Test report

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KSD SUNGDAE ENVIRONMENT
SCIENCE TECHNOLOGY R&D CO.,LTD

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The final report

KLH021

OH– Radical air disinfection air quality test

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Test Introduction

Test title: Before/After Installation Wellis air disinfection air quality test in International Naeun Hospital

Test number: KLH021

Test item: PAB

Purpose of test: We conducted an examination on an air quality trend by using a Wellis machine in a hospital.

This examination was conducted in reference to the indoor air quality fair examination standards by the Ministry of Environment announcement, #2010-24, according to the ENVIRONMENTAL EXAMINATION AND INSPECTION ACT . Article 6, Clause 1, No. 3.

Client company:

Name of company:	Wellis
ADD:	11, Dangsan-ro 41-gil, Yeongdeungpo-gu, Seoul, Korea
Client:	Lee Hongjong CMO
TEL:	02-6121-8251~5

Test agency :

Name of company:	KSD SUNGDAE ENVIRONMENT SCIENCE TECHNOLOGY R&D CO.,LTD
ADD:	86, Hakhyeon-ro, Uiwang-si Gyeonggi-do, Korea
CEO:	Kim Sungdae
TEL:	Tel)1577-4446 Fax)031-522-0550

Test schedule:		
	First measurement	2016.03.16
	Second measurement	2016.03.17
	Test date	2016.03.16~03.23
	Experiment end date	2016.03.27

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Test Method

1)Measurement date : 2016.03.16/03.17

2)Measurement places: International Naeun Hospital
1)7th floor reception desk 2)11th floor hospital room 1110

3)Test item: PAB

4)Test method: Each measurement was conducted in reference to "the indoor air quality fair examination standards" by the Ministry of Environment.

5)Measurement method: All measurements were performed before and after using a Wellis machine.

(1)PAB: In reference to the sampling procedure described in the main evaluation method according to 『the indoor air quality fair examination standards』 by the Ministry of Environment announcement, #2010-24 (Mar. 5, 2010), for the first test, we sampled every two hour from 9 a.m., which is prime time. For the second test, the same procedure was used as in the first test after the 15-hour operation of the Wellis machine.

The analysis method employs the principle that microorganisms collide with culture medium when an air sampler with a medium to culture bacteria collects indoor air. The method analyzes the concentration of the pathogenic bacteria collected by the sampler.

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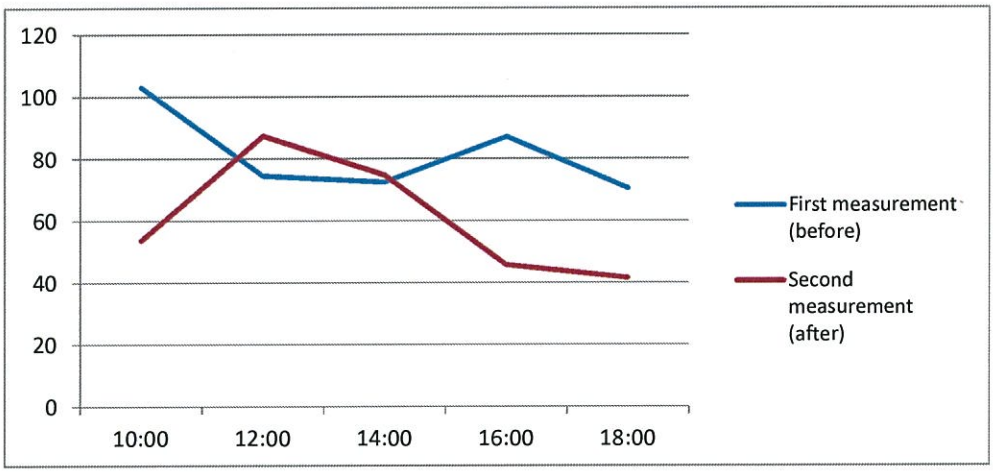
Result

1) PAB: 7th floor reception desk

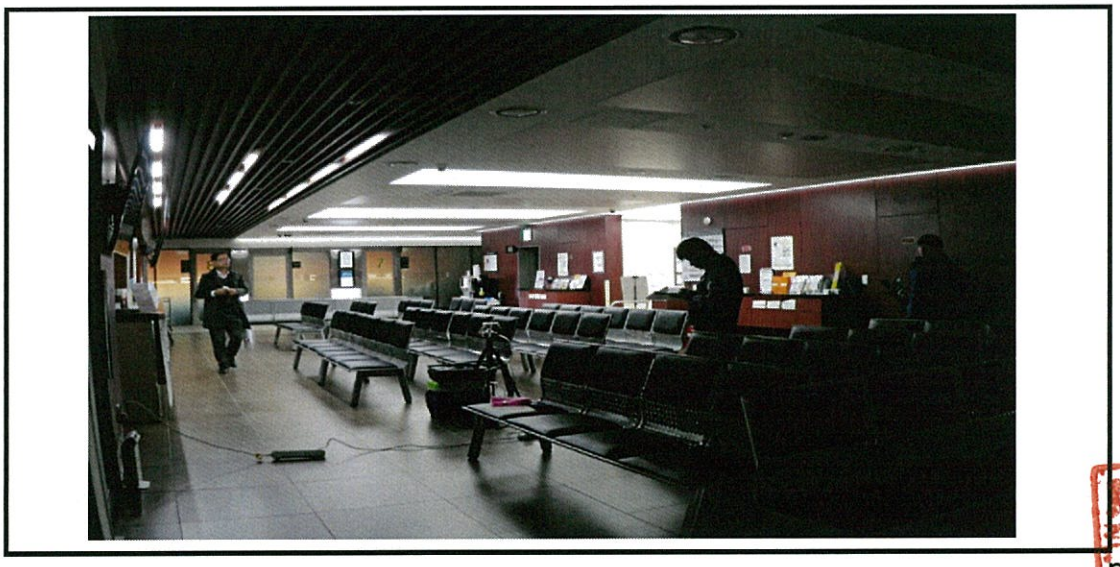
unit(CFU/㎥)

	10:00	12:00	14:00	16:00	18:00	Average	Relevant criteria
First measurement (before)	103.1	74.6	72.5	87.1	70.5	81.56	800
Second measurement (after)	53.7	87.4	74.8	45.7	41.5	60.62	800

Table1.



- A waiting room in the 7th floor has a roomy space and is connected with the outside. It is the first place in the hospital for patients' visit and has huge in-and-out flux of patients.
- Inconsistent patient visits may affect the measurement results.
- After the first sampling for the test, the machine starts its operation around 7 p.m.
- On 10 a.m. in the following day, indoor pollutants were significantly reduced by the machine operation. Although the patient visits in the morning increased considerably more than the previous day,20% of the pollutants from the previous day were cleansed.



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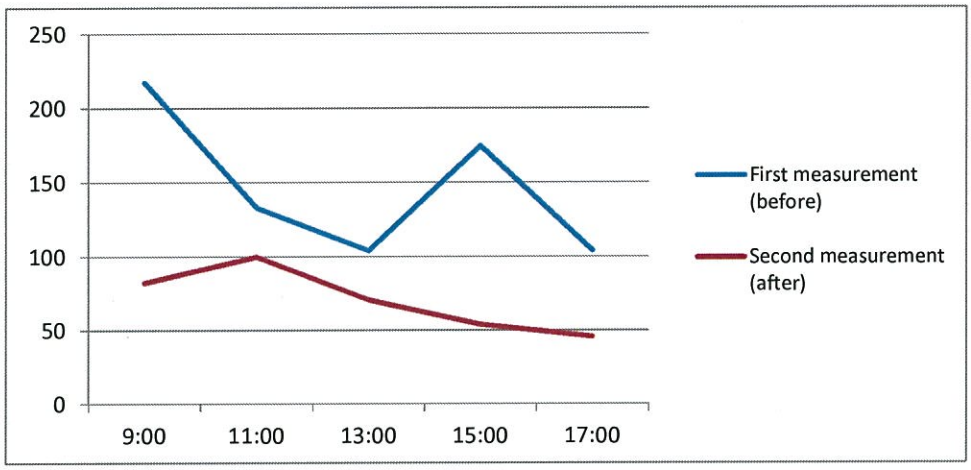
2) PAB: 11th floor hospital room 1110

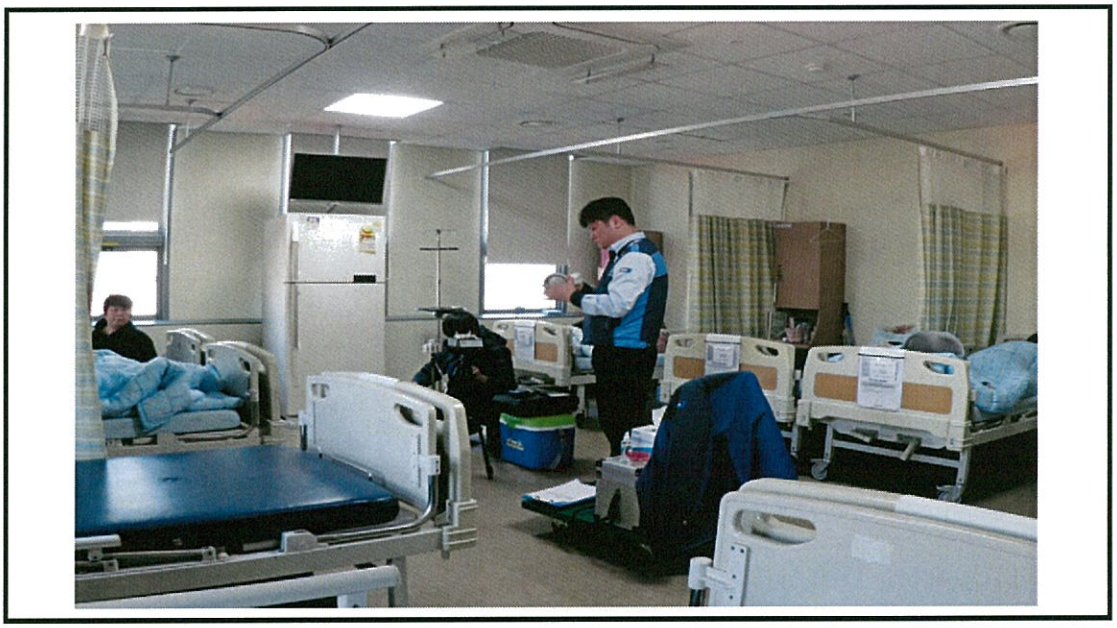
unit(CFU/㎥)

	9:00	11:00	13:00	15:00	17:00	Average	Relevant criteria
First measurement (before)	217.4	133.1	104.1	174.8	104	146.68	800
Second measurement (after)	82.5	99.9	70.8	54.1	45.8	70.62	800

Table2.



- Wards are designed for 8 patients.
- In the ward, while indoor pollutants had been growing over the night, they tended to decrease in the morning, thanks to the ventilation. However, they showed a tendency to grow during the point of increased family visits in the afternoon.
- In the following day morning, they showed the lower levels because of the machine operation through the night.
- Overall, 50% reduction of the pollutants was confirmed in the ward.



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※ Pathogen detection

	Pathogenicity
Staphylococcus aureus	Staphylococci can cause many forms of infection. Staphylococcus can cause food poisoning when a food handler contaminates food and then the food is not properly refrigerated. No matter how long(e.g.,30 min) heat at 100° C, *Staphylococcal enterotoxins* can' t be destroyed.
Pathogenic E.coli	Coli is best known for its ability to cause intestinal diseases. Coli is an important cause of diarrhea in infants and travelers in underdeveloped countries or regions of poor sanitation. *"O157"* is also notorious for causing serious and even life-threatening
Streptococcus Pyogenes	*Streptococcus pyogenes* is one of the most frequent pathogens of humans. Infections typically begin in the throat or skin. Acute Streptococcus pyogenes infections may present as pharyngitis, impetigo (infection of the superficial layers of the skin).
Streptococcus Pneumoniae	*Symptoms of pneumococcal disease* depend on the part of the body that is infected. In severe cases, pneumococcal disease can cause hearing loss, brain damage, and death.

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Gyeonggi Provincial Office Registration No.17 Certification number : KLH021

Indoor air quality test report

Test agency	Test item	PAB, HCHO	Purpose of test	self-measurement
	Measurement date	2016.03.16~17	Gatherer	Kim Jaehan and one other person
	Measurement place	International Naeun Hospital	Date of receipt	2016-03-16
Client	Client company	Wellis	Delegate	-
	ADD	11, Dangsan-ro 41-gil, Yeongdeungpo-gu, Seoul, Korea		

This examination was conducted in reference to the indoor air quality fair examination standards by the Ministry of Environment announcement, #2010-24, according to the ENVIRONMENTAL EXAMINATION AND INSPECTION ACT . Article 6, Clause 1, No. 3.

Test item	Relevant criteria	Measurement places		First measurement result	Second measurement result
TAB	800(CFU/㎥)or less	7F Receptionist Desk	10:00	103.1	53.7
			12:00	74.6	87.4
			14:00	72.5	74.8
			16:00	87.1	45.7
			18:00	70.5	41.5
		11F hospital room 1110	9:00	217.4	82.5
			11:00	133.1	99.9
			13:00	104.1	70.8
			15:00	174.8	54.1
			17:00	104.0	45.8

Decision: All measurements were performed before and after using a Wellis machine:Suitable

Mar 28th, 2016

KSD SUNGDAE ENVIRONMENT SCIENCE TECHNOLOGY R&D CO.,LTD

Quality manager : Lee Insung (sign) Technical Manager : Lee Younhee (sign)