GUIDANCE FOR THE USE OF THEATRICAL SMOKE AND HAZE

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Health Effects Study

- A Health Effects Study of theatrical smoke, haze, and pyrotechnics was conducted by Mount Sinai School of Medicine and ENVIRON Corporation in 1997-99.

- Results of the Health Effects Study were presented to the Fund on June 6, 2000.

Guidance Levels

- Exposures to theatrical effects should not exceed peak or ceiling concentrations of
  - 40 mg/m^3 for glycols
  - 25 mg/m^3 for mineral oil.
- Time-weighted average exposures to mineral oil should be kept below 5 mg/m^3.

Implementation of Guidance

- Two guidance documents were prepared to assist in the implementation of the guidance on theatrical smoke and haze:

  - *Evaluation of Short-Term Exposures to Theatrical Smoke and Haze ("Air Sampling Protocol")*

  - *Equipment-Based Guidelines for Use of Theatrical Smoke and Haze ("Equipment-Based Guidelines")*

Air Sampling Protocol

- The Air Sampling Protocol provides detailed procedures for conducting theater- and production-specific monitoring.

- Monitoring conducted in accordance with this Protocol can be used to evaluate potential peak exposures to smoke and haze special effects for theatrical productions where the Equipment-Based Guidelines are not used.

Equipment-Based Guidelines

- This document provides conservative Guidelines on the distance (with respect to the discharge point on the equipment) and length of time that concentrations exceeding the peak guidance levels may occur for various use patterns.

- These Equipment- Based Guidelines can be used in staging performances in lieu of conducting stage-specific testing.

Machines and Fluids Tested

Manufacturer	Machine	Fluid	Type of Fluid
High End Systems	F-100	Atmosphere HQ Formula Atmosphere Stage Formula Atmosphere Cold Flow Formula	Glycol
Le Maitre Special Effects	G100 G150	Regular Fog Fluid Quick Dissipating Extra Quick Dissipating Molecular Fog Fluid (G150 only)	Glycol
	Opti Mist Ranger	Mini Mist Canister	
MDG Fog Generators, Ltd.	Mini Max	MDG Dense Fluid	Glycol
	MAX 3000 Atmosphere	MDG Neutral Fluid	Oil
Reel EFX, Inc.	DF-50	Diffusion Fluid	Oil
Rosco Laboratories	1600 PF-1000 Alpha 900	Rosco Fog Fluid Rosco Stage & Studio Fluid Rosco Light Fog Fluid Rosco Clear Fog Fluid	Glycol

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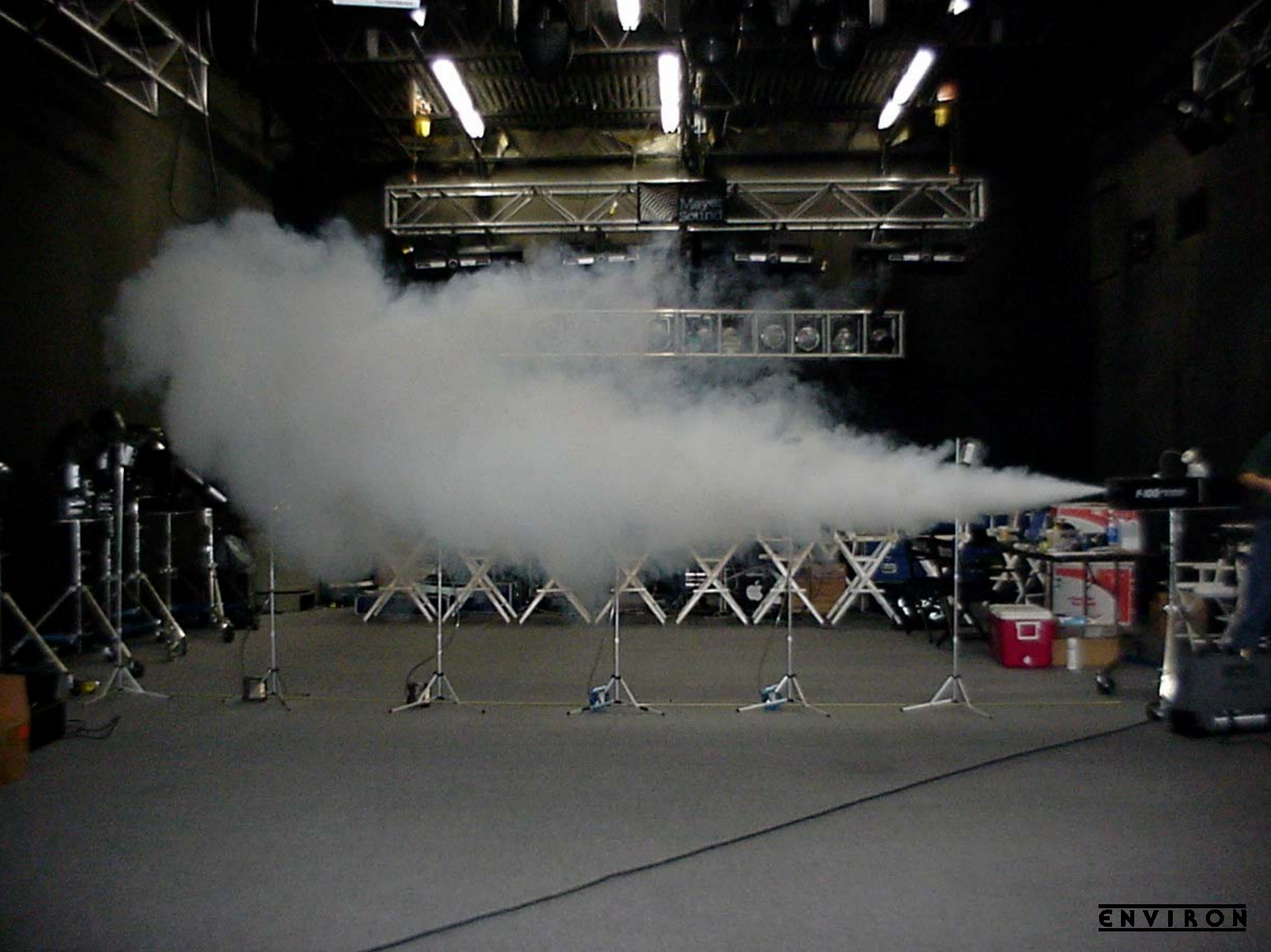
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Development of Guidelines

- Equipment-based guidelines based on conservative use assumptions:
  - No ventilation
  - No on-stage activities or props that enhance dispersion
  - Smoke and haze machines positioned between four and five feet above the ground
  - 10 to 15 seconds of continuous smoke generation or 40 seconds of continuous haze generation

TABLE 3
Summary of Equipment-Based Guidelines for Smoke Generation (Glycol)

Manufacturer	Machine	Fluid	Machine Setting	Time (in sec) After Which Air Concentrations Are Below Guidance Level (40 mg/m^3)					
				3 ft	6 ft	9 ft	12 ft	15 ft	18 ft
High End Systems	F-100	Atmosphere Cold Flow Formula	Full	70	30	30	30	30	30
			Medium	40	40	30	30	0	0
		Atmosphere HQ Formula	Full	190	190	180	20	0	0
			Medium	170	80	70	0	0	0
		Atmosphere Stage Formula	Full/Med	0	0	0	0	0	0
Le Maitre Special Effects	G100	Extra Quick Dissipating Fluid	On	100	40	40	40	30	30
		Quick Dissipating Fluid	On	150	150	40	40	30	30
		Regular Fog Fluid	On	150	30	30	0	0	0
	G150	Extra Quick Dissipating Fluid	Full	50	40	40	30	30	30
			Medium	50	0	0	0	0	0
		Molecular Fog Fluid	Full	90	50	40	0	0	0
			Medium	90	0	0	0	0	0
		Quick Dissipating Fluid	Full	60	60	40	0	0	0
			Medium	60	0	0	0	0	0
		Regular Fog Fluid	Full	110	80	70	70	0	0
			Medium	60	50	50	0	0	0
	Opti Mist Ranger	Mini Mist Canister	Full	110	80	60	60	0	0
			Medium	110	80	60	60	0	0
MDG Fog Generators, Ltd.	Mini Max	MDG Dense Fluid	Full	150	80	50	0	0	0
			Medium	130	40	40	0	0	0
Rosco Laboratories	1600	Rosco Clear Fog Fluid	Full	230	150	60	0	0	0
			Medium	230	70	60	0	0	0
		Rosco Fog Fluid	Full	170	100	80	40	40	40
			Medium	170	100	80	40	40	40
		Rosco Light Fog Fluid	Full	150	70	70	70	60	50
			Medium	150	50	50	50	50	50
		Rosco Stage & Studio Fluid	Full	80	80	50	40	40	40
			Medium	80	80	40	30	30	30
	PF-1000	Rosco Fog Fluid	Full	60	40	0	0	0	0
			Medium	60	0	0	0	0	0
		Rosco Stage & Studio Fluid	Full	100	70	60	60	0	0
			Medium	100	70	0	0	0	0
	Alpha 900	Rosco Fog Fluid	On	220	220	180	180	160	110
		Rosco Stage & Studio Fluid	On	140	140	140	130	50	30

TABLE 4
Summary of Equipment-Based Guidelines for Haze Generation

Manufacturer	Machine	Fluid	Time (in sec) After Which Air Concentration Below Guidance Level (25 mg/m^3)					
			3 ft	6 ft	9 ft	12 ft	15 ft	18 ft
MDG Fog Generators, Ltd.	MAX 3000	MDG Neutral Fluid	100	100	100	100	100	0
	Atmosphere	MDG Neutral Fluid	190	190	120	0	0	0
Reel EFX, Inc.	DF-50	Diffusion Fluid	0	0	0	0	0	0

When Is Testing Recommended?

- Different configurations for positioning machines (e.g., different heights)
- On-stage ventilation
- Longer (or shorter) cues

When Is Testing Recommended?

- 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.

- Use of smoke/haze machines or fluids other than those for which Guidelines were developed