



awions[®] alfawater

Bi-polar Ions Technology

Natural healthy indoor air...



Ions Concentration in Nature

Natural air has a fresh, revitalizing quality, thanks to cleaning effects of natural ions generated by sun, winds and sea water

Ions are nature's way of purifying and disinfecting air by controlling the spread of mold, bacteria and viruses



Coastal Area
50,000 ions/cm³



Seaside
5,000 ions/cm³



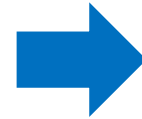
Mountains
15,000 ions/cm³



Countryside
2,000 ions/cm³



Cities
500 ions/cm³



Room Interior
< 100 ions/cm³



**The more pollution
the less natural ions**



Allowed Ions Concentration

Standards allow ion concentrations as they are found in nature: up to 50,000 ions/cm³

SanPiN (Sanitary and Epidemiological Norms) 2.2.4.1294-03

Normal quantity	Concentration n+ (ion/cm ³)	Concentration n- (ion/cm ³)
Minimum acceptable	n+ >= 400	n- >= 400
Maximum acceptable	n+ < 50,000	n- < 50,000



AWIONS SAFETY

SAFETY IS ASSURED:
AWIONS ions are the
same type of
airborne ions
occurring in nature

Safety evaluation testing

Purpose	Test name (abbreviated)	Ion concentration setting at which irritation may occur
Skin irritancy	Acute skin irritancy and corrosivity testing	Approx. 1 million/cm³
Eye irritancy	Acute eye irritancy and corrosivity testing	Approx. 13 million/cm³
Genotoxicity	Inhalation toxicity testing (assessment of genetic impact on lung tissue)	Approx. 7 million/cm³

Testing facilities: Mitsubishi Chemical Medience Corporation

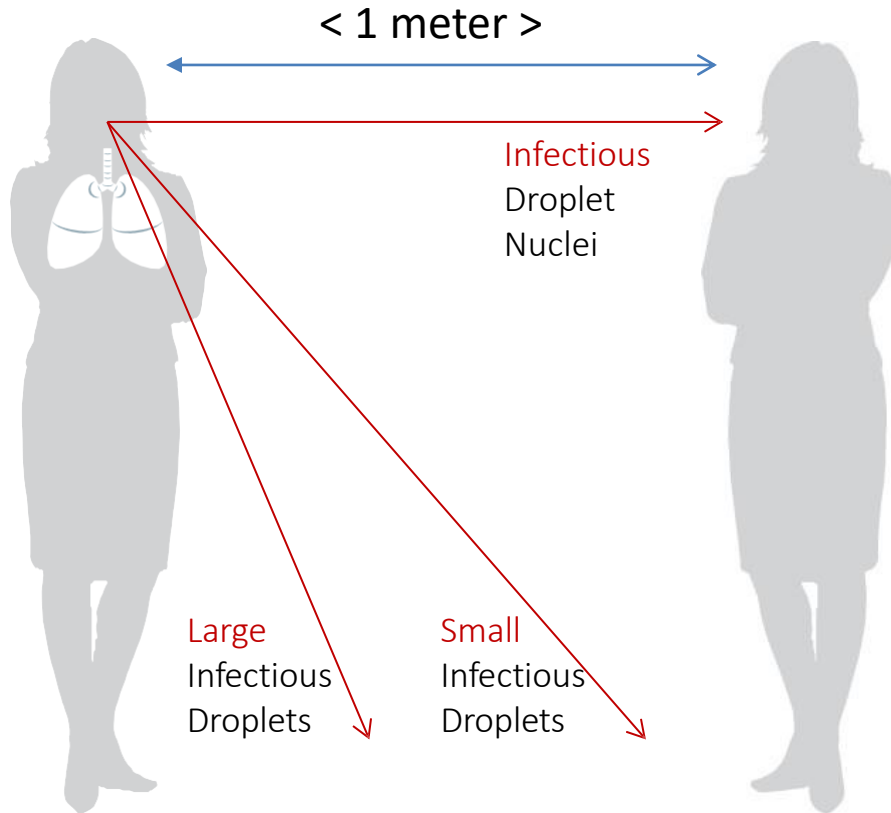


Indoor Air Quality (IAQ) affects each and every one of us,
regardless of where we live

We spend over **90%** of our time indoors!

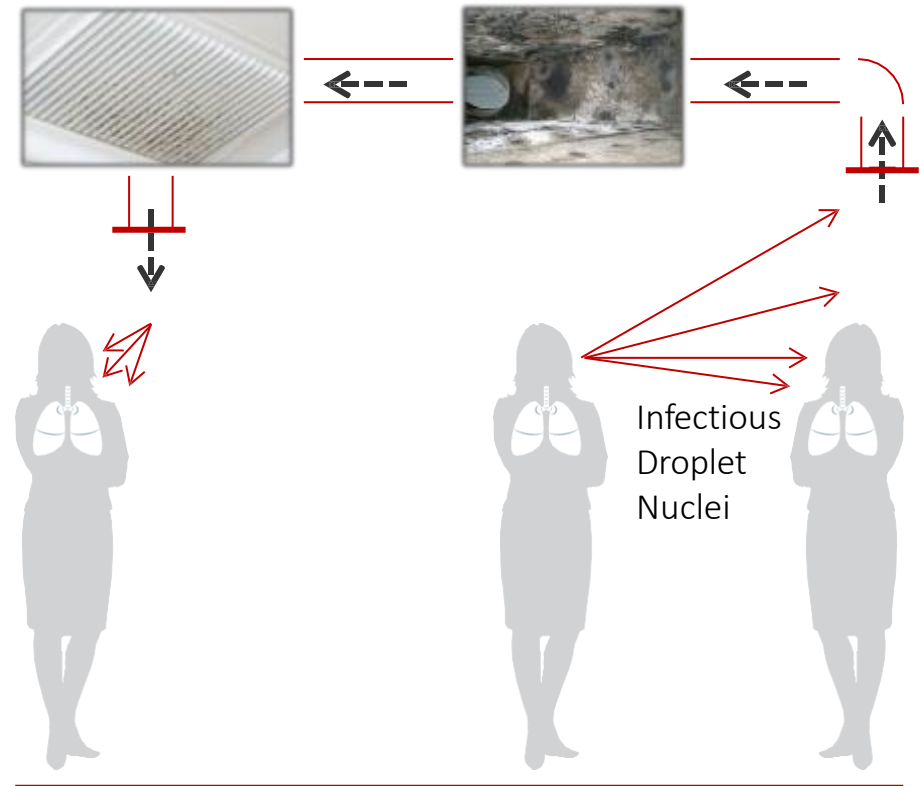
The US Environmental Protection Agency lists poor indoor air
quality as the fourth largest environmental threat to the country

65% of colds are contracted at home



Infectious droplets
& droplet nuclei
travel within rooms

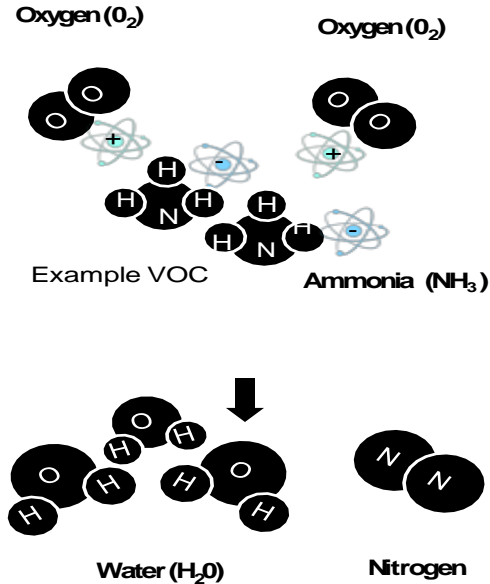
Droplet Nuclei
travel within
buildings
through the air
duct system



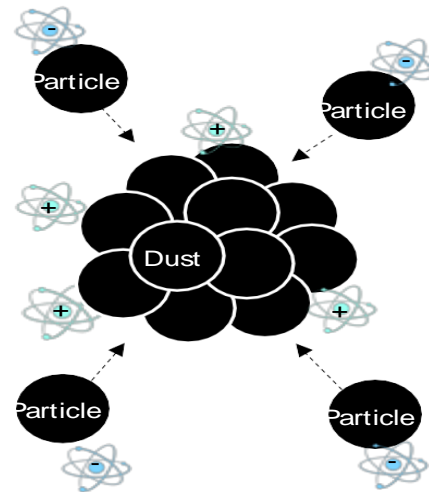
AWIONS **Nature's Way** to clean the air

AWIONS positive ions cause harmful **particles and VOC's** to agglomerate, removing them from the air we breathe

RESTRUCTURE
(VOCs)



AGGLOMERATE
(Dust/smoke)



Making dust & smoke stick together
and fall out of the breathing zone

AWIONS Nature's Way to clean the air

AWIONS negative ions clean the air from harmful pathogens

Pathogens (ie. virus, bacteria, fungus) are composed of proteins.

Hydrogen (H^+) is a building block of protein structures

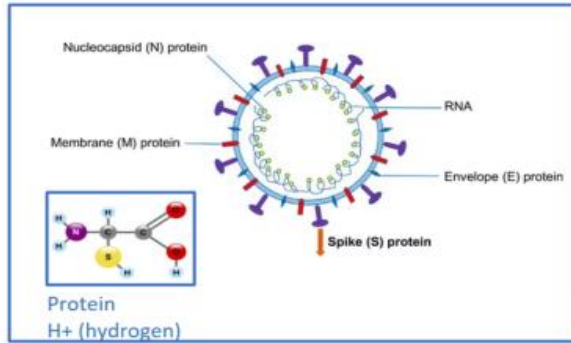


Illustration of viral structure

AWIONS generated negative charged super oxide species



Negative species bind to the Hydrogen (H^+) that make up the protein chains of the pathogen



Negative charged super oxides break down the protein structure by “damaging” the pathogen’s protein



Pathogens are inactivated, rendering them harmless

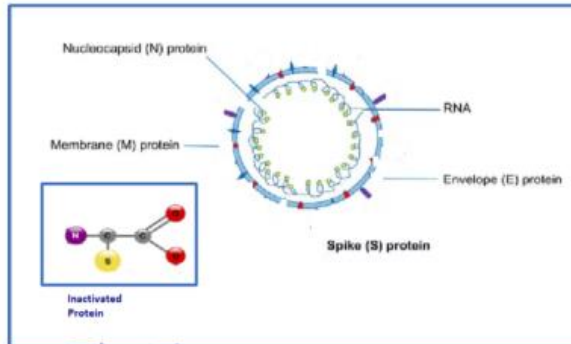
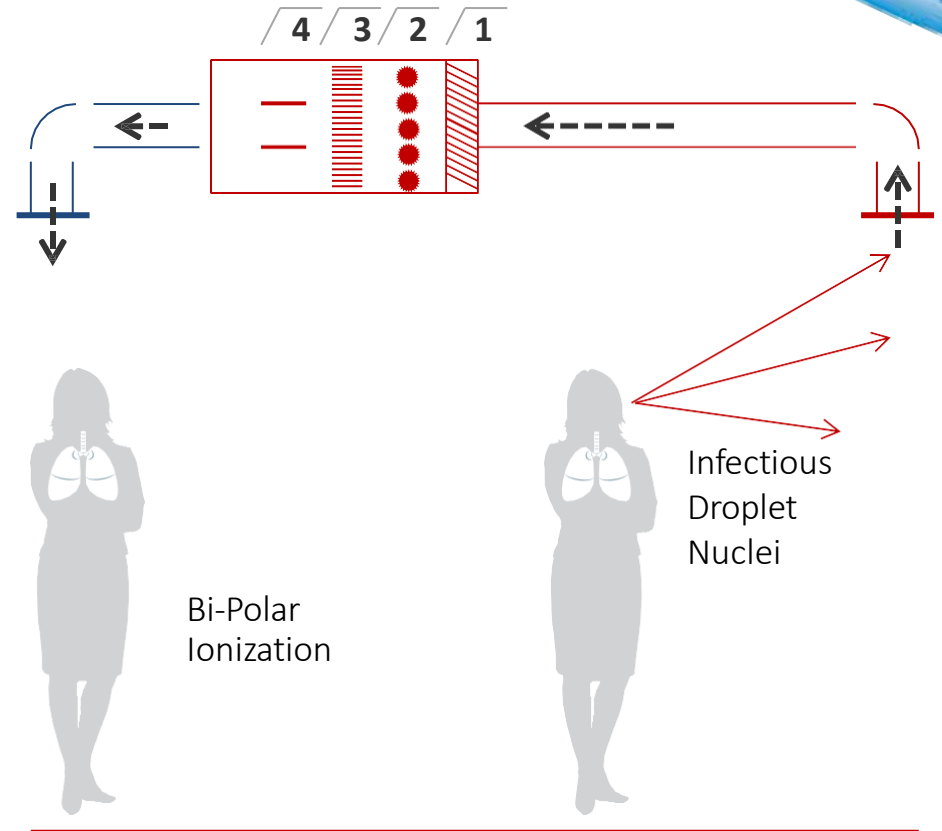


Illustration of viral structure damaged by AWIONS



AWIONS
inactivate
infectious (ie. viral,
bacterial) droplet
nuclei on surfaces
and in ambient air



AWIONS technology efficacy against various pathogens

Substance	Substance Name	Testing Organization	Removal	Year
Viruses	SARS	Retroscreen Virology, UK	--	2005
	Coxsackie	Kitaso Research Center, Gappone	99.9% inactivation 20-30 min (depends on ion density)	2002
	Polio	Kitaso Research Center, Gappone	99,6%	2002
	Corona	Kitaso Institute Medical Center Hospital, Gappone	99.7% inactive in 40 minutes	2004

Substance	Substance Name	Testing Organization	Removal	Year
Bacteria	Escherichia Coli	EMSL Analytical, USA	99%	2011
	Escherichia Coli ATCC	Istanbul University, Turchia	91%	2011
	Staphylococcus aureus	EMSL Analytical, USA	81%	2011
	Pseudomonas aeruginosa	Istanbul University, Turchia	99%	2011
	Staphylococcus aureus (MRSA)	EMSL Analytical, USA	99%	2013
Fungus	Aspergillus Niger	EMSL Analytical, USA	97%	2011
	Candida albicans	EMSL Analytical, USA	36%	2011
	Dichobotrys abundans	Prof. Joe F. Boatman, USA	90%	2006
	Penicillium	Prof. Joe F. Boatman, USA	95%	2006
Mold	Cladosporium cladosporioides	EMSL Analytical,	97%	2011
Spores	Bacillus subtilis var niger	Istanbul University, Turchia	89%	2011
Viruses	Influenza H1N1	Kitasato Research Center, Giappone	99%	2011
	Influenza H5N1	Kasetsart University, Thailandia	99%	2011

Benefits of AWIONS purification and disinfection technology

- ✓ Inactivates airborne/surface viruses, microbes, and mold
- ✓ Inactivates and removes airborne allergens (e.g. dust mite feces, dead dust mites)
- ✓ Removes VOC
- ✓ Does not produce harmful by-products
- ✓ Does not use chemical products
- ✓ Reduces static electricity (which attracts airborne particles)
- ✓ Removes odors
- ✓ NO major impacts on installed A/C Systems
- ✓ Allows the adoption of energy saving strategies using VOC's control
- ✓ Allows a significant cost reduction in maintenance in A/C Systems

Purification & Disinfection effective 24/7 , all year round

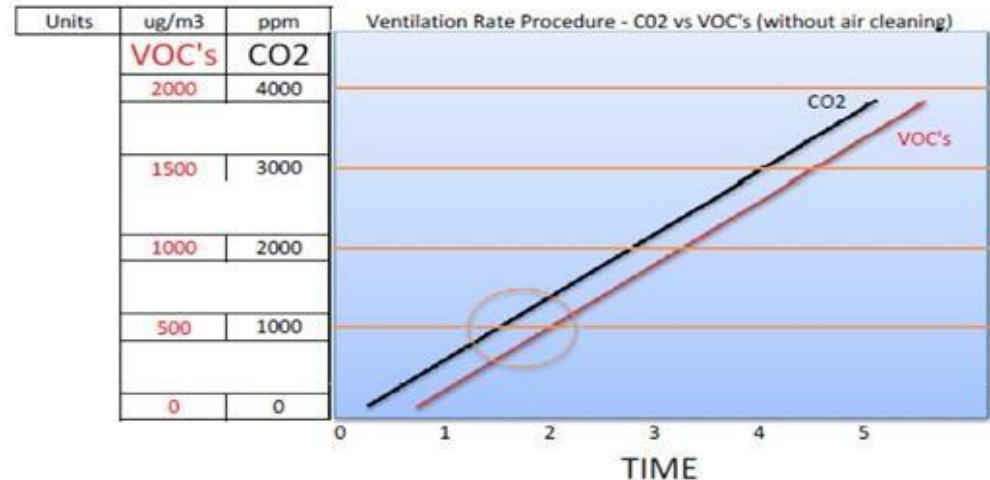
Air Cleansing Procedure - Ventilation Rate Procedure (VRP)

VRP: global standard for calculating outside air requirements in commercial buildings

VRP is based on CO₂ level detection in air-conditioned indoor spaces. CO₂ and other more dangerous contaminants, like Volatile Organic Compounds (VOC's) increase in proportion to the number of people in the space. VOC increase is linear to CO₂ build-up. Therefore, as CO₂ increases, fresh outside air volume must be proportionally pumped into the indoor space.

This results in high energy costs.

VRP allows up to 1,000 ppm CO₂ indoor level without addressing VOC's control





Air Cleansing Procedure- Indoor Air Quality Procedure (IAQP)

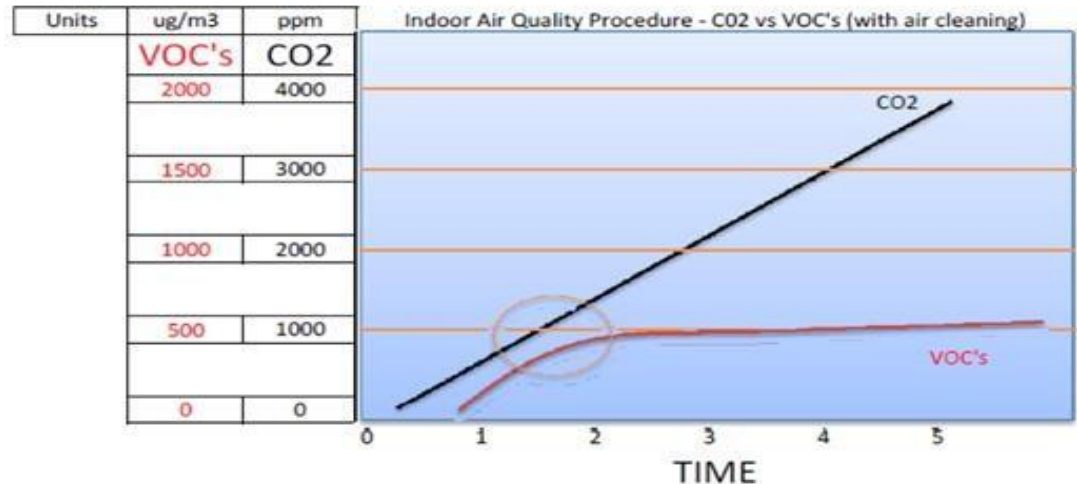
When **IAQP** is implemented, VOC's levels (not CO₂) are controlled using air purification equipment. **IAQP** allows VOC's levels to be maintained at about 500 µg/m³ and up to 5,000ppm CO₂.

This results in a reduction of required fresh air changes

One method of effectively controlling VOC's levels is the use of **Bi-polar Ionization Technologies**

IAQP with AWIONS

Results in Good air quality with
Substantial energy saving





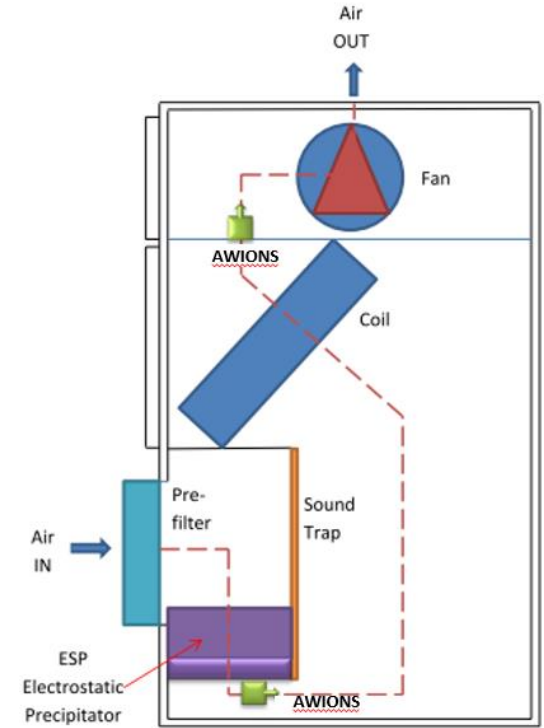
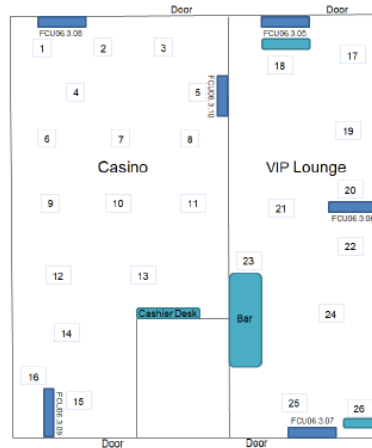
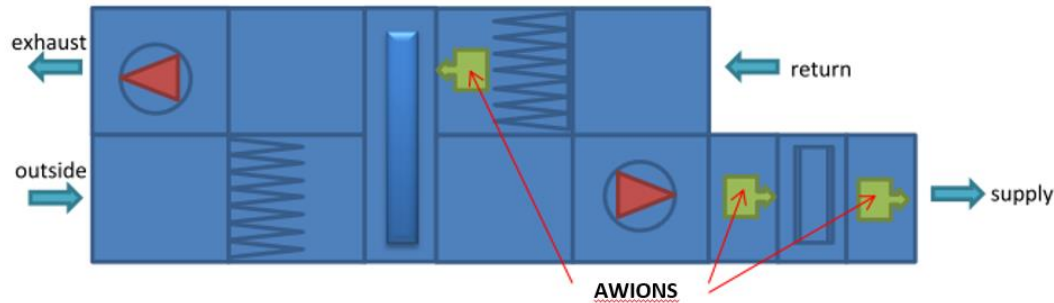
APPLICATIONS

- Air Conditioning Systems
- Heat Exchanger
- Ventilation Systems
- Air Ducts
- Air Outlets
- Refrigerators
- Air Purifiers
- Static Control Devices
- Customized Systems
- Stand-alone Units

CRUISE SHIP APPLICATIONS

IMPROVING IAQ IN CASINO AREA

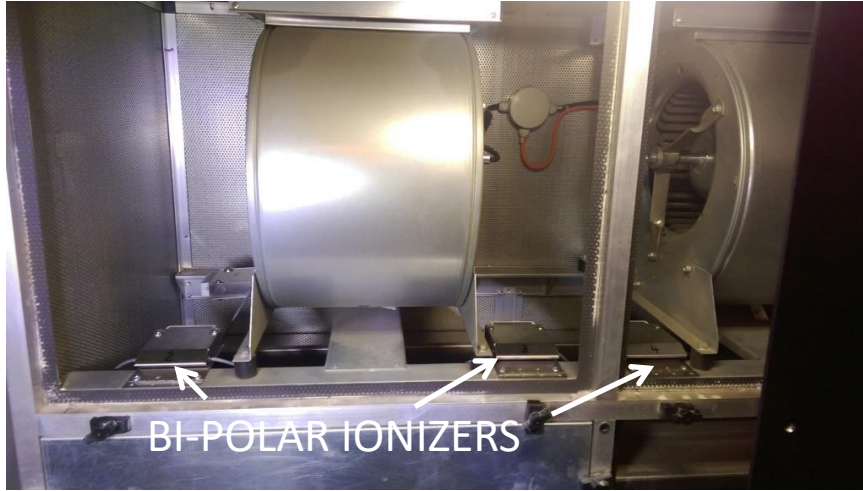
Air Handling Units (AHU's)



Fan Coil Units (FCU's)

CRUISE SHIP APPLICATIONS

IMPROVING IAQ IN CASINO AREA



CRUISE SHIP APPLICATIONS

IMPROVING IAQ IN CASINO AREA

Unit	Model	Place	Air Vol. m ³ / h	Ionizer Unit	Power Ionizer	ESP Unit	Power ESP
AHU 09.3.01		Deck 9	20295	24	90W		
AHU 09.3.04		Deck 9	3500	15	62W		
FC 06.3.05	FC-58	VIP Casino	4090	11	55W	2	37W
FC 06.3.06	FC-39	VIP Casino	2970	9	46W	2	35W
FC 06.3.07	FC-58	VIP Casino	4090	11	54W	2	37W
FC 06.3.08	FC-39	Casino	3670	9	52W	2	36W
FC 06.3.09	FC-39	Casino	3480	9	52W	2	36W
FC 06.3.10	FC-26	Casino	1700	6	14W	1	18W

CRUISE SHIP APPLICATIONS

IMPROVING IAQ IN CASINO AREA -RESULTS

Date	Hour	Place	Test Point	PM 2.5 µg/m³	TVOC ppb	CO ₂ ppm	RH %	Temp. °C	IAQ Index
07/05	20:59	OUT Deck 7		22	130	445	76	20.3	73
07/05	00:23	Casino	1	220	252	691	55	21.8	270
08/05	12:06	Cas.rest	1	201	166	1050	62	21.7	253
09/05	22:21	Casino	1	292	354	860	56	22.5	349
10/05	22:47	Casino	1	233	540	810	56	22.1	286
11/05	05:53	Cas.rest	1	27	188	584	58	20.0	79
07/05	00:	Average		74	187	599	57	21.6	152
08/05	13:	Average at rest		151	156	1123	65	20.9	208
09/05	22:	Average		112	250	743	58	21.6	176
10/05	22:	Average		61	367	746	57	21.5	139
11/05	06:	Average at rest		7	172	524	57	20.7	35
11/05	06:09	midship open space		5	192	482	57	21.3	44
11/05	06:15	staircase / elevator		3	179	489	62	21.6	37

A significant improvement in IAQ was achieved after the purifying systems were started in the late evening of the 9th. The IAQ indications went significantly down even to levels lower than those found in other places in the ship about 32 hours after the purifying systems were switched on. The main parameters for IAQ monitoring (particles and volatile organic compounds) showed a clear reduction

Note: An IAQ index of up to 50 is described as “good”, up to 100 as “moderate”

CRUISE SHIP APPLICATIONS

MICROBIOLOGICAL CONTAMINATION

TESTS CARRIED OUT IN CASINO AREA, POULTRY ROOM, AND SHIP'S HOSPITAL

STAND-ALONE IONIZERS WERE INSTALLED IN POULTRY ROOM AND SHIP'S HOSPITAL

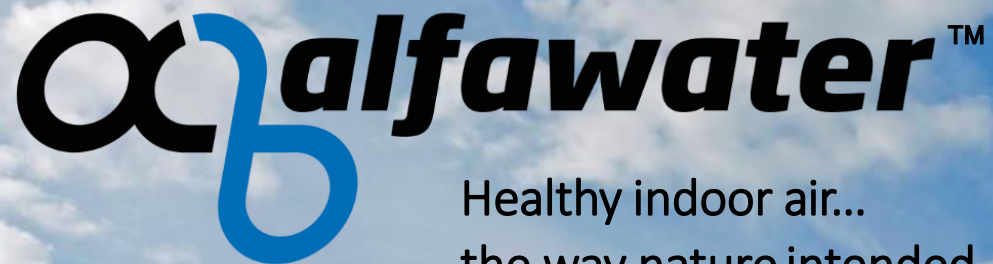
Petrifilm plates were used to detect environmental microbial contamination. The Petrifilm plates were used for air sampling procedure of aerobic count, coliform count, E.coli count, rapid coliform count and enterobacteriaceae count



In the clinic no microbial contamination was found after an ionizer treated the air for less than one day. Also in the poultry preparation area, a reduction in microbial contamination was found after two ionizers were installed in one of the air outlets.

The highest level of microbial contamination was found in the casino area (albeit still considered within normal limits). After the air purification systems started, here too, there was a significant reduction in microbial contamination.

Thank You



Healthy indoor air...
the way nature intended