

Minutes
Fog & Smoke Working Group
Wyndham Garden Anaheim
Anaheim, CA

Presiding chairperson: Brad Dittmer, Stage Labor of the Ozarks

Recording secretaries: Richard Nix, Karl G. Ruling; ESTA

Members attending:

Matthew Antonucci; Contract Services Administration Trust Fund; P; U
Brad Dittmer; Stage Labor of the Ozarks; P; U
Mark Elliott; Walt Disney Company; P; U
Cedric Jackson; Screen Actors Guild - American Federation of Television & Radio Artists; P; U
Paul Jordan; NBC Universal; P; U
Karl G. Ruling; Unit 12 Productions; I; CP
Mona Shum; Aura Health and Safety Corporation; I; U
Keith Sklar; Actors' Equity Association; O; U
Stephen Vanciel; IATSE Local 631; P; U

Visitors: None

1 Opening Remarks

Brad Dittmer called the meeting to order at 11:35 and apologized for being late. He had been trying to get connected on WebEx. He welcomed everyone to Anaheim.

2 Patent and anti-trust statements

2.1 Reading of the anti-trust statement

The following statement was read aloud to the assembly by Brad Dittmer:

ESTA and its members take seriously their obligation to comply with all applicable antitrust laws. Therefore, during this meeting and during all ESTA events, all discussions will be limited to those subjects that are permitted by the antitrust laws. All members should refrain from any discussion or mention of competitively sensitive subjects such as the current or future prices charged for any member product or services, current or future marketing plans or strategies, and current or future costs, including employee salaries. There also must be no agreement on the suppliers or customers that members will or will not do business with or the markets in which members will conduct business.

Violations of the antitrust laws can have serious consequences. If you have any questions or concerns about anything that is discussed at an ESTA meeting, please bring your concern to ESTA management. An easy to read pamphlet describing the antitrust laws is available from the ESTA staff.

No restraint of trade concerns were raised.

2.2 Reading of the call for patents

The following statement was read aloud to the assembly by Brad Dittmer:

ESTA intends not to publish any standard that contains protected intellectual property, unless that information can be licensed by anyone for a reasonable fee. ESTA uses a process of open patent and copyright disclosures to implement its intent. ESTA does not conduct patent or copyright searches and does not warrant that its standards contain no protected intellectual property.

In keeping with the open disclosures policy, I ask if anyone present wishes to notify this working group of the existence of a patent, patent application, copyright, or other protected intellectual property that might protect material in a standard being developed by this working group. You need not be the holder of the patent or copyright to notify this working group of its existence.

No protected intellectual property was revealed.

3 Attendance and Membership

3.1 Requirements for membership

The following statement was read aloud to the assembly by Brad Dittmer:

Membership is open to all parties who are affected by the work of the group; membership in ESTA is not a requirement, but there is a \$100/person/year participation fee to help fund the costs of running the Technical Standards Program. Voting members are required to attend meetings and vote on letter ballots. Any principal member and alternate that both miss three consecutive meetings or that miss three consecutive letter ballots will have their membership status changed to observer. This action will be taken at the beginning of the first meeting after such inaction and will be recorded in the minutes of that meeting.

3.2 Introduction of attendees

Those present in the room and on-line introduced themselves.

3.3 Determination of a quorum

Brad Dittmer announced a quorum was present.

3.4 Processing of new membership and status change requests

The following applications and status change requests had been received:

Keith Sklar; Actors' Equity Association; P; U (Voting status change request, O to P)
Tyler Mickley; Look Solutions, LLC; P; CP (new application)

Karl Ruling (Unit 12 Productions) moved that Keith Sklar be accepted as principal, but that Tyler Mickley be accepted as an observer due to his absence at this meeting. Voters are required to attend meetings, he noted, and they cannot vote at a meeting if they are not present to vote. The motion was seconded. The motion was approved unanimously.

3.5 Changes to observer status

3.5.1 Changes due to attendance

No voters were in danger of losing voting status due to lack of attendance.

3.5.2 Changes due to missed ballots

Cedric Jackson (SAG-AFTRA) was reminded that he had missed the last two letter ballots and would be moved to Observer status if the next letter ballot is missed:

3.6 Consensus body

The full consensus voting body during the meeting, including those not present, was:

Name	Representing	Status	Int Cat
Margaret Burke, MPH	20th Century Fox	P	U
Keith Sklar	Actors' Equity	P	U
Mona Shum	Aura Health and Safety Corporation	I	U
Matthew Antonucci	Contract Services Administration Trust Fund	P	U
Chris Moulton	Contract Services Administration Trust Fund	A	U
Larry Schoeneman	DesignLab Chicago, Inc.	P	DR
Edwin S. Kramer	I.A.T.S.E. Local 1	P	DE
Peter T. Donovan	I.A.T.S.E. Local 1	A	DE
Don Ward	I.A.T.S.E. Local 891	P	G
Stephen Vanciel	IATSE Local 631	P	U
Mike Wood	Mike Wood Consulting LLC	P	G
Paul Jordan	NBC Universal	P	U
Cedric Jackson	Screen Actors Guild - American Federation of Television & Radio Artists	P	U
Brad Dittmer	Stage Labor of the Ozarks	P	U
Marnie Styles	Ultratec Special Effects Inc.	P	MP
Karl G. Ruling	Unit 12 Productions	I	CP

Name	Representing	Status	Int Cat
Mark Elliott	Walt Disney Company	P	U
		Total possible votes: 15	
		Custom-market producer	CP 1
		Designer	DE 1
		Dealer or rental company	DR 1
		General interest	G 2
		Mass-market producer	MP 1
		User	U 9

Voting status key: P = Principal voter, A = Alternate voter, I = Individual voter, O = Observer member

4 Approval of the minutes from the last meeting

[See *FSmin07-2018r1.pdf*]

Steve Vanceil moved that the draft minutes be approved as written. The motion was seconded and then carried without opposition.

5 Approval of agenda

Mark Elliot moved that the agenda be approved as drafted. The motion was seconded and then approved unanimously.

6 Old Business

6.1 ANSI E1.5 – 2009 (R2018), Entertainment Technology - Theatrical Fog Made with Aqueous Solutions of Di- and Trihydric Alcohols (Reaffirmation, revision, or withdrawal by 29 November 2023)

No news or action at this time.

6.2 ANSI E1.14 - 2018, Entertainment Technology—Recommendations for Inclusions in Fog Equipment Manuals (Revise, reaffirm, or withdraw by 27 February, 2023).

No news or action.

6.3 ANSI E1.23 – 2010 (R2015), Entertainment Technology - Design and Execution of Theatrical Fog Effects (Reaffirmation, revision, or withdrawal by 13 February 2020)

No news or action at this time.

6.4 ANSI E1.29 – 2009 (R2018), Product Safety Standard for Theatrical Fog Generators that Create Aerosols of Water, Aqueous Solutions of Glycol or Glycerin, or Aerosols of Highly Refined Alkane Mineral Oil (Reaffirmation, revision, or withdrawal by 06 November 2023)

It's published! No news or action at this time.

6.5 ANSI E1.40 – 2016, Recommendations For the Planning of Theatrical Dust Effects (Reaffirmation, revision, or withdrawal by 16 September 2021)

Keith Sklar said that they are implementing E1.40 with shows that have sand, dirt, or other things that throw dust into the air. A recent Broadway show used sand. They were good about wetting it down, but not so good about making sure of the composition of the sand. Testing did show that the silica dust levels were within acceptable levels.

6.6 Introduction to Modern Atmospheric Effects, 5th edition

[See *IntroToModernAtmosphericEffects_6th_Edition_2018-3017r3.pdf*]

From the draft July minutes:

A task group of Karl Ruling, Keith Sklar, and Mike Wood was appointed to write a new chapter about exposure monitoring. The new text should be distributed to the working group by December 1 for discussion at a January meeting.

A revised document had been sent to the working group on 18 December 2018.

Mona Shum made the motion to offer it for public review. The motion was seconded. There was discussion.

Matt Antonucci said that he had heard people referring or using this document as the “gospel” and expressed concern that it might conflict with existing PELs determined by other organizations. He also expressed concern that people may not take the testing seriously since the testing section refers first to the rule-of-thumb use as little as possible and then points to testing.

Ruling pointed out that testing is mentioned in the context of fulfilling contractual obligations; that's a serious context. He also said it was not reasonable to say testing is needed for every fog effect. Ruling pointed out that public review will get the document out in front of the people we want to hear from, and they can echo these concerns, if they have them.

Mona Shum also said that she has been getting some negative feedback from people in British Columbia, particularly with regard to exposure limits for children, who appear often in productions there. A more general discussion about how people address this type of situation ensued, including the fact that children are already limited in the amount of time they are permitted on stages, so this becomes a beneficial stopgap in the absence of actual testing or exposure limits.

Cedric reported how SAG addresses controlling the fog exposure for children, also reporting that the use of smoke and fog effects is more prevalent on digital productions, because the effects are becoming more desirable to help take the sharpness off of the digital image.

The motion to offer the revised *Introduction* for public review was approved unanimously.

7 New business

7.1 Possible new project – smoke sensors

[See [TSP_ProjectRequestSmokeSensors101218.pdf](#)]

The new project request was submitted by Keith Sklar, who described how the request came about. Essentially, trends in today's touring practices can place performers in potentially dangerous situations because current monitoring techniques require a time to monitor—the monitoring is not continuous—and often environment or the fog cues change over the run of show, and no further monitoring is done to detect the new, perhaps unsafe, situation. Therefore, sensors should be used to take faster samples over a larger range of specific work and performance areas. He cited a recent incident wherein a technical production person suffocated due to overexposure to CO2 in a confined production area under the stage.

An email from Mike Wood to Keith Sklar and Karl Ruling about the proposal was read to the group by Ruling. The email gave reasons for why Wood thinks the project may be impractical or impossible to undertake. The email read:

The proposal on compulsory fog meters is interesting, and I don't disagree with the sentiment, but I can't see how we can do this.

1. The proposal suggests that there should be a requirement for these sensors. We cannot require anyone to do anything. That is the job of OSHA. We could tell you how to measure it, and what the limits are, but not require it.
2. It may be moot as whether we can or can't do this as I don't know how we would do it! Sensors to detect smoke already exist and are, presumably, already in place in these venues. Those sensors, as we know, can't distinguish between smoke and fog. If the fog level is too high, just the same as if smoke is around, then the smoke alarm will go off. This system is already in place in every venue. They aren't cumulative sensors, but they would suffer from the same problems.

Perhaps the intent is that some new sensor be developed that just measures glycol fog? I'm sure it's possible, but it doesn't exist right now, and I don't know how we would write a standard around something that doesn't exist. That

sensor would have to be very accurate and capable of distinguishing tiny differences in concentration between what is acceptable, and what isn't. Way more accurate than existing smoke sensors. They would have to eliminate dust, pollen, and other particulates. Otherwise somebody would sweep the floor and all the alarms would trigger.

3. Our standards are TWA over a working day. How does a fixed meter know when a working day starts and ends for any particular employee?

4. As we also know from the work done on glycol fog, positioning of meters is critical. There can be orders of magnitude difference in fog density between one location, and another a few feet away. Consider the extreme case of near the machine itself. In the direct plume the levels will be extremely high, however just outside the plume they may be fine. Any fixed meter will be wrong. It will be affected by whether the HVAC is running or not, where the fog machine is today, whether doors are open or not, whether it's cedar pollen season or not, and will in no way truly represent the fog levels experienced by a person working in the environment. They would either underestimate or over estimate, perhaps by substantial amounts, neither of which are useful. False triggering or false security are equally bad.

5. Leading on from 4, the glycol fog standards are TWA levels that are cumulative per person, not standards for a location. The only way to deal with that would be individual glycol-specific dosimeters on every employee.

Again, not impossible, but they also don't exist today. Another problem I see with it is that we care about the fog in the person's breathing zone. So we need a machine on each performer sampling at about head-height. We don't care about the fog elsewhere. Low-lying glycol fog is often above the 40 mg/m³ ceiling limit, but we don't care unless someone is lying on the stage floor. Haze machines often get set up in out of the way locations. The haze level in the venue is below the limits; I am sure that the level is much higher next to the machine--but nobody is there.

These personal dosimeters would have to be calibrated daily to account for all the environmental factors mentioned above. Local dust levels from field burning, cedar pollen levels, type of glycol being used etc etc. I just don't see a practical way to do this.

6. When it comes to carbon dioxide, there are already regulations in place from OSHA (I think, please correct me if wrong) which cover CO₂ levels, so it would be inappropriate for us to write conflicting requirements.

Keith - Sorry to be so negative, but I don't think this is practical at the moment and would result in a situation where we either got false triggering all the time or, perhaps even worse, made people believe that everything was fine in every location in the venue when it wasn't.

Mike

--

More discussion followed, expressing sympathy for both the concern and the opposing arguments.

Mona Shum suggested that a risk identification procedure might be useful—a procedure that identifies when conditions have changed and a new risk or changed risk is present.

Mark Elliot said that CalOSHA has several ways of monitoring things like this, and there may be resources available for us to research or to compare with.

Karl Ruling moved to disapprove the new project request as written, but rather consider a different project that establishes a risk identification and remediation process to address this issue. He said the problem is fundamentally one of performance slip: the show is okay, but over time it becomes not okay, and without a procedure to identify the change, nothing is done to get the show back to okay again. The motion was seconded, and approved.

Karl Ruling said that he'll work with Keith Sklar to come up with a new proposal. Mona Shum said that she would like to work on it, too.

8 Other business and announcements

8.1 Aura study funded by IATSE Local 891

From the draft July 2018 minutes:

Mona Shum reported that there has been an update to the report, and that more work is being done in British Columbia to study the health effects of fog. The updated version will be one that we can share with others. The study described in the report uses DustTrak aerosol monitors.

Keith Sklar said that he has been working with the Ramboll Group to find an alternative for the pDR 1500AN aerosol meter, which is becoming increasingly hard to obtain. He said that he'd made no progress with Ramboll yet.

Any news or updates?

Mona Shum reported on a new version with more correlation factors for the DustTrak. ESTA can publish this. She will send it to Karl Ruling for publication and distribution among the working group. (See *IA180101 Addendum_Fog Fluid Calibration Factors_3OCT_18_Final2.pdf* and *IA170101 Fog Final Rev 1 April 9 2018.pdf*.)

8.2 A follow-up study

Keith Sklar talked about meeting with Alan Kao of RAMBOL and a possible follow-up study to the *Health Effects Evaluation of Theatrical Smoke, Haze, and Pyrotechnics* study published in 2000. However, it's a busy year for contract negotiations, which cuts the time and resources available to pursue this, but there might be a follow-up study. We've now had almost two decades of working with the guidelines in the 2000 study. Do they work?

8.3 Above & Beyond Awards

Brad Dittmer reminded attendees that information on the Above & Beyond Awards may be found at http://tsp.esta.org/tsp/news/award_recipients.html. The nomination site is open year round, and the award is designed for members to highlight the work of their peers.

9 Schedule for future meetings

The full and current meeting schedule may be found at <http://www.esta.org/ESTA/meetings.php>.

9.1 Spring 2019 meetings (USITT)

Dittmer noted that the Spring 2019 meetings will be held in Louisville, KY, in conjunction with the USITT conference and Stage Expo. The F&SWG is currently scheduled to meet from 09:00 – 11:00 Eastern time, on 23 March 2019, at the Hyatt Regency Louisville.

There was some discussion of a possible agenda. Only the follow-up to item 8.1 would be ready perhaps. The consensus was that the working group should not meet in March. The next meeting would then be in July in Texas.

No meeting in March.

9.2 Summer 2019 meetings (Westlake, TX)

The Summer 2019 meetings will be at the usual location, the D/FW Marriott Solana, in Westlake, Texas, from the 18th to 22nd of July. The full meeting schedule has not yet been confirmed.

10 Adjournment

Mark Elliot moved the meeting adjourn. The motion was seconded. Hearing no objections, Brad Dittmer declared the meeting adjourned at 13:34.

Fog & Smoke Working Group members as 4 February 2019

Delegate	Representing	Voting status	Int. cat.
Matthew Antonucci	Contract Services Administration Trust Fund	P	U
Robert Barbagallo	Solotech Inc.	O	U
Paul Beasley	Walt Disney Company	O	U
Justin Cicerone	Harman International Industries	O	MP
Brad Dittmer	Stage Labor of the Ozarks	P	U
Peter T. Donovan	I.A.T.S.E. Local 1	A	DE
Mark Elliott	Walt Disney Company	P	U
Jerry Gorrell	Theatre Safety Programs	O	G
Erin Grabe	ESTA	exf	G
Robert Haycock	UC Berkeley	O	U
Cedric Jackson	Screen Actors Guild - American Federation of Television & Radio Artists	P	U
Paul Jordan	NBC Universal	P	U
Kent H. Jorgensen	IATSE Local 80	O	G
Nathan Kahn	Look Solutions USA Ltd.	O	MP
Edwin S. Kramer	I.A.T.S.E. Local 1	P	DE
Tyler Mickley	Look Solutions, LLC.	O	CP
Chris Moulton	Contract Services Administration Trust Fund	A	U
Margaret Burke, MPH	20th Century Fox	P	U
Richard J. Nix	ESTA	exf	G
Don Phillips	Ultratec Special Effects Inc.	O	MP
Karl G. Ruling	Unit 12 Productions	I	CP
Karl G. Ruling	ESTA	exf	G
Larry Schoeneman	DesignLab Chicago, Inc.	P	DR
Ford Sellers	Chauvet Lighting	O	MP
Mona Shum	Aura Health and Safety Corporation	I	U

Fog & Smoke Working Group members as 4 February 2019

Delegate	Representing	Voting status	Int. cat.
Keith Sklar	Actors' Equity Association	P	U
Marnie Styles	Ultratec Special Effects Inc.	P	MP
Stephen Vanciel	IATSE Local 631	P	U
Don Ward	I.A.T.S.E. Local 891	P	G
Colin Waters	TMB	O	G
Mike Wood	Mike Wood Consulting LLC	P	G