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Subject: St. Regis Hotel Tests – April 26, 2006



Ozone tests were carried with the ViroForce prototype using a room in Vancouver's classic heritage hotel, the St. Regis Hotel, as a test cabin. This room is thought to be representative of the size of a typical cruise ship cabin. The windows and vents of the room were sealed with polyethylene film prior to the tests.



The ozone generator/scrubber prototype was placed within the main room near its entrance door (photo to the right, above), while the rapid humidifier prototype was placed on the floor near the entrance to the bathroom (photo to left). A large fan circulated air, from the bathroom, above and over the humidifier (photo to right).



The ozone generators/scrubber and humidifier were actuated from outside of the room, after the test pathogens were placed in the room at random locations and the room was

sealed. The ozone concentration, humidity and temperature within the sealed room were also monitored from outside.

The planned test sequence was as follows:

1. Turn on the ozone generators until the room O₃ concentration reached 25 ppm.
2. Turn on the rapid humidifier for at least 4 minutes or until the humidity peaked.
3. Let the room “soak” for 15 minutes (everything turned off).
4. Turn on the scrubber until the ozone concentration within the room was reduced to a safe level of 0.25 ppm, then unseal the room and retrieve the pathogen samples.

The ozone generators flooded the room at a calculated rate of 11.3 g/hr of ozone. It took approximately 25 minutes to attain a desired ozone concentration of 25 ppm in the room. The ozone generators were then shut off and the rapid humidifier was turned on until it was empty; this took about 4.6 minutes. During this brief time the O₃ concentration went from 25 ppm down to 16.6 ppm and the relative humidity rose from 26.9% to 95%.

A total of 1,575 grams of moisture was added to the room air during the humidification process. Of this, 712 grams rapidly condensed onto the room surfaces (including the surfaces of the pathogens). It is estimated that the average layer of condensed water was 2 nanometers thick (about 7 water molecules thick).

During the 15-minute “soak” period the ozone concentration within the room dropped from 16.6 ppm down to 3.8 ppm, while the relative humidity went from 95% down to 70%. It is expected that most of the ozone was transferred to the previously mentioned water layer wherein it would be partially converted to the highly reactive hydroxyl radical, which is one of the most potent of germicidal agents available.

Computer modeling showed that ozone deposition to the room surfaces was enhanced by the elevated humidity, by approximately a factor of two. The low residual ozone level remaining after the “soak” period is reflected in the short time required to scrub the ozone down to a safe level, wherein the sealed room could be opened. The scrubber operated with a calculated efficiency of 100% and reduced the ozone concentration from 3.8 ppm down to a safe value of 0.26 ppm in 12 minutes.

The measured (experimental) data for the four different test periods that were discussed above are summarized in the table on the following page.

In conclusion, the tests at the St. Regis Hotel on April 26, 2006 were a success in that they validate the engineering and design of the ViroForce ozone generator/scrubber prototype and rapid humidifier prototype.

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April 27, 2006

St.Regis Hotel Testing - April 26, 2006			
Ozone Generators On			
Time (minutes)	Measured O₃ Concentration (ppm)	Room Temperature (C deg.)	Relative Humidity (%)
0	0.0	26.8	26.7
1	0.6		
3	4.9		
6	8.8		27.1
11	14.2		
21	22.6	25.3	26.9
25	25.7		
Rapid Humidifier On			
Time (minutes)	Measured O₃ Concentration (ppm)	Room Temperature (C deg.)	Relative Humidity (%)
0	25.7	25.3	26.9
1	25.6	25.6	35.7
2	23.0		62.0
3	21.4		75.0
4	19.2		82.0
4:34	16.6	26.3	95.0
Soak Period			
Time (minutes)	Measured O₃ Concentration (ppm)	Room Temperature (C deg.)	Relative Humidity (%)
0	16.6	26.3	95.0
1	14.9	26.3	94.0
4	11.2	26.3	85.0
7	8.1	26.3	80.0
10	6.1		73.7
13	4.5		70.4
15	3.8		69.5
Scrubber On			
Time (minutes)	Measured O₃ Concentration (ppm)	Room Temperature (C deg.)	Relative Humidity (%)
0	3.8		69.5
1	2.7		68.3
5	1.1		
8	0.6	26.0	57.8
12	0.3		