Appendix A **NAC/AEGL Meeting 43: June 20-22, 2007**

Decisions Minutes * from NAC 42

Chemical: **CAS Reg. No.:**

Action: Proposed_____ **Interim**_____ **Other** Minutes

Chemical Manager: **Staff Scientist:**

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
Henry Anderson					John Hinz				
Marc Baril					Jim Holler				
Lynn Beasley					Glenn Leach				
Alan Becker					Richard Niemeier				
Robert Benson					Susan Ripple				
Edward Bernas					George Rusch, Chair				
Gail Chapman					Martha Steele				
George Cushmac					Daniel Sudakin				
Ernest Falke					Marcel vanRaaij				
David Freshwater					Calvin Willhite				
Ralph Gingell					George Woodall				
Roberta Grant					Alan Woolf				
Dieter Heinz									
					TALLY				
					PASS/ FAIL				

PPM, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	, ( )	, ( )	, ( )	, ( )	, ( )
AEGL 2	, ( )	, ( )	, ( )	, ( )	, ( )
AEGL 3	, ( )	, ( )	, ( )	, ( )	, ( )
LOA					
*** = ≥10% LEL**					
**** = ≥ 50% LEL**					
***** = ≥100% LEL**					

*Safety considerations against the hazard(s) of explosion(s) must be taken into account.

** and ***Extreme safety considerations against the hazard(s) of explosion(s) must be taken into account.

* UNANIMOUS

NR= Not Recommended due to_____

AEGL 1 Motion by: Henry **Second by:** Willhite

AEGL 2 Motion by:_____ **Second by:**_____

AEGL 3 Motion by:_____ **Second by:**_____

LOA Motion by:_____ **Second by:**_____

Approved by Chair: [signature] **DFO:** [signature] **Date:** 6/22/2007

National Advisory Committee (NAC)
for Acute Exposure Guideline Levels (AEGLs) for Hazardous Substances

March 20-22, 2007

Meeting-42 Highlights

Arnold and Mabel Beckman Center
100 Academy Drive
Irvine, CA 92612

INTRODUCTION

Chairman George Rusch welcomed the committee. The draft NAC/AEGL-41 meeting highlights were reviewed. A motion was made by Richard Thomas and seconded by Dieter Heinz to accept the minutes as written with a date change for the next meeting, i.e., June 20-22, 2007. The motion passed unanimously by a show of hands (Appendix A). The final version of the NAC/AEGL-41 meeting highlights is attached (Appendix B).

George Rusch and Ernie Falke reported on the ACUTEX meeting in Ispra, Italy, on March 6-8, 2007. The E.U. Joint Chemical Research project includes members from JCR, The Netherlands, France, Germany, Finland, and The United Kingdom. Invited representatives of the U.S. were George Rusch, Ernie Falke, Richard Thomas and David Kelly, member of the National Research Council's Subcommittee to review AEGLs. ACUTEX was a research project addressing Development of Guideline Levels for European countries. Meeting attendees reviewed the completed ACUTEX report and discussed implementation of the guidance levels. Input from the U.S. representatives on several programs, including the AEGL program, led to a discussion of harmonization of the two programs.

The AEGL meeting began with Development Team meetings, a new protocol being tested to ensure consensus on individual chemicals among a NAC subgroup before opening discussions to the entire committee. The second meeting day also started with development team meetings. Interested members who were not part of the chemical manager/chemical reviewer team were encouraged to attend a subgroup meeting.

The highlights of the NAC/AEGL-42 meeting are summarized below along with the Meeting Agenda (Attachment 1) and the Attendee List (Attachment 2). The subject categories of the highlights do not necessarily follow the order listed in the NAC/AEGL-42 Agenda.

REVIEW of FEDERAL REGISTER-09 COMMENTS

Aliphatic Nitriles
Acetonitrile (CAS No. 75-05-8)
Isobutyronitrile (CAS No. 78-82-0)
Propionitrile (CAS No. 107-12-0)
Chloroacetonitrile (CAS No. 107-14-2)
Malononitrile (CAS No. 109-77-3)

Chemical Manager: George Rodgers
Chemical Reviewers: Ernest Falke, George Rusch
Staff Scientist: Cheryl Bast

Cheryl Bast explained that many comments were received only on acetonitrile; all of these comments were from one commenter (INEOS Nitriles). (Attachment 3). However, the relative toxicity of all nitriles must be considered when addressing the FR comments. Also, AEGL-2 and AEGL-3 values for chloroacetonitrile and malononitrile were derived by a molar equivalence approach from the acetonitrile values. Therefore, if the acetonitriles are revised, the values for these two nitiriles must also be revised. In response to the comments, two additional studies will be added to the TSD, and a discussion of effects in the Pozzani et al. (1959) study will be modified. Following discussion, the AEGL-1 for acetonitrile will continue to be constant across exposure durations at 13 ppm. The points of departure for the AEGL-2 and the AEGL-3 remained the same. The point of departure for the AEGL-2 was the 4-hour 4000 ppm concentration that induced lung effects in rats (Pozanni et al. 1959), and the point of departure for the AEGL-3 remained the 4-hour LC_{01} for the rat of 8421 ppm (Monsanto 1986). The same inter- and intraspecies uncertainty factors of 3 and 10 were applied. In response to FR comments, the n value for AEGL-2 and -3 was changed from 2.5 to 1.6. The 'n' value of 2.5 was derived from linear regression of rat lethality data; whereas, the revised value of 1.6 was derived from the tenBerge program, and is more consistent with current NAC practices. The revised values are listed in the table below. It was moved by George Rodgers and seconded by Ernie Falke to move the acetonitrile AEGLs to Interim. The motion carried unanimously (Appendix C). Based on relative toxicity, the new acetonitrile values were in line with the values for proprionitrile and isobutyronitrile (derived with chemical-specific data), and therefore propionitrile and isobutyronitrile were moved to Interim status (moved by Rich Neimier and seconded by Dieter Heinz). The vote was unanimous (Appendix D). Based on molar equivalents and the reevaluated n value, the corresponding values for chloroacetonitrile and malononitrile were recalculated. It was moved by Rich Neimier and seconded by Dieter Heinz to move the modified chloroacetonitrile values to Interim. The motion passed unanimously (Appendix E). It was moved by Henry Anderson and seconded by Marc Baril to move the modified malononitrile values to Interim. The motion passed unanimously (Appendix F). Values for chloroacetonitrile and malononitrile are summarized in the table below.

Summary of AEGL Values for Nitriles					
Classification	10-Minute	30-Minute	1-Hour	4-Hour	8-Hour
Acetonitrile					
AEGL-1	13 ppm	13 ppm	13 ppm	13 ppm	13 ppm
AEGL-2	490 ppm	490 ppm	320 ppm	130 ppm	86 ppm
AEGL-3	1000 ppm	1000 ppm	670 ppm	280 ppm	180 ppm
Chloroacetonitrile					
AEGL-1	NR	NR	NR	NR	NR
AEGL-2	49 ppm	49 ppm	32 ppm	13 ppm	8.6 ppm
AEGL-3	100 ppm	100 ppm	67 ppm	28 ppm	18 ppm
Malononitrile					
AEGL-1	NR	NR	NR	NR	NR
AEGL-2	7.5 ppm	7.5 ppm	4.9 ppm	2.0 ppm	1.3 ppm
AEGL-3	15 ppm	15 ppm	10 ppm	4.3 ppm	2.8 ppm

RD_{50} WHITE PAPER

Peter Bos discussed the RD_{50} assay and relevance for setting AEGLs (Attachment 4). A brief historical overview was given and the methodology was summarized, including a critical review of the proposed relationship of the RD_{50} concentration and the expected effect in humans. A challenge involves equating respiratory depression in animals with an equivalent effect in humans and distinguishing between stimulation of the olfactory versus trigeminal nerve. Discussion focused on whether or not the RD_{50} is an appropriate endpoint as a point-of-departure (POD) for AEGL derivation and how to handle scaling across time. It was concluded that appropriate human data on chemosensory effects (like effects following trigeminal nerve stimulation) are lacking; the available limited data on human nasal pungency thresholds do not support the use of the RD_{50} as POD for AEGL-derivation. As an alternative the following approach was adopted. The sensory irritation as measured by respiratory depression in the mouse bioassay was concluded to be an AEGL-1 endpoint. Criteria on minimal data requirements (regarding both data availability and quality) were laid down to judge the results of the bioassay on their suitability for AEGL-derivation. The RD_{10}, as a threshold for sensory irritation, was proposed as POD. Uncertainty factors are to be applied according to the SOP for local effects on the respiratory tract and one AEGL-1 value will be set for all exposure durations up to eight hour.

REVIEW OF PRIORITY CHEMICALS

Chlorobenzene (CAS No. 108-90-7)

Chemical Manager: Marinelle Payton
Chemical Reviewers: Steve Barbee, Marc Ruijten
Staff Scientist: J. Muller, Peter Bos

Peter Bos discussed the clinical and laboratory animal data for chlorobenzene and mentioned several approaches for development of AEGL-2 and -3 values, i.e., a PBPK modeling approach vs the traditional time scaling approach (Attachment 5). The different approaches resulted in conflicting values. Consensus as to a single approach had not been reached in the morning development team meeting, and there was much discussion among the committee later. Following initial writing of the document, new data from the Utah Biomedical Test Laboratory were located. The proposed AEGL-1 value was based on human data. The point of departure was a 10 ppm exposure of volunteers for 8 hours/day, 5 days/week which resulted in no complaints (Knecht and Woitowitz 2000). Because this was a conservative endpoint (only mild complaints were recorded at 60 ppm), an intraspecies UF of 1 was applied, and the value was not time-scaled. The point of departure for the AEGL-2 was a 30-minute exposure of rats and guinea pigs to 2990 ppm (Utah Biomedical Laboratory). Interspecies and intraspecies uncertainty factors of 3 each for a total of 10 were applied. Time scaling to the longer and shorter values used the default values of n of 3 and 1, respectively. Because chlorobenzene approaches steady-state in the blood of the rat in one hour, the same values were used for the one- through eight-hour exposure durations. Using the same study, the point of departure for the AEGL-3 was the highest non-lethal value in rats and guinea pigs – 8000 ppm for 30 minutes. Uncertainty factors and time scaling were the same as for the AEGL-2. A motion was made by Marc Ruijten and seconded by Marc Baril to accept the values. The motion passed unanimously (Appendix G).

Summary of AEGL Values for Chlorobenzene						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL-1	10 ppm	10 ppm	10 ppm	10 ppm	10 ppm	No effect – humans (Knecht and Woitowitz 2000)
AEGL-2	430 ppm	300 ppm	150 ppm	150 ppm	150 ppm	Slight eye and nasal irritation -rat (Utah Biomedical Test Laboratory)
AEGL-3	1100 ppm	800 ppm	400 ppm	400 ppm	400 ppm	Highest non-lethal value – rat (Utah Biomedical Test Laboratory)

Toluene (CAS No. 108-88-3)

Chemical Manager: George Woodall
Chemical Reviewer: Marquea King
Staff Scientist: Sylvia Talmage

Sylvia Talmage discussed the development of toluene AEGL values over the period 1999-2007 (Attachment 6). In response to a National Academy of Science AEGL Subcommittee recommendation concerning the originally-derived values, PBPK modeling was used to derive AEGL-2 and AEGL-3 values. The first modeled values were based on a human study (AEGL-2) and a rat lethality study (AEGL-3). Because the human exposure did not involve an endpoint

consistent with the definition of an AEGL-2, the AEGL-2 values were reconsidered. Discussions and suggestions among the NAC members prior to and during the presentation led to consideration of other studies for both the AEGL-2 and -3. Jim Dennison of Century Environmental, Inc., was called upon to model the data for the suggested studies. Of two studies considered for development of AEGL-2 values, the study of Oshiro and Bushnell (2004) was chosen. The point of departure was the threshold for narcosis in a 70-minute exposure of Long-Evans rats to 2400 ppm. A single intraspecies uncertainty factor of 3 was applied because modeling accounted for the rat to human extrapolation, and the threshold for narcosis does not differ by more than three-fold among humans. The AEGL-3 point of departure remained the highest non-lethal value of 6250 ppm in the rat in a 2-hour study by Mullin and Krivanek (1982). Scaling to the other exposure durations were based on modeling. A motion to accept all three sets of AEGL values was made by Marc Ruijten and seconded by Richard Thomas. The motion passed: YES: 18; NO: 0; Abstain: 1 (Appendix H). The values appear in the table below. Although these values were accepted, further discussions focused on the AEGL-3. Jim Dennison will run the PBPK model for a rat lethality study (Wada et al. 1989), and the newly modeled values will be considered at the next meeting.

Summary of AEGL Values for Toluene						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL-1	200 ppm	200 ppm	200 ppm	200 ppm	200 ppm	No effects above AEGL-1 definition-clinical studies
AEGL-2	3100 ppm *	1600 ppm *	1200 ppm	790 ppm	650 ppm	Threshold for narcosis – rat (Oshiro and Bushnell 2004)
AEGL-3	**	6100 ppm *	4500 ppm *	3000 ppm *	2500 ppm *	Highest non-lethal value – rat (Mullin and Krivanek 1982)

* The 10- and 3-minute AEGL-2 and 30-minute through 8-hour AEGL-3 values are higher than 1/10 of the lower explosive limit (LEL) of toluene in air (LEL = 14,000 ppm). Therefore, safety considerations against the hazard of explosion must be taken into account.

** The 10-minute AEGL-3 value of 13,000 ppm is higher than 50% of the LEL of toluene in air (LEL = 14,000 ppm). Therefore, extreme safety considerations against the hazard of explosion must be taken into account.

Bromine Chloride (CAS No. 13863-41-7)

Chemical Manager: George Cushmac
Chemical Reviewers: Alan Becker, Daniel Sudakin
Staff Scientist: Sylvia Talmage

Sylvia Talmage commented on the sparse data base for bromine chloride. The toxicity of bromine chloride is predicted to be between that of bromine and chlorine. Because no data were available for development of AEGL-1 values, it was suggested that the AEGL-1 for bromine chloride be set equal to the AEGL-1 values for the slightly more toxic chlorine. A single lethality study with the rat was available for development of AEGL-2 and -3 values (Dow Chemical Co. 1977). During a 7-hour exposure, respective mortalities of rats at 20, 40, 80, and 120 ppm were

0/6, 0/6, 1/6, and 5/6. Suggestions of using the 80 ppm value or using the graphed threshold for mortality of 70 ppm were rejected in favor of the benchmark-dose approach. The $BMDL_{05}$ was 39.5 ppm. Uncertainty factors 3 and 3 for a total of 10 were applied as the mechanism of action is direct irritation. The resulting value was time-scaled to the other exposure durations using default n values of 3 and 1 for shorter and longer exposure durations, respectively. Because of the long exposure duration, the 10-minute value was set equal to the 30-minute value. In accordance with Standing Operating Procedures for chemicals with sharp dose-response curves, the AEGL-2 was derived by dividing the AEGL-3 by 3. A motion was made by Dieter Heinz and seconded by Marc Baril to accept the suggested values. The motion passed unanimously (Appendix I). The values are summarized below.

Summary of AEGL Values for Bromine Chloride						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL-1	0.50 ppm	0.50 ppm	0.50 ppm	0.50	0.50 ppm	Analogy with chlorine
AEGL-2	3.2 ppm	3.2 ppm	2.5 ppm	1.6 ppm	1.2 ppm	One-third of the AEGL-3 values
AEGL-3	9.5 ppm	9.5 ppm	7.6 ppm	4.8 ppm	3.5 ppm	$BMDL_{05}$ – rat (Dow Chemical Co. 1977)

Boron Tribromide (CAS No. 10294-33-4)

Chemical Manager: Bob Benson
Chemical Reviewers: Marc Baril, Calvin Willhite
Staff Scientist: Sylvia Talmage

Bob Benson, the chemical manager, made a few introductory remarks. Sylvia Talmage then briefly discussed the TSD for the chemical (Attachment 8). There are no data available for the chemical. The draft TSD derived values based on analogy with hydrogen bromide with the assumption that hydrolysis of boron tribromide gives three moles of hydrogen bromide. After brief discussion of the issues, the NAC recommended that ORNL write a letter to the manufacturer asking for any acute toxicity data on the chemical as well as any information on the breakdown of the chemical in air. The chemical was tabled until additional information is received.

Diketene (CAS No. 674-82-8)

Chemical Manager: Bob Benson
Chemical Reviewers: John Hinz, Dieter Heinz
Staff Scientist: Kowetha Davidson

Bob Benson, the new chemical manager for diketene, summarized the status of the TSD for diketene. Diketene was discussed at NAC-36. No formal action was taken on the chemical at that time. The NAC requested that Kowetha Davidson try to get information on the original data from Danishevskii (1948). The study was cited in a secondary source (Fel'dman, 1967). At NAC-36 Susan Ripple also volunteered to search her sources for additional data. At NAC-42 Susan Ripple reported that no additional data are available. Cheryl Bast led the discussion (Attachment 9) and reported that Kowetha was unable to get additional information on Danishevskii (1948). During the discussion it was noted that the Benchmark Dose modeling in the TSD was done with the nominal concentration, rather than the analytical concentration, from the lethality study of Katz (1987). Appendix D will be revised accordingly. The recalculated value of the $BMCL_{05}$ for lethality (181 ppm, for a 1-hour exposure) was used to derive the AEGL-3. There are no data to derive a value of n. Therefore, the default time scaling was used. There are no appropriate data to derive AEGL-2 values. Accordingly, the AEGL-2 values were derived by dividing AEGL-3 values by 3. As the study used to derive AEGL-1 values could not be located, AEGL-1 values are not recommended. The proposed values are listed in the table below. Bob Benson made a motion to accept these values. The motion was seconded by Rick Niemeyer. The motion passed unanimously (Appendix J).

Summary of AEGL Values for Diketene						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL-1	NR	NR	NR	NR	NR	No data
AEGL-2	11 ppm	7.7 ppm	6.0 ppm	1.5 ppm	0.77 ppm	One-third of the AEGL-3 values
AEGL-3	33 ppm	23 ppm	18 ppm	4.5 ppm	2.3 ppm	$BMDL_{05}$ – rat (Katz 1987)

Silicon Tetrafluoride (CAS No. 7783-61-1)

Chemical Manager: Ernie Falke
Chemical Reviewers: George Rusch, Paul Tobin
Staff Scientist: Cheryl Bast

Cheryl Bast discussed the sparse data set for silicon tetrafluoride (Attachment 10). Some of the studies are old, provide conflicting results, and are incompletely reported. Although silicon tetrafluoride may break down into hydrogen fluoride and silicon, the data do not support a hydrogen fluoride molar equivalent approach. Cheryl presented values with the available data, but in view of the conflicting data and incomplete reports, the chemical was tabled until the June meeting. Richard Thomas will contact the Japanese researchers to try to obtain data from an LC_{50} study.

Acrylonitrile (CAS No. 107-13-1)

Chemical Manager: George Rodgers
Chemical Reviewers: Ernest Falke, George Rusch
Staff Scientist: Robert Young

Bob Young presented the data involving human exposures and laboratory animal studies (Attachment 11). The AEGL-3 values, adopted as presented, were based on the calculated $BMCL_{05}$ values from rat studies involving several time points: 30-minutes, and 1 and 8 hours (Appel et al. 1981; Dudley and Neal 1942). Inter- and intraspecies uncertainty factors of 3 each for a total of 10 were applied. The empirically-derived n value was 1.1. The 4-hour value was time-scaled from the 8-hour value. The values are supported by a recent study by WIL Research Laboratories (2005). It was moved by Ernie Falke and seconded by Richard Thomas to accept the values. The motion passed: YES: 13; NO: 4; Abstain: 0 (Appendix K). The AEGL-2 values were based on slight transitory effects in rats exposed to 305 ppm for 2 hours (Dudley and Neal 1942). Uncertainty factors and time-scaling were the same as for the AEGL-3 above. A motion was made by Marc Ruijten and seconded by Dieter Heinz to accept the values. The motion passed unanimously (19/19) (Appendix K). The AEGL-1 was based on monitoring data from DuPont Chemical Co. (unpublished). In that report, workers exposed to 16-20 ppm had no complaints of irritation. The value of 15 ppm was chosen as the point of departure. An uncertainty factor of 3 was applied and the resulting value of 4.6 ppm was used across all exposure durations because there is adaptation to the slight irritation that defines the AEGL-1. The value is supported by the study of Jakubowski et al. (1987) in which no effects were reported by male volunteers exposed to 4.6 ppm for 8 hours. The motion to accept 4.6 ppm was made by Richard Thomas and seconded by Ernie Falke. The motion passed: YES: 18; NO: 1; Abstain: 0 (Appendix K). Susan Ripple will supply the DuPont data.

Summary of AEGL Values for Acrylonitrile						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL-1	4.6 ppm	4.6 ppm	4.6 ppm	4.6 ppm	4.6 ppm	Monitoring data; clinical study (DuPont Chemical Co; Jakubowski et al. 1987)
AEGL-2	290 ppm	110 ppm	57 ppm	16 ppm	8.6 ppm	Slight transitory effects – rat (Dudley and Neal 1942)
AEGL-3	480 ppm	180 ppm	100 ppm	35 ppm	19 ppm	Calculated $BMDL_{05}$ – rat (Dudley and Neal 1942; Appel et al. 1981)

Oxygen Difluoride (CAS No. 7783-41-7)

Chemical Manager: Iris Camacho
Chemical Reviewers: Al Feldt, Henry Anderson
Staff Scientist: Robert Young

Bob Young presented the data base, pointing out that lethality was related to body size, i.e., a 17-fold difference among four species (Attachment 12). No AEGL-1 values were proposed due to insufficient data. AEGL-2 values were derived as one-third of the AEGL-3 values. The AEGL-2 values are supported by limited human data. The AEGL-3 values were based on the threshold for lethality, the 1-hour $BMCL_{05}$ of 7.48 ppm in the rhesus monkey (Davis 1971). The non-human primate was not considered more sensitive than humans (the rhesus monkey is the same size as a small child). This observation was used to justify a single uncertainty factor of 3. Analysis of data from Davis (1970) and Lester and Adams (1965) with the software of ten Berge provided an *n* value of 1.1 for time scaling. The resulting values, listed in the table below, are supported by limited human data. It was moved by Richard Thomas and seconded by Dieter Heinz to accept values as proposed. The vote to accept was unanimous (Appendix L).

Summary of AEGL Values for Oxygen Difluoride						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL-1	NR	NR	NR	NR	NR	Not recommended due to insufficient data
AEGL-2	4.3 ppm	1.6 ppm	0.83 ppm	0.24 ppm	0.13 ppm	One-third of the AEGL-3 values
AEGL-3	13 ppm	4.7 ppm	2.5 ppm	0.71 ppm	0.38 ppm	One-hour $BMCL_{05}$ in rhesus monkey (Davis 1971)

The final technical support document should contain tables of all fluoride AEGL values.

OTHER ISSUES

Allyl Alcohol (CAS No. 107-18-6)

Bob Benson gave a brief update on the status of allyl alcohol. Allyl alcohol was not on the agenda for NAC-42. Comments from the COT were discussed at NAC-41 and the company representative, Dr. Marcy Banton, agreed to ask Lyondell Chemical to conduct additional research. Dr. Banton has received approval from the company to conduct the necessary research and she is developing a detailed protocol for an acute study.

GENERAL ISSUES

The value of the Development Team meetings prior to the formal meeting was evaluated by the committee members and scientific staff. For some chemicals, a consensus of opinion shortened the formal discussion sessions. In other cases, consensus could not be reached during the team meetings, and discussion during the formal session reflected the diverse opinions. For the June meeting, it was decided to continue with pre-meetings as necessary. NAC members interested in specific chemicals should ask to be assigned to the small Development Team groups.

ADMINISTRATIVE MATTERS

The site and time of future meetings is as follows:

NAC/AEGL-43: June 20-22, 2007, Rotterdam, Netherlands
NAC/AEGL-44: September 5-7, 2007, Washington, DC

All items in the agenda were discussed as thoroughly as the time permitted. The meeting highlights were prepared by Sylvia Talmage, Cheryl Bast, and Robert Young, Oak Ridge National Laboratory, and Robert Benson, U.S. EPA, with input from the respective staff scientists, chemical managers, and other contributors.

LIST OF ATTACHMENTS

The attachments were distributed during the meeting and will be filed in the EPA Docket Office.

Attachment 1. NAC/AEGL-42 Meeting Agenda
Attachment 2. NAC/AEGL-42 Attendee List
Attachment 3. Review of FR-09 comments for Aliphatic Nitriles
Attachment 4. RD_{50}- Relevance for AEGL Derivation
Attachment 5. Data analysis for chlorobenzene
Attachment 6. Data analysis for toluene
Attachment 7. Data analysis for bromine chloride
Attachment 8. Data analysis for boron tribromide
Attachment 9. Data analysis for diketene
Attachment 10. Data analysis for silicon tetrafluoride
Attachment 11. Data analysis for acrylonitrile
Attachment 12. Data analysis for oxygen difluoride

LIST OF APPENDICES

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Appendix B. Final NAC-41 Meeting Highlights
Appendix C. Ballot for acetonitrile
Appendix D. Ballot for propionitrile and isobutyronitrile to Interim
Appendix E. Ballot for chloroacetonitrile
Appendix F. Ballot for malononitrile
Appendix G. Ballot for chlorobenzene
Appendix H. Ballot for toluene
Appendix I. Ballot for bromine chloride
Appendix J. Ballot for diketene

Appendix K. Ballot for acrylonitrile
Appendix L. Ballot for oxygen difluoride

NAC/AEGL Meeting 43: June 20-22, 2007

Chemical: SILICON TETRAFLUORIDE **CAS Reg. No.:** 7783-61-1

Action: Proposed ✓ **Interim**_____ **Other**_____

Chemical Manager: FALKE **Staff Scientist:** BAST

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
Henry Anderson	Y	Y	Y		John Hinz	A	A	A	
Marc Baril	A	A	A		Jim Holler	A	A	A	
Lynn Beasley	Y	Y	Y		Glenn Leach	A	A	A	
Alan Becker	Y	Y	Y		Richard Niemeier	A	A	A	
Robert Benson	Y	Y	Y		Susan Ripple	Y	Y	Y	
Edward Bernas	Y	Y	Y		George Rusch, Chair	Y	Y	Y	
Gail Chapman	Y	Y	Y		Martha Steele	A	A	A	
George Cushmac	Y	Y	Y		Daniel Sudakin	Y	Y	Y	
Ernest Falke	Y	Y	Y		Marcel vanRaaij	Y	Y	Y	
David Freshwater	A	A	A		Calvin Willhite	Y	Y	Y	
Ralph Gingell	Y	Y	Y		George Woodall	Y	Y	Y	
Roberta Grant	A	A	A		Alan Woolf	Y	Y	Y	
Dieter Heinz	Y	Y	Y						
					TALLY	17/17	17/17	17/17	
					PASS/ FAIL	P			

PPM, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(0.05)	,(0.05)	,(0.05)	,(0.05)	,(0.05)
AEGL 2	,(6.3)	,(4.3)	,(3.3)	,(0.87)	,(0.43)
AEGL 3	,(19)	,(13)	,(10)	,(2.6)	,(1.3)
LOA					
* = ≥10% LEL					
** = ≥ 50% LEL					
*** = ≥100% LEL					

*Safety considerations against the hazard(s) of explosion(s) must be taken into account.
** and ***Extreme safety considerations against the hazard(s) of explosion(s) must be taken into account.

NR= Not Recommended due to_____

AEGL 1 Motion by: Marcel **Second by:** Benson
AEGL 2 Motion by: Johnson **Second by:** Willhite
AEGL 3 Motion by: Benson **Second by:** Willhite
LOA Motion by:_____ **Second by:**_____

Approved by Chair: [signature] **DFO:** [signature] **Date:** 6/21/07

NAC/AEGL Meeting 43: June 20-22, 2007

Chemical: DICHLOROSILANE / DIPHENYL DICHLOROSILANE **CAS Reg. No.:** Appendix D

Action: Proposed ✓ **Interim**_____ **Other**_____

Chemical Manager: FALKE **Staff Scientist:** BAST

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
Henry Anderson	Y	Y	Y		John Hinz	A	A	A	
Marc Baril	A	A	A		Jim Holler	A	A	A	
Lynn Beasley	Y	Y	Y		Glenn Leach	A	A	A	
Alan Becker	Y	Y	Y		Richard Niemeier	A	A	A	
Robert Benson	Y	Y	Y		Susan Ripple	Y	Y	Y	
Edward Bernas	Y	Y	Y		George Rusch, Chair	Y	Y	Y	
Gail Chapman	Y	Y	Y		Martha Steele	A	A	A	
George Cushmac	Y	Y	Y		Daniel Sudakin	Y	Y	Y	
Ernest Falke	Y	Y	Y		Marcel vanRaaij	Y	Y	Y	
David Freshwater	A	A	A		Calvin Willhite	Y	Y	Y	
Ralph Gingell	Y	Y	Y		George Woodall	Y	Y	Y	
Roberta Grant	A	A	A		Alan Woolf	Y	Y	Y	
Dieter Heinz	Y	Y	Y						
					TALLY				
					PASS/ FAIL				

PPM, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(0.90)	,(0.90)	,(0.90)	,(0.90)	,(0.90)
AEGL 2	,(50)	,(22)	,(11)	,(5.5)	,(5.5)
AEGL 3	,(310)	,(110)	,(50)	,(13)	,(13)
LOA					
* = ≥10% LEL					
** = ≥ 50% LEL					
*** = ≥100% LEL					

*Safety considerations against the hazard(s) of explosion(s) must be taken into account.
** and ***Extreme safety considerations against the hazard(s) of explosion(s) must be taken into account.

NR= Not Recommended due to_____

AEGL 1 Motion by: Falke **Second by:** Heinz
AEGL 2 Motion by: _____ **Second by:** _____
AEGL 3 Motion by: _____ **Second by:** _____
LOA Motion by: _____ **Second by:** _____

Approved by Chair: [signature] **DFO:** [signature] **Date:** 6/20/2007

TRICHLOROSILANES

NAC/AEGL Meeting 43: June 20-22, 2007

Chemical: ALLYL TRICHLORO SILANE, AMYL-, BUTYL-, CHLOROMETHYL-, DODECYL-, HEXYL-, NONYL-, OCTADECYL-, OCTYL-, PROPYL-, DICHLOROPHENYL-, PHENYL-, VINYL-, TRICHLOROSILANE **CAS Reg. No.:**

Appendix E

Action: Proposed ✓ **Interim** _____ **Other** _____

Chemical Manager: FALKE **Staff Scientist:** BAST

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
Henry Anderson	Y	Y	Y		John Hinz	A	A	A	
Marc Baril	A	A	A		Jim Holler	A	A	A	
Lynn Beasley	Y	Y	Y		Glenn Leach	A	A	A	
Alan Becker	Y	Y	Y		Richard Niemeier	A	A	A	
Robert Benson	Y	Y	Y		Susan Ripple	Y	Y	Y	
Edward Bernas	Y	Y	Y		George Rusch, Chair	Y	Y	Y	
Gail Chapman	Y	Y	Y		Martha Steele	A	A	A	
George Cushmac	Y	Y	Y		Daniel Sudakin	Y	Y	Y	
Ernest Falke	Y	Y	Y		Marcel vanRaaij	Y	Y	Y	
David Freshwater	A	A	A		Calvin Willhite	Y	Y	Y	
Ralph Gingell	Y	Y	Y		George Woodall	Y	Y	Y	
Roberta Grant	A	A	A		Alan Woolf	Y	Y	Y	
Dieter Heinz	Y	Y	Y						
					TALLY				
					PASS/ FAIL				

PPM, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(0.60)	,(0.60)	,(0.60)	,(0.60)	,(0.60)
AEGL 2	,(33)	,(14)	,(7.3)	,(3.7)	,(3.7)
AEGL 3	,(210)	,(70)	,(33)	,(8.7)	,(8.7)
LOA					
* = ≥10% LEL					
** = ≥ 50% LEL					
*** = ≥100% LEL					

*Safety considerations against the hazard(s) of explosion(s) must be taken into account.
** and ***Extreme safety considerations against the hazard(s) of explosion(s) must be taken into account.

NR= Not Recommended due to _____

AEGL 1 Motion by: Falke **Second by:** Heinz
AEGL 2 Motion by: ↓ **Second by:** ↓
AEGL 3 Motion by: ↓ **Second by:** ↓
LOA Motion by: _____ **Second by:** _____

Approved by Chair: [signature] **DFO:** [signature] **Date:** 6/20/2007

NAC/AEGL Meeting 43: June 20-22, 2007

Chemical: SILICON TETRACHLORIDE **CAS Reg. No.:** 10026-04-7

Action: Proposed ✓ **Interim**_____ **Other**_____

Chemical Manager: ERNIE FALKE **Staff Scientist:** CHERYL BAST

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
Henry Anderson	Y	Y	Y		John Hinz	A	A	A	
Marc Baril	A	A	A		Jim Holler	A	A	A	
Lynn Beasley	Y	Y	Y		Glenn Leach	A	A	A	
Alan Becker	Y	Y	Y		Richard Niemeier	A	A	A	
Robert Benson	Y	Y	Y		Susan Ripple	Y	Y	Y	
Edward Bernas	Y	Y	Y		George Rusch, Chair	Y	Y	Y	
Gail Chapman	Y	Y	Y		Martha Steele	A	A	A	
George Cushmac	Y	Y	Y		Daniel Sudakin	Y	Y	Y	
Ernest Falke	Y	Y	Y		Marcel vanRaaij	Y	Y	Y	
David Freshwater	A	A	A		Calvin Willhite	Y	Y	Y	
Ralph Gingell	Y	Y	Y		George Woodall	Y	Y	Y	
Roberta Grant	A	A	A		Alan Woolf	Y	Y	Y	
Dieter Heinz	Y	Y	Y						
					TALLY				
					PASS/ FAIL				

PPM, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(0.45)	,(0.45)	,(0.45)	,(0.45)	,(0.45)
AEGL 2	,(25)	,(11)	,(5.5)	,(2.8)	,(2.8)
AEGL 3	,(160)	,(53)	,(25)	,(6.5)	,(6.5)
LOA					
* = ≥10% LEL					
** = ≥ 50% LEL					
*** = ≥100% LEL					

*Safety considerations against the hazard(s) of explosion(s) must be taken into account.
** and ***Extreme safety considerations against the hazard(s) of explosion(s) must be taken into account.

NR= Not Recommended due to_____

AEGL 1 Motion by: Benson **Second by:** Woodall
AEGL 2 Motion by: ↓ **Second by:** ↓
AEGL 3 Motion by: ↓ **Second by:** ↓
LOA Motion by:_____ **Second by:**_____

Approved by Chair: [signature] **DFO:** Paul S. Tobin **Date:** 6/20/07

NAC/AEGL Meeting 43: June 20-22, 2007

Chemical: BZ **CAS Reg. No.:** 6581-06-2

Action: Proposed ✓ **Interim**_____ **Other**_____

Chemical Manager: **Staff Scientist:**

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
Henry Anderson	P	P	P		John Hinz	A	A	A	
Marc Baril	A	A	A		Jim Holler	A	A	A	
Lynn Beasley	Y	Y	Y		Glenn Leach	A	A	A	
Alan Becker	Y	Y	Y		Richard Niemeier	A	A	A	
Robert Benson	P	P	P		Susan Ripple	Y	Y	Y	
Edward Bernas	P	P	P		George Rusch, Chair	Y	Y	Y	
Gail Chapman	Y	Y	Y		Martha Steele				
George Cushmac	Y	Y	Y		Daniel Sudakin	Y	Y	Y	
Ernest Falke	Y	Y	Y		Marcel vanRaaij	Y	Y	Y	
David Freshwater	A	A	A		Calvin Willhite	Y	Y	Y	
Ralph Gingell	Y	Y	Y		George Woodall	Y	Y	Y	
Roberta Grant	A	A	A		Alan Woolf	Y	Y	Y	
Dieter Heinz	Y	Y	Y						
					TALLY	14/14	14/14	14/14	
					PASS/ FAIL	P			

PPM, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(NR)	,(NR)	,(NR)	,( )	,( )
AEGL 2	,(0.20)	,(0.067)	,(0.033)	,( )	,( )
AEGL 3	,(3.7)	,(1.2)	,(0.62)	,( )	,( )
LOA					
* = ≥10% LEL					
** = ≥ 50% LEL					
*** = ≥100% LEL					

*Safety considerations against the hazard(s) of explosion(s) must be taken into account.
** and ***Extreme safety considerations against the hazard(s) of explosion(s) must be taken into account.

NR= Not Recommended due to_____

AEGL 1 Motion by: Willhite **Second by:** Heinz
AEGL 2 Motion by: _____ **Second by:** _____
AEGL 3 Motion by: _____ **Second by:** _____
LOA Motion by: _____ **Second by:** _____

Approved by Chair: _____ **DFO:** _____ **Date:** 6/20/2007

NAC/AEGL Meeting 43: June 20-22, 2007

Chemical: CHLOROSULFONIC ACID **CAS Reg. No.:** Appendix H

Action: Proposed ✓ **Interim**_____ **Other**_____

Chemical Manager: SUSAN RIPPLE **Staff Scientist:** SYLVIA MILANEZ

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
Henry Anderson	Y	Y	Y		John Hinz	A	A	A	
Marc Baril	A	A	A		Jim Holler	A	A	A	
Lynn Beasley	Y	Y	Y		Glenn Leach	A	A	A	
Alan Becker	Y	Y	Y		Richard Niemeier	A	A	A	
Robert Benson	Y	Y	Y		Susan Ripple	Y	Y	Y	
Edward Bernas	Y	Y	Y		George Rusch, Chair	Y	Y	Y	
Gail Chapman	Y	Y	Y		Martha Steele	A	A	A	
George Cushmac	Y	Y	Y		Daniel Sudakin	Y	Y	Y	
Ernest Falke	Y	Y	base		Marcel vanRaaij	Y	Y	N	
David Freshwater	A	A	A		Calvin Willhite	Y	Y	Y	
Ralph Gingell	Y	Y	Pass		George Woodall	Y	Y	Pass	
Roberta Grant	A	A	A		Alan Woolf	Y	Y	Y	
Dieter Heinz	Y	Y	Y						
					TALLY		17/17	13/14	
					PASS/ FAIL		P	P	

~~PPM~~, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(0.10)	,(0,10)	,(0,10)	,(0,10)	,(0,1)
AEGL 2	,(4,4)	,(4,4)	,(4,4)	,(4.4)	,(4,4)
AEGL 3	,(45)	,(31)	,(25)	,(6.1)	,(6.1)
LOA					
* = ≥10% LEL					
** = ≥ 50% LEL					
*** = ≥100% LEL					

*Safety considerations against the hazard(s) of explosion(s) must be taken into account.
** and ***Extreme safety considerations against the hazard(s) of explosion(s) must be taken into account.

NR= Not Recommended due to_____

AEGL 1 Motion by: Benson **Second by:** Falke
AEGL 2 Motion by: Marcel **Second by:** Heinz
AEGL 3 Motion by: Substitute **Second by:** Heinz
LOA Motion by:_____ **Second by:**_____

Approved by Chair: [signature] **DFO:** [signature] **Date:** 6/20/2007

NAC/AEGL Meeting 43: June 20-22, 2007

Chemical: METHANESULFONYL CHLORIDE * **CAS Reg. No.:** 124-63-0

Action: Proposed ✓ **Interim** _____ **Other** _____

Chemical Manager:

NAC Member	AEGL1	AEGL2	AEGL3	LOA
Henry Anderson	Y			
Marc Baril	A	A	A	
Lynn Beasley	Y			
Alan Becker	N			
Robert Benson	N			
Edward Bernas	Y			
Gail Chapman	Y			
George Cushmac	Y			
Ernest Falke	Y			
David Freshwater	A	A	A	
Ralph Gingell	Y			
Roberta Grant	A	A	A	
Dieter Heinz	Y			

Staff Scientist:

NAC Member	AEGL1	AEGL 2	AEGL3	LOA
John Hinz	A	A	A	
Jim Holler	A	A	A	
Glenn Leach	A	A	A	
Richard Niemeier	A	A	A	
Susan Ripple	Y			
George Rusch, Chair	Y			
Martha Steele	A	A	A	
Daniel Sudakin	Y			
Marcel vanRaaij	Y			
Calvin Willhite	Y			
George Woodall	Y			
Alan Woolf	Y			
TALLY				
PASS/ FAIL				

✱ Table until we get GLP SHERTZER Study.

PPM, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,( )	,( )	,( )	,( )	,( )
AEGL 2	,( )	,( )	,( )	,( )	,( )
AEGL 3	,( )	,( )	,( )	,( )	,( )
LOA					
* = ≥10% LEL					
** = ≥ 50% LEL					
*** = ≥100% LEL					

*Safety considerations against the hazard(s) of explosion(s) must be taken into account.
** and ***Extreme safety considerations against the hazard(s) of explosion(s) must be taken into account.

NR= Not Recommended due to _____

AEGL 1 Motion by: Woodall **Second by:** Willhite
AEGL 2 Motion by: _____ **Second by:** _____
AEGL 3 Motion by: _____ **Second by:** _____
LOA Motion by: _____ **Second by:** _____

Approved by Chair: _____ **DFO:** Paul S. Tobin **Date:** 6/21/07

NAC/AEGL Meeting 43: June 20-22, 2007

Appendix J

Chemical: OSMIUM TETROXIDE **CAS Reg. No.:** 20816-12-0

Action: Proposed ✓ **Interim**_____ **Other**_____

Chemical Manager: HEINZ **Staff Scientist:** YOUNG

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
Henry Anderson	Y	Y	Y		John Hinz	A	A	A	
Marc Baril	A	A	A		Jim Holler	A	A	A	
Lynn Beasley	Y	Y	Y		Glenn Leach	A	A	A	
Alan Becker	Y	Y	Y		Richard Niemeier	A	A	A	
Robert Benson	Y	Y	Y		Susan Ripple	Y	Y	Y	
Edward Bernas	Y	Y	Pass		George Rusch, Chair	Y	Y	Y	
Gail Chapman	Y	Y	Y		Martha Steele	A	A	A	
George Cushmac	Y	Y	Y		Daniel Sudakin	Y	Y	Y	
Ernest Falke	Y	Y	Y		Marcel vanRaaij	Pass	Y	Y	
David Freshwater	A	A	A		Calvin Willhite	Y	Ho	Y	
Ralph Gingell	Y	Y	Y		George Woodall	Y	Y	Y	
Roberta Grant	A	A	A		Alan Woolf	Y	Y	Y	
Dieter Heinz	Y	Y	Y						
					TALLY				
					PASS/ FAIL				

PPM, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(NR)	,(NR)	,(NR)	,(NR)	,(NR)
AEGL 2	,(0.015)	,(0.011)	,(0.0084)	,(0.0033)	,(0.0017)
AEGL 3	,(5.0)	,(5.0)	,(4.0)	,(2.5)	,(2.0)
LOA					
* = ≥10% LEL					
** = ≥ 50% LEL					
*** = ≥100% LEL					

*Safety considerations against the hazard(s) of explosion(s) must be taken into account.
** and ***Extreme safety considerations against the hazard(s) of explosion(s) must be taken into account.

NR= Not Recommended due to_____

AEGL 1 Motion by: Show of hands **Second by:**_____
AEGL 2 Motion by: Benson **Second by:** Heinz
AEGL 3 Motion by: Benson **Second by:** Heinz
LOA Motion by:_____ **Second by:**_____

Approved by Chair: [signature] **DFO:** Paul S. Tobin **Date:** 6/21/07

NAC/AEGL Meeting 43: June 20-22, 2007

Chemical: PENTABORANE **CAS Reg. No.:** 19624-22-7

Action: Proposed ✓ **Interim** _____ **Other** _____

Chemical Manager:

NAC Member	AEGL1	AEGL2	AEGL3	LOA
Henry Anderson	Y	Y	Y	
Marc Baril	A	A	A	
Lynn Beasley	Y	Y	Y	
Alan Becker	Y	Y	Y	
Robert Benson	Y	Y	Y	
Edward Bernas	Y	Y	Y	
Gail Chapman	Y	Y	Y	
George Cushmac	Y	Y	Y	
Ernest Falke	Y	Y	Y	
David Freshwater	A	A	A	
Ralph Gingell	Y	Y	Y	
Roberta Grant	A	A	A	
Dieter Heinz	Y	Y	Y	

Staff Scientist:

NAC Member	AEGL1	AEGL 2	AEGL3	LOA
John Hinz	A	A	A	
Jim Holler	A	A	A	
Glenn Leach	A	A	A	
Richard Niemeier	A	A	A	
Susan Ripple	Y	Y	Y	
George Rusch, Chair	Y	Y	Y	
Martha Steele	A	A	A	
Daniel Sudakin	Y	Y	Y	
Marcel vanRaaij	Y	Y	Y	
Calvin Willhite	Y	Y	Y	
George Woodall	Y	Y	Y	
Alan Woolf	Y	Y	Y	
TALLY	17/17	17/17	17/17	
PASS/ FAIL	P	P	P	

PPM, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(NR)	,(NR)	,(NR)	,(NR)	,(NR)
AEGL 2	,(0.56)	,(0,24)	,(0,14)	,(0,048)	,(0,028)
AEGL 3	,(2.8)	,(1,2)	,(0,70)	,(0,24)	,(0,14)
LOA					
* = ≥10% LEL					
** = ≥ 50% LEL					
*** = ≥100% LEL					

*Safety considerations against the hazard(s) of explosion(s) must be taken into account.
** and ***Extreme safety considerations against the hazard(s) of explosion(s) must be taken into account.

NR= Not Recommended due to _____

AEGL 1 Motion by: _____ **Second by:** _____
AEGL 2 Motion by: Benson **Second by:** Woodall
AEGL 3 Motion by: Benson **Second by:** Marcel van Raaij
LOA Motion by: _____ **Second by:** _____

Approved by Chair: _____ **DFO:** Paul S Tobin **Date:** 6/21/07