

MMR Cross-Contamination Study

Informational Technical Bulletin



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TB sign spurs tests for students

By Tom Lochner
CONTRA COSTA TIMES

CONCORD - An Ygnacio Valley High School student was tested positive for tuberculosis, county public health officials said. The school will be tested as a precaution.

The Contra Costa
tuberculosis

SARS Kills Hong Canadian Nurses

Monday, June 02, 2003

HONG KONG - A front-line
and in a hospital

Health Care Worker; Officials Ignored Warnings

(search) health care worker died of SARS (search) or
ignoring warnings of Toronto's latest outbreak, which

The Threat Is Real



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and

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770 w
thern China in November. Most of the victims have been in

deaths, including Dr. Cheng Ha-yan, 30, who died Sunday night at
been transferred there after being infected by a patient who initial
d. Cheng had been hospitalized since April 21.

nce of Wales Hospital also died after being infected while caring
282 SARS deaths.

The dead
beaten the
has been in Canada's largest city, Toronto, where authorities believed
number of infections was found last month in two city hospitals.

Health officials reported Sunday that an unidentified 60-year-old woman died the day before. The woma

Because every life has a purpose...

Who offers the correct facepiece for your health & safety?

MSA's inhalation check valve protects against regulator cross-contamination.

More and more fire departments are providing individual-issue facepieces to firefighters, mainly to prevent cross-contamination from one user to another.

Q: What is meant by cross-contamination?

A: Cross-contamination occurs when one person receives infectious materials such as respiratory secretions from another person by touching a contaminated surface, breathing contaminated air, etc.

Q: Why is it such a big issue?

A: Suppose that your friend has a cold or flu. Would you drink out of his/her glass and risk contracting that respiratory infection? The answer is most likely, "No." The same holds true for a respiratory protection device; would you use his/her facepiece? What about using the second-stage regulator? Both components can act as the "drinking glass" and pass the respiratory infection to the next user. And even if you are not concerned about cold and flu contamination, how do you feel about getting close to SARS or tuberculosis?

Q: How does MSA prevent cross-contamination of your air mask?

A: For decades, MSA engineers have incorporated an inhalation check valve as part of facepiece design to prevent bodily fluids and perspiration from entering the regulator. This one-way valve allows you breathe in to only the facepiece, not out through the regulator.

Q: Why is this design unique?

A: Most manufacturers do not incorporate an inhalation check-valve in their facepiece design. All MSA facepieces are equipped with an inhalation check-valve as a standard component and have been for decades.

Q: What's the value of this design?

A: You have to sanitize **ONLY** the facepiece, not the regulator. No additional decontamination saves time and money and simplifies maintenance.



Q: Everyone in our department has individual-issue facepieces, so what's the big deal?

A: Although individual facepieces provide many benefits, they alone do not provide complete protection against cross-contamination. Mask-mounted second-stage regulators that are shared among users can also serve as a source for cross-contamination when facepiece inhalation check valves are not used.

Q: Why isn't thorough cleaning of our entire SCBA after each use sufficient?

A: Although disinfection of second-stage regulators is recommended by SCBA manufacturers, it is often not performed or is ineffective in actual practice.

Q: Why shouldn't I believe other manufacturers who say that your inhalation check valve claims can't be true?

A: Don't just take our word for it. Read the results of a third-party study, outlined on the next two pages.

MSA contracted with Microbac Laboratories to determine the degree of protection that users of three typical SCBA facepiece/regulator combinations are given from cross-contamination of pathogenic microorganisms. MSA's was the only design that prevented entrance of test agent *Streptococcus lactis* organism into the second-stage regulator. The other two facepiece designs tested did not have inhalation check valves, and allowed a significant quantity of contaminant into the regulator. Conclusion: MSA is the only design type effective in preventing against cross-contamination of potentially harmful organisms.

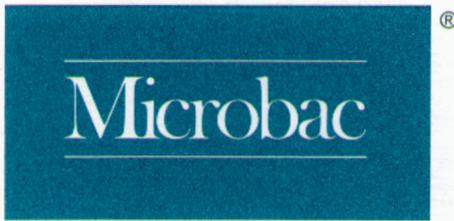
In addition to the Microbac study, OSHA acknowledged benefits of the inhalation check-valve in a clarification letter (issued to MSA on October 28, 1998) that states that regulator designs without an inhalation check valve should be decontaminated between uses.

Any questions regarding this study should be directed to the MSA Fire Service Hot Line at **1-877-MSA-FIRE**.

Cross-Contamination Protection

The inhalation check-valve allows air to flow in only one direction when a facepiece is pressurized, protecting a shared-use regulator from contamination.

MSA Ultra Elite® Facepiece with bottom cover removed.



June 30, 2000

Michael T. Rupert
Product Line Manager, SCBA
Mine Safety Appliances Company
Pittsburgh, PA 15230

Dear Mr. Rupert,

At the request of MSA, Microbac Laboratories Inc. has completed the proposed microbial challenge study of typical facepiece-regulator combinations, for the purpose of enhancing firefighter safety.

Background:

Microbac Laboratories Inc. is a full service testing laboratory and consulting group, with 24 divisions across the United States. Microbac's Laboratories are certified or accredited by various national and international organizations, including NVLAP, A2LA, USDA, FDA, and NIOSH. In addition we hold over 90 state certification and accreditation's. Microbac also maintains memberships and active participation in many professional organizations such as the American Council for Independent Laboratories (ACIL), American Industrial Hygiene Association (AIHA), Association of Official Analytical Chemists (AOAC), the Institute of Food Technologists (IFT), and the American Chemical Society (ACS).

This study, conducted for MSA, was designed to determine the user protection provided by typical SCBA (self-contained breathing apparatus) facepiece-regulator combinations against cross-contamination by microorganisms. It is understood that users of SCBA are commonly issued individual facepieces, but share the use of second-stage regulators. Typically, the facepiece is easily and effectively cleaned in the field, however, the cleaning of second-stage regulators is more difficult and either is often not done, or ineffective. For this reason, it is of interest to understand the risk of transfer of microorganisms from an individual facepiece to a shared second-stage regulator. At the request of MSA, the company identity of the competitive designs evaluated in this study are not revealed in this report.

Methodology:

Three typical facepiece-regulator designs were chosen as follows:

- **Brand A**, (facepiece-mounted exhalation valve and no facepiece-mounted inhalation check valve)
- **Brand B**, (regulator-mounted exhalation valve and no facepiece-mounted inhalation check valve)
- **MSA**, (facepiece-mounted exhalation valve with facepiece-mounted inhalation check valve)

The test equipment used was a Biosystems PosiCheck breathing machine. Approximately 7 milliliters of a bacterial culture of *Streptococcus lactis* was standardized to a viable count in a sterile buffered solution and introduced into the facepiece using an in-line aerosol nebulizer. The aerosol nebulizer was located in the flow-channel between the headform and breathing machine to simulate pathogen microorganisms exhaled by a user.

The bacteria *Streptococcus lactis* was chosen for the experiment to eliminate the risks associated with handling pathogenic microorganisms, however the small cell size and morphology of this microorganism is representative of other disease-causing organisms.

All facepiece-regulator combinations were sterilized prior to testing. Swab samples were taken from the internal surfaces of each facepiece and regulator, before and after exposure to the aerosolized *Streptococcus lactis*. Exposure of the facepiece to the microorganism occurred only during the exhalation cycle of the breathing machine. Swab samples were plated following standard microbiological procedures and incubated for 48 hours. Following incubation, the samples were enumerated for growth of the *Streptococcus lactis* culture.

Swab samples taken from the regulators and facepieces before exposure to the culture served to establish sterility of the components. Samples taken from the internal surfaces of the facepieces after exposure to the culture served as the test control to establish the presence of the microorganism in the exhaled air. Lastly, samples taken from the internal surfaces of regulators following organism exposure (breathing machine test), served as the test variable. Any *Streptococcus lactis* detected in the regulator after the breathing machine test would indicate contamination of the regulator.

Results:

Brand A: (facepiece-mounted exhalation valve and no facepiece-mounted inhalation check valve)

- Regulator Before Sterile
- Facepiece Before Sterile
- Facepiece After 250 colony forming units *S. lactis* detected
- **Regulator After 220 colony forming units *S. lactis* detected**

Brand B: (regulator-mounted exhalation valve and no facepiece-mounted inhalation check valve)

- Regulator Before Sterile
- Facepiece Before Sterile
- Facepiece After 460 colony forming units *S. lactis* detected
- **Regulator After 310 colony forming units *S. lactis* detected**

MSA: (facepiece-mounted exhalation valve with facepiece-mounted inhalation check valve)

- Regulator Before Sterile
- Facepiece Before Sterile
- Facepiece After 360 colony forming units *S. lactis* detected
- **Regulator After zero colony forming units *S. lactis* detected**

Conclusions:

Based on the test results, the MSA facepiece-regulator combination was the only design type that prevented the entry of the *Streptococcus lactis* indicator organisms into the regulator. It is believed the inhalation check-valve is the unique feature of the MSA design that shielded the regulator from the microorganisms. All other facepiece-regulator types tested did not incorporate an inhalation check valve, and permitted the entry of the *Streptococcus lactis* indicator organisms, indicating a potential risk of contamination of regulators, which could result in the cross-contamination of SCBA users.

Thank you for choosing Microbac for your testing and analytical needs.

Sincerely,



Mark A. Matrozza
Vice President

Note: This bulletin contains only a general description of the products shown. While uses and performance capabilities are described, under no circumstances shall the products be used by untrained or unqualified individuals and not until the product instructions including any warnings or cautions provided have been thoroughly read and understood. Only they contain the complete and detailed information concerning proper use and care of these products.



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