996, 31 U.S.C. 3701 note, as implemented by 61 FR 69360 (December 31, 1996), a non-complying Company could be subject to a civil penalty of up to \$27,500 per violation, with each day in violation potentially constituting a separate violation under section 15. Knowing or willful violations may lead to the imposition of criminal penalties, or a fine of not more than \$27,500 for each day of violation, or imprisonment for not more than one year, or both. In addition, EPA could enforce this ECA pursuant to section 17 of TSCA, 15 U.S.C. 2616, by seeking an injunction to compel adherence to the requirements of this ECA.

XII. EPA MONITORING OF ENFORCEABLE CONSENT AGREEMENT TESTING

EPA may conduct monitoring activities of the testing conducted under this ECA such as laboratory inspections and study audits, as permitted under section 11 of TSCA, 15 U.S.C. 2610.

XIII. SUBMISSIONS TO EPA

All data submitted to EPA under this ECA will be identified by the Docket Number: OPPTS-42197C and the name: ethylene dichloride. Six (6) copies of all submissions under this ECA will be provided to EPA at the address specified in 40 CFR 790.5(b).

XIV. PUBLICATION AND DISCLOSURE OF TEST RESULTS

All results of testing conducted pursuant to this ECA will be announced to the public by EPA in accordance with the procedures specified in section 4(d) of TSCA, 15 U.S.C. 2603(d).

Disclosure by EPA of data generated by such testing will be governed by section 14(b) of TSCA, 15 U.S.C. 2613(b), and 40 CFR part 2.

XV. CONFIDENTIALITY OF INFORMATION

Any claims of confidentiality for information submitted under this ECA will be made under the terms of 40 CFR 790.7. If no claim of confidentiality is made by the submitter of the information at the time of submission, the information will be deemed by EPA, in accordance with 40 CFR 790.7, to be public, and may be made available to the public without further notice to the submitter. Information claimed as confidential will be treated in accordance with the procedures in 40 CFR part 2 established pursuant to section 14 of TSCA, 15 U.S.C. 2613.

XVI. RESPONSIBILITIES OF THE COMPANIES

A. The Companies are bound by the terms of this ECA and the provisions of 40 CFR 790.62 and 790.65.

B. The Companies will comply with the notification requirements of section 12(b)(1) of TSCA, 15 U.S.C. 2611(b)(1), and 40 CFR part 707, subpart D, if they export or intend to export ethylene dichloride. Any other person who exports or intends to export ethylene dichloride will be subject to these export notification requirements upon promulgation of an export notification rule for ethylene dichloride under section 12(b)(1) of TSCA.

C. If ethylene dichloride becomes subject to a rule promulgated under TSCA section 5(a)(2), 15 U.S.C. 2604(a)(2), governing significant new uses of ethylene dichloride, then the Companies will be subject to the data submission requirements imposed by section 5(b)(1)(A) of TSCA, 15 U.S.C. 2604(b)(1)(A), as if the testing under this ECA had been required by a TSCA section 4 test rule.

XVII. SEVERABILITY OF ENFORCEABLE CONSENT AGREEMENT PROVISIONS

In the event that one or more provisions of this ECA are determined by a court decision to be unenforceable, the remaining provisions of this ECA will not be presumed to be valid, and EPA will either initiate a rulemaking proceeding to require testing or publish in the Federal Register the reasons for not initiating such a proceeding.

XVIII. FINAL AGENCY ACTION

Issuance of this ECA by EPA constitutes final EPA action for purposes of 5 U.S.C. 704.

XIX. PUBLIC RECORD

EPA has established a public record which will contain this ECA, the Order that incorporates this ECA, the Federal Register notice announcing issuance of the Order incorporating this ECA, and any and all relevant information, subject to the confidentiality provisions of section 14(b) of TSCA and 40 CFR part 2. The official record for this ECA, including the public version, which does not include any information claimed as CBI, has been established under docket control number OPPTS-42197C.

XX. EFFECTIVENESS

This ECA may be signed in separate counterparts. This ECA will not be effective unless signed by each of the Companies and by EPA. This ECA will take effect on the date of publication of the Federal Register notice announcing the issuance of the Order that incorporates this ECA.

XXI. RIGHTS OF THE COMPANIES

By signing this ECA, the Companies waive their right to challenge EPA's authority to assess penalties for violations of the terms of this ECA. This waiver does not affect any other rights that the Companies may have under TSCA, including the right to dispute the amount of any penalty or to dispute factually whether a violation of the terms of this ECA has occurred, or to seek judicial review of any rule that may be adopted by EPA that imposes requirements to test ethylene dichloride.

XXII. IDENTITY OF THE COMPANIES

The Companies subject to this ECA are:

The Dow Chemical Co.
Louisiana Hwy 1
P.O. Box 150
Plaquemine, LA 70765

Vulcan Materials Company
1200 Urban Center Drive
Birmingham, AL 35242

Occidental Chemical Corporation
5005 LBJ Freeway
Dallas, TX 75244

Oxy Vinyls, LP
Suite 500, LB30
5005 LBJ Freeway
Dallas, TX 75244

Georgia Gulf Corporation
26100 LA 45
Plaquemine, LA 70764

Westlake Chemical Corporation
2801 Post Oak Blvd.
Suite 600
Houston, TX 77056

PPG Industries, Inc.
One PPG Place
Pittsburgh, PA 15272

Borden Chemicals & Plastics
Operating Limited Partnership
180 E. Broad Street
Columbus, OH 43215

Formosa Plastics Corporation, U.S.A.
9 Peach Tree Hill Road
Livingston, NJ 07039

XXIII. SIGNATURE

TEST SPONSOR

The Dow Chemical Company

Date: _____

Roger L. Bowlin
R&D Director for Chlorinated Organics
The Dow Chemical Company
Louisiana Hwy 1
P.O. Box 150
Plaquemine, LA 70765-0150

The Dow Chemical Company agreed to sponsor ethylene dichloride in Tier I of the Voluntary Children's Chemical Evaluation Program as a member of the American Chemistry Council Vinyl Chloride Health Committee.

XXIII. SIGNATURE

TEST SPONSOR

Vulcan Materials Company

Date: _____

George L. Fish
Vice President, Technical
Vulcan Chemicals Division
Vulcan Materials Company
1200 Urban Center Drive
Birmingham, AL 35242

Vulcan Materials Company agreed to sponsor ethylene dichloride in Tier I of the Voluntary Children's Chemical Evaluation Program as a member of the American Chemistry Council Vinyl Chloride Health Committee.

XXIII. SIGNATURE

TEST SPONSOR

Occidental Chemical Corporation

Date: _____

Charles L. Mears
Vice President & General Manager
Electrochemicals
Occidental Chemical Corporation
5005 LBJ Freeway
Dallas, TX 75244

Occidental Chemical Corporation agreed to sponsor ethylene dichloride in Tier I of the Voluntary Children's Chemical Evaluation Program as a member of the American Chemistry Council Vinyl Chloride Health Committee.

XXIII. SIGNATURE

TEST SPONSOR

Georgia Gulf Corporation

Date: _____

Edward A. Schmitt
President and CEO
Georgia Gulf Corporation
26100 LA 45
Plaquemine, LA 70764

Georgia Gulf Corporation agreed to sponsor ethylene dichloride in Tier I of the Voluntary Children's Chemical Evaluation Program as a member of the American Chemistry Council Vinyl Chloride Health Committee.

XXIII. SIGNATURE

TEST SPONSOR

Westlake Chemical Corporation

Date: _____

Wayne Morse
Senior Vice President, Vinyls
Westlake Chemical Corporation
2801 Post Oak Blvd., Suite 600
Houston, TX 77056

XXIII. SIGNATURE

TEST SPONSOR

PPG Industries, Inc.

Date: _____

James A. Barter, Ph.D.
Director, Environmental Health Sciences
PPG Industries, Inc.
One PPG Place
Pittsburgh, PA 15272

PPG Industries, Inc. agreed to sponsor ethylene dichloride in Tier I of the Voluntary Children's Chemical Evaluation Program as a member of the American Chemistry Council Vinyl Chloride Health Committee.

XXIII. SIGNATURE

TEST SPONSOR

Borden Chemicals & Plastics Operating Limited Partnership

Date: _____

Wayne P. Leonard
Executive Vice President & Chief
Operating Officer
Borden Chemicals & Plastics
Operating Limited Partnership
180 E. Broad Street,
Columbus, OH 43215

XXIII. SIGNATURE

TEST SPONSOR

Formosa Plastics Corporation, U.S.A.

Date: _____

Robert F. Kelly
Vice President for Environment, Health,
Safety and Communication
Formosa Plastics Corporation, U.S.A.
9 Peach Tree Hill Road
Livingston, NJ 07039

Formosa Plastics Corporation, U.S.A. agreed to sponsor ethylene dichloride in Tier I of the Voluntary Children's Chemical Evaluation Program as a member of the American Chemistry Council Vinyl Chloride Health Committee.

XXIII. SIGNATURE

TEST SPONSOR

Oxy Vinyls, LP

Date: _____

Duane Stamp
Vice President/General Counsel
Oxy Vinyls, LP
Suite 500, LB30
5005 LBJ Freeway
Dallas, TX 75244

Oxy Vinyls, LP agreed to sponsor ethylene dichloride in Tier I of the Voluntary Children's Chemical Evaluation Program as a member of the American Chemistry Council Vinyl Chloride Health Committee.

XXIV. SIGNATURE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Date: _____

Stephen L. Johnson
Assistant Administrator
Office of Prevention, Pesticides, and Toxic Substances

Address: U.S. Environmental Protection Agency
Office of Pollution Prevention And Toxic Substances
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Table 1 REQUIRED TESTING, TEST STANDARDS, REPORTING AND OTHER REQUIREMENTS FOR ETHYLENE DICHLORIDE

TIER I HAPs Testing for EDC	Test Standard (citations are to 40 CFR; appendices are attached to this ECA)	Deadline for Final Report (Months)¹
Acute Toxicity with BAL and histopathology (inhalation) ²	§ 799.9135 (as annotated in appendix D.1)	18
Acute Neurotoxicity (inhalation) ²	§ 799.9620 (as annotated in appendix D.1)	18
Developmental Toxicity	Appendix E.3 ³	

¹ Number of months after the effective date of the Order that incorporates this ECA when final report is due. Interim status reports, describing the status of all testing to be performed under this ECA, must be submitted by the Companies to EPA every 6 months beginning six months from the effective date of this ECA until the end of the ECA testing program (see Part VIII. E. and Part XIII. of this ECA).

² Acute toxicity and acute neurotoxicity testing to be conducted under a combined protocol following §799.9135 and §799.9620 as annotated in appendix D.1. As specified in Part VI. A. of this ECA, EPA has determined that the macrophage function assay reported by Sherwood *et al.* (1987) adequately fulfills the macrophage function assay portion of the acute toxicity testing requirement. A copy of this report is included as Appendix E.1.

³ As specified in Part VI.A. of this ECA, EPA has determined that the developmental toxicity studies reported by Payan *et al.* (1995), in rats, and Rao *et al.* (1980), in rabbits, adequately fulfill the HAPs rulemaking testing requirement for developmental toxicity testing for ethylene dichloride. A copy of these reports is included as Appendix E.3.

TIER I Program Review Testing for EDC ⁴	Test Standard (citations are to 40 CFR; appendices are attached to this ECA)	Deadline for Final Report (Months)
PK/MECH data to support model validation and verification of oral-to-inhalation extrapolation for the following data needs in the F344 rat ⁵ : a. Subchronic toxicity ⁶ b. Subchronic neurotoxicity ⁷ c. Reproductive toxicity ⁸	Appendix C (1-4)	21
PBPK model simulations ⁹	Appendix C (1-5)	21

⁴ As described in Part VI.C. of this ECA, before work under the Tier II testing segment is conducted, EPA will conduct a Program Review of the Tier I Program Review Testing data and data from other studies acceptable to EPA that could be used in performing quantitative route-to-route extrapolations.

⁵ Previously published inhalation PBPK model (D' Souza *et al.*, 1987; 1988) to be extended and validated to (1) periodic inhalation exposures based on PK/MECH data to be acquired as part of the "Tier I Inhalation Toxicity" and (2) oral administration via corn oil gavage and drinking water.

⁶ Relevant to existing data in rats administered EDC via corn oil gavage (Daniel, *et al.* (1994)

⁷ Relevant to drinking water administration in rats

⁸ Relevant to drinking water administration and capable to inform route-to-route extrapolation from each dosing paradigm of extant data by Alumot, *et al.* (1976), Rao, *et al.* (1980), and Lane, *et al.* (1982)

⁹ The model simulations are to provide point and uncertainty estimates of internal dose metrics (parent chemical peak and area under the curve (AUC) concentrations in blood and brain, and 24-hour total glutathione-dependent metabolism) in rats and humans to allow quantitative route-to-route extrapolations. These simulations will be used to evaluate the acceptability of : (1) subchronic neurotoxicity testing of oral exposure via drinking water in rats; (2) extant oral subchronic toxicity data of Daniel *et al.* (1994) in rats via corn oil gavage, and (3) reproductive toxicity testing of oral exposure via drinking water in rats.

Tier II Testing and/or Extrapolation Reporting for EDC	Test Standard (citations are to 40 CFR; appendices are attached to this ECA)	Deadline for Final Report (Months)
Subchronic toxicity (route-to-route extrapolation of extant data) ¹⁰	Appendix C.2 and C.6	36
Subchronic neurotoxicity: a) testing by the oral route	§ 799.9620 (as annotated in Appendix D.2)	42
b) route to route extrapolation ¹¹	Appendix C.3 and C.6	52
Reproductive toxicity: ¹² a) testing by the oral route	§ 799.9380 (as annotated in Appendix D.3)	42
b) route to route extrapolation ¹³	Appendix C.4 and C.6	52

¹⁰ Quantitative route-to-route extrapolation of extant data of Daniel *et al.* (1994) documented graphically and with tabular data using point estimates and uncertainty measures for parent compound (peak and AUC) and total amount metabolized by glutathione-dependent pathways to develop the dose metric.

¹¹ Quantitative route-to-route extrapolation of subchronic toxicity testing developed under Tier II Testing, documented graphically and with tabular data using point estimates and uncertainty measures for parent compound (peak and AUC) in blood and brain and total amount metabolized by glutathione-dependent pathways to develop the dose metric. Ability to characterize blood and CNS time-course data, if possible, for both oral and inhalation routes must be demonstrated.

¹² Control and high-dose groups will be evaluated for fertility index, gestation index, gross necropsy, organ weight and histopathology to confirm lack of effect reported in extant studies by Alumot *et al.*, 1976; Rao *et al.*, 1980; and Lane *et al.*, 1982. Observation of an effect in the high-dose will trigger detailed evaluation of low-dose and mid-dose groups for the above mentioned effects. Estrous cycle, sperm evaluation (vaginal opening, preputial separation) will be evaluated for all dose groups.

¹³ Quantitative route-to-route extrapolation of reproductive toxicity testing developed under Tier II Testing and extant data from Alumot, *et al.* (1976), Rao, *et al.* (1980), and Lane, *et al.* (1982) documented graphically and with tabular data using point estimates and uncertainty measures for parent compound (peak and AUC) and total amount metabolized by glutathione-dependent pathways to develop the dose metric.