

Pre-Production (Planning) Memo

These guidelines are recommendations to either eliminate or reduce worker exposure to inhalation hazards created by chemicals generated when using artificial smoke or fog (theatrical haze, fogs, mists, etc.). Artificial smoke or fog is commonly generated using a fog or haze machine, which releases a chemical solution as an airborne aerosol to create various effects during filming/performing.

Chemical Product Guidelines and Exposure Limits

Various chemical solutions and mixtures are used to generate artificial smoke or fog. Some artificial smoke or fog ingredients have Occupational Exposure Limits (OELs) regulated by WorkSafeBC and others do not. Regardless if there is an OEL or not, it is important to realize every individual is different and health effects may range from none to irritations of the eyes or respiratory tract.

Products containing the following chemicals should not be used due to their possible health effects:

- Aromatic and aliphatic hydrocarbon mixtures
- Ethylene glycol & diethylene glycol (DEG)
- Hexachloroethane
- Cyclohexylamine
- Fumed and hydrolyzed chlorides
- Any known carcinogens (e.g. tobacco)

Products containing the following chemicals may be used. Airborne occupational exposure limits as specified in the table below should not be exceeded unless exposure controls are in place.

INGREDIENT	8-hour Time Weighted Average (mg/m ³)	PEAK (mg/m ³)
1,3-Butylene Glycol	10	40
1,2-Butylene Glycol	10	40
Propylene Glycol	10	40
Triethylene Glycol	10	40
Polyethylene Glycol	10	40
Dipropylene Glycol	10	40
Total Glycol	10	40
Glycerin (total)	10	50
Glycerin (respirable)	3	15
Mineral Oil (highly-refined only)	5/1 ^a	25/5

^a The OSHA PEL, ACGIH TLV, Quebec OEL and Alberta OEL are all 5mg/m³. WorkSafeBC has an OEL of 1mg/m³ for mineral oil.

CRYOGENS

Cryogenics (i.e. liquid nitrogen, carbon dioxide [dry-ice]) should not be used in enclosed spaces or low lying areas. When used, adequate fresh air should be supplied to avoid oxygen depletion and creation of a hazardous atmosphere.

Production Requirements

- Ensure qualified technicians are utilized to generate artificial smoke or fog.
- Technicians should follow manufacturers' guidelines for the use of equipment and only use fluids and gasses specified by the manufacturer.
- Technicians should not mix their own solutions or use custom-made equipment.
- Ensure that exposure estimates (based on previous monitoring reports, available literature or health and safety professional advice), or actual airborne monitoring is available during artificial smoke or fog generation in order to predict artificial smoke or fog exposure levels on-site.
- Ensure fit testing has been conducted if respirators are required (see Respirator Use section below).
- Consult with your joint health and safety committee and production safety representative to inform them of the intended use and to ensure proper documentation and safety equipment (i.e; respirators, ventilation, etc.) are available.
- Artificial smoke or fog generation on-set will be under the direction of the Special Effects (SPFX) Department. Names and contact information for SPFX Department employees should appear on the crew list.

ATTENTION

Consider when developing controls that some workers may be more sensitive to smoke and fog exposure. This group includes, but is not limited to, the elderly, children, people with severe lung problems and/or asthma, and pregnant women.

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Joint Health and Safety Committee Responsibilities

- Consult with the JHSC when creating or reviewing smoke or fog safe work procedures or an exposure control plan (ECP). Procedures should be specific to the smoke and fog chemicals being used and if a respirator is required, they must indicate the type, including filters or cartridges.
- The JHSC does not need to be consulted every time smoke or fog is used.

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EXTENDED EXPOSURE

It's very important to take into consideration extended work shifts and the consequences of working more than 8 hours per shift as it relates to OEL or time-weighted average (TWA). As exposure time increases, the permitted exposure limit decreases.

FACTOR	LENGTH OF EXPOSURE PERIOD (hours)
0.7	more than 8, less than 10
0.5	more than 10, less than 12
0.25	more than 12, less than 16
0.1	more than 16

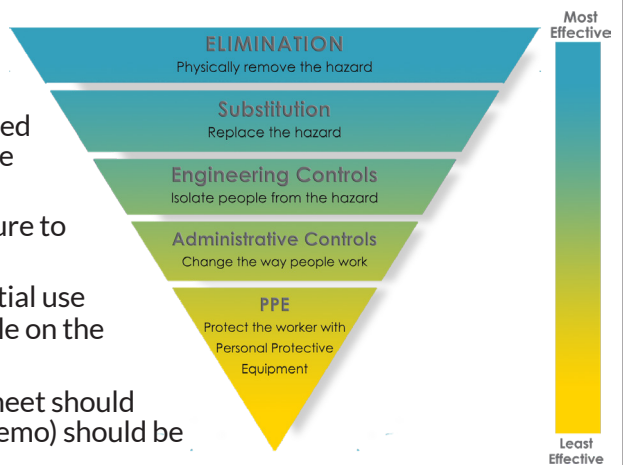
Measuring Airborne Concentrations

Airborne concentrations can be measured using a variety of instruments and by following recognized monitoring methods.

- Various direct reading instruments that measure airborne aerosol are available for rent or purchase.
- Testing should be conducted by or under the direction of an individual who is knowledgeable about the testing process.
- For an accurate reading, a correction factor will need to be applied.
- An industrial hygienist or qualified person can be contacted to discuss measuring airborne concentrations (including) correction factors and testing.

Control Measures

The following control measures should be performed or implemented:



- Whenever possible, eliminate the need for artificial smoke or fog.
- Ventilation and exhaust mechanisms should be considered to maintain levels that do not exceed applicable exposure limits.
- Whenever possible, limit cast and crew members exposure to the amount and duration of artificial smoke and fog.
- Safety Data Sheets (SDS) are to be consulted prior to initial use of artificial smoke or fog products and be readily available on the worksite.
- Whenever artificial smoke or fog is scheduled, the call sheet should state its use, and page three of this bulletin (call sheet memo) should be attached.

- If airborne levels are expected to exceed exposure limits, respirators of the appropriate type and size must be provided.

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CHECK LIST

- Call Sheet Memo
- SDS available
- Exposure Control Plan, if necessary.
- Respirator fit testing if necessary
- TWA-Extended work shift factor considered.

Respirator Use

When a respirator is required, workers must be properly fit tested and trained on use, maintenance, inspection and storage.

Note: Fit testing is not required when a worker chooses to wear a personal respirator when air contaminants do not exceed the OEL.

Additional Training

Actsafe offers two workshops that may be useful in helping employers and supervisors further understand their responsibilities to create a safe and healthy workplace related to the subject matter of this bulletin or any other safety hazard.

- Joint Health and Safety Committee Fundamentals
- Safety for Supervisors

REGULATORY REFERENCES

Where applicable, the following WorkSafeBC regulations were used in the development of this bulletin:

- Exposure Limits & Excursion Limits OHS Regulation Part 5.48 & Part 5.49
- Extended Work Periods OHS Regulation Part 5.50
- Workplace Monitoring & Exposure Control Plan OHS Regulation Part 5.53 & Part 5.54
- Respirators OHS Regulation Parts 8.32 thru 8.45

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Call Sheet Memo

Artificial smoke and fog is commonly generated using a fog or haze machine, which releases a chemical solution as an airborne aerosol in order to generate various effects during filming/performing.

There are no known long-term effects from exposure to artificial smoke or fog. However, it is important to realize every individual is different and possible health effects may range from:

- none
- irritation to the eyes
- dry throat
- minor respiratory irritation

Control Measures

Your employer may have one or more of the following control measures in place to reduce your exposure.

- The number of cast and crew exposed to artificial smoke and fog may be limited. If your presence is not required, please keep clear of the area.
- The time or duration of exposure may be limited. Worksites where workers are exposed for extended durations may require additional control measures.
- Ventilation and exhaust mechanisms may be used to maintain levels that do not exceed applicable exposure limits.
- Safety Data Sheets (SDS) should be readily available at the worksite.
- The employer may monitor airborne levels to ensure they do not exceed exposure limits.
- Artificial smoke or fog generation on set will be under the direction of the Special Effects (SPFX) Department.



DID YOU KNOW?

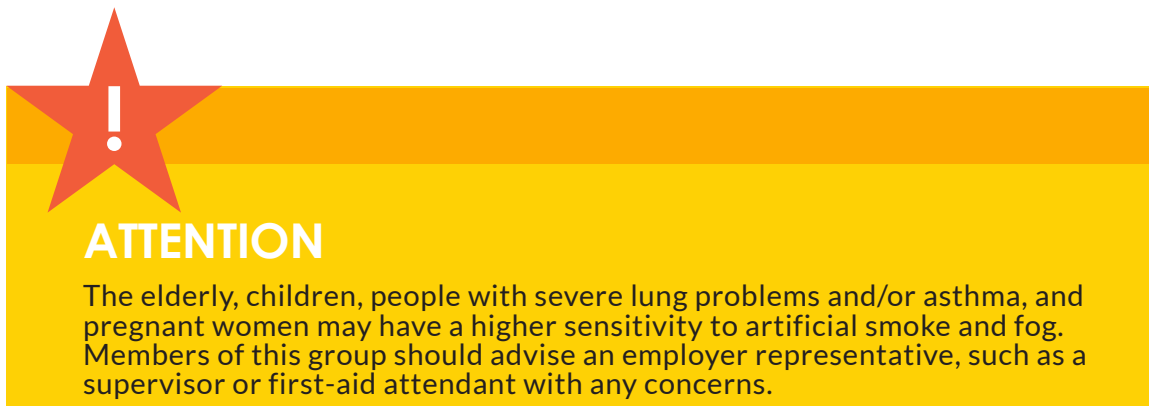
Individual exposure is affected by both the concentration and duration of the smoke and fog used. Permitted exposure limits begin to decrease rapidly after more than 8 hours of continued exposure.

Safety Talks

Safety talks must be held with cast and crew to discuss operations and precautions associated with the use of artificial smoke or fog.

Safety talks may include but are not limited to the following:

- Possible health effects of exposure to smoke or fog (e.g., irritation to eyes, dry throat and respiratory irritation).
- When and where atmospheric effects will be used.
- Steps that personnel should take to avoid smoke or fog exposure when possible.
- Ventilation procedures in place to ensure adequate fresh air is available.
- Availability and use of respiratory protection if airborne levels are expected to exceed exposure limits.
- Who to contact if you experience any signs of health effects from exposure.



ATTENTION

The elderly, children, people with severe lung problems and/or asthma, and pregnant women may have a higher sensitivity to artificial smoke and fog. Members of this group should advise an employer representative, such as a supervisor or first-aid attendant with any concerns.

Additional guidelines are available for pre-production and planning at www.actsafe.ca.

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