Prepared for
Ultratec Special Effects

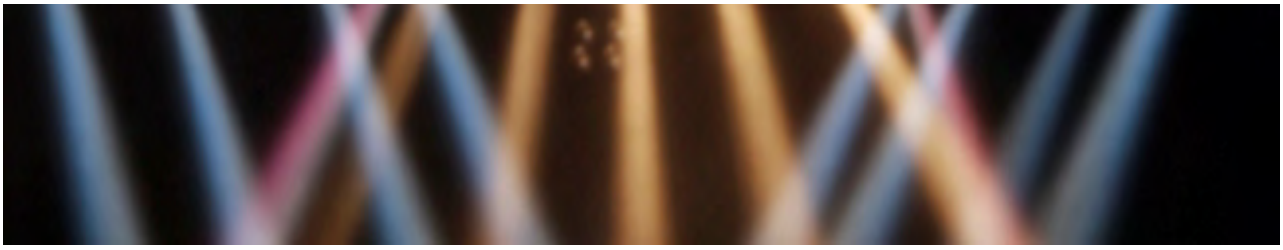
Document type
Final

Date
October 2020

Report on
Calibration Factor and Time-and-Distance Guidelines

ENVIRONMENTAL TESTING OF THEATRICAL FOG EQUIPMENT

HANDY FOGGER



RAMBØLL

ENVIRONMENTAL TESTING OF THEATRICAL FOG EQUIPMENT
HANDY FOGGER

Revision	**2**
Date	**October 25, 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 Ultratec Special Effects to develop calibration factors and time-and-distance guidelines for the following equipment-fluid combinations:

Machine Combination	Glycol	Glycol	Glycol
	Pro Beam	Director's Choice	Quick Dissipating
Handy Fogger	X	X	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 a 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 approximately four feet. 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 hand pumping of the fog machine every 3-5 seconds, allowing sustained fog generation to occur. After a period of approximately two 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 3 feet above ground) were used. Each fog machine was turned on for durations ranging from 15 to 60 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. For low fog machines, tripods were also placed at various heights off of the floor at a set distance from the smoke machine

to represent breathing heights of actors in various positions (e.g. lying down, sitting, kneeling, and standing).

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 four equipment-fluid combinations tested are shown in Figures 3 through 5. First order regression curves are also shown on these figures. The calibration factors, calculated from the slope of the regression, are 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 49 mg/m^3 for the Ultratec Handy Fogger with Director's Choice 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 19.6 mg/m^3 for the Ultratec Handy Fogger with Director's Choice Fluid combination.

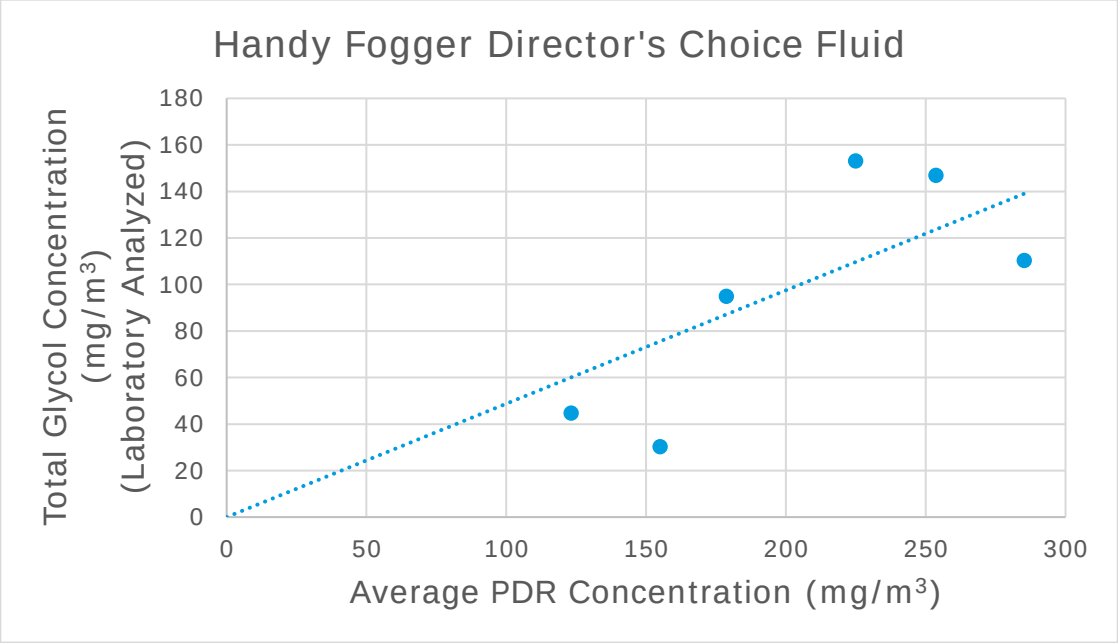


Figure 4: Calibration curve for Ultratec's Handy Fogger with Director's Choice Fog Fluid. Calibration factor, based on slope of curve, is 0.49 (mg/m^3 glycol)/ (mg/m^3 aerosol).

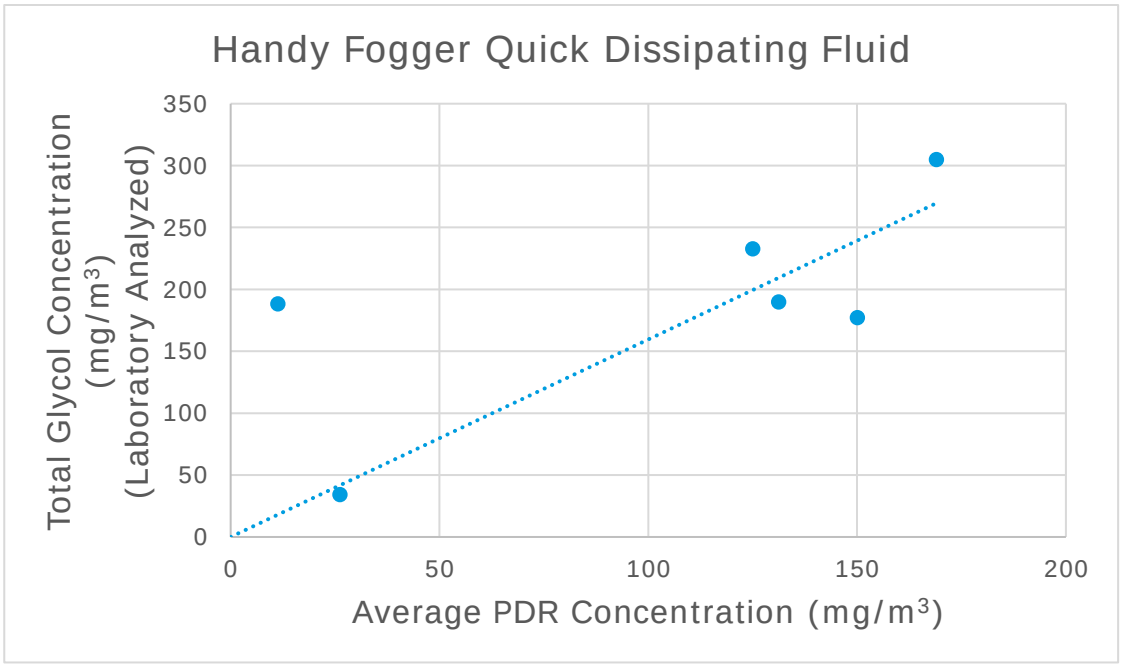


Figure 5: Calibration curve for Ultratec's Handy Fogger with Quick Dissipating Fog Fluid. Calibration factor, based on slope of curve, is 1.60 (mg/m^3 glycol)/ (mg/m^3 aerosol).

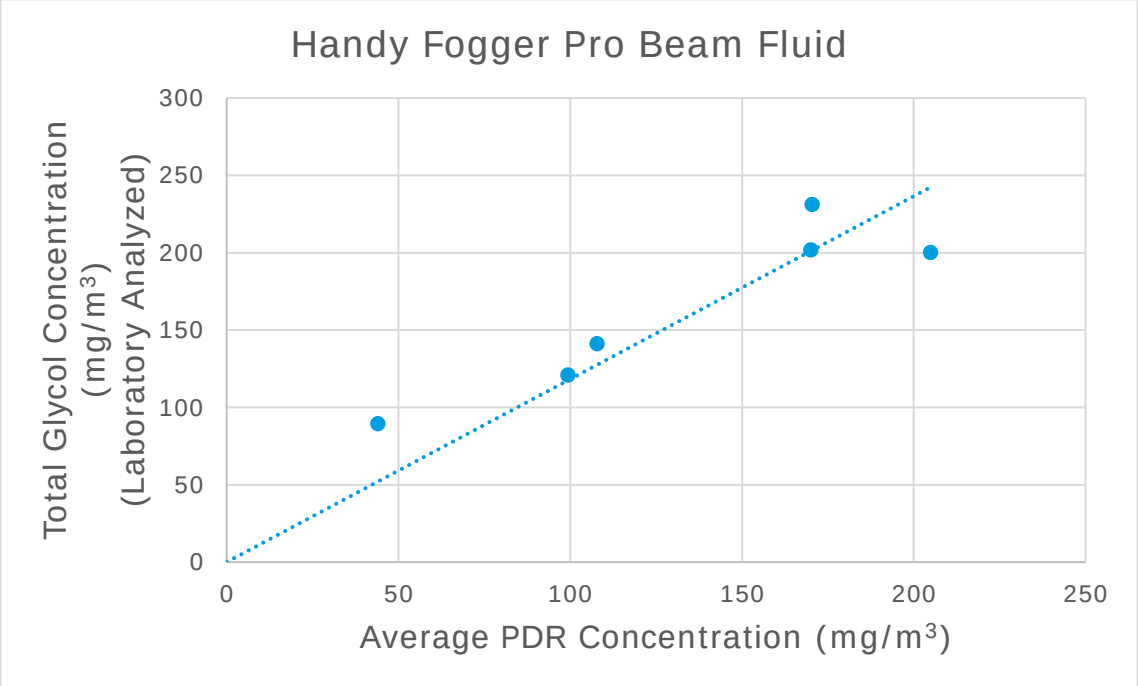


Figure 3: Calibration curve for Ultratec's Handy Fogger with Pro Beam Fog Fluid. Calibration factor, based on slope of curve, is 1.18 (mg/m^3 glycol)/ (mg/m^3 aerosol).

3.3 Time-and-Distance Guidelines

For various distances from the cue release point, Appendix C 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 C has elapsed following the end of the cue. For example, if a production is using the Handy Fogger/Pro Beam Fog Fluid combination with 60-second cue duration and 20 hand pumps, an actor's breathing zone should not be situated within 10 feet of the fog machine until at least 50 seconds following the end of the cue release, and should not be within 20 feet of the fog machine for at least 10 seconds following the end of the cue release.

It should be reiterated that the Time-and-Distance Guidelines provided in Appendix C 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 C are based on the fog machine being positioned approximately five feet above the ground and being operated to achieve 15 to 60 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 SHEETS

SAFETY DATA SHEET

1. Product and Company Identification

Product identifier	**Director's Choice Fog Fluid**
Other means of identification	Not available
Recommended use	Theatrical Fog
Recommended restrictions	None known.
Manufacturer information	Ultratec Special Effects 1960 Blue Heron Drive London, ON N6H 5L9 CA Phone: 1 -519-659-7972 Toll Free Phone: 1-800-388-0617 Emergency Number: ChemTel: 1-800-255-3924
Supplier	See above.

2. Hazards Identification

Physical hazards	Not classified.
Health hazards	Not classified.
Environmental hazards	Not classified.
WHMIS 2015 defined hazards	Not classified
Label elements	
Hazard symbol	None.
Signal word	None.
Hazard statement	The mixture does not meet the criteria for classification.
Precautionary statement	
Prevention	Observe good industrial hygiene practices.
Response	Wash hands after handling.
Storage	Store away from incompatible materials.
Disposal	Dispose of waste and residues in accordance with local authority requirements.
WHMIS 2015: Health Hazard(s) not otherwise classified (HHNOC)	None known
WHMIS 2015: Physical Hazard(s) not otherwise classified (PHNOC)	None known
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	Not applicable.

3. Composition/Information on Ingredients

Mixture

Chemical name	Common name and synonyms	CAS number	%
Dipropylene glycol		25265-71-8	60-80*

Composition comments

US GHS: The exact percentage (concentration) of composition has been withheld as a trade secret in accordance with paragraph (i) of §1910.1200.
*CANADA GHS: The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First Aid Measures

Inhalation	If symptoms develop move victim to fresh air. If symptoms persist, obtain medical attention.
Skin contact	Flush with cool water. Wash with soap and water. Obtain medical attention if irritation develops or persists.
Eye contact	Immediately flush with cool water. Remove contact lenses, if applicable, and continue flushing for 15 minutes. Obtain medical attention if irritation develops or persists.

Ingestion	Do not induce vomiting. Rinse mouth with water, then drink one or two glasses of water. Obtain medical attention. Never give anything by mouth if victim is unconscious or is convulsing.
Most important symptoms/effects, acute and delayed	Direct contact with eyes may cause temporary irritation.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Avoid contact with eyes and skin. Wear rubber gloves and safety glasses with side shields. Keep out of reach of children.

5. Fire Fighting Measures

Suitable extinguishing media	Alcohol foam. Carbon dioxide. Water Fog. Dry chemical.
Unsuitable extinguishing media	Not available.
Specific hazards arising from the chemical	Firefighters should wear a self-contained breathing apparatus.
Special protective equipment and precautions for firefighters	Firefighters should wear full protective clothing including self-contained breathing apparatus.
Fire-fighting equipment/instructions	Cool containers with flooding quantities of water until well after fire is out.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.
Hazardous combustion products	May include and are not limited to: Oxides of carbon.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep out of low areas. Keep people away from and upwind of spill/leak. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Large Spills: Stop leak if you can do so without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Use water spray to reduce vapors or divert vapor cloud drift. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and Storage

Precautions for safe handling	Avoid prolonged exposure. Use good industrial hygiene practices in handling this material. When using do not eat or drink. Wash hands before breaks and immediately after handling the product.
Conditions for safe storage, including any incompatibilities	Store away from incompatible materials (see Section 10 of the SDS). Keep out of reach of children.

8. Exposure Controls/Personal Protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Biological limit values	No biological exposure limits noted for the ingredient(s).
Exposure guidelines	There are no established ACGIH or OSHA PEL exposure limits for the hazardous chemicals listed in section 3 of the SDS.
Appropriate engineering controls	General ventilation normally adequate.
Individual protection measures, such as personal protective equipment	
Eye/face protection	Safety glasses recommended.
Skin protection	
Hand protection	If there is constant skin contact, rubber gloves are recommended.
Other	As required by employer code.

Respiratory protection	Not normally required if good ventilation is maintained. Where exposure guideline levels may be exceeded, use an approved NIOSH respirator.
Thermal hazards	Not available.
General hygiene considerations	Wash hands before breaks and immediately after handling the product. Handle in accordance with good industrial hygiene and safety practice. When using do not eat or drink.

9. Physical and Chemical Properties

Appearance	Clear
Physical state	Liquid.
Form	Liquid
Color	Colorless
Odor	no odour
Odor threshold	Not available.
pH	6 - 6.5
Melting point/freezing point	Not available.
Initial boiling point and boiling range	> 451.4 °F (> 233 °C)
Pour point	Not available.
Specific gravity	Not available.
Partition coefficient (n-octanol/water)	Not available.
Flash point	249.8 °F (121.0 °C) Pensky-Martens Closed Cup
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	> 2.2
Flammability limit - upper (%)	< 12.6
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	< 0.1 mmHg @ 20°C (68°F)
Vapor density	4.63 (Air = 1)
Relative density	1.03 @ 20°C (68°F) (H2O = 1)
Solubility(ies)	Completely miscible
Auto-ignition temperature	590 °F (310 °C)
Decomposition temperature	Not available.
Viscosity	1.07 poise @ 20°C (68°F)

10. Stability and Reactivity

Reactivity	May react with incompatible materials.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Chemical stability	Stable.
Conditions to avoid	Avoid temperatures exceeding the flash point. Do not mix with other chemicals.
Incompatible materials	Acids. Oxidizers.
Hazardous decomposition products	May include and are not limited to: Oxides of carbon.

11. Toxicological Information

Routes of exposure	Eye, Skin contact, Inhalation, Ingestion.
Information on likely routes of exposure	
Ingestion	May cause stomach distress, nausea or vomiting.
Inhalation	No adverse effects due to inhalation are expected.
Skin contact	No adverse effects due to skin contact are expected.
Eye contact	No adverse effects due to eye contact are expected.

Symptoms related to the physical, chemical and toxicological characteristics There are no hazards associated with this product in normal use.

Information on toxicological effects

Acute toxicity

Components	Species	Test Results
Dipropylene glycol (CAS 25265-71-8)		
Acute		
Dermal		
LD50	Rabbit	> 5010 mg/kg, 24 Hours, ECHA
		20 ml/kg, HSDB
Inhalation		
LC50	Rat	> 2.3 mg/L, 4 Hours, ECHA
Oral		
LD50	Guinea pig	17600 mg/kg, HSDB
		17.6 g/kg, HSDB
	Mouse	> 2000 mg/kg, OECD SIDS Assessment
	Rat	> 5 g/kg, ECHA
		15.8 ml/kg, ECHA
		14.8 ml/kg, HSDB

Skin corrosion/irritation Not expected to be a primary skin irritant. Prolonged skin contact may cause temporary irritation.

Exposure minutes Not available.

Erythema value Not available.

Oedema value Not available.

Serious eye damage/eye irritation Direct contact with eyes may cause temporary irritation.

Corneal opacity value Not available.

Iris lesion value Not available.

Conjunctival reddening value Not available.

Conjunctival oedema value Not available.

Recover days Not available.

Respiratory or skin sensitization

Respiratory sensitization Not available.

Skin sensitization This product is not expected to cause skin sensitization.

Mutagenicity Non-hazardous by WHMIS/OSHA criteria.

Carcinogenicity Non-hazardous by WHMIS/OSHA criteria.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity Non-hazardous by WHMIS/OSHA criteria.

Teratogenicity Non-hazardous by WHMIS/OSHA criteria.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not classified.

Chronic effects Non-hazardous by WHMIS/OSHA criteria.

12. Ecological Information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Mobility in general Not available.

Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal Considerations

Disposal instructions	Review federal, state/provincial, and local government requirements prior to disposal. Collect and reclaim or dispose in sealed containers at licensed waste disposal site.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport Information

Transport of Dangerous Goods (TDG) Proof of Classification	Classification Method: Classified as per Part 2, Sections 2.1 – 2.8 of the Transportation of Dangerous Goods Regulations. If applicable, the technical name and the classification of the product will appear below.

U.S. Department of Transportation (DOT)

Not regulated as dangerous goods.

Transportation of Dangerous Goods (TDG - Canada)

Not regulated as dangerous goods.

15. Regulatory Information

Canadian federal regulations This product has been classified in accordance with the hazard criteria of the HPR and the SDS contains all the information required by the HPR.

Export Control List (CEPA 1999, Schedule 3)

Not listed.

Greenhouse Gases

Not listed.

Precursor Control Regulations

Not regulated.

WHMIS 2015 Exemptions Not applicable

US federal regulations This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - No Delayed Hazard - No Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No
SARA 302 Extremely hazardous substance	No
SARA 311/312 Hazardous chemical	No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

US state regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - Texas Effects Screening Levels: Listed substance

Dipropylene glycol (CAS 25265-71-8) Listed.

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. Pennsylvania Worker and Community Right-to-Know Law

Dipropylene glycol (CAS 25265-71-8)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

Not Listed.

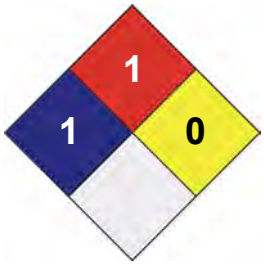
Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

16. Other Information

LEGEND	
Severe	4
Serious	3
Moderate	2
Slight	1
Minimal	0



Disclaimer The information in the sheet was written based on the best knowledge and experience currently available. Information contained herein was obtained from sources considered technically accurate and reliable. While every effort has been made to ensure full disclosure of product hazards, in some cases data is not available and is so stated. Since conditions of actual product use are beyond control of the supplier, it is assumed that users of this material have been fully trained according to the requirements of all applicable legislation and regulatory instruments. No warranty, expressed or implied, is made and supplier will not be liable for any losses, injuries or consequential damages which may result from the use of or reliance on any information contained in this document.

Issue date 01-April-2019

Version # 01

Effective date 01-April-2019

Prepared by Dell Tech Laboratories, Ltd. Phone: (519) 858-5021

Other information For an updated SDS, please contact the supplier/manufacturer listed on the first page of the document.

SAFETY DATA SHEET

1. Product and Company Identification

Product identifier	**Pro Beam Long Lasting Fog Fluid**
Other means of identification	Not available
Recommended use	Theatrical Fog
Recommended restrictions	None known.
Manufacturer information	Ultratec Special Effects 1960 Blue Heron Drive London, ON N6H 5L9 CA Phone: 1 -519-659-7972 Toll Free Phone: 1-800-388-0617 Emergency Number: ChemTel: 1-800-255-3924
Supplier	See above.

2. Hazards Identification

Physical hazards	Not classified.
Health hazards	Not classified.
Environmental hazards	Not classified.
WHMIS 2015 defined hazards	Not classified
Label elements	
Hazard symbol	None.
Signal word	None.
Hazard statement	The mixture does not meet the criteria for classification.
Precautionary statement	
Prevention	Observe good industrial hygiene practices.
Response	Wash hands after handling.
Storage	Store away from incompatible materials.
Disposal	Dispose of waste and residues in accordance with local authority requirements.
WHMIS 2015: Health Hazard(s) not otherwise classified (HHNOC)	None known
WHMIS 2015: Physical Hazard(s) not otherwise classified (PHNOC)	None known
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	Not applicable.

3. Composition/Information on Ingredients

Mixture

Chemical name	Common name and synonyms	CAS number	%
1,2-Propanediol		57-55-6	15 - 40*
Triethylene glycol		112-27-6	15 - 40*

Composition comments

US GHS: The exact percentage (concentration) of composition has been withheld as a trade secret in accordance with paragraph (i) of §1910.1200.
*CANADA GHS: The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First Aid Measures

Inhalation	If symptoms develop move victim to fresh air. If symptoms persist, obtain medical attention.
Skin contact	Flush with cool water. Wash with soap and water. Obtain medical attention if irritation develops or persists.

Eye contact	Immediately flush with cool water. Remove contact lenses, if applicable, and continue flushing for 15 minutes. Obtain medical attention if irritation develops or persists.
Ingestion	Do not induce vomiting. Rinse mouth with water, then drink one or two glasses of water. Obtain medical attention. Never give anything by mouth if victim is unconscious or is convulsing.
Most important symptoms/effects, acute and delayed	Direct contact with eyes may cause temporary irritation.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Avoid contact with eyes and skin. Wear rubber gloves and safety glasses with side shields. Keep out of reach of children.

5. Fire Fighting Measures

Suitable extinguishing media	Alcohol foam. Carbon dioxide. Water Fog. Dry chemical.
Unsuitable extinguishing media	Not available.
Specific hazards arising from the chemical	Firefighters should wear a self-contained breathing apparatus.
Special protective equipment and precautions for firefighters	Firefighters should wear full protective clothing including self-contained breathing apparatus.
Fire-fighting equipment/instructions	Cool containers with flooding quantities of water until well after fire is out.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.
Hazardous combustion products	May include and are not limited to: Oxides of carbon.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep out of low areas. Keep people away from and upwind of spill/leak. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Large Spills: Stop leak if you can do so without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Use water spray to reduce vapors or divert vapor cloud drift. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and Storage

Precautions for safe handling	Avoid prolonged exposure. Use good industrial hygiene practices in handling this material. When using do not eat or drink. Wash hands before breaks and immediately after handling the product.
Conditions for safe storage, including any incompatibilities	Store away from incompatible materials (see Section 10 of the SDS). Keep out of reach of children.

8. Exposure Controls/Personal Protection

Occupational exposure limits

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

Components	Type	Value	Form
1,2-Propanediol (CAS 57-55-6)	TWA	155 mg/m3	Vapor and aerosol.
		10 mg/m3	Aerosol.
		50 ppm	Vapor and aerosol.

US. AIHA Workplace Environmental Exposure Level (WEEL) Guides

Components	Type	Value	Form
1,2-Propanediol (CAS 57-55-6)	TWA	10 mg/m3	Aerosol.
Triethylene glycol (CAS 112-27-6)	TWA	10 mg/m3	Particulate.

Biological limit values No biological exposure limits noted for the ingredient(s).

Exposure guidelines Chemicals listed in section 3 that are not listed here do not have established limit values for ACGIH or OSHA PEL.

Appropriate engineering controls General ventilation normally adequate.

Individual protection measures, such as personal protective equipment

Eye/face protection Safety glasses recommended.

Skin protection

Hand protection If there is constant skin contact, rubber gloves are recommended.

Other As required by employer code.

Respiratory protection Not normally required if good ventilation is maintained. Where exposure guideline levels may be exceeded, use an approved NIOSH respirator.

Thermal hazards Not available.

General hygiene considerations Wash hands before breaks and immediately after handling the product. Handle in accordance with good industrial hygiene and safety practice. When using do not eat or drink.

9. Physical and Chemical Properties

Appearance Clear

Physical state Liquid.

Form Liquid

Color Colorless

Odor no odour

Odor threshold Not available.

pH Neutral

Melting point/freezing point Not available.

Initial boiling point and boiling range Not available.

Pour point Not available.

Specific gravity Not available.

Partition coefficient (n-octanol/water) Not available.

Flash point > 249.8 °F (> 121.0 °C) Tag Closed Cup

Evaporation rate Not available.

Flammability (solid, gas) Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) Not available.

Flammability limit - upper (%) Not available.

Explosive limit - lower (%) Not available.

Explosive limit - upper (%) Not available.

Vapor pressure Not available.

Vapor density > 1 (Air = 1)

Relative density 1.05

Solubility(ies) Complete

Auto-ignition temperature Not available.

Decomposition temperature Not available.

Viscosity Not available.

10. Stability and Reactivity

Reactivity May react with incompatible materials.

Possibility of hazardous reactions	Hazardous polymerization does not occur.
Chemical stability	Stable.
Conditions to avoid	Avoid temperatures exceeding the flash point. Do not mix with other chemicals.
Incompatible materials	Acids. Oxidizers.
Hazardous decomposition products	May include and are not limited to: Oxides of carbon.

11. Toxicological Information

Routes of exposure Eye, Skin contact, Inhalation, Ingestion.

Information on likely routes of exposure

Ingestion May cause stomach distress, nausea or vomiting.

Inhalation No adverse effects due to inhalation are expected.

Skin contact No adverse effects due to skin contact are expected.

Eye contact No adverse effects due to eye contact are expected.

Symptoms related to the physical, chemical and toxicological characteristics There are no hazards associated with this product in normal use.

Information on toxicological effects

Acute toxicity

Components	Species	Test Results
1,2-Propanediol (CAS 57-55-6)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg, 24 Hours, ECHA
		20800 mg/kg, Millipore
Inhalation		
LC50	Rabbit	> 317042 mg/m3, 2 Hours, ECHA
Oral		
LD50	Dog	19 g/kg, HSDB
	Guinea pig	19700 mg/kg, ECHA
		18.4 g/kg, HSDB
	Mouse	24900 mg/kg, ECHA
		23900 mg/kg, HSDB
		23.9 g/kg, HSDB
	Rabbit	22.8 g/kg, CCOHS
		18 g/kg, HSDB
	Rat	19.4 - 36 g/kg, Millipore
		22000 mg/kg, ECHA
		21 g/kg, CCOHS
Triethylene glycol (CAS 112-27-6)		
Acute		
Dermal		
LD50	Rabbit	22600 mg/kg, HSDB
		22460 mg/kg
		16 ml/kg, 24 Hours, ECHA
	Rat	> 5000 mg/kg, Millipore
Inhalation		
LC50	Rat	> 5.2 mg/l/4h, Millipore
		> 3.9 mg/L, 4 Hours, HSDB
Oral		
LD50	Guinea pig	7900 mg/kg, HSDB
	Mouse	18500 mg/kg, HSDB

Components	Species	Test Results
	Rabbit	9500 mg/kg, HSDB
	Rat	> 2000 mg/kg, ECHA
		> 16 ml/kg, ECHA
		17000 mg/kg, HSDB

Skin corrosion/irritation Not expected to be a primary skin irritant. Prolonged skin contact may cause temporary irritation.

Exposure minutes Not available.

Erythema value Not available.

Oedema value Not available.

Serious eye damage/eye irritation Direct contact with eyes may cause temporary irritation.

Corneal opacity value Not available.

Iris lesion value Not available.

Conjunctival reddening value Not available.

Conjunctival oedema value Not available.

Recover days Not available.

Respiratory or skin sensitization

Respiratory sensitization Not available.

Skin sensitization This product is not expected to cause skin sensitization.

Mutagenicity Non-hazardous by WHMIS/OSHA criteria.

Carcinogenicity Non-hazardous by WHMIS/OSHA criteria.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity Non-hazardous by WHMIS/OSHA criteria.

Teratogenicity Non-hazardous by WHMIS/OSHA criteria.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not classified.

Chronic effects Non-hazardous by WHMIS/OSHA criteria.

12. Ecological Information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Ecotoxicological data

Components		Species	Test Results
1,2-Propanediol (CAS 57-55-6)			
Crustacea	EC50	Daphnia	10000 mg/L, 48 Hours
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	> 10000 mg/L, 48 hours
Fish	LC50	Fathead minnow (Pimephales promelas)	710 mg/L, 96 hours
Triethylene glycol (CAS 112-27-6)			
Crustacea	EC50	Daphnia	42426 mg/L, 48 Hours
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	48.9 - 56 mg/L, 48 hours
Fish	LC50	Bluegill (Lepomis macrochirus)	> 10000 mg/L, 96 hours

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Mobility in general Not available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal Considerations

Disposal instructions	Review federal, state/provincial, and local government requirements prior to disposal. Collect and reclaim or dispose in sealed containers at licensed waste disposal site.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport Information

Transport of Dangerous Goods (TDG) Proof of Classification	Classification Method: Classified as per Part 2, Sections 2.1 – 2.8 of the Transportation of Dangerous Goods Regulations. If applicable, the technical name and the classification of the product will appear below.

U.S. Department of Transportation (DOT)

Not regulated as dangerous goods.

Transportation of Dangerous Goods (TDG - Canada)

Not regulated as dangerous goods.

15. Regulatory Information

Canadian federal regulations This product has been classified in accordance with the hazard criteria of the HPR and the SDS contains all the information required by the HPR.

Export Control List (CEPA 1999, Schedule 3)

Not listed.

Greenhouse Gases

Not listed.

Precursor Control Regulations

Not regulated.

WHMIS 2015 Exemptions Not applicable

US federal regulations This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - No Delayed Hazard - No Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No
SARA 302 Extremely hazardous substance	No
SARA 311/312 Hazardous chemical	No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

US state regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - Minnesota Haz Subs: Listed substance

1,2-Propanediol (CAS 57-55-6)	Listed.

Triethylene glycol (CAS 112-27-6) Listed.

US - New Jersey RTK - Substances: Listed substance

1,2-Propanediol (CAS 57-55-6)

US - Texas Effects Screening Levels: Listed substance

1,2-Propanediol (CAS 57-55-6) Listed.
Triethylene glycol (CAS 112-27-6) Listed.

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. Pennsylvania Worker and Community Right-to-Know Law

1,2-Propanediol (CAS 57-55-6)
Triethylene glycol (CAS 112-27-6)

US. Rhode Island RTK

1,2-Propanediol (CAS 57-55-6)
Triethylene glycol (CAS 112-27-6)

US. California Proposition 65

Not Listed.

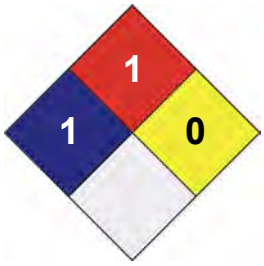
Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

16. Other Information

LEGEND	
Severe	4
Serious	3
Moderate	2
Slight	1
Minimal	0



Disclaimer The information in the sheet was written based on the best knowledge and experience currently available. Information contained herein was obtained from sources considered technically accurate and reliable. While every effort has been made to ensure full disclosure of product hazards, in some cases data is not available and is so stated. Since conditions of actual product use are beyond control of the supplier, it is assumed that users of this material have been fully trained according to the requirements of all applicable legislation and regulatory instruments. No warranty, expressed or implied, is made and supplier will not be liable for any losses, injuries or consequential damages which may result from the use of or reliance on any information contained in this document.

Issue date 28-March-2019

Version # 01

Effective date 28-March-2019

Prepared by Dell Tech Laboratories, Ltd. Phone: (519) 858-5021

Other information For an updated SDS, please contact the supplier/manufacturer listed on the first page of the document.

SAFETY DATA SHEET

1. Product and Company Identification

Product identifier	**Quick Dissipating Fog Fluid**
Other means of identification	Not available
Recommended use	Theatrical Fog
Recommended restrictions	None known.
Manufacturer information	Ultratec Special Effects 1960 Blue Heron Drive London, ON N6H 5L9 CA Phone: 1 -519-659-7972 Toll Free Phone: 1-800-388-0617 Emergency Number: ChemTel: 1-800-255-3924
Supplier	See above.

2. Hazards Identification

Physical hazards	Not classified.
Health hazards	Not classified.
Environmental hazards	Not classified.
WHMIS 2015 defined hazards	Not classified
Label elements	
Hazard symbol	None.
Signal word	None.
Hazard statement	The mixture does not meet the criteria for classification.
Precautionary statement	
Prevention	Observe good industrial hygiene practices.
Response	Wash hands after handling.
Storage	Store away from incompatible materials.
Disposal	Dispose of waste and residues in accordance with local authority requirements.
WHMIS 2015: Health Hazard(s) not otherwise classified (HHNOC)	None known
WHMIS 2015: Physical Hazard(s) not otherwise classified (PHNOC)	None known
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	Not applicable.

3. Composition/Information on Ingredients

Mixture

Chemical name	Common name and synonyms	CAS number	%
1,2-Propanediol		57-55-6	45-70*

Composition comments

US GHS: The exact percentage (concentration) of composition has been withheld as a trade secret in accordance with paragraph (i) of §1910.1200.
*CANADA GHS: The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First Aid Measures

Inhalation	If symptoms develop move victim to fresh air. If symptoms persist, obtain medical attention.
Skin contact	Flush with cool water. Wash with soap and water. Obtain medical attention if irritation develops or persists.
Eye contact	Immediately flush with cool water. Remove contact lenses, if applicable, and continue flushing for 15 minutes. Obtain medical attention if irritation develops or persists.

Ingestion	Do not induce vomiting. Rinse mouth with water, then drink one or two glasses of water. Obtain medical attention. Never give anything by mouth if victim is unconscious or is convulsing.
Most important symptoms/effects, acute and delayed	Direct contact with eyes may cause temporary irritation.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Avoid contact with eyes and skin. Wear rubber gloves and safety glasses with side shields. Keep out of reach of children.

5. Fire Fighting Measures

Suitable extinguishing media	Alcohol foam. Carbon dioxide. Water Fog. Dry chemical.
Unsuitable extinguishing media	Not available.
Specific hazards arising from the chemical	Firefighters should wear a self-contained breathing apparatus.
Special protective equipment and precautions for firefighters	Firefighters should wear full protective clothing including self-contained breathing apparatus.
Fire-fighting equipment/instructions	Cool containers with flooding quantities of water until well after fire is out.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.
Hazardous combustion products	May include and are not limited to: Oxides of carbon.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep out of low areas. Keep people away from and upwind of spill/leak. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Large Spills: Stop leak if you can do so without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Use water spray to reduce vapors or divert vapor cloud drift. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and Storage

Precautions for safe handling	Avoid prolonged exposure. Use good industrial hygiene practices in handling this material. When using do not eat or drink. Wash hands before breaks and immediately after handling the product.
Conditions for safe storage, including any incompatibilities	Store away from incompatible materials (see Section 10 of the SDS). Keep out of reach of children.

8. Exposure Controls/Personal Protection

Occupational exposure limits

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

Components	Type	Value	Form
1,2-Propanediol (CAS 57-55-6)	TWA	155 mg/m3	Vapor and aerosol.
		10 mg/m3	Aerosol.
		50 ppm	Vapor and aerosol.

US. AIHA Workplace Environmental Exposure Level (WEEL) Guides

Components	Type	Value	Form
1,2-Propanediol (CAS 57-55-6)	TWA	10 mg/m3	Aerosol.

Biological limit values	No biological exposure limits noted for the ingredient(s).
Exposure guidelines	Chemicals listed in section 3 that are not listed here do not have established limit values for ACGIH or OSHA PEL.
Appropriate engineering controls	General ventilation normally adequate.

Individual protection measures, such as personal protective equipment

Eye/face protection	Safety glasses recommended.
Skin protection	
Hand protection	If there is constant skin contact, rubber gloves are recommended.
Other	As required by employer code.
Respiratory protection	Not normally required if good ventilation is maintained. Where exposure guideline levels may be exceeded, use an approved NIOSH respirator.
Thermal hazards	Not available.
General hygiene considerations	Wash hands before breaks and immediately after handling the product. Handle in accordance with good industrial hygiene and safety practice. When using do not eat or drink.

9. Physical and Chemical Properties

Appearance	Clear
Physical state	Liquid.
Form	Liquid
Color	Colorless
Odor	no odour
Odor threshold	Not available.
pH	Neutral
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Pour point	Not available.
Specific gravity	Not available.
Partition coefficient (n-octanol/water)	Not available.
Flash point	> 217.4 °F (> 103.0 °C) Tag Closed Cup
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	> 1 (Air = 1)
Relative density	1.024 (H2O = 1)
Solubility(ies)	Complete
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.

10. Stability and Reactivity

Reactivity	May react with incompatible materials.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Chemical stability	Stable.
Conditions to avoid	Avoid temperatures exceeding the flash point. Do not mix with other chemicals.
Incompatible materials	Acids. Oxidizers.

Hazardous decomposition products May include and are not limited to: Oxides of carbon.

11. Toxicological Information

Routes of exposure Eye, Skin contact, Inhalation, Ingestion.

Information on likely routes of exposure

Ingestion May cause stomach distress, nausea or vomiting.

Inhalation No adverse effects due to inhalation are expected.

Skin contact No adverse effects due to skin contact are expected.

Eye contact No adverse effects due to eye contact are expected.

Symptoms related to the physical, chemical and toxicological characteristics There are no hazards associated with this product in normal use.

Information on toxicological effects

Acute toxicity

Components	Species	Test Results
1,2-Propanediol (CAS 57-55-6)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg, 24 Hours, ECHA
		20800 mg/kg, Millipore
Inhalation		
LC50	Rabbit	> 317042 mg/m3, 2 Hours, ECHA
Oral		
LD50	Dog	19 g/kg, HSDB
	Guinea pig	19700 mg/kg, ECHA
		18.4 g/kg, HSDB
	Mouse	24900 mg/kg, ECHA
		23900 mg/kg, HSDB
		23.9 g/kg, HSDB
	Rabbit	22.8 g/kg, CCOHS
		18 g/kg, HSDB
	Rat	19.4 - 36 g/kg, Millipore
		22000 mg/kg, ECHA
		21 g/kg, CCOHS

Skin corrosion/irritation Not expected to be a primary skin irritant. Prolonged skin contact may cause temporary irritation.

Exposure minutes Not available.

Erythema value Not available.

Oedema value Not available.

Serious eye damage/eye irritation Direct contact with eyes may cause temporary irritation.

Corneal opacity value Not available.

Iris lesion value Not available.

Conjunctival reddening value Not available.

Conjunctival oedema value Not available.

Recover days Not available.

Respiratory or skin sensitization

Respiratory sensitization Not available.

Skin sensitization This product is not expected to cause skin sensitization.

Mutagenicity Non-hazardous by WHMIS/OSHA criteria.

Carcinogenicity Non-hazardous by WHMIS/OSHA criteria.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity	Non-hazardous by WHMIS/OSHA criteria.
Teratogenicity	Non-hazardous by WHMIS/OSHA criteria.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not classified.
Chronic effects	Non-hazardous by WHMIS/OSHA criteria.

12. Ecological Information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Ecotoxicological data

Components		Species	Test Results
1,2-Propanediol (CAS 57-55-6)			
Crustacea	EC50	Daphnia	10000 mg/L, 48 Hours
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	> 10000 mg/L, 48 hours
Fish	LC50	Fathead minnow (Pimephales promelas)	710 mg/L, 96 hours

Persistence and degradability	No data is available on the degradability of this product.
Bioaccumulative potential	No data available.
Mobility in soil	No data available.
Mobility in general	Not available.
Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal Considerations

Disposal instructions	Review federal, state/provincial, and local government requirements prior to disposal. Collect and reclaim or dispose in sealed containers at licensed waste disposal site.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport Information

Transport of Dangerous Goods (TDG) Proof of Classification Classification Method: Classified as per Part 2, Sections 2.1 – 2.8 of the Transportation of Dangerous Goods Regulations. If applicable, the technical name and the classification of the product will appear below.

U.S. Department of Transportation (DOT)

Not regulated as dangerous goods.

Transportation of Dangerous Goods (TDG - Canada)

Not regulated as dangerous goods.

15. Regulatory Information

Canadian federal regulations This product has been classified in accordance with the hazard criteria of the HPR and the SDS contains all the information required by the HPR.

Export Control List (CEPA 1999, Schedule 3)

Not listed.

Greenhouse Gases

Not listed.

Precursor Control Regulations

Not regulated.

WHMIS 2015 Exemptions Not applicable

US federal regulations This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - No
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance No

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

US state regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - Minnesota Haz Subs: Listed substance

1,2-Propanediol (CAS 57-55-6) Listed.

US - New Jersey RTK - Substances: Listed substance

1,2-Propanediol (CAS 57-55-6)

US - Texas Effects Screening Levels: Listed substance

1,2-Propanediol (CAS 57-55-6) Listed.

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. Pennsylvania Worker and Community Right-to-Know Law

1,2-Propanediol (CAS 57-55-6)

US. Rhode Island RTK

1,2-Propanediol (CAS 57-55-6)

US. California Proposition 65

Not Listed.

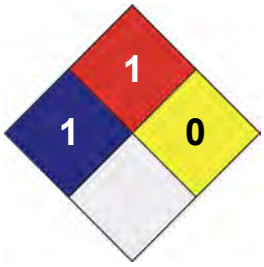
Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

16. Other Information

LEGEND	
Severe	4
Serious	3
Moderate	2
Slight	1
Minimal	0



Disclaimer	The information in the sheet was written based on the best knowledge and experience currently available. Information contained herein was obtained from sources considered technically accurate and reliable. While every effort has been made to ensure full disclosure of product hazards, in some cases data is not available and is so stated. Since conditions of actual product use are beyond control of the supplier, it is assumed that users of this material have been fully trained according to the requirements of all applicable legislation and regulatory instruments. No warranty, expressed or implied, is made and supplier will not be liable for any losses, injuries or consequential damages which may result from the use of or reliance on any information contained in this document.
Issue date	01-April-2019
Version #	01
Effective date	01-April-2019
Prepared by	Dell Tech Laboratories, Ltd. Phone: (519) 858-5021
Other information	For an updated SDS, please contact the supplier/manufacturer listed on the first page of the document.

APPENDIX B
CALIBRATION FACTORS AND TIME-AND-DISTANCE GUIDELINES

Summary of Calibration Factors				
Manufacturer	**Machine**	**Fluid**	**Fluid Type**	**Calibration Factor**
Ultratec	Handy Fogger	Director's Choice Fog Fluid	Glycol only	**0.49**
Ultratec	Handy Fogger	Quick Dissipating Fog Fluid	Glycol only	**1.60**
Ultratec	Handy Fogger	Pro Beam Fog Fluid	Glycol only	**1.18**

Time-and-Distance Guidelines Ultratec Handy Fogger							
Fog Fluid Used	**Release Duration**	**Number of Hand Pumps**	**Time (in sec) After Which Air Concentrations Are Below Guidance Level (40mg/m³)**				
			Height Above Ground				
	(secs)		**5 ft**	**10 ft**	**15 ft**	**20 ft**	**25 ft**
Director's Choice	15	5	15	25	25	0	0
	30	10	30	50	50	0	0
	60	20	60	50	50	10	0
Quick Dissipating	15	5	0	0	0	0	0
	30	10	20	20	10	10	0
	60	20	20	20	10	10	0
Pro Beam	15	5	15	15	0	0	0
	30	10	50	50	30	0	0
	60	20	140	140	40	10	0

APPENDIX C
SUMMARY SHEET

RAMBOLL

ENVIRONMENT
& HEALTH

Calibration Factor and Time-and-Distance Guidelines

Handy Fogger with Director's Choice, Quick Dissipating, and Pro Beam Fog Fluids

Prepared for Ultratec by Ramboll

Ramboll developed calibration factors and Time-and-Distance guidelines for Director's Choice, Quick Dissipating, and Pro Beam Fog Fluid in a Ultratec Handy Fogger fog machine.

Director's Choice, Quick Dissipating, and Pro Beam Fog Fluids are all 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 Handy Fogger.

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

The calibration curves for glycols is shown below:

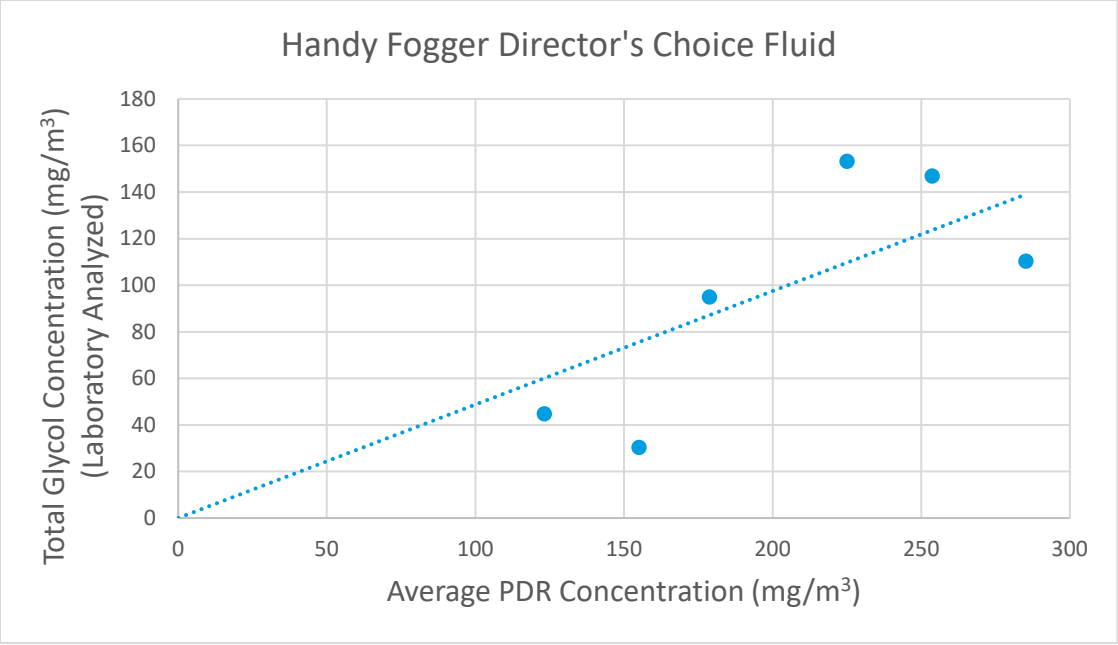


Figure 1. Calibration curve for Ultratec's Handy Fogger with Director's Choice Fog Fluid, based on glycol laboratory data. Calibration factors, based on slope of curve, are 0.49 (mg/m^3 glycol) / (mg/m^3 aerosol).

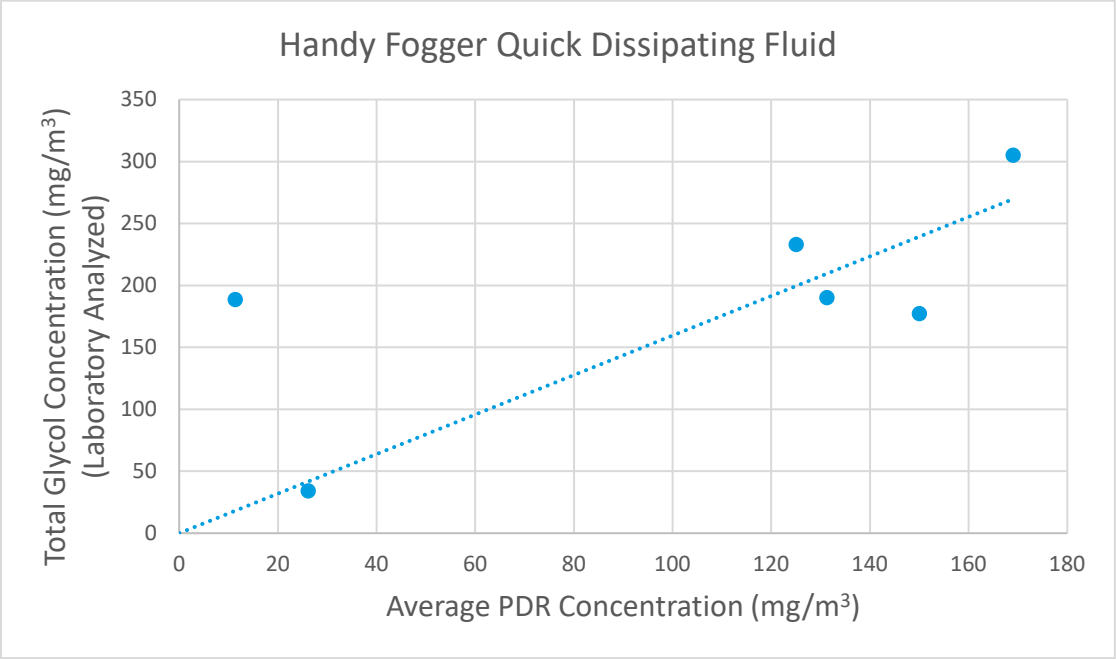


Figure 2. Calibration curve for Ultratec's Handy Fogger with Quick Dissipating Fog Fluid, based on glycol laboratory data. Calibration factors, based on slope of curve, are 1.60 (mg/m³ glycol) / (mg/m³ aerosol).

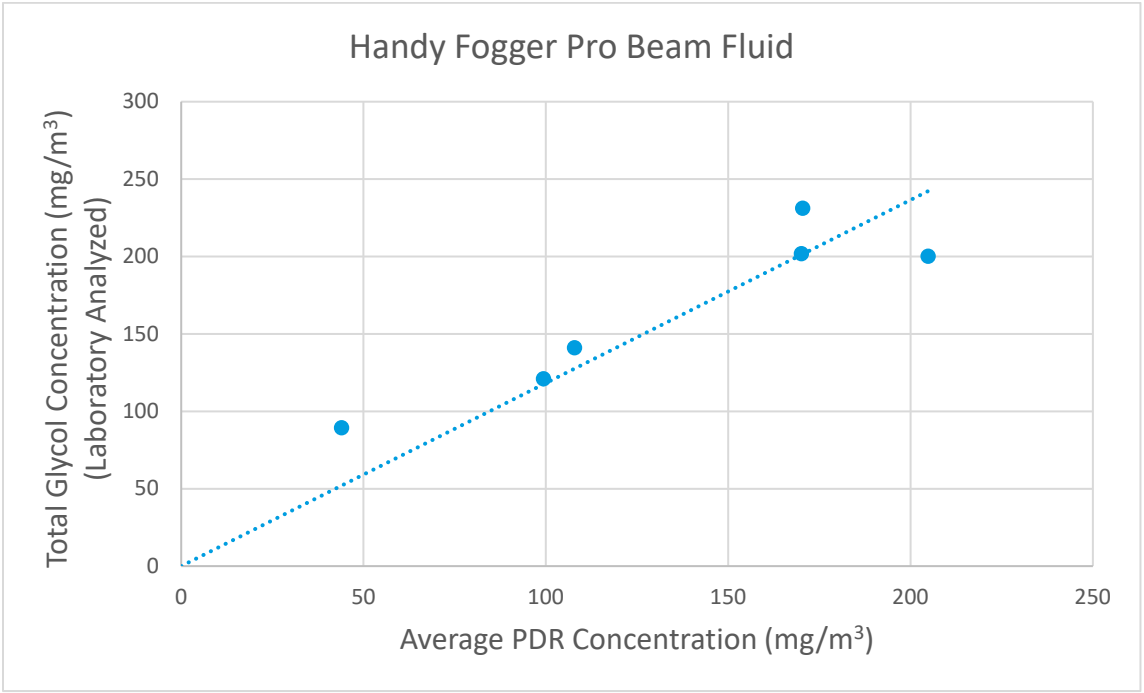


Figure 3. Calibration curve for Ultratec's Handy Fogger with Pro Beam Fog Fluid, based on glycol laboratory data. Calibration factors, based on slope of curve, are 1.18 (mg/m³ glycol) / (mg/m³ aerosol).

Summary of Calibration Factors				
Manufacturer	**Machine**	**Fluid**	**Fluid Type**	**Calibration Factor**
Ultratec	Handy Fogger	Director's Choice Fog Fluid	Glycol only	**0.49**
Ultratec	Handy Fogger	Quick Dissipating Fog Fluid	Glycol only	**1.60**
Ultratec	Handy Fogger	Pro Beam Fog Fluid	Glycol only	**1.18**

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 Handy Fogger/Pro Beam Fog Fluid combination with 60-second cue duration and 20 hand pumps, an actor's breathing zone should not be situated within 10 feet of the fog machine until at least 50 seconds following the end of the cue release, and should not be within 20 feet of the fog machine for at least 10 seconds following the end of the cue release.

Time-and-Distance Guidelines Ultratec Handy Fogger							
Fog Fluid Used	**Release Duration**	**Number of Hand Pumps**	**Time (in sec) After Which Air Concentrations Are Below Guidance Level (40mg/m³)**				
			Height Above Ground				
	(secs)		**5 ft**	**10 ft**	**15 ft**	**20 ft**	**25 ft**
Director's Choice	15	5	15	25	25	0	0
	30	10	30	50	50	0	0
	60	20	60	50	50	10	0
Quick Dissipating	15	5	0	0	0	0	0
	30	10	20	20	10	10	0
	60	20	20	20	10	10	0
Pro Beam	15	5	15	15	0	0	0
	30	10	50	50	30	0	0
	60	20	140	140	40	10	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.