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**NIOSH Docket Office
Robert A. Taft Laboratories, M/S C 34
4676 Columbia Parkway
Cincinnati, OH 45226**

Los Angeles, 29 October 2002

Dear NIOSH Docket Office,

*Subject: NIOSH/NIST/SBCCOM Public Meeting at Hilton Garden Inn, Canonsburg, PA October 16-17, 2002.
September 16, 2002 DRAFT Concept for CBRN Full Face piece Air Purifying Respirator Standard.*

It is very encouraging to see how far this new standard has come in such a short period of time.

I am in particular pleased to see that we have acknowledged that it is likely that first responders will work at a work rate where their oxygen requirement forces their minute volume to 100 liters/minute.

Some tests have been done to confirm that the absorbing part of the filter can handle this flow by using a breathing machine set on 100 liters volume as a sinus curve. This gives a Peak Inhalation Air Flow (PIAF) of 314 liters/minute.

Some more tests are scheduled to also confirm that the adsorbing (ammonia, acids) part of the filters is handling this flow rate.

What remains to be done is to confirm that the filtration of particulates is satisfactory at this higher flow rate.

This is of great importance, as we know that all materials used to filter particulates are velocity dependent, meaning that any increase of flow above the testing flow rate will decrease the performance (some types more, some less).

And last but not least, the physiological burden of simply breathing through the entire assembly at those elevated flow rates must be considered if we want this new standard to mean anything to the First Responder Community.

It was clearly spelt out in the RAND publication *Protecting Emergency Responders: Lessons Learned from Terrorist Attacks*, quoting from page xii:

“For almost all protective technologies, responders indicated serious problems with equipment not being comfortable enough to allow extended wear during demanding physical labor. It was frequently observed that current technologies require a tradeoff between the amount of protection they provide and the extent to which they are light enough, practical enough, and wearable enough to allow responders to do their jobs.”

As we all know, we can't allow a trade-off if it means that we don't wear the respirator because we can't breathe through it, talk through it, or see through it.

Another quote, this time from page 23:

“Several of the firefighters at the World Trade Center who inhaled large quantities of dust during the collapse of the towers opted for paper masks because they felt that any increased respiratory burden of breathing through an APR was too much.”

This, if anything, underlines the importance of the overall breathing resistance of the APR, and it should be limited to what a human can physiologically handle at the elevated work rates required in order to perform these tasks.

There was a preliminary report presented at this meeting by Dr. J. Kaufman of NAVAIR, confirming a PIAF of 200–300 liters when performing rescue tasks while wearing an M40 with NBC filter. These tests were performed by US Marines.

Last week at the CEN meeting in Portugal, there was another presentation by Ingvar Holmér from the Department of Ergonomics at the National Institute for Working Life in Solna, Sweden.

Holmér's presentation covered moderate work levels during various exercises. He also introduced talking as part of the test. He measured average PIAF of 150–200 liters/minute and maximal PIAF of 300–400 liters/minute.

He also measured what proportion of the total inhalation involved air flow rates higher than 90 liters/min. Those values were frequently up to 80–90% of the whole inhalation cycle. I will attach his report as part of this letter.

Yours Sincerely,

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Joint Managing Director
The SEA Group

Attachment; PDF File, Resp_flow_MSW.pdf by Ingvar Holm'er.