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

September 21-23, 2004

Final Meeting-34 Highlights

U.S. Department of Labor, Room C5515
200 Constitution Avenue
Washington, DC 20210

INTRODUCTION

Chairman George Rusch welcomed the committee, as well as industry guests who included Andrew Jaques, Bill Gulledge,and Bill Snellings from the American Chemistry Council (ACC), and John Thomas (Texas), and Cynthia Mann (ExxonMobil). The draft NAC/AEGL-33 meeting highlights were reviewed. Several editorial corrections were suggested. A motion was made by Mark Ruijten and seconded by Robert Snyder to accept the meeting highlights as presented with the aforementioned revisions. The motion passed unanimously by a voice vote (Appendix A). The final version of the NAC/AEGL-33 meeting highlights is attached (Appendix B).

George Rusch discussed the last COT meeting (August 2004, Woods Hole), at which 16 documents were reviewed and about 9 were finalized. The COT put together a list of items that need to be included as an addendum to the SOP. It was suggested that the Chemical Managers should take more careful notes during the TSD author's presentation, to help capture the essence of the discussion such as the uncertainty factor rationale.

Ernest Falke made some points regarding use of uncertainty factors (UFs). He noted that UFs >30 are generally too large, and that it would be worth knowing how often we have used a 3-fold reduction of the AEGL-3 values to obtain AEGL-2 values. EPA has some database information relevant to use of uncertainty factors. Richard Niemeier noted that NIOSH has some useful information on chemical classes.

Marquea King presented a summary of the development and use of RD_{50} values by the scientific community. The issue remains as to when and how should the NAC/AEGL use RD_{50} values in AEGL development. An electronic copy of the presentation was put on the Bulletin Board. Marquea will coordinate work by those interested (John Hinz, Peter Bos, etc.) in this topic. John Hinz briefly spoke about Jet Fuels, which used RD_{50} values as part of the UF justification. He or Sylvia Talmage will update the committee on the Jet fuels TSD in March.

The highlights of the NAC/AEGL-34 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-34 Agenda.

REVIEW AND RESOLUTION OF COT/AEGL COMMENTS ON THE INTERIM AEGL VALUES

Comments from the National Research Council, Committee on Toxicology, Subcommittee on AEGLs (COT/AEGL) on three interim chemicals were discussed. Tetranitromethane and acetone cyanohydrin were reviewed by COT/AEGL at its January 2004 meeting, and the comments were published in the Eleventh Interim Report (July 2004). Propylene oxide was reviewed by COT/AEGL at its July 2003 meeting, and the comments were published in the Tenth Interim Report (January 2004).

Acetone Cyanohydrin (CAS No. 75-86-5)

Staff Scientist: Peter Griem, Germany (absent)
Chemical Manager: Ernest Falke, U.S. EPA

Ernest Falke discussed the comments made by COT on acetone cyanohydrin at the January 2004 meeting (Attachment 3). The COT suggested that the mechanism of action needs revising, and the interspecies UF of 3 can be used because the mechanism is exactly the same for all species. The COT felt that it was inappropriate to use a repeat-exposure study to derive AEGL-1 values, and instead recommended using the hydrogen cyanide values. It was moved by George Rogers and seconded by Tom Hornshaw that all changes suggested by COT, including the new AEGL-1 values, be accepted. The motion carried unanimously (YES: 17; NO: 0; ABSTAIN: 0) (Appendix C).

Summary of AEGL Values for Acetone Cyanohydrin						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL–1	2.5 ppm	2.5 ppm	2.0 ppm	1.3 ppm	1.0 ppm	Used hydrogen cyanide values by structural analogy.
AEGL–2	Not addressed (no change).					
AEGL–3	Not addressed (no change).					

Tetranitromethane (CAS No. 509-14-8)

Staff Scientist: Sylvia Milanez, ORNL
Chemical Manager: Ernest Falke, U.S. EPA

Sylvia Milanez briefed the NAC on the response of the COT (January 2004 meeting) to the tetranitromethane (TNM) TSD and reviewed the TNM data (Attachment 4). The COT recommended basing AEGL-2 and AEGL-3 values on a single-exposure study (Kinkead et al. 1977) rather than a multiple-exposure study (NTP 1990). COT also recommended eliminating the AEGL-1 due to lack of data, as the original values were recently found to have been based on an erroneous interpretation of the NTP (1990) report, after obtaining raw study data.

The new AEGL-2 and AEGL-3 values were based on the 4-hour rat LC_{50} study of Kinkead et al. (1977), in which mortality occurred at ≥15 ppm but not at 10 ppm [0/10]. The rats were lethargic, had a slowed rate and depth of respiration, nose and eye irritation, mild lung congestion, and premature decedents had lung congestion and hemorrhage. The AEGL-2 point of departure (POD) was 3.3 ppm, which was obtained by applying a MF of 3 to 10 ppm (lowest concentration tested) to obtain a concentration that would cause only mild reversible lung irritation. Scaling across time was performed using the default n=3 or n=1, except that the 30-minute values were adopted for 10 minutes. A total uncertainty factor of 10 was used: 3 for interspecies extrapolation because the key study tested the most sensitive species, and 3 to account for sensitive humans because mild reversible lung irritation from a gas with a steep dose-response is not likely to vary greatly among humans. The resulting AEGL-2 values were lower than those derived using a TNM inhalation cancer slope factor based on the NTP (1990) 2-year inhalation study, at a 10^{-4} theoretical excess cancer risk level. However, the NAC asked that the cancer assessment be redone using lung surface area comparison instead of body weight comparison between rats and humans for the dosimetric adjustment.

The new AEGL-3 values were based on the calculated $BMDL_{05}$ for lethality of 11 ppm (log/probit model from EPA's Benchmark Dose Software, Version 1.3.2.) using the Kinkead et al. (1977) lethality data. Scaling across time was performed as for the AEGL-2. A total uncertainty factor of 10 was applied: 3 for interspecies extrapolation (key study tested the most sensitive species), and 3 for human variability (threshold for lethality from extreme lung irritation from a gas with a steep dose-response is not likely to vary greatly among humans).

A single motion was made by George Rodgers and seconded by Susan Ripple to accept all three sets of new AEGL values. The motion carried unanimously (YES: 20; NO: 0; ABSTAIN: 0) (Appendix D). An LOA was not developed due to lack of data.

Summary of AEGL Values for Tetranitromethane						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL–1	Not recommended due to insufficient data.					
AEGL–2	0.66 ppm	0.66 ppm	0.52 ppm	0.33 ppm	0.17 ppm	Mild reversible lung irritation in rats (Kinkead et al. 1977).
AEGL–3	2.2 ppm	2.2 ppm	1.7 ppm	1.1 ppm	0.55 ppm	$BMDL_{05}$ for lethality in rats (Kinkead et al. 1977).

Propylene Oxide (CAS No. 75-56-9)

Staff Scientist: Claudia Troxel, ORNL
Chemical Manager: Jim Holler, ATSDR

Claudia Troxel reviewed the propylene oxide July 2003 COT comments, which recommended all different values than originally proposed (Attachment 5). The NAC discussion began with the AEGL-3, and considered the relevancy of the mouse, rat, dog, monkey, and rat data. The mouse was considered overly sensitive, as it depletes glutathione more readily than other species. The rat NTP (1985) lethality data were used as the basis for developing AEGL-3 values. The calculated 4-hour, $BMCL_{05}$ of 1161 ppm was used as the point of departure. A total uncertainty factor of 3 was applied. An intraspecies UF of 3 was applied on the basis that the mechanism of toxicity, irritation, is not expected to differ greatly between individuals. The interspecies UF of 1 was applied on the basis of supporting data in dogs (similar $BMCL_{05}$; Jacobson et al., 1956), primates (300 ppm, 6 hours/day for 2 years or 457 ppm, 7 hrs/day for 154 days were not lethal; Spintz et al. 1982; Setzer et al., 1997; Lynch et al., 1983; Rowe et al., 1952), and humans (1520 ppm for 171 minutes not lethal). A value of n=1.7 was derived from the Rowe et al. (1956) study and used to scale across time, except that the 30-minute value was adopted for 10 minutes. The motion to adopt these values was made by Bob Benson and seconded by Jim Holler and passed unanimously (YES: 18; NO: 0; ABSTAIN: 0).

The AEGL-2 derivation began with a discussion about the relevance of dyspnea as an AEGL-2 endpoint, NAC concluding that dyspnea was a broad-spectrum symptom and someone with severe dyspnea would have an impaired ability to escape. The AEGL-2 was based on dyspnea in mice that inhaled 387 ppm for 4 hours (NTP, 1985). A total UF of 3 was applied. An intraspecies UF of 3 was applied because the mechanism of toxicity, irritation, is not expected to differ greatly between individuals. An interspecies UF of 1 was applied because mice were the most sensitive laboratory species tested, available data indicate that mice are equally or slightly more sensitive than humans, and dyspnea was the most sensitive endpoint (NTP reported effect at a lower concentration than any other study). Scaling across time was done as for the AEGL-3. The resulting values were supported by dog and monkey data. George Rodgers proposed and

Richard Thomas seconded that the resulting values be adopted and the motion passed (YES: 12; NO: 1; ABSTAIN: 4).

The AEGL-1 is based on the workplace survey which measured exposure concentrations of 380 ppm for 177 minutes, 525 ppm for 121 minutes; 392 ppm for 135 minutes; and 460 ppm for 116 minutes in the breathing zone of three workers during drumming operations (CMA, 1998a). Strong odor and irritation was noted in monitoring study (exact nature of the irritation, other than the strong odor, was not provided, but occasional eye irritation was noted in the report as reason for monitoring program). Because irritant effects are not scale across time, the values would be set equal across time. Therefore, the 4 exposure concentrations can be averaged together, resulting in a point of departure of 440 ppm. A total uncertainty factor and modifying factor of 6 is applied. An intraspecies uncertainty factor of 3 was applied because irritation is a point of contact effect and is not expected to vary greatly among individuals. A modifying factor of 2 is applied because the defined effects are above an AEGL-1 (undefined irritation) but below an AEGL-2 endpoint. Marc Ruijten proposed and Jim Holler seconded that the resulting values and the motion passed (YES: 13; NO: 0; ABSTAIN: 3) (Appendix E).

An LOA of 21 ppm was accepted unanimously by a hand vote.

Summary of AEGL Values for Propylene Oxide						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL–1	73 ppm	73 ppm	73 ppm	73 ppm	73 ppm	CMA, 1998a
AEGL–2	440 ppm	440 ppm	290 ppm	130 ppm	86 ppm	NTP, 1985
AEGL–3	1300 ppm	1300 ppm	870 ppm	390 ppm	260 ppm	NTP, 1985

REVIEW of PRIORITY CHEMICALS

Acetaldehyde (CAS No. 75-07-0)

Staff Scientist: Johan Schefferlie, RIVM, the Netherlands
Chemical Manager: Marinelle Payton, Jackson State University (absent)

Johan Schefferlie presented the available human and animal data for acetaldehyde, which is found in foods and formed in the metabolism of ethanol (Attachment 6). The initially proposed AEGL-1 was based on eye irritation in human volunteers exposed to 50 ppm for 15 minutes, the NOEL was 25 ppm (Silverman et al. 1946). After application of a UF of 3, this yielded 8 ppm, which was applied to all exposure durations. The developed values were considered too low and based only on nominal concentrations, so Robert Benson moved (second by John Hinz) that the AEGL-1 instead be based on the Sim and Pattle (1957) study, in which human subjects exposed to a measured concentration of 134 ppm for 30 minutes reported mild upper respiratory irritation but

no eye irritation. An intraspecies UF of 3 was applied for sensitive individuals, and the resulting value of 45 ppm was applied to all exposure durations. The motion passed (YES: 17; NO: 4; ABSTAIN: 1).

Two options were presented for developing AEGL-2 values, one being based on the NOEL for nasal pathology in the rat (1500 ppm for 6 hrs; Cassee et al. 1996b) and the second a NOEL for dyspnea (2217 ppm for 30 minutes; Appelman et al. 1982). A motion was made by Marc Ruijten and seconded by Bob Benson to use option 1 and default time extrapolation (n=3 or n=1) and apply an interspecies UF of 1 (effect was below the threshold for AEGL-2) and an intraspecies UF of 3, yielding 1100, 1100, 800, 500, and 380 ppm for 10, 30, 60, 240, and 480 minutes, respectively. This motion failed (YES: 2; NO: 20; ABSTAIN: 0). Another motion was made (George Woodall; second by Richard Thomas) also based on option 1 but using an interspecies UF of 1 and an intraspecies UF of 10 (considerable variation among humans), yielding 340, 340, 270, 170, and 110 ppm, respectively. This motion passed (YES: 20; NO: 2; ABSTAIN: 0).

AEGL-3 values were based on a rat lethality study (Appelman et al. 1982) from which a BMDL05 of 5295 ppm was calculated for a 4-hour exposure. To this level a total uncertainty factor of 10 was applied, consisting of a factor of 3 for interspecies extrapolation and a factor of 3 for sensitive human subpopulations. Using default n= 3 or n=1, this yielded AEGL-3 values of 1100, 1100, 840, 530, and 260 ppm for 10, 30, 60, 240, and 480 minutes, respectively. The motion was made by George Alexeeff and seconded by John Hinz, and passed (YES: 20; NO: 0; ABSTAIN: 2) (Appendix F).

An LOA of 0.56 ppm was accepted unanimously by a hand vote.

Summary of AEGL Values for Acetaldehyde						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL–1	45 ppm	45 ppm	45 ppm	45 ppm	45 ppm	Mild upper respiratory irritation in humans (Sim and Pattle 1957)
AEGL–2	340 ppm	340 ppm	270 ppm	170 ppm	110 ppm	NOEL for nasal pathology in the rat (Cassee et al. 1996b)
AEGL–3	1100 ppm	1100 ppm	840 ppm	530 ppm	260 ppm	$BMDL_{05}$ in acute rat lethality study (Appelman et al. 1982)

Vinyl Acetate (CAS No. 108-05-4)

Staff Scientist: Claudia Troxel, ORNL
Chemical Manager: Richard Thomas, INTERCET, Ltd.

Claudia Troxel presented the AEGL derivations for vinyl acetate (Attachment 7). The AEGL-1 was based on a human study (Smyth and Carpenter 1973) in which inhalation by humans of 4-20

ppm for 2 minutes caused very slight irritation whereas inhalation of 34 ppm for 2 hours caused persistent throat irritation. The POD was 20 ppm, which represents a no-effect level for notable discomfort. A total uncertainty factor of 3 was applied for intraspecies uncertainty because the slight irritation is a local effect not expected to vary greatly among individuals. The resulting value of 6.7 ppm was applied to all exposure durations. The motion was made by Marc Ruijten and seconded by George Alexeeff and passed (YES: 20; NO: 0; ABSTAIN: 2).

The AEGL-2 was based on a rat study (Bogdanffy et al. 1987) in which exposure for 6 hours to 1000 ppm caused reversible nasal lesions (cell proliferation). A visitor from DuPont (Rudy Valentine) indicated that the study pathologist (Randall Frame) considered the lesions reversible. The NAC asked that the pathologist be contacted to confirm this; if he does not, the AEGL-2 will be revisited. Default values of n=3 or n=1 were applied as well as a total UF of 10: 3 for interspecies and 3 for intraspecies variability because a higher UF would reduce the AEGL-2 values to those that did not cause serious health effects in humans. Marc Ruijten, with a second by John Hinz, made the motion to accept the resulting AEGL values and the motion carried (YES: 13; NO: 3; ABSTAIN: 6).

After some discussion of the mouse being overly sensitive, the Bogdanffy et al. (1987) 6-hour rat study was also used to derive AEGL-3 values. The POD was 1000 ppm, which caused olfactory lesions and was far below a lethal concentration. Default values of n=3 or n=1 were applied. The total UF was 3: 1 for interspecies uncertainty because the POD was far below a lethal concentration, and 3 for human variability. Bob Benson proposed and Marc Ruijten seconded that the resulting values and the motion passed (YES: 15; NO: 0; ABSTAIN: 5) (Appendix G). The NAC commented that the TSD needs to clearly state why a carcinogenicity risk assessment was not put in the Appendix.

An LOA of 0.25 ppm was accepted unanimously by a hand vote.

Summary of AEGL Values for Vinyl Acetate

Classification	10-minute	30-minute	1-hour	4-hour	8-hour	Endpoint (Reference)
AEGL-1	6.7 ppm	6.7 ppm	6.7 ppm	6.7 ppm	6.7 ppm	NOEL for notable discomfort in humans (Smyth and Carpenter 1973).
AEGL-2	230 ppm	230 ppm	180 ppm	110 ppm	75 ppm	Reversible nasal lesions in rats (Bogdanffy et al. 1987).
AEGL-3	760 ppm	760 ppm	610 ppm	380 ppm	250 ppm	Reversible nasal lesions in rats as conservative estimate of lethality threshold (Bogdanffy et al. 1987).

Disulfur Dichloride (CAS No. 10025-67-9)

Staff Scientist: Kowetha Davidson, ORNL
Chemical Manager: Ernest Falke, U.S. EPA

Kowetha Davidson discussed the limited data available to derive disulfur dichloride AEGL values (Attachment 8). All three sets of AEGL values were based on a recent 4-hour exposure rat study conducted by Bomhard et al. (2000). AEGL-1 values were based on the NOEL of 33.3 ppm for upper respiratory tract irritation, breathing difficulty, and other signs of discomfort seen in the rats. Because very little is known about the toxicity of inhaled sulfur chloride, and no data were available to compare the toxicity of sulfur chloride in different species or among humans, UFs of 10 for interspecies sensitivity and 10 for intraspecies variability were applied to 33.3 ppm (total = 100). Defaults values $n = 3$ and $n = 1$ were used to extrapolate to shorter and longer time frames, except that the 30-minute value was adopted for 10 minutes. The NAC did not use the 4-hour value of 0.33 ppm for all time points because disulfur dichloride is not water-soluble and there was concern about doubling the concentration in the deep lung for the 8-hour exposure duration. The motion to use the scaled AEGL values was made by Steve Barbee and seconded by George Alexeeff and passed (YES: 17; NO: 0; ABSTAIN: 2).

For AEGL-2, the POD was 242 ppm (which was within 20% of the $BMDL_{05}$), which caused upper respiratory irritation (bloody and serous nasal discharge), breathing difficulty, and reduced activity, and could impede the ability to escape. A modifying factor (MF) of 2 was applied to because the observed effects exceeded the severity of AEGL-2 and the database was deficient. A total UF of 30 was used: 10 for interspecies variability because only one animal study was available without corroborating human data, and 3 for intraspecies variability because sulfur chloride is an irritant and the response in humans is not expected to vary by more than a factor of 3. Greater MF or UFs were not used as they would cause the AEGL-2 values to approach the no-effect level. Time scaling was performed as for AEGL-1. It was moved by Steve Barbee and seconded by Ernest Falke that the values be accepted. The motion carried (YES: 16; NO: 1; ABSTAIN: 3).

The POD for the AEGL-3 was the $BMDL_{05}$ for lethality of 328 ppm, which was derived using the log/probit model from EPA's Benchmark Dose Software, Version 1.3.2. A total UF of 30 was applied: 10 for interspecies sensitivity and 3 for intraspecies variability, using the same rationale as for AEGL-2. Time scaling was performed as for AEGL-1 and AEGL-2. It was moved by Marc Ruijten and seconded by Bob Benson that the values be accepted. The motion carried (YES: 19; NO: 0; ABSTAIN: 1) (Appendix H).

An LOA was not developed due to lack of data; this statement needs to be added to the TSD.

Summary of AEGL Values for Disulfur Dichloride						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL–1	0.67 ppm	0.67 ppm	0.53 ppm	0.33 ppm	0.17 ppm	NOEL for upper respiratory tract irritation and other signs in rats (Bomhard et al., 2000)
AEGL–2	8.1 ppm	8.1 ppm	6.4 ppm	4.0 ppm	2.0 ppm	Respiratory irritation in rats and inability to escape (Bomhard et al., 2000)
AEGL–3	19 ppm	19 ppm	15 ppm	9.6 ppm	4.8 ppm	$BMDL_{05}$ for lethality in rats (Bomhard et al., 2000)

Dibromoethane (CAS No. 106-93-4)

Staff Scientist: Kowetha Davidson, ORNL
Chemical Manager: Nancy Kim, NY State Dept. of Health

Kowetha Davidson reviewed the human and animal data on dibromoethane, which affects the respiratory system, heart, and CNS, and is genotoxic (Attachment 9). She also noted that the ppm to mg/m^3 conversion on the handout was done backwards. There were no data from which to calculate AEGL-1 values, which were not developed.

AEGL-3 values were developed first. In the TSD, AEGL-3 values were based on the NOEL for lethality (100 ppm for 8.5 hours) in a study where rats were exposed to 100 to 10,000 ppm dibromoethane for 1.2 minutes to 16 hours (Rowe et al. 1952). The total UF of 10 included 1 for interspecies variability because PBPK modeling showed that human uptake and metabolism is at least 3-fold slower than of rats, and 10 for human variability due to polymorphisms in several metabolic enzymes. Time scaling used a data-derived n=1.4 (from this study), which yielded values of 166, 76, 46, 17, and 10 ppm. The NAC, however, derived AEGL-3 values using the same study but an alternate form of the ten Berge equation, including an interaction factor, as presented by Mark Ruijten, which yielded n=1.2 and AEGL-3 values of 96, 40, 26, 18, 13, for 10 minutes to 8 hours, respectively. The motion to accept the values, made by Richard Thomas and seconded by George Woodall, carried (YES: 15; NO: 1; ABSTAIN: 2) (Appendix I).

The NAC deferred development of AEGL-2 values to a future NAC/AEGL meeting due to lack of adequate data. In the TSD, AEGL-2 values were based on an abstract describing a developmental neurotoxicity study in which rat embryos were exposed to 65 ppm 1,2-dibromoethane, 6 hours/day for 3 days during gestation (Vodickova et al. 2003). AEGL-2 values were developed using a single exposure to 6 hours, because developmental effects can occur from a single day exposure of the fetus, and the half-life of 1,2-dibromoethane excretion after a 7-hour exposure is <6 hours. The total UF was 10 (rationale as for AEGL-3). Time scaling using n = 1.4

(see AEGL-3) yielded AEGL-2 values of 84, 38, 23, 8.7, and 5.3 ppm, respectively, for 10 minutes to 8 hours. These values could no longer be used because they intersected with the newly developed AEGL-3 values. Additionally, the NAC had doubts about the credibility of the abstract, and the use of a single exposure from a multiple-exposure developmental study to derive values.

An LOA was not developed due to lack of data, which needs to be stated in the TSD.

Summary of AEGL Values for Dibromoethane						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL–1	Not recommended due to insufficient data.					
AEGL–2	Deferred to the December, 2004 NAC/AEGL meeting due to inadequate data.					
AEGL–3	96 ppm	40 ppm	26 ppm	18 ppm	13 ppm	Rowe...

Hydroxylamine (CAS No. 7803-49-8)

Staff Scientist: Sylvia Milanez, ORNL
Chemical Manager: George Cushmac, U.S. DOT

Sylvia Milanez presented the limited available information on hydroxylamine, which is very explosive and difficult to handle as a free base (Attachment 10). Adequate data were not available to derive AEGL-1, AEGL-2, or AEGL-3 values either for hydroxylamine, or its more stable sulfate or hydrochloride salts. A suggestion was made by the NAC that a statement should be developed for chemicals such as hydroxylamine, which are not likely to pose an inhalation hazard due to their low volatility and low potential for human exposure. Some NAC members questioned why this chemical was addressed, i.e. which agency nominated it and why.

A single motion was made by George Rodgers and seconded by Richard Thomas to not develop any AEGL values due to lack of data. The motion carried unanimously by a show of hands (Appendix J).

An LOA was not developed due to lack of data.

Summary of AEGL Values for Tetranitromethane						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL–1	Not recommended due to insufficient data.					
AEGL–2	Not recommended due to insufficient data.					
AEGL–3	Not recommended due to insufficient data.					

Cumene (CAS No. 98-82-8)

Staff Scientist: Sylvia Milanez, ORNL
Chemical Manager: John Hinz, AFIOH/RSRE

Sylvia Milanez provided a review of the background and inhalation toxicity of cumene (Attachment 11). The AEGL-1 in the TSD was based on an NTP (2004) study in which exposure to 250 ppm for 6 hours (repeatedly) was a NOEL for neurotoxic effects. The NAC initially considered not adopting AEGL-1 values (Bob Benson motioned; Nancy Kim second), but the motion failed (YES: 6; NO: 11; ABSTAIN: 1). The NAC ultimately based the AEGL-1 on an anecdotal report that exposure to 300-400 ppm was painful to the eyes and upper respiratory passages of chemical workers (Dow 1948). A modifying factor of 2 was applied to keep toxicity within the scope of AEGL-1 (mild eye and respiratory irritation), and a UF of 3 for intraspecies variability, because mild eye and respiratory irritation is not expected to vary greatly among humans. The resulting AEGL value of 50 ppm was adopted for 10 minutes to 8 hours, and was supported by a study in which volunteers willingly tolerated exposure to 49-146 ppm cumene for an 8-hour period with two 30-minute breaks (Senczuk and Litewka 1976). The motion to accept the values, made by Bob Benson and seconded by George Rodgers, carried (YES: 17; NO: 0; ABSTAIN: 1).

The POD for the AEGL-2 was exposure to 500 ppm for 6 hours, which caused mild reversible neurological changes in a rat functional observational battery (FOB) (Bushy Run 1989), and was a NOEL for ataxia and an impaired ability to escape. A total UF of 3 was applied, consisting of an interspecies UF of 1 [most sensitive species tested; greater UF would yield AEGL-2 values below those which had no effect on monkeys, rats, dogs, or guinea pigs upon repeated exposure (244 ppm 8 hours/day for 30 days; Jenkins 1970)], and an intraspecies UF of 3 (CNS depression not expected to vary more than 3-fold among humans). Scaling across time, including to 10 minutes (studies showed dose-response from 20 minutes to 6 hours), was performed using default values of n=3 or n=1. Marc Ruijten motioned, and John Hinz seconded, to accept the resulting values, and the motion passed (YES: 15; NO: 1; ABSTAIN: 1).

AEGL-3 values were based on the same study as the AEGL-2, and exposure to 1200 ppm for 6 hours was considered the lethality threshold because (1) 2000 ppm for 6 hours/day caused 100% mortality in rats and mice in 2 days (NTP 2004), and (2) up to 90 days of exposure to 1200 ppm for 6 hours/day was not lethal in several rat studies. An interspecies UF of 1 was used because the animal data showed that 1200 ppm for 6 hours was not lethal, and use of a UF of 3 would yield AEGL-3 values below AEGL-2 values. An intraspecies UF of 3 was used because CNS depression is not expected to vary by more than a factor of 3 among humans. Scaling was done as for the AEGL-2. It was noted that the 10-minute and 30-minute AEGL-3 values exceed 10% of the LEL (lower explosive limit) of cumene of 9000 ppm. Marc Ruijten motioned, and Bob Benson seconded, to accept these values, and the motion carried (YES: 17; NO: 0; ABSTAIN: 1) (Appendix K).

An LOA of 0.017 ppm was accepted unanimously by a hand vote.

Summary of AEGL Values for Cumene						
Classification	**10-minute**	**30-minute**	**1-hour**	**4-hour**	**8-hour**	**Endpoint (Reference)**
AEGL–1	50 ppm	50 ppm	50 ppm	50 ppm	50 ppm	Mild eye and respiratory irritation in humans (Dow 1948)
AEGL–2	550 ppm	380 ppm	300 ppm	190 ppm	130 ppm	Mild reversible neurological changes and NOEL for ataxia in rats, and impaired ability to escape (Bushy Run 1989)
AEGL–3	1300 ppm*	920 ppm*	730 ppm	460 ppm	300 ppm	Lethality threshold in rats (Bushy Run 1989)

*These values exceed 10% of the LEL (lower explosive limit) of 9000 ppm.

Diketene (CAS No. 674-82-8)

Staff Scientist: Kowetha Davidson, ORNL
Chemical Manager: George Alexeeff, California EPA

Kowetha Davidson briefly brought up diketene, although time ran out to do a formal presentation, and the chemical will be presented at a future date.

OTHER ISSUES

Comments by Industry on Ethylene Oxide

Bill Snellings (instead of Bill Gulledge) from the ACC gave a short presentation in which he proposed alternate AEGL values for ethylene oxide (Attachment 12).

Rewording of AEGL Definition

The NAC changed one word and one phrase of the most recent definition of AEGLs to be put on the U.S. EPA AEGL web site (Attachment 13). As shown below, the word "federal" was changed to "**national**", and the phrase "non-repetitive" (in the definition of the word "acute") was changed to **"for not more than 8 hours.**" Ernest Falke made the motion, and George Rodgers seconded, that the new definition be accepted. The motion carried (YES: 12; NO: 2; ABSTAIN: 0) (Appendix L). The definition now reads,

> Acute* Exposure Guideline Levels are intended to describe the risk to humans resulting from once-in-a-lifetime, or rare, exposure to airborne chemicals. The National Advisory Committee for AEGLs is developing these guidelines to help

both ~~federal~~ **national** and local authorities, as well as private companies, deal with emergencies involving spills, or other catastrophic exposures.

*Definition = Acute exposures are single, ~~non-repetitive~~ **for not more than 8 hours.**

ADMINISTRATIVE MATTERS

The date and place of the next NAC/AEGL meeting (#35) was announced to be December 13-15, in Washington DC (U.S. Department of Labor). The next meeting of the NAC/COT will be February 21-23 at the Beckman Center in California.

All items in the agenda were discussed as thoroughly as the time permitted. The meeting highlights were prepared by Sylvia Milanez, Oak Ridge National Laboratory, with input from the respective staff scientists, chemical managers, and others.

LIST OF ATTACHMENTS

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

Attachment 1. NAC/AEGL-34 Meeting Agenda
Attachment 2. NAC/AEGL-34 Attendee List
Attachment 3. Response to COT/AEGL comments on acetone cyanohydrin
Attachment 4. Response to COT/AEGL comments on tetranitromethane
Attachment 5. Response to COT/AEGL comments on propylene oxide
Attachment 6. Data analysis for acetaldehyde
Attachment 7. Data analysis for vinyl acetate
Attachment 8. Data analysis for disulfur dichloride
Attachment 9. Data analysis for dibromoethane
Attachment 10. Data analysis for hydroxylamine
Attachment 11. Data analysis for cumene
Attachment 12. Bill Snellings (ACC) ethylene oxide presentation
Attachment 13. Revision of AEGL definition

LIST OF APPENDICES

Appendix A. Ballot for final meeting highlights of NAC/AEGL-33
Appendix B. Final meeting highlights of NAC/AEGL-33
Appendix C. Ballot for acetone cyanohydrin
Appendix D. Ballot for tetranitromethane
Appendix E. Ballot for propylene oxide
Appendix F. Ballot for acetaldehyde
Appendix G. Ballot for vinyl acetate
Appendix H. Ballot for disulfur dichloride
Appendix I. Ballot for dibromoethane

Appendix J. Ballot for hydroxylamine
Appendix K. Ballot for cumene
Appendix L. Ballot for revised AEGL definition for Web site

APPROVAL OF MINUTES *

NAC/AEGL Meeting 35: December 13-15, 2004

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

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

Chemical Manager: **Staff Scientist:**

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff					Nancy Kim				
Steven Barbee					Glenn Leach				
Lynn Beasley					John Morawetz				
Robert Benson					Richard Niemeier				
Jonathan Borak					Marinelle Payton				
William Bress					Susan Ripple				
George Cushmac					George Rodgers				
Ernest Falke					Marc Ruijten				
Alfred Feldt					George Rusch, Chair				
John Hinz					Robert Snyder				
Jim Holler					Richard Thomas				
Tom Hornshaw					George Woodall				
Warren Jederberg									
					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.

* APPROVED UNANIMOUS

NR= Not Recommended due to_____

AEGL 1 **Motion by:** R. THOMAS **Second by:** W. JEDERBERG
AEGL 2 **Motion by:**_____ **Second by:**_____
AEGL 3 **Motion by:**_____ **Second by:**_____
LOA **Motion by:**_____ **Second by:**_____

Approved by Chair: _____ **DFO:** _____ **Date:** 12/13/04

NAC/AEGL Meeting 35: December 13-15, 2004

RAISE TO INTERIM *

Chemical: ACROLEIN **CAS Reg. Nc** Appendix B

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

Chemical Manager: **Staff Scientist:**

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff					Nancy Kim				
Steven Barbee					Glenn Leach				
Lynn Beasley					John Morawetz				
Robert Benson					Richard Niemeier				
Jonathan Borak					Marinelle Payton				
William Bress					Susan Ripple				
George Cushmac					George Rodgers				
Ernest Falke					Marc Ruijten				
Alfred Feldt					George Rusch, Chair				
John Hinz					Robert Snyder				
Jim Holler					Richard Thomas				
Tom Hornshaw					George Woodall				
Warren Jederberg									
					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:** Snyder **Second by:**_____
AEGL 2 **Motion by:** Ruijten **Second by:**_____
AEGL 3 **Motion by:**_____ **Second by:**_____
LOA **Motion by:**_____ **Second by:**_____

Approved by Chair: _____ **DFO:** Paul S Tobin **Date:** 12/13/04

RAISE TO INTERIM *

NAC/AEGL Meeting 35: December 13-15, 2004

Appendix C

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

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

Chemical Manager: **Staff Scientist:**

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff					Nancy Kim				
Steven Barbee					Glenn Leach				
Lynn Beasley					John Morawetz				
Robert Benson					Richard Niemeier				
Jonathan Borak					Marinelle Payton				
William Bress					Susan Ripple				
George Cushmac					George Rodgers				
Ernest Falke					Marc Ruijten				
Alfred Feldt					George Rusch, Chair				
John Hinz					Robert Snyder				
Jim Holler					Richard Thomas				
Tom Hornshaw					George Woodall				
Warren Jederberg									
					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 except MORAWETZ

NR= Not Recommended due to_____

AEGL 1 Motion by: Benson **Second by:** Ruijten
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:** 12/13/04

RAISE TO INTERIM *

NAC/AEGL Meeting 35: December 13-15, 2004

Chemical: N,N- DIMETHYL FORMAMIDE **CAS Reg. No.:**

Appendix D

Action: Proposed_____ **Interim**_____ **Other**____

Chemical Manager: **Staff Scientist:**

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff					Nancy Kim				
Steven Barbee					Glenn Leach				
Lynn Beasley					John Morawetz				
Robert Benson					Richard Niemeier				
Jonathan Borak					Marinelle Payton				
William Bress					Susan Ripple				
George Cushmac					George Rodgers				
Ernest Falke					Marc Ruijten				
Alfred Feldt					George Rusch, Chair				
John Hinz					Robert Snyder				
Jim Holler					Richard Thomas				
Tom Hornshaw					George Woodall				
Warren Jederberg									
					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 except M. Ruijten + Bob Snyder abstain.

NR= Not Recommended due to_____

AEGL 1 **Motion by:** Hornshaw **Second by:** Kim

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

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

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

Approved by Chair: [signature] **DFO:** [signature] **Date:** 12/13/04

NITROGEN DIOXIDE (NITRIC OXIDE) → INTERIM

NAC/AEGL Meeting 35: December 13-15, 2004

Chemical: $NO_2 + NO$ **CAS Reg. No.:**

Action: Proposed_____ **Interim**_____ **Other**_____ Appendix E

Chemical Manager: **Staff Scientist:**

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff					Nancy Kim				
Steven Barbee					Glenn Leach				
Lynn Beasley					John Morawetz				
Robert Benson					Richard Niemeier				
Jonathan Borak					Marinelle Payton				
William Bress					Susan Ripple				
George Cushmac					George Rodgers				
Ernest Falke					Marc Ruijten				
Alfred Feldt					George Rusch, Chair				
John Hinz					Robert Snyder				
Jim Holler					Richard Thomas				
Tom Hornshaw					George Woodall				
Warren Jederberg									
					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.

Rodgers + Morawetz opposed, otherwise unanimous

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: _____ **DFO:** Paul S. Tobin **Date:** 12/13/04

Peracetic Acid • Interim *

NAC/AEGL Meeting 35: December 13-15, 2004

Chemical: PERACETIC ACID **CAS Reg. No.:**

Appendix F

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

Chemical Manager: **Staff Scientist:**

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff					Nancy Kim				
Steven Barbee					Glenn Leach				
Lynn Beasley					John Morawetz				
Robert Benson					Richard Niemeier				
Jonathan Borak					Marinelle Payton				
William Bress					Susan Ripple				
George Cushmac					George Rodgers				
Ernest Falke					Marc Ruijten				
Alfred Feldt					George Rusch, Chair				
John Hinz					Robert Snyder				
Jim Holler					Richard Thomas				
Tom Hornshaw					George Woodall				
Warren Jederberg									
					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.

* Address Asst Prof. comment
UNANIMOUS

NR= Not Recommended due to_____

AEGL 1 **Motion by:** Benson **Second by:** Ruijten
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:** 10/13/04

TRICHLOROETHYLENE → Interim

NAC/AEGL Meeting 35: December 13-15, 2004

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

Action: Proposed_____ **Interim**_____ **Other**____

Chemical Manager: **Staff Scientis**

Appendix G

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff			A		Nancy Kim			Y	
Steven Barbee			Y		Glenn Leach			Y	
Lynn Beasley			Y		John Morawetz			Y	
Robert Benson			P		Richard Niemeier			Y	
Jonathan Borak			A		Marinelle Payton			Y	
William Bress			A		Susan Ripple			Y	
George Cushmac			Y		George Rodgers			Y	
Ernest Falke			Y		Marc Ruijten			Y	
Alfred Feldt			Y		George Rusch, Chair			Y	
John Hinz			A		Robert Snyder			P	
Jim Holler			Y		Richard Thomas			Y	
Tom Hornshaw			Y		George Woodall			P	
Warren Jederberg			Y						
					TALLY				
					PASS/ FAIL			15/18	

PPM, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,( )	,( )	,( )	,( )	,( )
AEGL 2	,( )	,( )	,( )	,( )	,( )
AEGL 3	None 6100 ,( )	,( )	,( )	,( )	,( )
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.

Snyder abstain - otherwise unanimous

NR= Not Recommended due to_____

AEGL 1 **Motion by:** Ruijten **Second by:** Benson

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

AEGL 3 **Motion by:** Roberts **Second by:** Ripple (if no interim)

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

Approved by Chair: _____ **DFO:** Paul S. Tobin **Date:** 12/13/04

NAC/AEGL Meeting 35: December 13-15, 2004

Chemical: Perchloro methylmercaptan **CAS Reg. No.:** 594-42-3

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

Chemical Manager: Susan Ripple **Staff Scientist:** Claudia Troxel

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff	ABS				Nancy Kim	Y	N	N	
Steven Barbee	Y	Y	Y		Glenn Leach				
Lynn Beasley	ABS				John Morawetz	P	P	P	
Robert Benson	Y	Y	Y		Richard Niemeier	Y	Y	Y	
Jonathan Borak	ABS				Marinelle Payton	Y	Y	Y	
William Bress	ABS				Susan Ripple	Y	Y	Y	
George Cushmac	Y	Y	Y		George Rodgers	Y	Y	Y	
Ernest Falke	Y	Y	Y		Marc Ruijten	Y	Y	Y	
Alfred Feldt	ABS				George Rusch, Chair	Y	Y	Y	
John Hinz	ABS				Robert Snyder	Y	Y	Y	
Jim Holler	Y	Y	Y		Richard Thomas	Y	Y	Y	
Tom Hornshaw	Y	Y	Y		George Woodall	Y	Y	Y	
Warren Jederberg	Y	Y	Y						
					TALLY				
					PASS/ FAIL	Pass	Pass	Pass	

PPM, (mg/m³)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(.013)	,(.013)	,(.013)	,(.013)	,(.013)
AEGL 2	,(.53)	,(.37)	,(.3)	,(.077)	,(.037)
AEGL 3	,(1.60)	,(1.1)	,(.9)	,(.23)	,(.11)
LOA	0.016 ppm				
* = ≥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_____

11
7

AEGL 1 **Motion by:** M. Ruijten **Second by:** Steve Barbee
AEGL 2 **Motion by:**_____ **Second by:**_____
AEGL 3 **Motion by:**_____ **Second by:**_____
LOA **Motion by:**_____ **Second by:**_____

Approved by Chair: [signature] **DFO:** [signature] **Date:** 12/13/04

NAC/AEGL Meeting 35: December 13-15, 2004

Chemical: Methylene Chloride (DCM) **CAS Reg. No.:** 75-09-2

Action: Proposed X **Interim** _____ **Other** _____

Chemical Manager: Bob Benson **Staff Scientist:** Peter Bos

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff	ABSENT				Nancy Kim Y	Y	Y	Y	
Steven Barbee Y	Y	Y	Y		Glenn Leach Y	Y			
Lynn Beasley Y	Y	Y	Y		John Morawetz P	P	P	P	
Robert Benson Y	Y	Y	Y		Richard Niemeier Y	Y	Y	Y	
Jonathan Borak	ABSENT				Marinelle Payton Y	Y	Y	Y	
William Bress	ABSENT				Susan Ripple Y	Y	Y	Y	
George Cushmac Y	Y	Y	Y		George Rodgers Y	Y	Y	Y	
Ernest Falke Y	Y	Y	Y		Marc Ruijten Y	Y	Y	Y	
Alfred Feldt Y	Y	Y	Y		George Rusch, Chair Y	Y	Y	Y	
John Hinz	ABSENT				Robert Snyder Y	Y	Y	Y	
Jim Holler Y	Y	Y	Y		Richard Thomas Y	Y	Y	Y	
Tom Hornshaw Y	Y	Y	Y		George Woodall Y	Y	Y	Y	
Warren Jederberg Y	Y	Y	Y						
					TALLY	20/21	20/21	20/21	
					PASS/FAIL	P	P	P	

PPM, (mg/m³)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(290)	,(230)	,(200)	,(NR)	,(NR)
AEGL 2	,(1700)	,(1200)	,(560)	,(100)	,(60)
AEGL 3	,(12,000)	,(8,500)	,(6,900)	,(4800)	,(2,100)
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 _____

All together

AEGL 1 **Motion by:** M. Ruijten **Second by:** S. Ripple
AEGL 2 **Motion by:** M **Second by:** _____
AEGL 3 **Motion by:** _____ **Second by:** _____
LOA **Motion by:** _____ **Second by:** _____

Approved by Chair: _____ **DFO:** _____ **Date:** 12/13/04

NAC/AEGL Meeting 35: December 13-15, 2004

Chemical: Chloroacetaldehyde **CAS Reg. No.:** 107-20-0

Action: Proposed X **Interim**_____ **Other**_____

Chemical Manager: Marinelle Payton **Staff Scientist:** Peter BOS

NAC Member	AEGL1	AEGL2	AEGL3	LOA
George Alexeeff ABS				
Steven Barbee	Y	Y	Y	
Lynn Beasley	Y	Y	Y	
Robert Benson	Y	Y	Y	
Jonathan Borak ABS				
William Bress ABS				
George Cushmac	Y	Y	Y	
Ernest Falke	Y	Y	Y	
Alfred Feldt	Y	Y	Y	
John Hinz ABS				
Jim Holler	Y	Y	Y	
Tom Hornshaw	A	N	Y	
Warren Jederberg	Y	Y	Y	

NAC Member	AEGL1	AEGL 2	AEGL3	LOA
Nancy Kim	Y	Y	Y	
Glenn Leach	Y	Y	Y	
John Morawetz	Y	Y	Y	
Richard Niemeier	Y	Y	Y	
Marinelle Payton	Y	Y	Y	
Susan Ripple	Y	Y	Y	
George Rodgers	Y	Y	Y	
Marc Ruijten	Y	Y	Y	
George Rusch, Chair	Y	Y	Y	
Robert Snyder	Y	Y	Y	
Richard Thomas	Y	Y	Y	
George Woodall	Y	Y	Y	
	failed Pass			
TALLY	21/28	20/21	21/21	
PASS/ FAIL	Pass	Pass	Pass	

PPM, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(2.3)	,(2.3)	,(1.3)	,(0.40)	,(0.23)
AEGL 2	,(9.8)	,(3.9)	,(2.2)	,(0.69)	,(0.39)
AEGL 3	,(44)	,(18)	,(9.9)	,(3.1)	,(1.8)
LOA	not enough data				
* = ≥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, 3 Motion by: Bob Snyder **Second by:** Bob Benson
AEGL 2 Motion by: Marc Ruijten **Second by:** Warren Jederberg
AEGL 1, 2 Motion by: " " **Second by:** "
LOA Motion by:_____ **Second by:** "

Approved by Chair: [signature] **DFO:** [signature] **Date:** 12/13/04

NAC/AEGL Meeting 35: December 13-15, 2004

Chemical: Propionaldehyde **CAS Reg. No.:** 123-38-6

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

Chemical Manager: Marinelle Payton **Staff Scientist:** Peter Bos

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff	ABS	ABS			Nancy Kim	Y	Y	N	
Steven Barbee	Y	Y	Y		Glenn Leach	Y	Y	Y	
Lynn Beasley	Y	Y	Y		John Morawetz	Y	Y	Y	
Robert Benson	Y	Y	Y		Richard Niemeier	Y	Y	Y	
Jonathan Borak	Y	Y	Y		Marinelle Payton			ABS	
William Bress	ABS	ABS			Susan Ripple	Y	Y	Y	
George Cushmac	Y	Y	Y		George Rodgers	Y	Y	Y	
Ernest Falke	Y	Y	Y		Marc Ruijten	Y	Y	Y	
Alfred Feldt	Y	Y	Y		George Rusch, Chair	Y	Y	Y	
John Hinz	ABS	ABS			Robert Snyder	Y	Y	Y	
Jim Holler	Y	Y	Y		Richard Thomas	Y	Y	Y	
Tom Hornshaw	Y	Y	Y		George Woodall	Y	Y	Y	
Warren Jederberg	Y	Y	Y						
					TALLY	✓	✓	✓	
					PASS/ FAIL	Passed	Passed	Passed	

PPM, (mg/m³)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(45)	,(45)	,(45)	,(45)	,(45)
AEGL 2	,(330)	,(330)	,(260)	,(170)	,(110)
AEGL 3	,(1,100)	,(1,100)	,(840)	,(530)	,(260)
LOA	0.64 ppm Thomas/Ruijten				
• = ≥10% LEL					
** = ≥ 50% LEL					
*** = ≥100% LEL					

adopted Acetaldehyde

no effects 6HR/1453 4 3 3 n=1,3

acetaldehyde values adopted

*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 3 Motion by: Marc Ruijten **Second by:** Richard Niemeier

AEGL 2 Motion by: Ernie Falke **Second by:** Richard Niemeier

AEGL 1 Motion by: Ernie Falke **Second by:** Richard Thomas

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

Approved by Chair: [signature] **DFO:** [signature] **Date:** 12/14/04

NAC/AEGL Meeting 35: December 13-15, 2004

Chemical: Biphenyl **CAS Reg. No.:** 92-52-4

Action: Proposed X **Interim**_____ **Other**_____

Chemical Manager: Richard Thomas **Staff Scientist:** Dana Glass/ORNL

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff	ABS				Nancy Kim	Y	N		
Steven Barbee	Y	Y			Glenn Leach	Y	Y		
Lynn Beasley	Y	Y			John Morawetz	Y	N		
Robert Benson	Y	Y			Richard Niemeier	Y	Y		
Jonathan Borak	P	Y			Marinelle Payton	Y	Y		
William Bress	ABS				Susan Ripple	P	Y		
George Cushmac	Y	Y			George Rodgers	Y	Y		
Ernest Falke	Y	Y			Marc Ruijten	N	Y		
Alfred Feldt	Y	Y			George Rusch, Chair	Y	Y		
John Hinz	ABS				Robert Snyder	Y	Y		
Jim Holler	Y	Y			Richard Thomas	Y	Y		
Tom Hornshaw	Y	Y			George Woodall	Y	Y		
Warren Jederberg	Y	Y							
					TALLY		20/22		
					PASS/ FAIL	Passed	Passed		

PPM, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(NR)	,(NR)	,(NR)	,(NR)	,(NR)
☆ AEGL 2	,(12)	,(12)	,(9.6)	,(6.0)	,(4.4)
AEGL 3	,(NR)	,(NR)	,(NR)	,(NR)	,(NR)
LOA					
* = ≥10% LEL					
** = ≥ 50% LEL					
*** = ≥100% LEL					

express in mg/m3

*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.

7Hr/50ppm-POD AEGL2 only

NR= Not Recommended due to lack of data / lethality data

AEGL 1

No values!

AEGL 1 Motion by: George Woodall **Second by:** Nancy Kim

AEGL 2 Motion by: Marc Ruijten **Second by:** Bob Benson

No values **AEGL 3 Motion by:** Warren Jederberg **Second by:** Thomas Hornshaw

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

Approved by Chair: [signature] **DFO:** [signature] **Date:** 12/14/04

Proposed

NAC/AEGL Meeting 35: December 13-15, 2004

Chemical: 1,3-Butadiene **CAS Reg. No.:** 106-99-0

Action: Proposed X **Interim**_____ **Other**_____

Chemical Manager: Al Feldt **Staff Scientist:** Peter Bos

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff	ABS				Nancy Kim	Y	N	Y	
Steven Barbee	Y	Y	Y		Glenn Leach	Y	Y	Y	
Lynn Beasley	Y	Y	Y		John Morawetz	N	N	Y	
Robert Benson	Y	Y	Y		Richard Niemeier	Y	Y	Y	
Jonathan Borak	Y		Y		Marinelle Payton	Y	Y	P	
William Bress	ABS				Susan Ripple	Y	Y	Y	
George Cushmac	Y	Y	Y		George Rodgers	Y	Y	Y	
Ernest Falke		Y	Y		Marc Ruijten	Y	Y	Y	
Alfred Feldt	Y	Y	Y		George Rusch, Chair	Y	Y	Y	
John Hinz	ABS				Robert Snyder	P	P	Y	
Jim Holler	Y	Y	Y		Richard Thomas	Y	N	Y	
Tom Hornshaw	Y	Y	Y		George Woodall	P	N	P	
Warren Jederberg	Y	Y	Y						
					TALLY	/	17/21	20/20	
					PASS/ FAIL		Passed	Passed	

PPM, (mg/m³)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(670)	,(670)	,(670)	,(670)	,(670)
AEGL 2	,(6700)	,(6700)	,(~~4800~~ 5300)	,(~~3400~~ 3400)	,(~~2600~~ 3700)
AEGL 3	,(27,000)	,(~~27,000~~ 27,000)	,(22,000)	,(14,000)	,(6800)
LOA	3.7 ppm unanimously				
* = ≥10% LEL	AEGL-3, 10 min/30 min/1 HR				
** = ≥ 50% LEL	AEGL-3, 4 HR —				
*** = ≥100% LEL					

(margin notes: 5 Human ~~...~~ → AEGL 2; inter → AEGL 3; 5 intra; N penetration ... vomits)

*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:** Susan Ripple	**Second by:** Bob Benson
AEGL 2	**Motion by:** Bob Benson	**Second by:** Steve Barbee
AEGL 3	**Motion by:** Richard Thomas	**Second by:** Warren Jederberg
LOA	**Motion by:**	**Second by:**

Approved by Chair: [signature] ~~DFO:~~ [signature] **Date:** 12/14/04

DRAFT values only

NAC/AEGL Meeting 35: December 13-15, 2004

Chemical: Dimethylamine **CAS Reg. No.:** 124-40-3

Action: Proposed ◯ **Interim**_____ **Other**_____

Chemical Manager: Ernest Falke **Staff Scientist:** Alexander Maslennikov

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff	ABS		ABS		Nancy Kim	Y		ND	
Steven Barbee	Y		Y		Glenn Leach	Y		Y	
Lynn Beasley	Y		Y		John Morawetz	Y		N	
Robert Benson	Y		ABS		Richard Niemeier	Y		Y	
Jonathan Borak			P		Marinelle Payton	Y		Y	
William Bress	ABS		ABS		Susan Ripple	Y		Y	
George Cushmac	Y		Y		George Rodgers	ND		Y	
Ernest Falke	P		N		Marc Ruijten	Y		Y	
Alfred Feldt	Y		Y		George Rusch, Chair	Y		Y	
John Hinz	ABS		ABS		Robert Snyder	P		ND	
Jim Holler	Y		ND		Richard Thomas	Y		Y	
Tom Hornshaw	Y		Y		George Woodall	N		Y	
Warren Jederberg	Y								
					TALLY			PWD	
					PASS/ FAIL			15/20	

PPM, (mg/m³)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(30)	,(30)	,(30)	,(30)	,(30)
AEGL 2	,( )	,( )	,( )	,( )	,( )
AEGL 3	,(570)	,(570)	,(450)	,(290)	,(190)
LOA					
* = ≥10% LEL					
** = ≥ 50% LEL					
*** = ≥100% LEL					

UF10

UF10

→ 10 across all times

*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_____

OT voted on

AEGL 1 3 Motion by: M. Ruijten **Second by:** R. Thomas
AEGL 2 Motion by: ~~M~~ **Second by:** ~~R. Niemeier~~
AEGL 1 1 Motion by: M. Ruijten **Second by:** R. Niemeier
LOA Motion by:_____ **Second by:**_____

Approved by Chair: [signature] **DFO:** [signature] **Date:** 12/14/04

NAC/AEGL Meeting 35: December 13-15, 2004

Chemical: Ethyl Mercaptan **CAS Reg. No.:** 75-08-1

Action: Proposed X **Interim**_____ **Other**_____

Chemical Manager: Iris Camacho **Staff Scientist:** Cheryl Bast

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff	ABS	—	—		Nancy Kim	Y	N	Pass	
Steven Barbee	Y	Y	Y		Glenn Leach	Y	Y	Y	
Lynn Beasley	Y	Y	Y		John Morawetz	Y	N	Pass	
Robert Benson	Y	Y	Y		Richard Niemeier	Y	Y	Y	
Jonathan Borak	P	P	P		Marinelle Payton	Y	Y	Pass	
William Bress	ABS	—	—		Susan Ripple	Y	Y	Y	
George Cushmac	Y	Y	Y		George Rodgers	Y	Y	Y	
Ernest Falke	Y	Y	Y		Marc Ruijten	Y	Y	Y	
Alfred Feldt	Y ABS	Y	Y		George Rusch, Chair	Y	Y	Y	
John Hinz	ABS	—	—		Robert Snyder	Y	Y	Y	
Jim Holler	ABS	—	—		Richard Thomas	Y	Y	Y	
Tom Hornshaw	Y	N	ABSTAIN		George Woodall	Y	Y	Y	
Warren Jederberg	Y	Y	Y						
					TALLY				
					PASS/ FAIL				

PPM, (mg/m^3)	10 Min	30 Min	1 Hr	4 Hr	8 Hr
AEGL 1	,(1.0)	,(1.0)	,(1.0)	,(1.0)	,(1.0)
AEGL 2	,(150)	,(150)	,(120)	,(77)	,(37)
AEGL 3	,(450)	,(450)	,(360)	,(230)	,(110)
LOA	~~0.012ppm~~ / Susan Ripple / Bob Benson				
* = ≥10% LEL	.0000087			8.7ppt (16)	
** = ≥ 50% LEL	.00014ppm				
*** = ≥100% LEL					

Marinelle will provide new data

*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: Nancy Kim **Second by:** George Rodgers

AEGL 2 Motion by: M. Ruijten **Second by:** Steve Barbee / Susan Ripple

AEGL 3 Motion by: Bob Benson **Second by:** E. Falke

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

NAC/AEGL Meeting 35: December 13-15, 2004

Application of Acute Exposure Guideline Levels

~~Chemical:~~ ~~CAS Reg No:~~

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

~~Lead Author~~: John Morawetz ~~Staff Scientist~~

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff	ABS				Nancy Kim	Y			
Steven Barbee	Y				Glenn Leach	Y			
Lynn Beasley	Y				John Morawetz	Y			
Robert Benson	Y				Richard Niemeier	ABS			
Jonathan Borak	ABS				Marinelle Payton	ABS			
William Bress	ABS				Susan Ripple	Y			
George Cushmac	Y				George Rodgers	Y			
Ernest Falke	Pass				Marc Ruijten	Y			
Alfred Feldt	ABS				George Rusch, Chair	Y			
John Hinz	ABS				Robert Snyder	Y			
Jim Holler	ABS				Richard Thomas	ABS			
Tom Hornshaw	Y				George Woodall	Y			
Warren Jederberg	Y								
					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.

~~Chair~~ **Recommended** ~~for~~ **to** Be put on website & TSDs

AEGL 1 **Motion by:** J. Morawetz **Second by:** B. Benson
AEGL 2 **Motion by:**_____ **Second by:**_____
AEGL 3 **Motion by:**_____ **Second by:**_____
LOA **Motion by:**_____ **Second by:**_____

DFO: ~~Paul Tobin~~ **Date:** 12/15/04

formally
decided upon

NAC/AEGL Meeting 35: December 13-15, 2004

[redacted]: Definition for AEGL Website (recount/revote)

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

~~Chemical Manager~~: J. Morawetz **Staff Scientist:**

NAC Member	AEGL1	AEGL2	AEGL3	LOA	NAC Member	AEGL1	AEGL 2	AEGL3	LOA
George Alexeeff	ABS				Nancy Kim	Y			
Steven Barbee	Y				Glenn Leach	Y			
Lynn Beasley	Y				John Morawetz	Y			
Robert Benson	Y				Richard Niemeier	ABS			
Jonathan Borak	ABS				Marinelle Payton	Y			
William Bress	ABS				Susan Ripple	Y			
George Cushmac	Y				George Rodgers	Y			
Ernest Falke	Y				Marc Ruijten	Y			
Alfred Feldt	ABS				George Rusch, Chair	Y			
John Hinz	ABS				Robert Snyder	Y			
Jim Holler	ABS				Richard Thomas	ABS			
Tom Hornshaw	Y				George Woodall	Y			
Warren Jederberg	Y								
					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.

~~Not~~ Recommended to adopt this language for website

AEGL 1 Motion by: J. Morawetz **Second by:** E. Falke
AEGL 2 Motion by:_____ **Second by:**_____
AEGL 3 Motion by:_____ **Second by:**_____
LOA Motion by:_____ **Second by:**_____

AEGL Committee Chairman Certification of Minutes

National Advisory Committee for AEGLs December 13-15, 2004 Meeting

I, Dr. George Rusch, certify that these Minutes for the December 13-15, 2004 meeting of the National Advisory Committee for the Development of Acute Exposure Guideline Levels represent a true and accurate representation of the conduct of the meeting.

Chairman, George Rusch, Ph.D.