Forward:

The threat of bioterrorism and emerging Infectious diseases are increasingly of great concern as we enter the 21st Century.

Recombinant DNA technology applied to bioweapons can yield drug resistant microorganisms that can overwhelm even the most advanced medical response units put in place since 9/11.

Nature can be the greatest of all bioterrorists and in combination with modern air travel can cause pandemics very quickly.

Isolation quarantines are age old responses that may or may not work and if the viral host is in an animal population, the viral infections may reoccur every winter season.

Wein Ionic generators have been designed to substantially reduce the concentrations and therefore the inhalation risk of ALL airborne bacteria and viruses and when used in a health care settings, can significantly enhance both surgical and respirator mask protection factors for all health care workers.

Even used by themselves these safe effective advanced ionic air purifies can reduce pathogen concentration in the breathing zone without masks.

We wish to thank Dr. Grinshpun and his dedicated staff of Aerosol Scientists for their excellent reports which will soon be published on this ground breaking research.

Stanley Weinberg
Chairman & CEO
Wein Products Inc.

**University of Cincinnati**
**Medical Center**

**Department of Environmental Health**
**University of Cincinnati**

May 23, 2003

Mr. Stanley Weinberg
Wein Products Inc.
115 West 25th St.
Los Angeles, CA 90007

Dear Mr. Weinberg,

You have requested a letter expressing my opinion as to whether the findings on the efficiency of your ion generating equipment, which has been tested in our laboratory, can be extrapolated to the SARS virus, the Anthrax bacterial spores, and the Smallpox virus. As I understand it, your request relates to two issues: (1) whether the aerosol concentration decrease observed in our tests with non-pathogenic particles is expected to occur with the above biological agents and (2) if so, would your air purifying equipment provide any meaningful degree of protection against airborne microorganisms causing SARS, Anthrax, or Smallpox.

With respect to the first question, it is my opinion that the aerosol concentration reduction, which we found earlier for test particles ranging from about 0.3 to 3 microns, can be extrapolated to any particles of this aerodynamic size range, regardless of their infectious characteristics. Furthermore, our recent preliminary study has shown that the above particle size range may be extended to lower sizes: below 0.04 μm (as measured by the ELPI). Thus, the entire tested particle size range covers the sizes of most airborne viruses and bacteria.

The next question relates to the evaluation of the protection efficiency against SARS and other diseases for which the airborne transmission has either been identified or anticipated. It is presently anticipated that the SARS-causing virus can potentially be transmitted via airborne routes, i.e. with the droplets from a human sneeze or cough. Generally, the sizes of single viruses range from about 0.04 to 0.3 μm. Aerosolized saliva droplets containing viruses may be one or two orders of magnitude greater. However, as some water content of these droplets evaporates rapidly, most of the virus-carrying particles fall into the size range of about 0.1 to 3 μm. This range has been tested in our experiments. Our data show that your ion generating equipment,

including the tested VI-2500 (stationary) and AS-150MM (wearable), should significantly reduce the concentration of droplets of 0.1 to 3 μm in the vicinity of the ionic air purifiers (at least, under the conditions tested of our laboratory). This reduction in the aerosol concentration should occur in the breathing zone of a person using your wearable ionic purifier and in a room in which your stationary unit is operating. The effect was found to be time-dependent and indoor air volume-dependent. The aerosol concentration reduction is especially pronounced in confined spaces and may vary considerably from one model/manufacturer to another, depending on the ion emission rate and other factors.

It should be understood that ionic air purifiers are not generally viewed as a way to replace personal masks or respirator filters. However, under certain conditions, the utilization of ionic devices may offer the same or comparable air purification efficiency as achievable with surgical masks and respirators while providing a greater comfort level for the wearer/user. It should be also understood that no claims must be made that your ionic air purifiers can fully eliminate the risk of inhaling airborne particles or prevent the transmission of infectious agents in indoor air. The reductions in airborne particle concentrations that we observed would, in my opinion, be useful in providing some degree of risk reduction against any disease for which the aerosol transmission is one of the infectious pathways. As a general principle, if the airborne concentration of a virus or bacteria is substantially reduced, the risk of contracting the disease through inhalation is also substantially reduced. In fact, for this very reason the conventional personal protective devices, such as personal masks and N95 respirators, are recommended by the US Centers for Disease Control and Prevention (CDC) and other agencies. The personal masks reduce the number of particles inhaled from the air contaminated with microorganisms (not aiming necessarily to achieve a zero-penetration). The airborne precautions were specified in the CDC document of May 1, 2003, entitled "Updated Interim Domestic Infection Control Guidelines in the Health-Care and Community Settings for Patients with Suspected SARS" (www.cdc.gov).

In the case of SARS, it is believed that aerosol transmission is one of the infectious pathways. During the CDC Telebriefing of May 15, Dr. Gerberding, the agency Director, stated: "there were opportunities for SARS virus to become airborne … it is imperative that we practice extreme vigilance in infection control precautions, that airborne contacts and standard procedures are appropriate in situations where patients with SARS are housed and that the droplet precautions that have been the primary focus need to be continue as well." She also stated: "we can't rule out the possibility of aerosol or airborne transmission, and so … we are emphasizing the extreme importance of vigilance to all levels of airborne protection" (CDC Telebriefing Transcript: Update on SARS, www.cdc.gov). The CDC recommended that the N95 respirator be used to protect against SARS transmission by the airborne route (Updated Interim Domestic Infection Control Guidelines in the Health-Care and Community Settings for Patients with Suspected SARS, www.cdc.gov).

The N95 respirator works by trapping at least 95% of airborne particles, thereby reducing the concentration of inhaled microorganisms. While based on a different principle and providing a time- and room-volume-dependent efficiency, the Wein ion generating equipment also reduces the concentration of aerosol particles in the breathing zone, thus providing a decrease in the exposure to indoor infectious aerosol agents.

Our ongoing manikin-based laboratory study addresses the situation when the respirator is being used in combination with an ionic air purifier operating in its vicinity. The aerosol concentration measurements are being conducted inside and outside the mask. The particle penetration

efficiency is determined as a function of time within the particle size range of 0.04 to about 3 microns. Among viruses and bacteria within this size range are coronavirus (SARS), which is between 0.06 to 0.22 μm, *Variola major* virus (Small pox), which is about 0.2 to 0.3 μm, and *Bacillus anthracis* bacteria (Anthrax), which is about 1 μm. The experiments have been set up in a room-size (25 $m^3$) indoor test chamber utilizing "physical" particles. The natural aerosol concentration decay is taken into account in our study design. The preliminary data obtained with an inhalation rate of 30 liters of air per minute revealed that a unipolar ion emission near the respirator significantly enhances its performance, especially for small submicrometer particles. The protection factor (the inverse of the particle penetration) of the N95 respirator with a perfect face fit was found to increase by about 50% due to the enhancement provided by the AS-1250 unit. When a more powerful VI-2500 ion emitter was operating near the manikin's face, the N95 protection factor increased more significantly allowing <1 % of aerosol particles to penetrate through the filter (instead of the 5% penetration threshold of the certified N95 respirator). Based on our preliminary data, I believe that the added electrostatic charges on the N95 fibers cause a significant enhancement effect (about 5-fold for the VI-2500 ionic purifier). I would expect this fiber-charge-driven enhancement effect to also manifest itself with other facemasks (e.g., with the common surgical mask that has lower collection efficiency than the N95 respirator). This statement needs to be experimentally verified. The laboratory tests involving surgical masks combined with ionic emitters are now in the planning stage with results expected in about two months.

I believe that when both effects (the indoor air concentration reduction and the respirator filter performance enhancement) are combined, the concentration of particles inhaled by a person wearing both a respirator mask and a Wein ionic air purifier would be reduced to a greater degree than if the person used the mask alone. This applies to all airborne particles in the tested size range.

Based on the currently available data, I would conclude that the aerosol concentration reduction, which results from operating the Wein ion emitters in indoor environments should further reduce the infection risk of airborne viruses or bacteria as compared to either completely unprotected breathing or to the inhalation protection provided by the N95 respirator alone. Depending on the infectious dose of a specific organism and its indoor aerosol concentration level, the risk reduction may be achieved for any agent within the size range of 0.04 to 3 microns, including coronavirus, Smallpox-causing virus and Anthrax-causing *B. anthracis* spores. I anticipate that the best results can be obtained when all the people in a room use ionic purifiers and wear personal protective mask. This should increase the overall efficiency for each individual exposed to an indoor air contaminant and minimize the cross-contamination effect.

I recognize that although the major transmission route for SARS is still to be identified, it is presently thought to be spread by touch as well as by the aerosol transmission. Thus, reducing the concentration of airborne particulates should reduce the risk of infection. According to E.A. Nardell and J.M. Macher (Respiratory Infections – Transmission and Environmental Control – Chapter 9; IN: Bioaerosols: Assessment and Control, ACGIH, 1999), "the expected number of cases among a given number of susceptible persons is proportional to the average concentration of infectious droplet nuclei in a room and the probability that the particles will be inhaled" (p. 9-6). Among the measures that can prevent or reduce airborne infection, the above experts list the control of the concentration of infectious agents in potential sources and maximizing removal rates of airborne infectious aerosols through dilution ventilation and use of air cleaners (p. 9-11). Numerous recently published documents, including the WHO (www.who.int) and CDC

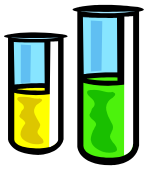
(www.cdc.gov) guidelines and recommendations, some of which were already quoted in this letter, as well as other materials (e.g., the SARS Clinical Information Sheet issued by the Johns Hopkins University on April 24, 2003), support this viewpoint.

I understand that the ions emitted from your purifiers charge aerosol particles and these particles move toward indoor surfaces and deposit on them. This suggests that the surface cleaning issue should be properly addressed when the equipment is used. As I have previously stated, the surface decontamination seems to be a less complex task than the air cleaning when the latter is done at very high efficiency levels. Although the particle resuspension from surfaces is generally acknowledged as a potential air contamination source, the efficiency of reaerosolizing viruses and bacteria is believed to be very low because of their small size. For infectious aerosols, "particles that contact a surface are assumed to adhere to it" (Nardell and Macher, p.9-10). The charged particles are especially difficult to resuspend. From my perspective as an aerosol scientist, it is of a primary importance to significantly reduce the aerosol concentration of infectious particles, which will subsequently decrease the probability that these particles would be inhaled and – as a result – will reduce the risk of adverse health effects.

Let me know if you have further questions.

Sincerely,

Sergey A. Grinshpun, Ph.D.
Director, Center for Health-Related Aerosol Studies



**Alexander Zakhartchouk, Ph.D., D.V.M.**

**Research Scientist (II)**
**Vaccine and Infectious**
**Disease Organization**
**University of Saskatchewan**

**Marat Khodoun, PhD.**

**Research Fellow**
**Cincinnati Children's Hospital**
**Medical Center,**
**Research Foundation, Division of**
**Developmental biology,**

June 5, 2003

Mr. S. Weinberg, CEO
Wein Products Inc.
115 West 25th St.
Los Angeles, CA 90007

Dear Mr. Weinberg:

This letter is written in response to your request and expresses our professional opinion regarding physical and biological properties of the coronavirus, its infectious pathways, and possible methods to decrease the risk of infection in indoor environments. In March 2003, a novel coronavirus was discovered in association with cases of severe acute respiratory syndrome (SARS).

Both of undersigned (AZ and MK) were trained in virology, molecular biology and infectious diseases. Dr. A. Zakhartchouk has an extensive expertise in virology. He has published 19 peer-reviewed papers on various aspects of virology and is currently engaged in research on SARS vaccine development at the Vaccine and Infectious Disease Organization, University of Saskatchewan, Saskatoon (Canada). Dr. M. Khodoun has 7 years of experience in molecular diagnostic research and is currently employed at the Children's Hospital Medical Center in Cincinnati (USA).

Coronavirus virions are spherical, enveloped virus particles, ranging from 80 to 160 nm in diameter. They may become airborne through the aerosolization of the body fluids and transmitted in the air while being carried by larger droplets (for example, with saliva aerosolized during cough and sneeze). Similar to the previously known coronaviruses, the newly-emerged SARS-associated coronavirus is also transmitted by droplet spread. The combination of a surface contamination and,

possibly, an airborne spread may play a role. Recent data suggest that the virus may remain viable for considerable periods on a dry surface (up to 24 hours).

The discovery of a novel SARS-associated coronavirus provides a dramatic example of an emerging disease in humans caused by a coronavirus family. Although previously discovered and characterized human coronaviruses cause up to 30 per cent of colds, they rarely cause a lower respiratory tract disease. In contrast, animal coronaviruses cause devastating epizootic of respiratory or enteric diseases in livestock and poultry. However, phylogenetic analyses and sequence comparisons showed that SARS-associated coronavirus is not closely related to any of the previously known coronaviruses.

Since the coronavirus, like many others viruses, can be transported in the air as aerosol particles, the risk of infection spread is proportional to their aerosol concentration. Depending on the ID50 and other factors, this risk can be drastically decreased if the viral particle concentration in indoor air is reduced. The use of indoor air cleaners and personal respirators is believed to be an adequate measure for the risk reduction.

We hope this information will be of your assistance.

Sincerely,

Alexander Zakhartchouk, Ph.D., D.V.M.
Research Scientist (II)
Vaccine and Infectious Disease Organization
University of Saskatchewan

Marat Khodoun, PhD.
Research Fellow
Cincinnati Children's Hospital Medical Center,
Research Foundation, Division of Developmental biology,

Prepared by Dr. Sergey A. Grinshpun, July 29, 2003

After the VI-2500 air purifier operates continuously for 15 min in a 25 $m^3$ room, the concentration of submicron particles in this room decreases by a factor of 6. The overall protection factor of a surgical mask, enhanced by the ionic purifier, is about 30 (this takes into account the finding that the considerable improvement of the filter characteristics was partially suppressed by the leakage effect, see Phase 2 results). Thus, the number of submicron particles inhaled by a person is reduced by a factor of 6x30=180, instead of about 4 provided by a surgical mask alone. The air volume inhaled during a one-hour exposure is 1.8 $m^3$ assuming that the breathing rate is 30 LPM. Some examples are presented below. The green color indicates that the estimated number of bioagent particles is below ID50; the red color indicates that the estimated number is above ID50.

| **INFECTIOUS AGENT (inhalation route)** | **TYPE** | **ID50** | **AIRBORNE MICROBIAL CONCENTRATION, $M^{-3}$** | **ESTIMATED NUMBER OF ORGANISMS INHALED DURING 1 H AT 30 LPM** | | |
|---|---|---|---|---|---|---|
| | | | | **UNPRO-TECTED** | **SURGICAL MASK ALONE** | **SURGICAL MASK + VI-2500** |
| Venezuelan Equine Encephalitis | Virus | 10 – 100 | $10^2$ | **180** | **45** | **1** |
| | | | $10^3$ | **1,800** | **450** | **10** |
| Coxsackie A21 | Virus | 18 | $10^2$ | **180** | **45** | **1** |
| | | | $10^3$ | **1,800** | **450** | **10** |
| Influenza A-min or simulants | Virus | 80 | $2 \times 10^2$ | **360** | **90** | **2** |
| | | | $10^3$ | **1,800** | **450** | **10** |
| Influenza A2-max | Virus | 790 | $2 \times 10^3$ | **3,600** | **900** | **20** |
| | | | $10^4$ | **18,000** | **4,500** | **100** |
| *B. anthracis* | Bact. | 8,000 – 15,000 | $4 \times 10^4$ | **72,000** | **18,000** | **400** |
| | | | $10^5$ | **180,000** | **45,000** | **1,000** |

**University of Cincinnati**
**Medical Center**

**Environmental Health Foundation**
**Department of Environmental Health**
**University of Cincinnati**

June 27, 2003

Mr. Stanley Weinberg
Wein Products Inc.
115 West 25th St.
Los Angeles, CA 90007

Dear Mr. Weinberg:

This memo is to summarize the results of the Phase 1 tests that have recently been performed with surgical masks sealed to a manikin (with an absolute fit, i.e., no leakage). In this memo, I would also like to inform you about some preliminary findings of Phase 2, which was initiated to test the masks worn on a subject (the Phase 2 study design enables us to address the leakage issue).

**Phase 1.** This phase included the following:

- the indoor air cleaning efficiency evaluation of your five products, such as VI-2500, AS150MM (positive and negative), AS1250, and Sanimate-250B, conducted with the ELPI in a virus-size range;
- the filter performance tests conducted with N95/R95 respirators sealed on a manikin when operating in the presence of high ion flows emitted by your products; and
- the latter tests conducted with surgical masks.

The indoor air cleaning efficiency data for all the Wein ionic purifiers tested with the ELPI have been submitted to you earlier. The indoor aerosol concentration decreased significantly due to the ionization, especially when using the VI-2500 air purifier: a 30-minute operation of this air purifier

in a typical room (volume = 25 $m^3$) removed about 97% of 0.1 μm particles and about 95% of 1 μm particles from the air. You have also received the data on the performance of the N95/R95 respirators sealed to a manikin, which demonstrated an ionizer-driven improvement of the filter collection efficiency by a factor ranging from 1.6±0.1 (AS1250) to 4.5±0.7 (VI-2500).

My report below is focused on the performance of surgical masks operating with the Wein air purifiers.

First, we tested a 3M surgical mask (Model 1838, widely used, very popular) that was perfectly sealed on the manikin face and operated at the inhalation flowrate of 30 L/min. The collection efficiency was about 80% for submicron particles, including the virus-size range of 0.04 to 0.21 μm that was specifically targeted. This 80% efficiency translates into a protection factor of 5. The protection factor (also referred to as the fit factor, American National Standard – Fit Testing Method, ANSI Z88.10-2001, p.1) is the ratio of the aerosol concentration in the breathing zone outside the mask to that inside the mask. The factor is generally particle size dependent. The most penetrating particle size range is about 0.1 to 0.3 μm. Once the VI-2500 was switched on, the protection factor started increasing and exceeded the level of 70 in about 3 minutes of the ionizer's operation (the average value during this time interval). It jumped to about 400 in 6 min and continued further increasing with the time (although at a lower rate). The above effect exclusively represents the enhancement of the performance of the respirator filter material. The rapid decrease of the ambient concentration due to the VI-2500 was taken into account when determining the protection factor. The AS150MM units (positive and negative) have also demonstrated a considerable enhancement effect: the protection factor increased from about 5 at t=0 to over 70 at t=3 min and was relatively stable at the level of 70 to130 at t = 6-12 min. The AS1250 showed some enhancement as well; however, the effect was weaker (the reason was previously discussed with you).

Overall, we are excited to see the filter performance effect of this magnitude, although it is understood that Phase 1 was set to test the masks in a perfect fit condition while the surgical masks have generally a very poor fit potential.

**Phase 2**. This phase was initiated to address the leakage issue. Indeed, in a real life the protection factor depends on the particle penetration through the respirator filter material as well as on the

particle penetration through the leakage. The leakage of some size always exists between the face surface and the filter. The face/body movement increases the potential of the particle penetration through the leakage. The standard fit test is performed to determine an individual's ability to obtain an adequate seal with a specific respirator. For instance, the fit test performed with the N95/R95 facepiece respirators using the Portacount (TSI, Inc.) is supposed to check whether these respirators fit well enough so their overall collection efficiency exceeds the 95% threshold (protection factor >20). If the filter material is very efficient and creates a good barrier, the aerosol tends to flow through a leak, especially if the pressure drop through the filter is high. Once the collection efficiency of a filter material significantly increases (e.g., >>95%), the potential of the particle penetration through the leakage may increase tremendously (as the pressure drop change may result in a rerouting of the aerosol flow). Under certain conditions, this pathway may become a primary one. Therefore, it is important to run the tests not only with a manikin with a sealed mask but also with a human subject, using the Portacount as the standard method. The exploratory part of Phase 2 was performed in collaboration with Dr. Roy McKay who actually conducted the fit testing of the 3M-1838 mask on me since I volunteered to be a subject. The standard fit testing protocol, which utilized the Portacount, included numerous procedures (normal and deep breathing, moving the face and the body left and right and up and down, talking, etc.).

The initial protection factor of the 3M-1838 surgical masks was found to range from 3.5 to 4. These values are slightly lower than those obtained in our Phase 1 experiments carried out with the mask sealed on the manikin. The difference points to the leakage effect. The protection factor determined increased to about 30 ($t \approx 9$ min) when the VI-2500 was operating, thus turning a surgical mask with a poor fit and relatively low filter efficiency into an N95-level respirator in terms of its collection characteristics. Indeed, the collection efficiency of the surgical mask exceeded 95% due to VI-2500. The AS150MM unit demonstrated the ionizer-driven improvement of the efficiency from 3.5 to about 9. The enhancement of the mask overall performance was lower than that observed with a more powerful VI-2500 but still significant: almost 3-fold.

The data suggest that the leakage represent a clear limitation of the respirator performance enhancement effect, which could have been over an order of magnitude greater if the mask's fit was perfect. We did not observe any fit improvement due to the ionization. Thus, we could not expect a perfect fit from a surgical mask because of its design. We anticipate that the average leak size remained about the same while the filter material exhibits a much better protection due to the

ionization. It is believed that since the particles and the filter fibers charged unipolarly by the ions, the repelling forces decreased the particle flow toward the filter. This consequently reduced the number of particles that could potentially penetrate through the mask and be inhaled. In spite of the fit factor limitations, the overall performance of a surgical mask against virus-size particles seems to drastically improve due to the constant ion flow produced by the VI-2500 and AS150MM.

In addition to our tests with the surgical masks on a human subject, we conducted one run with the R95-type respirator that fits to the face much tighter than a surgical mask. Due to its rigid periphery, it can be easily adjusted to a specific shape and thus has a better fit potential. When operating the VI-2500 located at a distance of 40 cm from the human face, the overall protection factor demonstrated a 4-fold increase, exceeding 1000 for certain procedures (normal breathing and deep breathing). The above improvement of the respirator performance agrees well with our Phase 1 results obtained with this respirator sealed on a manikin (4.5±0.7). The slight difference can be attributed to the leakage. The leakage effect was not as significant for the R95 respirator as the one observed for a surgical mask.

It is understood that the above-described Phase 2 findings are preliminary and we are interested in continuing this phase beyond the exploratory level.

The above-summarized data are being further analyzed from the statistical viewpoint and presented in a non-dimensional graphical form. The detailed data report on Phase 1 and the above-summarized data on Phase 2 will be submitted to you within a week.

All the objectives and specific aims proposed for Phase 1 and the exploratory stage of Phase 2 have been met. Two issues were addressed beyond the work scope, originally outlined for Phases 1 and 2 (see below).

**Air cleaning, exposure to infectious agents and overall risk reduction:** We have concluded that an ionic air purifier exhibits two mechanisms, which decrease the number of infectious particles inhaled by a person wearing a respirator mask: the reduction of the indoor concentration upstream of the respirator and the enhancement of the respirator performance. The sample estimate presented below exemplifies the cumulative effect resulting from these two mechanisms. The calculations

were performed based on the data obtained with the VI-2500 unit. *Please keep in mind that this is only estimation but not a full-fledge risk assessment!*

After the VI-2500 air purifier operates continuously for 15 min in a 25 $m^3$ room, the concentration of submicron particles in this room decreases by a factor of 6. The overall protection factor of a surgical mask, enhanced by the ionic purifier, is about 30 (this takes into account the finding that the considerable improvement of the filter characteristics was partially suppressed by the leakage effect, see Phase 2 results). Thus, the number of submicron particles inhaled by a person is reduced by a factor of 6x30=180, instead of about 3.5 - 4 provided by a surgical mask alone. Let us assume that the concentration of influenza virus in an indoor environment is 1000 $m^{-3}$. Its infectious dose, ID, is 79 viruses (inhaled). The air volume inhaled during one hour is 1.8 $m^3$ assuming that the breathing rate is 30 L/min. Thus, an unprotected person will inhale 1,800 viruses (> ID50); the person wearing the surgical mask will receive 1,800/4=450 viruses (> ID50); and a person walking into a room where the VI-2500 was operating for about 10 min will inhale about 1,800/180=10 viruses (< ID50). This example shows the potential of the ionic air purifiers for the exposure reduction when they are used together with respirator masks. More comprehensive assessments that include infectious characteristics of other viruses/bacteria can be performed upon your request.

**The ion emission rate and the aerosol particle mobility (or how much should the ion production rate be increased?)**. The particle charges were measured in our experiments with the ELPI in its charge distribution mode (the software was obtained from Dekati, Inc., Finland). The particle charge distribution was also assessed using the diffusion charging theory (described by Hinds in his "Aerosol Technology" book, 1999, Chapter 15). The experimental and theoretical data are in a good agreement. It was found that the particle charging level is close to the highest possible. In my opinion, this aspect deserves to be further investigated. There is a saturation charge level for every particle size. The performance of ionic air purifiers depends on the particle mobility, which is a complex function of their size and charge. Ideally, any newly-developed ionic air purifier should be evaluated as to its ion emission rate. If this rate is too low, it may be insufficient to drastically affect the particle mobility. On the other hand, starting from a certain level, any further increase in the ion production will probably not affect the air cleaning performance since the aerosol particle charging has essentially reached a plato. In the latter case, a constant supply of ions is needed to maintain the air cleaning efficiency level, but the performance would not improve if the

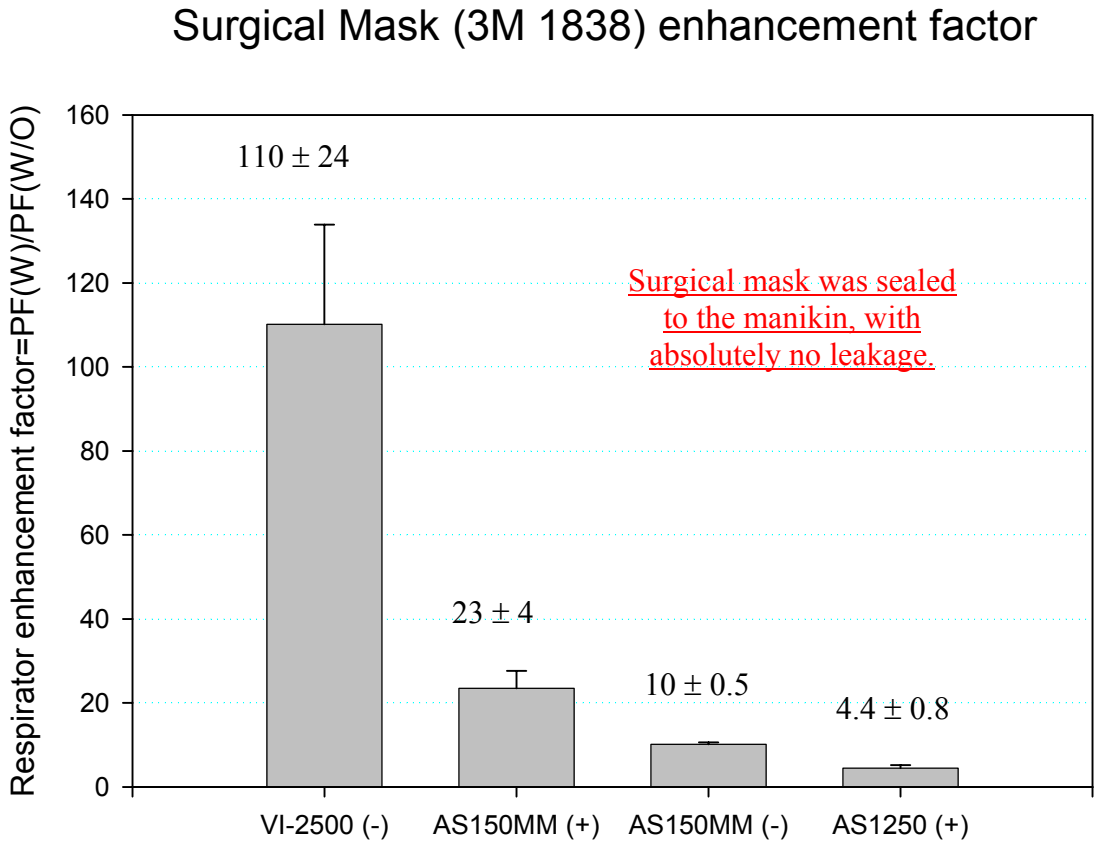
ion concentration increases. Thus, it is important to know how much effort should be devoted to the increase of the ion flow emitted by a specific model.

Please let me know if you have any questions. We are certainly excited about our findings and look forward to working with you further on Phase 2. Dr. McKay has agreed to continue collaborating on the project if so requested.

Best regards,

Sergey A. Grinshpun, Ph.D.

* Enhancement factor – summary (four ionizers in one plot)




PF(W) = Surgical mask protection factor with ionizers, 9 min operation (VI-2500), 3 min operation (AS150MM (+), AS150MM (-), AS1250).
PF(W/O) = Surgical mask protection factor without ionizers
Surgical mask protection factor was measured for the viral particle size range(0.04 – 0.2μm). Protection factor was based on decaying ambient aerosol concentration, therefore what is presented here is

"PURE ENHANCEMENT EFFECT OF THE FILTER PERFORMANCE DUE TO THE AIR IONIZATION".

DR. GABOR LANTOS
P.Eng M.B.A M.D.

OCCUPATIONAL HEALTH MANAGEMENT SERVICES
Toronto • Barrie • London • Vancouver

January 16, 2004

Mr. Stanley Weinberg
Wein Products Inc.
115 West 25th Street
Los Angeles, CA 90007

Dear Mr. Weinberg:

You have asked me for my professional opinion regarding the potential use of the Wein Air Supply Ionic Air Purifiers as adjunctive self-protection for healthcare workers and for other individuals who might be contacts of the SARS virus or other infectious agents.

As an Occupational Health consultant to many of Toronto's teaching hospitals I have been much involved with containing the recent SARS outbreaks and have made both private and public submissions to the Ontario Commission to Investigate the Introduction and Spread of SARS in Ontario (www.sarscommission.ca My own submission of November 17th begins on page 165 of the transcript).

For the reasons that follow, it is my professional opinion, both as a professional engineer and as an occupational physician, that both the room-size and the neck-worn air purifiers can be of significant benefit in mitigating the risks from SARS, as well as from other common airborne pathogens such as the "common cold" coronaviruses, tuberculosis, and Influenza A & B.

Current medical knowledge about SARS is not adequate for prevention and is not reliable for treatment. Immunoprophylactic means do not yet exist and early therapeutic trials for the afflicted have been ineffective and even harmful. Until such time as effective immunizations and/or therapies are developed and readily available, the emphasis must be on **preventative** measures.

The successful containment of the SARS outbreaks was predicated on Public Health interventions, Environmental Controls, and Personal Protection Equipment. Traditional Infection Control policies and procedures were insufficient. As per a recent CDC publication (Emerging Infectious Diseases Vol. 9, No. 10, October 2003): "To prevent the spread of SARS we...implemented strict respiratory and contact precautions...".

2/...

DR. GABOR LANTOS
P.Eng M.B.A M.D.

OCCUPATIONAL HEALTH MANAGEMENT SERVICES
Toronto • Barrie • London • Vancouver

The World Health Organization's investigation of Hong Kong's Amoy Garden Apartments revealed how the infection was spread via interconnected airstreams throughout the building.

The rationale for the use of Ionic Air Purifiers is that ion emission reduces the concentration of airborne particles. Aerosolized pathogens and contaminated airborne droplets become charged and precipitate on nearby surfaces; no longer to be inhaled. Early studies conducted by the UCLA Department of Microbiology simulated the airstream characteristics of human breathing, "mimicking real-life usage" of the neck-worn instrument. They showed a "consistently reproducible", 90% reduction of airborne bacteria. Dr. Spira, the medical director, opined that "...by virtue of the experiments we have conducted, the results suggest that we could significantly reduce the risk of pneumonia – especially those contracted in hospitals".

This last statement is particularly noteworthy given the fact that at least half of the SARS cases in Toronto were acquired in hospitals (nosocomially).

Later research conducted at the University of Cincinnati Medical Center's Division of Environmental and Industrial Hygiene/Health Related Aerosol Studies were published in the peer-reviewed Journal of Aerosol Science Vol.32, S1, September 2001, and subsequently presented at the European Aerosol Conference in Germany. It was found that depending on particle size, operational time, and other variables, anywhere from 79 - 97% of particles were removed from room air. This size range includes particles of bacteria, molds, and viruses. The most recent Summer 2003 studies by the lead authors Drs. Grinshpun and MacKay showed that whereas a surgical mask alone reduced by 75% the total number of inhaled organisms, the combination of a surgical mask **and** the VI-2500 room air purifier resulted in a 99.5% reduction of inhaled infectious particles.

Respirators(masks) and ionic air purifiers used together create a **synergistic system.** Not only does the air purifier reduce the upstream concentration of particles, but it also enhances the filtering performance of the respirator because charged particles are more effectively filtered than are electrically neutral ones. There are well known difficulties with the sourcing, securing, fitting, and wearing of N95's. The effectiveness of a standard surgical mask together with an ionic air purifier is equal to or greater than that of an N95 alone.

3/...

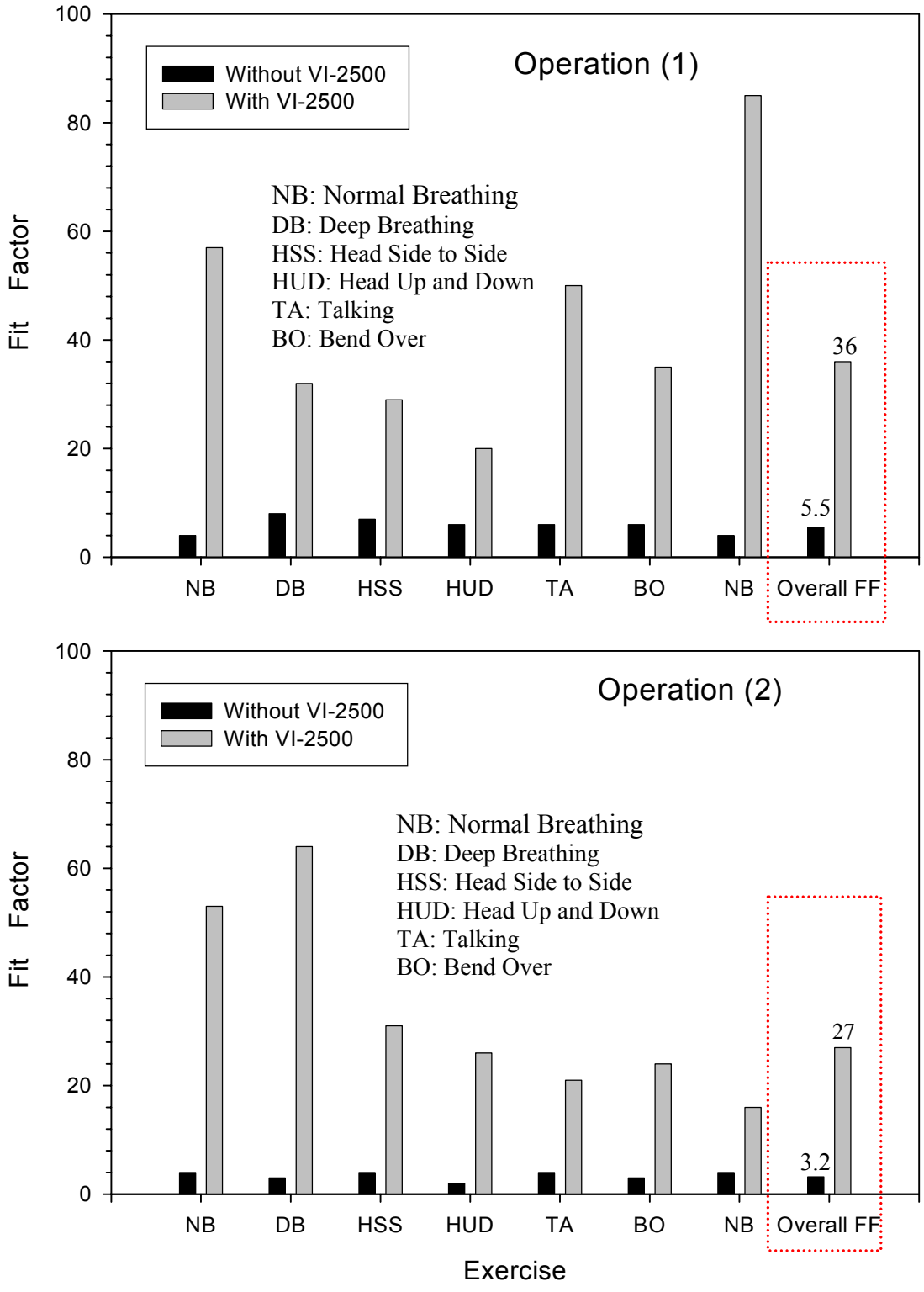



**Figure 8. Surgical mask (3M1838) fit factor determined with a human subject (Portacount measurement, VI-2500 operation).**

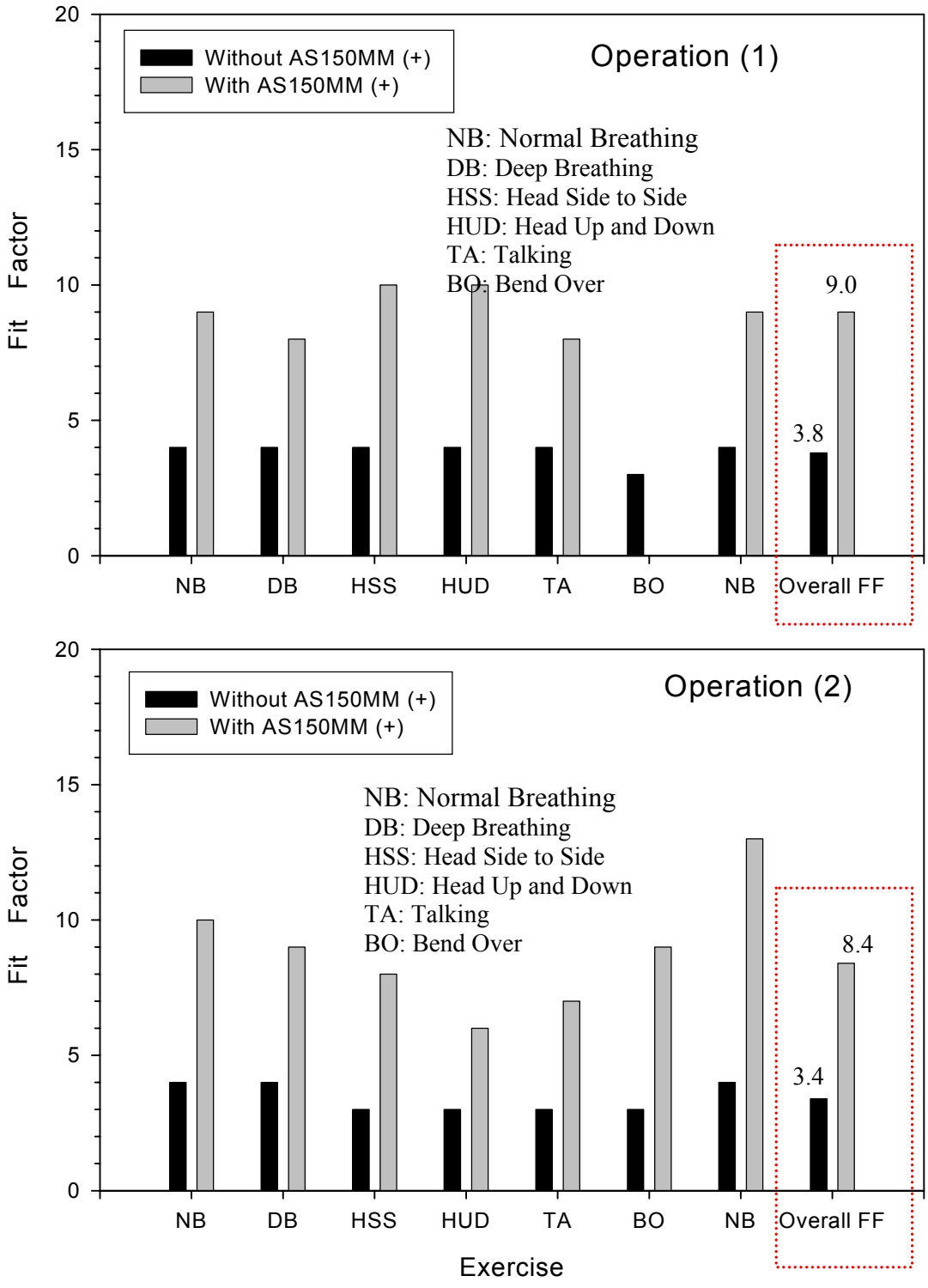



**Figure 9. Surgical mask (3M1838) fit factor determined with a human subject (Portacount measurement, AS150MM (+) operation).**