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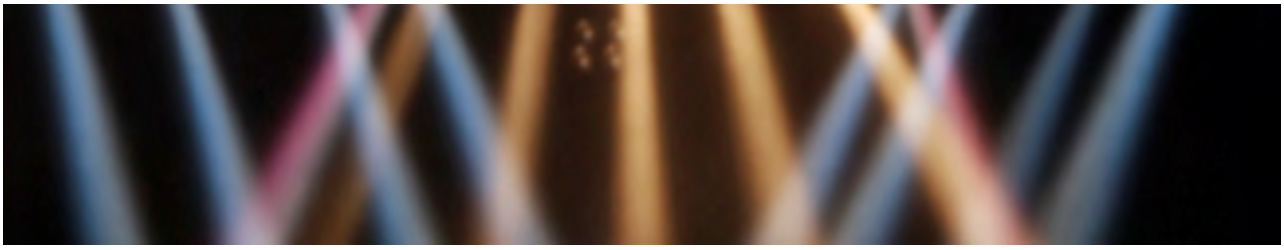
Report on
Calibration Factor and Time-and-Distance Guidelines

ENVIRONMENTAL TESTING OF THEATRICAL FOG EQUIPMENT

MAGMA PRIME FOGGER



RAMBØLL

ENVIRONMENTAL TESTING OF THEATRICAL FOG EQUIPMENT
MAGMA PRIME FOGGER

Revision	**1**
Date	**August 2020**
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1. INTRODUCTION

In 1997-99, at the request of Actors' Equity Association (Actors' Equity) and the League of American Theaters and Producers (LATP) and with the support of the Equity-League Pension and Health Trust Funds, investigators from the Mount Sinai School of Medicine (Mt. Sinai) and ENVIRON International Corporation (now Ramboll) conducted a study to evaluate whether the use of smoke, fog, haze, and pyrotechnics special effects in theatrical musical productions is associated with a negative health impact in actors. This effort was initiated in response to ongoing concerns by actors that the use of these theatrical effects may have an impact on their health. The results of this study were presented in the report *Health Effects Evaluation of Theatrical Smoke, Haze, and Pyrotechnics* (Mt. Sinai and ENVIRON 2000).

The results of the Mt. Sinai/ENVIRON study indicate that there are certain health effects associated with actors exposed to elevated or peak levels of glycol smoke/fog and mineral oil. However, as long as peak exposures are avoided, actors' health, vocal abilities, and careers should not be harmed. Pyrotechnics as used on Broadway at the time of the study did not have an observable effect on actors' health.

Mt. Sinai and ENVIRON recommended the following peak guidance levels with respect to glycols and mineral oil:

- The use of glycols should be such that an actor's exposure does not exceed **40 milligrams per cubic meter (mg/m^3)**.
- Mineral oil should be used in a manner such that an actor's exposure does not exceed a peak concentration of **25 mg/m^3**.
- For chronic exposures to mineral oil, the existing standards established for oil mists (**5 mg/m^3** as an eight-hour time-weighted average) should also be protective for actors in theatrical productions.

Comparable guidance levels were developed for glycerol in a subsequent study (ENVIRON 2001b):

- Glycerol should be used in a manner such that an actor's exposure does not exceed a peak concentration of **50 mg/m^3**.
- For chronic exposures to glycerol, the existing standards established for glycerin mists (**10 mg/m^3** as an eight-hour TWA) should also be protective for actors in theatrical productions.

To ensure that peak smoke, fog, and haze levels are below these guidelines, one option available to productions is to conduct show-specific testing at their theatres using an aerosol monitor. In order to conduct this testing, calibration data must be developed for each equipment/fluid combination. These calibration data are necessary to convert the readings of the aerosol monitor to glycol, mineral oil, or glycerol concentrations. A compilation of calibration factors approved for use in evaluating compliance with the peak guidance levels is provided on the Actors' Equity website (https://www.actorsequity.org/resources/Producers/safe-and-sanitary/smoke-and-haze/).

Ramboll was retained by Elation Professional to develop calibration factors and time-and-distance guidelines for the following equipment-fluid combination:

Machine Combination	Glycol
	Atmosity Extreme Filtered (AEF) Fog Fluid
Magma Prime	X

2. TESTING METHODOLOGY

2.1 Sampling Equipment and Materials

Monitoring of short-term concentrations was performed using portable real-time aerosol monitors (*personal* DataRAM Model PDR-1000) manufactured by Thermo Scientific. The PDR-1000 is a high sensitivity (i.e., photometric) monitor that uses a light scattering sensing chamber to measure the concentration of airborne particulate matter (liquid or solid), providing a direct and continuous readout as well as electronic logging of the data.

The PDR-1000 aerosol monitors as obtained are calibrated to Arizona road dust over a measurement range of 0.001 to 400 mg/m^3. In order to be utilized to measure short-term glycol concentrations, the monitors were first calibrated for the smoke and fluids being used. Calibration of the aerosol monitors was conducted by collecting simultaneous measurements with a series of sampling pumps and PDR-1000 aerosol monitors, mounted on tripods.

For developing the calibration factors, Gillian GilAir3 sampling pumps were used to draw air through collection media. The calibration sampling was conducted in conjunction with operating the PDR-1000 aerosol monitor.

OSHA Versatile Sampler (OVS) traps were used as the collection media, each containing two sections of XAD-7 resin (200-mg front section, 100-mg back section, separated by a polyurethane foam [PUF] plug). The XAD-7 resin was used to collect both the particulate and vapor phase of the glycol aerosol. A 13-mm glass fiber filter (GFF) plug precedes the front section and a PUF plug follows the back section. This sampling is based on a variation of NIOSH Method 5523 (NIOSH 1996; Pendergrass 1999). Bulk fluid samples are also collected and submitted for laboratory analysis to determine which species of glycols are present.

The testing was performed at J&M Special Effects in Brooklyn, NY.

2.2 Aerosol Monitor Calibration Procedure

A series of tripod assemblies was used for calibrating the aerosol monitors, each consisting of a sampling pump, flexible tubing, sampling media, and an aerosol monitor. The height of the tripods was set to approximately five feet, corresponding with the breathing zone of a typical actor. For the ground level fog machine, sampling assemblies were placed near the ground.

a. The sampling pumps were calibrated to 2 liters per minute (LPM) using a BIOS DryCal DC-Lite calibrator. The aerosol monitors were zeroed, the data logging function of the aerosol monitors was turned on, and the data logging time for the aerosol monitors were synchronized.

b. The fog machine was positioned on a table to allow a release of fog at a height of four feet. For ground level fog, the machine was kept on the floor. The tripods were placed at various distances from the fog machine release nozzle to achieve a range of exposure concentrations.

c. The sampling pumps were turned on, followed by the fog machines, allowing sustained fog generation to occur. After a period of approximately one to ten minutes, the machines and pumps were simultaneously turned off.

d. The sampling media were capped and labeled to identify the type of device and fluid, sampling date, and other sampling specifics. After being capped and labeled, OVS traps were placed in a freezer.

e. Various fans and ceiling vents were used between runs to clear residual aerosols from the testing area air by room ventilation.

f. The collection media and bulk fluid samples, along with appropriate field blanks, were submitted for analysis to Analytics Laboratory of Richmond, Virginia, an American Industrial Hygiene Association (AIHA) accredited laboratory.

Figure 1. Configuration for calibration factor procedure, consisting of the tripod assemblies with sampling pumps, OVS tubes, and aerosol monitors.

2.3 Laboratory Analysis

All sample analyses were conducted by using validated analytical methodologies, as described in the ENVIRON Air Sampling Protocol (ENVIRON 2001a).

Samples were analyzed for glycols using a variation of NIOSH Method 5523, which involves the use of a gas chromatograph with a flame ionization detector (GC/FID). The NIOSH Method 5523 was extended to a validated level of quantification (LOQ) of 5.0 to 15.0 μg of each individual glycol per sample.

2.4 Time-and-Distance Monitoring Procedure

To measure the levels of glycol present at different distances from the release point, a series of five tripods equipped with aerosol monitors positioned at breathing height (approximately 5 feet above ground) were used. Each fog machine was turned on for durations 300 seconds, allowing sustained fog generation to occur, and then turned off. The aerosol monitors collected logged data on the fog levels as the concentrations gradually dissipated.

Figure 2: Time-and-distance testing setup

3. RESULTS AND DISCUSSION

3.1 Aerosol Monitor Calibration

Total glycol concentrations were calculated from the analytical data. To develop a calibration curve, the average aerosol monitor readings during the period of time in which air was drawn through the sampling media for each air sample were calculated and plotted against the total glycol concentration data.

The calibration curves for the equipment-fluid combination tested is shown in Figure 3. A first order regression curve is also shown on this figure. The calibration factor, calculated from the slope of the regression, is summarized in Appendix B.

3.2 Use of Calibration Factors

The real-time aerosol monitor readings can be converted to glycol concentrations using the appropriate calibration factor for the fluid, as follows:

$$CONC = C \times PDR$$

where:

CONC = air concentration of total glycols, mg/m^3

C = aerosol monitor calibration factor (mg/m^3)/ (mg/m^3 aerosol)

PDR = aerosol monitor reading, mg/m^3 aerosol

For example, an uncalibrated reading of 100 mg/m^3 on the aerosol monitor would correspond to a glycol concentration of 43 mg/m^3 for the Elation Magma Prime with AEF Fog Fluid combination. These calculated concentrations can then be compared with the peak guidance levels. The peak guidance level for glycols of 40 mg/m^3 would correspond to an uncalibrated aerosol monitor reading of 93.54 mg/m^3 for the Elation Magma Prime with AEF Fluid combination.

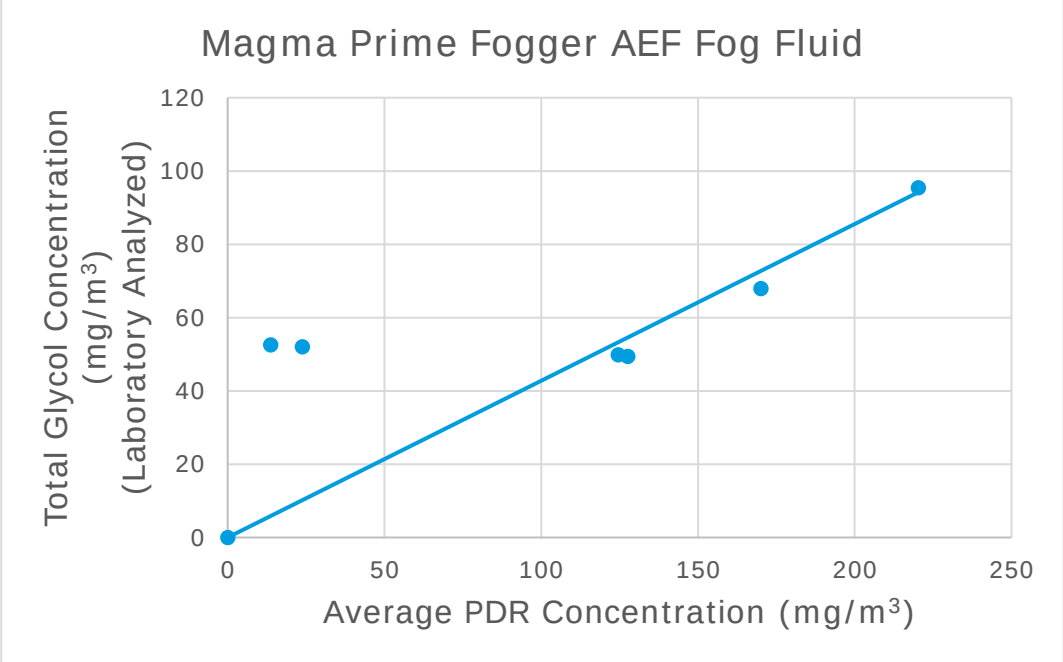

Figure 3: Calibration curve for Elation Magma Prime with AEF Fog Fluid. Calibration factor, based on slope of curve, is 0.43 (mg/m^3 glycol)/ (mg/m^3 aerosol).

3.3 Time-and-Distance Guidelines

For various distances from the cue release point, Appendix B provides the average time (in seconds) after the end of the cue release after which the glycol concentrations will have fallen below the guidance levels. Thus, in order to prevent peak exposures to actors, the blocking and choreography should be arranged such that actors are not situated within a particular distance from the front of the fog release point until the amount of time listed in Appendix B has elapsed following the end of the cue. For example, if a production is using the Magma Prime with AEF Fluid combination at 100% fan and 100% fog with a 300-second cue duration, an actor's breathing zone should not be situated within 5 feet of the machine until the end of the cue release.

It should be reiterated that the Time-and-Distance Guidelines provided in Appendix B is intended to allow a production to use the tested equipment and fluid combinations without conducting monitoring. However, these Guidelines may not be appropriate for all productions. Tables in Appendix B are based on the fog machine being positioned approximately five feet above the ground and being operated to achieve 300 seconds of continuous fog generation.

Productions may want to use different configurations for positioning the machine (e.g., different heights), provide on-stage ventilation, or generate fog for a shorter or longer period of time. In addition, many productions may have other stage-specific conditions (e.g., on-stage activities and props that enhance dispersion) that would allow actors to be present in areas that are restricted under these Guidelines but which, in fact, do not exceed the guidance levels. In those cases, production-specific monitoring would be recommended to determine whether peak exposure may occur.

4. REFERENCES

ENVIRON International Corporation (ENVIRON). 2001a. Evaluation of short-term exposures to theatrical smoke and haze: Air sampling protocol. Prepared for Equity-League Pension and Health Trust Funds. May 14.

ENVIRON International Corporation (ENVIRON). 2001b. Theatrical Haze and Fog Testing for Mamma Mia!, Winter Garden Theatre. Prepared for Mamma Mia! Broadway and Nina Lannan Associates. November 12.

Mount Sinai School of Medicine and ENVIRON International Corporation (Mt. Sinai and ENVIRON). 2000. Health effects evaluation of theatrical smoke, haze, and pyrotechnics. Prepared for Equity-League Pension and Health Trust Funds. June 6.

National Institute for Occupational Safety and Health (NIOSH). 1996. Method 5523: Glycols, Issue 1. NIOSH Manual of Analytical Methods (NMAM). Fourth Edition. May 15.

Pendergrass, S.M. 1999. Determination of glycols in air: Development of sampling and analytical methodology and application to theatrical smokes. AIHA Journal, 60:452-457.

APPENDIX A
SAFETY DATA SHEET

TITLE 1 - IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND COMPANY

1.1. Identification of the preparation

Product form :	Mixture
Product Name :	ATMOSITY EXTREME FILTERED FOG FLUID - AEF - 2L ATMOSITY EXTREME FILTERED FOG FLUID - AEF - 4L ATMOSITY EXTREME FILTERED FOG FLUID - AEF - 20L

1.2. Relevant identified uses of the substance or mixture and uses

1.2.1. Relevant identified uses

Use of the substance / mixture:	Liquid formulation used to produce an artificial smoke used in the entertainment events, shows, clubs, theaters, training occupational safety drills. Professional use and general public use
1.2.2. Uses deprecated	No additional information available

1.3. Idendification of the company

ELATION LIGHTING , INC

6122 S.EASTERN AVEC
LOS ANGELES - CA 90040 - USA
Email : support@elationlighting.com
www.elationlighting.com
Tel. (866) 245-6726

1.4. Emergency Telephone Number

Country	Company	Emergency Number
France	ORFILA	+33 1 45 42 59 59

See page 8 / List of Emergency Numbers

TITLE 2 - HAZARDS IDENDIFICATION

2.2. Classification of the substance or mixur

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Unclassified

Physicochemical harmful effects , for human health and the environment

To our knowledge, this product does not present any particular risk, subject to compliance with the general rules of industrial hygiene

2.2. Label Elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Precautionary statements (CLP) :	P101 - If medical advice is needed, keep at disposal the container or label P102 - Keep out of reach of children P271 - Use only outdoors or in a well ventilated area P270 - Do not eat, drink or smoke when using this product P234 - Keep only in the original container

2.3. Other Hazards

No additional information available

TITLE 3 - COMPOSITION / INFORMATION ON INGREDIENTS

3.1. Substance

Not applicable

3.2. Mixture

Product	Product Identifier	%	Classification according to Regulation EC No 1272/2008 (CLP)
TRIETHYLENE GLYCOL	(CAS Number) 112-27-6 (CE Number) 203-953-2 (N° REACH) 01-2119438366-35	14 - 30	Unclassified
MONOPROPYLENE GLYCOL	(CAS Number) 57-55-6 (CE Number) 200-338-0 (N° REACH) 01-2119456809-23	4-10	Unclassified

Full text of H-phrases: see section 16

TITLE 4 - FIRST AID

4.1. First aid indications

First aid after inhalation : Remove the person to fresh air and keep her in a position comfortable for breathing.
First aid for skin contact: Wash skin with plenty of water.
First aid after eye contact : Flush eyes with water as a precaution.
First aid after ingestion: Call a poison control center or physician if you feel unwell.

4.2. Main symptoms and effects, acute and delayed

No additional information available

4.3. Indication of immediate medical attention and special treatment needed

Symptomatic treatment.

TITLE 5 - MEASURES AGAINST FIRE

5.1. Extinguishing Media

Appropriated Extinguishing Media: Water spray. Dry powder. Foam. Carbon dioxide.
Unsuitable extinguishing agents: Direct jet water.

5.2. Special hazards arising from the substance or mixture

Hazardous decomposition products in case of fire : Possible release of toxic fumes

5.3. Advice for firefighters

Protection in case of fire: Do not work without suited protective equipment.
Respiratory protection , Self-contained.
Complete protection of the body

TITLE 6 - MEASURES ACCIDENTALRELEASE

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non first-aiders

Emergency Procedures:	Ventilate spill area

6.1.2. For rescuers

Protection Equipment:	Do not work without suited protective equipment. For more information, refer to Section 8: "Control of individual exposure-protection ".

6.2. Precautions for environmental protection

Avoid release into the environment.

6.3. Methods and materials for containment and cleaning

Cleaning processes:	Absorb the spilled liquid in absorbent material.
Other informations :	Remove materials or solid residues in an authorized center

6.4. Reference to other sections

For more information, see Section 13.

TITLE 7 - HANDLING AND STORAGE

7.1. Precautions for safe handling

Precautions for handling	Ensure good ventilation at the workplace
without danger :	Wear personal protective equipment.
Hygiene measures:	Do not eat, drink or smoke when using this product Wash hands after handling.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions :	Store at temperatures above 0 ° C and below 50 ° C. Keep only in the original container. Store in a well ventilated area. Store away from light.
Storage temperature :	0 - 50 °C

7.3. Particular end use

No additional information available

TITLE 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control Parameters No additional information available

8.2. Exposure controls

Appropriate engineering controls:	Ensure good ventilation at the workplace.
Hand protection :	Protective gloves
Eye protection:	Safety glasses
Skin and body protections:	Wear suitable protective clothing
Respiratory Protection :	In case of insufficient ventilation, wear suitable respiratory equipment
Control of environmental exposure:	Avoid release into the environment.

TITLE 9 - PHYSICAL AND CHEMICAL PROPERTIES

9.1. Basic physical and chemical properties Information

Physical state:	Liquid
Colour :	Colorless
Odour :	no smell
Odour threshold:	No data available
pH :	7 - 8
Relative evaporation rate (butylacetate = 1):	No data available
Fusion point:	Not applicable
Freezing point :	No data available
Boiling point :	100 - 290 °C
Flash point :	> 175 °C
Auto ignition temperature :	370 °C
Decomposition Temperature :	No data available
Flammability (solid, gas):	Not applicable
Vapor Pressure:	No data available
Relative vapor density at 20 ° C:	No data available
Relative density:	No data available
Density :	1018 kg /m3 at 20°C.
Solubility :	Soluble in water.
	Partially soluble in organic solvents by the presence of glycolic derivative
Log Pow :	No data available
Kinematic viscosity:	No data available
Dynamic viscosity:	No data available
Explosive properties:	No data available
Oxidising properties:	No data available
Explosion limits:	No data available

9.2. Other informations

No additional information available

TITLE 10 - STABILITY AND REACTIVITY

10.1. Reactivity

The product is not reactive under normal conditions of use, storage and transport.

10.2. Chemical stability

Stable under normal conditions

10.3. Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use.

Reacts violently with oxidants.

Reactions with strong acids.

10.4. Conditions to avoid

None under conditions of storage and handling recommendations (see section 7).

10.5. Incompatible materials

Strong acids. oxidizing agent.

10.6. Hazardous decomposition products

Hazardous decomposition products should not be generated under normal conditions of storage and use.

Thermal decomposition generates: Carbon monoxide. Carbon dioxide.

TITLE 11 - TOXICOLOGICAL INFORMATIONS

11.1. Information on toxicological effects

Acute toxicty: Unclassified

MONOPROPYLENE GLYCOL (57-55-6)

LD50 oral rat > 2000 mg / kg

TRIETHYLENE GLYCOL (112-27-6)

LD50 oral rat > 15 000 mg / kg
LD50 rat dermal > 22 000 mg / kg

Skin corrosion / irritation: Not classified
pH: 7 - 8
Serious eye damage / eye irritation: Not classified
pH: 7 - 8
respiratory or skin sensitization : Not classified
Germ cell mutagenicity : Not classified
carcinogenicity : Not classified
Reproductive toxicity: Not classified
Specific toxicity for target organs (single exposure): Not classified
Specific toxicity for target organs (repeated exposure): Not classified
Aspiration hazard: Not classified

TITLE 12 - ECOLOGICAL INFORMATIONS

12.1. Toxicity

Ecology - general: This product is not considered toxic to aquatic organisms and does not cause long-term adverse effects in the environment.

MONOPROPYLENE GLYCOL (57-55-6)	
LC50 fish 1	> 500 mg/l 96h

TRIETHYLENE GLYCOL (112-27-6)	
LC50 fish 1	10000 mg/l Leuciscus idus(Ide); 48h
LC50 fish 2	5000 mg/l 24h
ErC50 (algae)	10000 mg/l Daphnie; 24h
NOEC (acute)	320 mg/l Pseudomonas putida; 16h

12.2. Persistence

MONOPROPYLENE GLYCOL (57-55-6)	
Persistence and degradability:	readily biodegradable
Degradation :	> 70% Exposure time 28 days
TRIETHYLENE GLYCOL (112-27-6)	
Persistence and degradability:	Not readily biodegradable

12.3. Potential for bioaccumulation

TRIETHYLENE GLYCOL (112-27-6)	
Potential for bioaccumulation:	High

12.4. Mobility in soil

No additional information available

12.5. Results of PBT and vPvB

No additional information available

12.6. Other adverse effects

Additional information: Avoid release into the environment

TITLE 13 - CONSIDERATIONS DISPOSAL

13.1. Waste treatment methods

Waste treatment methods: Dispose of contents / container in accordance with the sorting instructions from approved collector.

TITLE 14 - TRANSPORT INFORMATIONS

In accordance with the requirements of ADR / RID / IMDG / IATA / AND

14.1. ONU number

N° ONU (ADR) : Not applicable
N° ONU (IMDG) : Not applicable
N° ONU (IATA) : Not applicable
N° ONU (ADN) : Not applicable
N° ONU (RID) : Not applicable

14.2. Official shipping transport name ONU

Proper Shipping Name (ADR) : Not applicable
Proper Shipping Name (IMDG) : Not applicable
Proper Shipping Name (IATA) : Not applicable
Proper Shipping Name (ADN) : Not applicable
Proper Shipping Name (RID) : Not applicable

14.3. Hazard class for transport

ADR / Hazard class for transport (ADR) :	Not applicable
IMDG / Hazard class for transport (IMDG) :	Not applicable
IATA /Hazard class for transport (IATA) :	Not applicable
AND / Hazard class for transport (ADN) :	Not applicable
RID / Hazard class for transport (RID) :	Not applicable

14.4. Packing Group

Packing Group (ADR) :	Not applicable
Packing Group (IMDG) :	Not applicable
Packing Group (IATA) :	Not applicable
Packing Group (ADN) :	Not applicable
Packing Group (RID) :	Not applicable

14.5. Environmental hazards

Dangerous for the environment:	No
Marine pollutant:	No
Other informations :	No additional information available

14.6. Special precautions for user

- Overland transport	No data available
- Maritime transport	No data available
- Air transport	No data available
- Waterway transport	No data available
- Rail transport	No data available

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

TITLE 15 - REGULATORY INFORMATION

15.1. Regulations / legislation for the substance or mixture Safety, health and environment

15.1.1. EU regulations

Contains no substance subject to restrictions according to Annex XVII of REACH
Contains no substances of the candidate list of REACH
Does not contain substances listed in Annex XIV of REACH

15.1.2. national regulations

No additional information available

15.2. Evaluation of chemical safety

No chemical safety assessment has been carried out

TITLE 16 - OTHER INFORMATIONS

Other informations : None.

EMERGENCY NUMBERS

Australia	Poison control Center	+61 02 9515 1267
Austria	Poison Control Centre - Emergency helpline:	+43 1 406 43 43
Belgium	Centre Antipoisons / bruxelles	070 245 245
Bulgaria	National Toxicology Center,	+359 2 9154 233
Canada	Centre Toxicologie Quebec	+1 418 650 6115
California – Usa	Poison control system	+1 415-502-6000
Croatia	Poison Control Centre	+385 1 23-48-342.
Czech Republic	Toxikologické informační středisko	+420 224 919 293
Denmark	Bispibjerg Hospital - Giftlinjen ring	82 12 12 12
Estonia	Poisoning Information Centre	16 662
Finland	Poison Information Centre	09 471977
France	Orfila	+33 1 45 42 59 59
Germany	Giftnotruf Berlin, Emergency telephone:	+49 30 19240
Greece	Poison Information Centre	+30 2107793777
India	National Poison Center Information	+91 011 26589391
Hungary	Health Information - Toxicological Service	+36 80 20 11 99
Iceland	Landspitali - Poison Centre	543 2222
Ireland	Poisons information center of ireland	01 809 2166
Italy	Centro anti veleni	+39 02
Latvia	Valsts Toksikoloģijas centrs	+ 371 67042473 or 112
Lithuania	Nuodų Centras	+370 687 533 78
Luxembourg	Belgian Poison Center	+352 8002-5500.
Maroc	Centre Anti Poison	+212 80 1000180
Netherlands	Nationaal vergiftigingen informatie centrum	030 274 88 88
Norway	Giftinformasjonen	22 59 13 00
Portugal	CIAV	808 250 143
Romania	Centru de Control Otravă	+402 212 106 282
Singapore	Poison Information Center	+ 65 6423 9119
Slovakia	Narodné Toxikologické Informacné Centrum	+421 (0) 2 5477 4166
South Africa	Poison Control Center / Johanesburg	+ 27 11 642 2417
Spain	Urgencias toxicológicas	+34 91 562 04 20
Sweden	Giftinformationscentralen (Sverige)	08 33 12 31
Switzerland	Tox Info Suisse	+41 044 251 66 66
Tunisia	Centre Anti Poison	+ 216 71 335 500
Turkye	Poison Control Center Istanbul	114
United Kingdom	UK National Poisons Emergency number	+44 870 600 6266

The contents and format of this SDS are in accordance with Regulation (EC) No 1907/2006

OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

The information contained in this safety data sheet is based on the state of our knowledge on the indicated date. The information given in this sheet should be considered as a description of the product safety requirements, they should not be considered as a warranty or quality specification and have no contractual value on the properties of the product. The information contained in this safety data sheet relates to the specifically designated product, and cannot be valid for a product associated with another product. The conditions or methods of handling, soring, using or eliminating the product are beyond our control and cannot be under our responsibility.

APPENDIX B
CALIBRATION FACTORS AND TIME-AND-DISTANCE GUIDELINES

Summary of Calibration Factors				
Manufacturer	**Machine**	**Fluid**	**Fluid Type**	**Calibration Factor**
Elation	Magma Prime	AEF Fog Fluid	Glycol only	**0.43**

Time-and-Distance Guidelines Elation Magma Prime with AEF Fog Fluid							
Release Duration	**Fan Setting (%)**	**Fog Setting (%)**	**Time (in sec) After Which Air Concentrations Are Below Guidance Level (40mg/m³)**				
			Distance from Machine				
(secs)			**5 ft**	**10 ft**	**15 ft**	**20 ft**	**25 ft**
300	100	100	0	0	0	0	0
300	100	75	0	0	0	0	0
300	75	100	0	0	0	0	0

APPENDIX C
SUMMARY SHEET

RAMBOLL

ENVIRONMENT
& HEALTH

Calibration Factor and Time-and-Distance Guidelines

Magma Prime with Atmosity Extreme Filtered (AEF) Fog Fluid

Prepared for Elation by Ramboll

Ramboll developed calibration factors and Time-and-Distance guidelines for Atmosity Extreme Filtered (AEF) Fog Fluid in an Elation Magma Prime fog machine.

AEF Fog Fluid is a glycol-based fluid. Calibration factors were developed to allow a Thermo Scientific PDR-1000 aerosol monitor to be used to measure concentrations glycols in the air after being released from the Magma Prime.

The measured concentrations should be compared against the peak exposure guidance level for glycols, which is 40 mg/m^3.

The calibration curve for glycols is shown below:

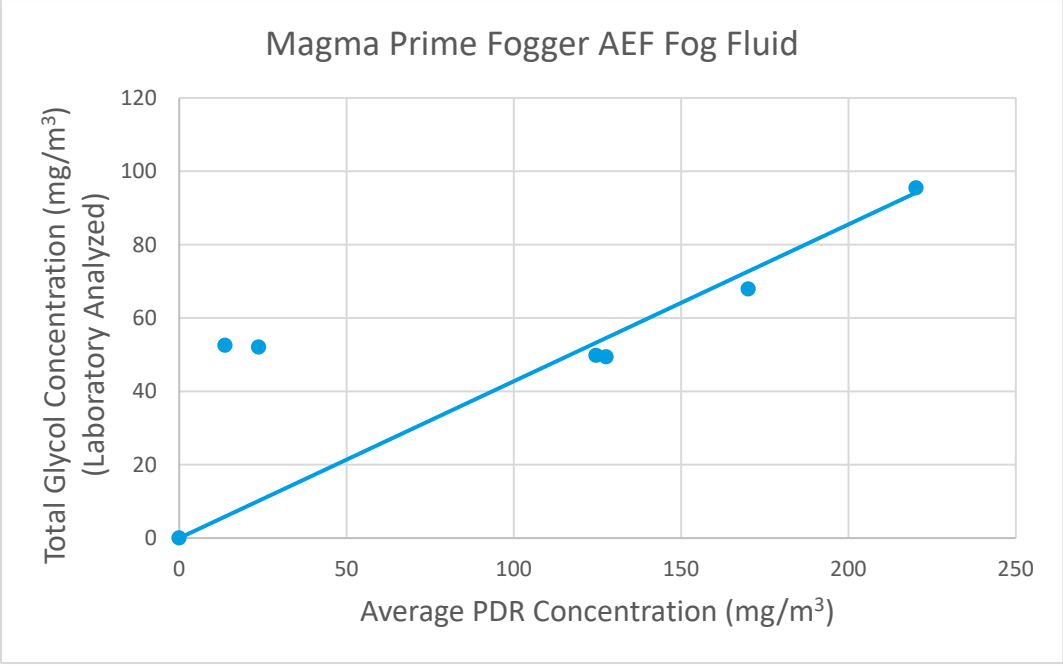

Figure 1. Calibration curve for Elation's Magma Prime fog machine with AEF Fog Fluid, based on glycol laboratory data. Calibration factor, based on slope of curve, is 0.43 (mg/m^3 glycol) / (mg/m^3 aerosol).

Summary of Calibration Factors				
Manufacturer	**Machine**	**Fluid**	**Fluid Type**	**Calibration Factor**
Elation	Magma Prime	AEF Fog Fluid	Glycol only	**0.43**

Time and Distance Guidelines. The T&D guidelines are provided for various distances from the cue release point rather than height above the release point. The following table provides the average time (in seconds) after the end of the cue release after which the glycol concentrations will have fallen below the guidance levels at these distances. Thus, in order to prevent peak exposures to actors, the blocking and choreography should be arranged such that actors' breathing zones are not situated within a particular distance from the cue point until the amount of time listed in this table has elapsed following the end of the cue. For example, if a production is using the Magma Prime with AEF Fluid combination at 100% fan and 100% fog with a 300-second cue duration, an actor's breathing zone should not be situated within 5 feet of the machine until the end of the cue release.

Time-and-Distance Guidelines Elation Magma Prime with AEF Fog Fluid							
Release Duration	**Fan Setting (%)**	**Fog Setting (%)**	**Time (in sec) After Which Air Concentrations Are Below Guidance Level (40mg/m³)**				
			Distance from Machine				
(secs)			**5 ft**	**10 ft**	**15 ft**	**20 ft**	**25 ft**
300	100	100	0	0	0	0	0
300	100	75	0	0	0	0	0
300	75	100	0	0	0	0	0

It should be reiterated that the Time-and-Distance Guidelines provided above are intended to allow a production to use the tested equipment and fluid combinations without conducting monitoring. However, these Guidelines may not be appropriate for all productions. Productions may want to use different configurations for positioning the machine (e.g., different distances or heights), provide on-stage ventilation, or generate fog for a shorter or longer period of time. In addition, many productions may have other stage-specific conditions (e.g., on-stage activities and props that enhance dispersion) that would allow actors to be present in areas that are restricted under these Guidelines but which, in fact, do not exceed the guidance levels. In those cases, production-specific monitoring would be recommended to evaluate whether peak exposure may occur.