



Your inhouse Laundry Partner

**Bacteriological Tests Results Following Disinfection  
of Microfibre Mops & Cloths Using JLA's OTEX  
System at the QE11 Hospital, Welwyn Garden City.**

**6 Month Final Report**

**November 2005**

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	<b>Page</b>
<b>CONTENTS</b>	
1. INTRODUCTION	3
2. TEST PROTOCOL	3
3. WASH PROGRAM DETAILS	4
4. LOADING CRITERIA	4
5. BACTERIOLOGICAL RESULTS	5
6. WASH QUALITY	23
7. OBSERVATIONS AND CONCLUSION	23

**APPENDIX A: MICROSEARCH LABORATORIES LIMITED  
ACCREDITATION**

## **1. Introduction.**

JLA's OTEX ozone disinfection system was introduced on May 17<sup>th</sup> 2005 at the QE11 Hospital, Welwyn Garden City for a 6 months trial to provide a disinfection laundering system for Microfibre cloths and mops. Standard laundering practice would normally have been in accordance with HSG (95) 18 using a thermal disinfection program. The guidelines however were set out before 1980 and prior to the recent problems associated by MRSA, C.diff and other hospital acquired infections. The OTEX system utilises the second most powerful disinfectant known, ozone, which is produced throughout the wash process providing full bacteriological protection.

Microfibre mops and cloths were introduced to replace conventional cotton mops by ISS Mediclean at the QE11 and Lister Hospital at Stevenage. Both hospitals utilise the ISS Mediclean facilities at the QE11 hospital, which has been equipped with 2x 30lb washing machines and 1x 50lb gas dryer.

This document reports the results of the OTEX trial at Welwyn Garden City QE11 Hospital.

## **2. Test Protocol**

As set out by the East and North Hertfordshire NHS Trust Infection Control the following sampling protocol was agreed:

**Target Organisms:** Methicillin Resistant Staphylococcus Aureus (MRSA)  
Clostridium difficile. (C.difficile)  
Yeasts  
Moulds (Aspergillus Niger initially requested)

**Acceptable results – none isolated on samples.**

**Total Viable Count (TVC)** – Originally set as the TVC of new items immediately after being removed from packaging with gloved hands. However following on site consultation with the infection control team acceptable result agreed as **2.5 CFU/CM<sup>2</sup> or equivalent to the standard achieved with thermal disinfection (Slight Growth 12 CFU/cm<sup>2</sup>)**

**Test Schedule**

Week 1	Wash liquor twice per week	Dipslide daily
Week 2	Wash liquor once per week	Dipslide daily
Week 3	Wash liquor once per week	Twice a week
Week 4		Twice a week
Week 5+	Samples of cloths and mops 1 per week	Dipslide weekly

Dipslides sometimes called paddle testers are generally regarded as the standard semi-quantitative measurement for bacteria testing in the analysis of industrial, environmental and recreational waters. These should however only be considered/used as a guide, as accuracy is limited due to the sample size and the method of obtaining a result.

Due to the poor drainage on site it was agreed that wash liquor samples would not be taken for the duration of the trial. Therefore it was agreed samples of mops/cloths would be removed after laundering and submitted to an accredited microbiologic laboratory for independent microbiological analysis by Microsearch Laboratories.

**3. Wash Program Details**

Details of the wash program installed is given below together with the ISS Mediclean thermal disinfection program details for comparison.

Program	OTEX	Thermal Disinfection
	Temp	Temp
Pre Wash	Cold	Warm 40°C
Main Wash	Cold	Hot 75°C
Rinse 1	Cold	Cold
Rinse 2	Cold	Cold
Rinse 3	Cold	
Cycle Time	47 mins	1 hour
Detergent Volumes	40 mls	80mls

**4. Loading Criteria:**

The following loading matrix had been agreed.

Item	Maximum Per Net Bag	Maximum Per Wash Load
Microfibre Mops	20	4
Microfibre Cloths	40	6

## 5. Bacteriological Results



### QE II Hospital Welwyn Garden City 6 Monthly Bacteriological Results Summary

November 2005

**Table 1: Independent Results ex Microsearch Laboratories: Week 1**

Date	Type	Process	MRSA cfu per cm <sup>2</sup>	C.dif cfu per cm <sup>2</sup>	Yeasts cfu per cm <sup>2</sup>	Moulds cfu per cm <sup>2</sup>	A.niger cfu per cm <sup>2</sup>
18/05/2005	Microfibre Cloth	New	0	0	0	0	0
20/05/2005	Microfibre Mop	Dirty	0	0	3.10E+04	0	0
18/05/2005	Microfibre Mop	After OTEX	0	0	0	0	0
18/05/2005	Wash Liquor	After OTEX	0	0	0	0	0
20/05/2005	Microfibre Mops	After OTEX	0	0	16	0	0
20/05/2005	Wash Liquor	After OTEX	0	0	0	0	0
20/05/2005	Microfibre Cloth	After OTEX	0	0	0	0	0
20/05/2005	Wash Liquor	After OTEX	0	0	0	0	0

**Table 2: Independent Results ex Microsearch Laboratories: Week 2**

<b>Date</b>	<b>Type</b>	<b>Process</b>	<b>MRSA cfu per cm<sup>2</sup></b>	<b>C.dif cfu per cm<sup>2</sup></b>	<b>Yeasts cfu per cm<sup>2</sup></b>	<b>Moulds cfu per cm<sup>2</sup></b>	<b>A.niger cfu per cm<sup>2</sup></b>
24/05/2005	Microfibre Mop	After OTEX	0	0	0	0	0
	Wash Liquor	After OTEX	0	0	0	0	0
25/05/2005	Microfibre Mop	Dirty	2.10E+03	1.30E+04	9.20E+08	7.10E+04	2.80E+03
	Microfibre Mop	After OTEX	0	0	0	0	0
	Wash Liquor	After OTEX	0	0	0	0	0
27/05/2005	Microfibre Cloth	Dirty	1.90E+04	2.60E+04	3.10E+07	8.20E+05	7.10E+06
	Microfibre Cloth	After OTEX	0	0	0	0	0
	Wash Liquor	After OTEX	0	0	0	0	0

**Table 3: Independent Results: Week 3**

Date	Type	Process	MRSA cfu per cm <sup>2</sup>	C.dif cfu per cm <sup>2</sup>	Yeasts cfu per cm <sup>2</sup>	Moulds cfu per cm <sup>2</sup>	A.niger cfu per cm <sup>2</sup>
31/05/2005	Microfibre Mop	Dirty	0	0	0	0	0
	Microfibre Mop	After OTEX	0	0	0	0	0
	Wash Liquor	After OTEX	0	0	0	0	0
	Microfibre Cloth	Dirty	0	0	0	0	0
	Microfibre Cloth	After OTEX	0	0	0	0	0
	Wash Liquor	After OTEX	0	0	0	0	0
03/06/2005	Microfibre Mop	Dirty	2.6E+02	1.90E+03	4.10E+03	7.30E+05	2.60E+02
	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Mop	After Drying	0	0	0	0	0
	Microfibre Cloth	Dirty	1.4E+03	4.50E+03	9.10E+04	3.20E+05	4.10E+03
	Microfibre Cloth	After OTEX	0	0	0	0	0
	Microfibre Cloth	After Drying	0	0	0	0	0



**Table 4: Independent Results: Week 4**

Date	Type	Process	MRSA cfu per cm <sup>2</sup>	C.dif cfu per cm <sup>2</sup>	Yeasts cfu per cm <sup>2</sup>	Moulds cfu per cm <sup>2</sup>	A.niger cfu per cm <sup>2</sup>
08/06/2005	Microfibre Mop	Dirty	9.60E+02	0	4.00E+06	8.20E+04	7.10E+02
	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth	Dirty	40	20	6.00E+05	4.20E+04	1.10E+03
	Microfibre Cloth	After OTEX	0	0	0	0	0
	Microfibre Spanky	Dirty	0	0	4.30E+07	4.00E+05	2.00E+02
	Microfibre Spanky	After OTEX	0	0	0	0	0

**Table 5: Independent Results: Week 5 Onwards**

Date	Type	Process	MRSA cfu per cm <sup>2</sup>	C.dif cfu per cm <sup>2</sup>	Yeasts cfu per cm <sup>2</sup>	Moulds cfu per cm <sup>2</sup>	A.niger cfu per cm <sup>2</sup>
07/07/ 05	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth (Red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0
	Microfibre Spanky	After OTEX	0	0	0	0	0
	Microfibre Spanky	After OTEX	0	0	0	0	0
12/07/05	Microfibre Mop	Dirty	0	0	3.80E+04	4.00E+04	200
	Microfibre Cloth (Red)	Dirty	0	0	5.20E+04	1.20E+04	130
	Microfibre Cloth (Blue)	Dirty	7	500	6.10E+04	3.80E+03	0
	Microfibre Spanky	Dirty	0	230	5.30E+04	5.60E+03	0
	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth (Red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0

Date	Type	Process	MRSA cfu per cm <sup>2</sup>	C.dif cfu per cm <sup>2</sup>	Yeasts cfu per cm <sup>2</sup>	Moulds cfu per cm <sup>2</sup>	A.niger cfu per cm <sup>2</sup>
12/07/05	Microfibre Spanky	After OTEX	0	0	0	0	0
19/07/05	Microfibre Mop	Dirty	0	2	5.30E+05	2.40E+04	1860
	Microfibre Cloth (Red)	Dirty	0	19	1.20E+04	3.00E+04	290
	Microfibre Cloth (Blue)	Dirty	90	37	3.00E+04	330	0
	Microfibre Spanky	Dirty	330	0	2.70E+03	1.60E+05	1700
	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth (Red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0
	Microfibre Spanky6	After OTEX	0	0	0	0	0
4/08/05	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth (red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0
	Microfibre Spanky	After OTEX	0	0	0	0	0
9/08/05	Microfibre Mop	Dirty	0	0	1.40E+03	9.00E+02	0
	Microfibre Cloth (Red)	Dirty	2	5	3.40E+04	1.20E+03	1.20E+03

Date	Type	Process	MRSA cfu per cm <sup>2</sup>	C.dif cfu per cm <sup>2</sup>	Yeasts cfu per cm <sup>2</sup>	Moulds cfu per cm <sup>2</sup>	A.niger cfu per cm <sup>2</sup>
9/08/05	Microfibre Cloth (Blue)	Dirty	29	39	3.00E+04	5.60E+03	4.00E+03
	Microfibre Cloth (Spanky)	Dirty	7	12	1.20E+05	2.30E+03	3.40E+03
	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth (Red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0
	Microfibre Spanky	After OTEX	0	0	0	0	0
19/08/05	Microfibre Mop	Dirty	92	12	4.80E+05	6.00E+04	2.40E+03
	Microfibre Cloth (Red)	Dirty	0	0	6.20E+06	7.30E+04	1.90E+03
	Microfibre Cloth (Blue)	Dirty	0	0	4.10E+05	5.90E+04	2.10E+03
	Microfibre Spanky	Dirty	0	5	7.20E+05	2.00E+04	7.20E+02
	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth (red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0
	Microfibre Spanky	After OTEX	0	0	0	0	0
25/08/05	Microfibre Mop	Dirty	15	4	3.80E+05	9.60E+04	560

Date	Type	Process	MRSA cfu per cm <sup>2</sup>	C.dif cfu per cm <sup>2</sup>	Yeasts cfu per cm <sup>2</sup>	Moulds cfu per cm <sup>2</sup>	A.niger cfu per cm <sup>2</sup>
25/08/05	Microfibre Cloth (Red)	Dirty	31	4	2.90E+05	8.30E+06	130
	Microfibre Cloth (Blue)	Dirty	18	18	3.10E+05	5.60E+04	1.70E+03
	Microfibre Spanky	Dirty	27	1	7.00E+05	3.80E+04	4.10E+03
	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth (Red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0
	Microfibre Spanky	After OTEX	0	0	0	0	0
7/09/05	Microfibre Mop	Dirty	86	0	2.10E+04	1700	30
	Microfibre Cloth (Red)	Dirty	0	9	5.20E+04	6.00E+04	9300
	Microfibre Cloth (Blue)	Dirty	0	7	6.10E+04	5.10E+03	1400
	Microfibre Spanky	Dirty	0	26	5.00E+05	3.90E+04	40
	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth (Red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0
	Microfibre Spanky	After OTEX	0	0	0	0	0

Date	Type	Process	MRSA cfu per cm <sup>2</sup>	C.dif cfu per cm <sup>2</sup>	Yeasts cfu per cm <sup>2</sup>	Moulds cfu per cm <sup>2</sup>	A.niger cfu per cm <sup>2</sup>
22/09/05	Microfibre Mop	Dirty	0	0	3.10E+03	1.30E+03	220
	Microfibre Cloth (Red)	Dirty	0	0	4.90E+05	1.20E+04	470
	Microfibre Cloth (Blue)	Dirty	0	0	7.20E+04	3.10E+04	430
	Microfibre Cloth (Spanky)	Dirty	0	0	3.10E+04	2.10E+03	90
	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth (Red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Spanky)	After OTEX	0	0	0	0	0
30 /09/05	Microfibre Mop	Dirty	8.0E+02	5.6E+01	4.3E+05	1.3E+04	1.7E+02
	Microfibre Cloth (Red)	Dirty	450	2.10E+02	3.00E+03	1.50E+02	30
	Microfibre Cloth (Blue)	Dirty	300	8	4.10E+03	2.8E+03	43
	Microfibre Cloth (Spanky)	Dirty	0	0	33	80	0

Date	Type	Process	MRSA cfu per cm <sup>2</sup>	C.dif cfu per cm <sup>2</sup>	Yeasts cfu per cm <sup>2</sup>	Moulds cfu per cm <sup>2</sup>	A.niger cfu per cm <sup>2</sup>
30/09/05	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth (Red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0
	Microfibre Spanky	After OTEX	0	0	0	0	0
13/10/05	Microfibre Mop	Dirty	3.00E+04	80	6.10E+05	1.7E+04	2.30E+03
	Microfibre Cloth (Red)	Dirty	73	130	7.20E+05	2.90E+03	47
	Microfibre Cloth (Blue)	Dirty	210	2	8.30E+05	5.00E+03	47
	Microfibre Spanky	Dirty	4500	0	2.90E+03	2.90E+03	90
	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth (Red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0
	Microfibre Spanky	After OTEX	0	0	0	0	0

Date	Type	Process	MRSA cfu per cm <sup>2</sup>	C.dif cfu per cm <sup>2</sup>	Yeasts cfu per cm <sup>2</sup>	Moulds cfu per cm <sup>2</sup>	A.niger cfu per cm <sup>2</sup>
19/10/05	Microfibre Mop	Dirty	2.00E+00	4.80E+01	1.30E+02	2.00E+01	0
	Microfibre Cloth (Red)	Dirty	0	0	1.50E+02	3.00E+01	0
	Microfibre Cloth (Blue)	Dirty	0	0	3.30E+02	6.00E+01	0
	Microfibre Cloth (Spanky)	Dirty	4.50E+02	1.10E+02	6.10E+04	3.90E+03	1.80E+02
	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth (Red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Spanky)	After OTEX	0	0	0	0	0
27/10/05	Microfibre Mop	Dirty	2.10E+01	2.40E+02	8.20E+04	3.00E+03	2.66E+02
	Microfibre Cloth (Red)	Dirty	3.10E+03	8.00E+00	2.70E+04	4.60E+03	4.12E+00
	Microfibre Cloth (Blue)	Dirty	3.50E+02	3.00E+01	5.30E+03	1.90E+02	2.00E+01
	Microfibre Cloth (Spanky)	Dirty	2.80E+01	1.90E+01	1.90E+04	5.1-E+03	3.00E+02
	Microfibre Mop	After OTEX	0	0	0	0	0
	Microfibre Cloth (Red)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Blue)	After OTEX	0	0	0	0	0
	Microfibre Cloth (Spanky)	After OTEX	0	0	0	0	0



### 6: WGC Weekly Total Viable Count (TVC) Log Week 1

Date	Test	Program	TVC Before CFU/cm <sup>2</sup>	TVC After CFU/cm <sup>2</sup>
17/05/2005	Microfibre cloths	New not processed		Nil
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre cloths			
17/05/2005	Microfibre Mops	OTEX	12 Slight	
17/05/2005	Microfibre Mops		12 Slight	<2.5 VSG
17/05/2005	Microfibre Cloths		100 Heavy	<2.5 VSG
17/05/2005	Microfibre Cloths		100 Heavy	<2.5 VSG
17/05/2005	Microfibre Cloths		100 Heavy	Nil
17/05/2005	Microfibre Cloths		100 Heavy	Nil
18/05/2005	Microfibre Mops		12 Slight	Nil
18/05/2005	Microfibre Mops			Nil
18/05/2005	Microfibre Mops			<2.5 VSG
19/05/2005	Microfibre Mops		New not processed	
19/05/2005	Microfibre Mops			<2.5 VSG
19/05/2005	Microfibre Mops			Nil
19/05/2005	Microfibre Mops			Nil
19/05/2005	Microfibre Mops			Nil
19/05/2005	Microfibre Mops			Nil
19/05/2005	Microfibre Mops			Nil
19/05/2005	Microfibre Mops			Nil
19/05/2005	Microfibre Mops			Nil
19/05/2005	Microfibre Mops			Nil
19/05/2005	Microfibre Mops			Nil
19/05/2005	Microfibre Mops			Nil
19/05/2005	Microfibre Mops			Nil
19/05/2005	Microfibre Mops			Nil
19/05/2005	Microfibre Mops			<2.5 VSG
19/05/2005	Microfibre Mops	OTEX	<2.5 VSG	Nil
19/05/2005	Microfibre Mops		<2.5 VSG	Nil
19/05/2005	Microfibre Cloths		12 Slight	<2.5 VSG
19/05/2005	Microfibre Cloths			
19/05/2005	Microfibre Mops		100 Heavy	Nil
19/05/2005	Microfibre Mops		Nil	Nil
19/05/2005	Microfibre Mops		12 Slight	Nil
19/05/2005	Microfibre Cloths		12 Slight	<2.5 VSG
19/05/2005	Microfibre Cloths		40 Mod	2.5 VSG

**Table 7: WCG Weekly Total Viable Count (TVC) Log Week 2**

Date	Test	Program Details	TVC Before CFU/cm <sup>2</sup>	TVC After CFU/cm <sup>2</sup>	TVC After Drying CFU/cm <sup>2</sup>
23-May-05	Microfibre Mops	OTEX	40 Moderate	Nil	<2.5 VSG
23-May-05	Microfibre cloths		40 Moderate	Nil	<2.5 VSG
23-May-05	Microfibre Mops		40 Moderate	Nil	Nil
24-May-05	Microfibre Mops		100 Heavy	Nil	
24-May-05	Microfibre Mops		100 Heavy	12 Slight	
24-May-05	Microfibre Cloth		100 Heavy	Nil	
24-May-05	Microfibre Cloth		12 Slight	12 Slight	
25-May-05	Microfibre Cloth			12 Slight	Nil
25-May-05	Microfibre Mops		12 Slight	2.5 VSG	Nil
25-May-05	Microfibre Cloths		12 Slight	<2.5VSG	Nil
25-May-05	Microfibre Mops		12 Slight	12 Slight	Nil
25-May-05	Microfibre Mops		2.5 VSG	< 2.5 VSG	Nil
25-May-05	Microfibre Cloths			<2.5 VSG	Nil
25-May-05	Microfibre Mops			12 Slight	Nil
25-May-05	Microfibre Mops			Nil	Nil
25-May-05	Microfibre Cloths			Nil	Nil
25-May-05	Microfibre Mops			Nil	Nil
25-May-05	Microfibre Cloths			<2.5 VSG	Nil
26-May-05	Microfibre Mops		40 Moderate	2.5 VSG	
26-May-05	Microfibre Mops			<2.5VSG	
26-May-05	Microfibre Mops		100 Heavy	12 slight	
26-May-05	Microfibre Mops		100 Heavy	2.5 VSG	
26-May-05	Microfibre Cloths		100 Heavy	12 Slight	
26-May-05	Microfibre Cloths		100 Heavy	<2.5 VSG	
26-May-05	Microfibre Mops		100 Heavy	<2.5 VSG	
26-May-05	Microfibre Mops		100 Heavy	Nil	
26-May-05	Microfibre Cloths			<2.5VSG	
26-May-05	Microfibre Cloths			Nil	Nil
26-May-05	Microfibre Cloths			Nil	
26-May-05	Microfibre Mops			Nil	
27-May-05	Microfibre Cloths		40 Moderate	2.5 VSG	Nil
27-May-05	Microfibre Mops		40 Moderate	2.5 VSG	Nil
27-May-05	Microfibre Mops		100 Heavy	2.5VSG	Nil
27-May-05	Microfibre Mops		2.5 VSG	<2.5VSG	Nil
27-May-05	Microfibre Cloths		40 Moderate	<2.5 VSG	Nil
27-May-05	Microfibre Mops			<2.5 VSG	Nil
27-May-05	Microfibre Mops		250 VHG	2.5 VSG	
27-May-05	Microfibre Cloths		12 Slight	2.5 VSG	

**Table 8: WCG Weekly Total Viable Count (TVC) Log Week 3**

Date	Test	Program Details	TVC Before CFU/cm <sup>2</sup>	TVC After CFU/cm <sup>2</sup>	TVC After Drying CFU/cm <sup>2</sup>
31-May-05	Microfibre Mops	OTEX	40 Moderate	<2.5 VSG	Nil
31-May-05	Microfibre cloths		12 Slight	Nil	Nil
3-Jun-05	Microfibre Mops		100 Heavy	Nil	Nil
3-Jun-05	Microfibre Mops		2.5 VSG	Nil	Nil

**Table 9: WCG Weekly Total Viable Count (TVC) Log Week 4**

Date	Test	Program Details	TVC Before CFU/cm <sup>2</sup>	TVC After CFU/cm <sup>2</sup>	TVC After Drying CFU/cm <sup>2</sup>
7-Jun-05	Microfibre Mop	OTEX		2.5 VSG	
7-Jun-05	Microfibre Mop		100 Heavy	<2.5 VSG	
7-Jun-05	Microfibre Cloth			<2.5	
7-Jun-05	Microfibre Cloth			Nil	
8-Jun-05	Microfibre Cloth		40 Mod	Nil	
8-Jun-05	Microfibre Mop		40 Mod	<2.5 VSG	
8-Jun-05	Spanky		<2.5 VSG	Nil	
8-Jun-05	Microfibre Cloth			Nil	
8-Jun-05	Microfibre Cloth			Nil	
8-Jun-05	Microfibre Cloth			<2.5 VSG	

**Table 10: WCG Weekly Total Viable Count (TVC) Log week 5 Onwards**

Date	Test	Program Details	TVC Before CFU/cm <sup>2</sup>	TVC After CFU/cm <sup>2</sup>	TVC After Drying CFU/cm <sup>2</sup>
13-Jun-05	Microfibre Mop	OTEX	10 Slight	Nil	
13-Jun-05	Microfibre Mop		10 Slight	Nil	
13-Jun 05	Microfibre Cloth		10 Slight	Nil	
14-Jun-05	Microfibre Mop		10 Slight	Nil	
29 Jun-05	Microfibre Mop		250 VHG	12 SG	
29 Jun 05	Microfibre Cloth		40 Mod	<2.5 VSG	
29 Jun 05	Microfibre Mop		100 HG	12 SG	
29 Jun 05	Microfibre Mop		100 HG	<2.5 VSG	
30-Jun-05	Microfibre Mop		100 HG	12 SG	
30-Jun-05	Microfibre Mop		100 HG	2.5 VSG	
30 Jun 05	Microfibre Cloth		100 HG	<2.5 VSG	
30 Jun 05	Microfibre Cloth		12 SG	12 SG	
7 Jul 05	Microfibre Mop		12 SG	<2.5 VSG	Nil
	Microfibre Mop		40 Mod	<2.5 VSG	Nil
	Microfibre Mop		40 Mod	2.5 VSG	Nil
	Microfibre Cloth		2.5 VSG	<2.5VSG	Nil
	Microfibre Mop		40 Mod	Nil	Nil
	Microfibre Mop		40 Mod	Nil	Nil
	Microfibre Mop		40 Mod	Nil	Nil
12 Jul 05	Microfibre Mop		100 HG	Nil	
	Microfibre Cloth		12 SG	Nil	
19 Jul 05	Microfibre Mop		Batch already in wash	<2.5 VSG	
	Microfibre Mop		250 VHG	<2.5VSG	
	Microfibre Mop	2.5VSG	Nil		
	Microfibre Cloth	Batch already in wash	2.5 VSG		
	Microfibre Cloth	Batch already in wash	<2.5 VSG		
	Microfibre Cloth	250 VHG	12 SG		
	Microfibre Cloth	40 Mod	<2.5 VSG		
	Microfibre Cloth	2.5 VSG	Nil		
	Microfibre Cloth	40 Mod	<2.5 VSG		
	Microfibre Cloth	40 Mod	12 SG		
9 Aug 05	Microfibre Cloth	12 SG	Nil		
	Microfibre Cloth	Not Sampled	<2.5VSG		
	Microfibre Cloth	Not Sampled	Nil		
	Microfibre Mop	40 Mod	Nil		
	Microfibre Mop	Not Sampled	Nil		
18 Aug 05	Microfibre Mop	40 Mod	12 SG		
	Microfibre Mop	Not Sampled	12 SG		
	Microfibre Mop	Not sampled	<2.5VSG		
	Microfibre Spanky	12 SG	Nil		

Date	Test	Program Details	TVC Before CFU/cm <sup>2</sup>	TVC After CFU/cm <sup>2</sup>	TVC After Drying CFU/cm <sup>2</sup>
18 Aug 05	Microfibre Cloth	OTEX	12 SG	<2.5VSG	
	Microfibre Cloth		40 Mod	2.5 VSG	
	Microfibre Cloth		40 Mod	Nil	
25 Aug 05	Microfibre Mop		100 Heavy	<2.5 VSG	
	Microfibre Cloth		<2.5 VSG	Nil	
	Microfibre Mop		100 Heavy	12 SG	
	Microfibre Mop		100 Heavy	2.5 VSG	
	Microfibre Mop		100 Heavy	< 2.5 VSG	
	Microfibre Cloth		Not Sampled	Nil	
	Microfibre Cloth		Not Sampled	<2.5 VSG	
7 Sept 05	Microfibre Mop		100 Heavy	12 SG	
	Microfibre Mop		40 Mod	2.5VSG	
	Microfibre Cloth		40 Mod	Nil	
	Microfibre Cloth		2.5 VSG	<2.5VSG	
	Microfibre Cloth		Not Sampled	Nil	
	Microfibre Cloth		Not Sampled	Nil	
21 Sept 05	Microfibre Cloth		12 SG	<2.5VSG	
	Microfibre Cloth		40 Mod	<2.5VSG	
	Microfibre Cloth		12 SG	Nil	
	Microfibre Mop		100 Heavy	2.5VSG	
	Microfibre Mop		2.5VSG	Nil	
	Microfibre Mop		40 Mod	2.5 VSG	
	Microfibre Cloth		100 Heavy	<2.5 VSG	
30 Sept 05	Microfibre Cloth		2.5 VSG	Nil	
	Microfibre Mop		40 Mod	<2.5VSG	Nil
	Microfibre Cloth		40 Mod	<2.5 VSG	Nil
6 Oct 05	Microfibre Mop		40 Mod	2.5 VSG	Nil
	Microfibre Cloth		40 Mod	Nil	
	Microfibre Cloth	40 Mod	Nil		
	Microfibre Mop	40 Mod	<2.5VSG		
	Microfibre Mop	40 Mod	Nil		
	Microfibre Mop	100 Heavy	Nil		
13 Oct 05	Microfibre Mop	100 Heavy	Nil		
	Microfibre Mop	100 Heavy	<2.5VSG		
	Microfibre Mop	40 Mod	<2.5 VSG		
	Microfibre Cloth	100 Heavy	<2.5 VSG		
27 Oct 05	Microfibre Cloth	100 Heavy	Nil		
	Microfibre Cloth	40 Mod	Nil		
	Microfibre Cloth	100 Heavy	Nil		
	Microfibre Cloth	40 Mod	Nil		
			40 Mod	2.5VSG	

**Table11:Independent Results ex Microsearch Laboratories: Thermal Disinfection Processes**

Date	Type	Process	MRSA	C.diff	Yeast	Moulds	A niger
07/06/2005	Microfibre Mop	Dirty Pre-Thermal	3.50E+03	2.90E+02	6.20E+02	1.00E+03	3.00E+02
07/06/2005	Microfibre Mop	After Thermal	0	15	0	0	0
09.06.2005	Microfibre Mop	Dirty Pre Thermal	40	1.60E+03	7.80E+04	7.10E+03	8.30E+02
09.06.2005	Microfibre Mop	After Thermal	0	300	0	0	0
09.06.2005	Microfibre Cloth	Dirty Pre Thermal	2	2.30E+03	8.20E+05	8.50E+04	7.40E+02
09.06.2005	Microfibre Cloth	After Thermal	0	0	0	0	0

**Table 12: WGC Hospital Total Viable Count (TVC) Test Results: Microfibre Thermal Disinfection Cycle**

Date	Test	Program Details	TVC Before CFU/cm <sup>2</sup>	TVC After CFU/cm <sup>2</sup>
17- May-05	Mop	Thermal	100 Heavy	Nil
19 -May-05	Mop	Thermal	40 Moderate	12 Slight
19-May-05	Mop	Thermal	100 Heavy	<2.5 VSG
20-jun-05	Mop	Thermal	40 Moderate	<2.5 VSG
07-Jun-05	Mop	Thermal	12 Slight	Nil
08-Jun-05	Mop	Thermal	12 Slight	2.5VSG

## **6. Wash Quality**

Observations on the visual appearance of the Microfibre mops and cloths made following laundering by either thermal disinfection or by the OTEX system will be further investigated in conjunction with the manufacturer.

Tests conducted on site confirmed the absence of any residual alkalinity on laundered items from the detergent used in the process.

## **7. Observations & Conclusions**

The prime objective of the trial at QEII Hospital at Welwyn Garden City was to demonstrate the bactericidal effectiveness of ozone in comparison to current laundering practices. Without question the OTEX system has proven to be an effective method of laundering microfibre mops and cloths than current thermal disinfection processes. Its effectiveness against specific types of bacteria in particular spore forming bacteria, has been found to be superior. Throughout the 6 month OTEX trial no residual target organisms, as set by the East and North Hertfordshire NHS Trust Infection Control, have been detected including *Clostridium difficile* after processing with the OTEX system.

In addition the OTEX system has provided a simple laundering process with one cycle, which can also accommodate traditional cotton mops whilst using less detergent and being energy efficient.

**APPENDIX A:  
MICROSEARCH LABORATORIES  
LIMITED ACCREDITATION**



# United Kingdom Accreditation Service

## ACCREDITATION CERTIFICATE



**TESTING LABORATORY  
No. 1916**

**Microsearch Laboratories Ltd  
Unit 3-7  
Scotts Trading Complex  
Mytholmroyd  
Halifax  
HX7 5LH**

is accredited to undertake tests as detailed in the schedule bearing the above accreditation number. From time to time this schedule may be revised and reissued by the United Kingdom Accreditation Service.

Accredited laboratories comply with the requirements of International Standard BS EN ISO/IEC 17025, which replaces ISO/IEC Guide 25 and EN45001. Testing and calibration laboratories that comply with the requirements of this International Standard operate a quality system for their testing and calibration activities that also meets the requirements of ISO 9001 when they engage in the design/development of new methods, and/or develop test programmes combining standard and non-standard test and calibration methods, and ISO 9002 when they only use standard methods.

This Accreditation shall remain in force until the expiry date printed below, subject to continuing compliance with United Kingdom Accreditation Service requirements.

**Initial Accreditation 25 June 1998**

A handwritten signature in blue ink, appearing to be 'A. Martin', written over a horizontal line.

*Accreditation Manager, United Kingdom Accreditation Service*

**This certificate issued on 29 May 2002**

**Expiry date 30 June 2006**

The Department of Trade and Industry (DTI) has entered into a memorandum of understanding with the United Kingdom Accreditation Service (UKAS) through which UKAS is recognised as the national body responsible for assessing and accrediting the competence of organisations in the fields of calibration, testing, inspection and certification of systems, products and personnel.



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## **Report on the Bacteriological Testing of Microfibre Cloths and Mops Utilising the OTEX System**

### **Wash Liquor:**

The original test protocol called for wash liquor samples to be analysed. The liquor test points on the two washing machines are sited on the drain outlets.

Due to the extremely poor site conditions with blocked and back-flowing drains at the commencement of the trial it was agreed that samples of the actual cloths and mops, both before and after laundering, would be removed, refrigerated and submitted for independent microbiological analysis.

To add confidence to this study wash liquor testing was performed under laboratory conditions in a washing machine containing 30 litres of water at ambient temperature.

The water was challenged with at least  $10^8$  cfu/ml of the target organisms C.dif, MRSA and A.niger. Samples were taken at 1 minute intervals, after 3 minutes there was no viable trace of any test organisms. The OTEX system at QE11 utilises ozone throughout the whole of the 47 minutes. programme.

### **Samples with No Contamination:**

The samples of used microfibre utilities examined in this trial were not challenged. The levels of recovered targets, we believe, reflect the actual levels of contamination due to usage. It is true that on some occasions our tests indicated an absence of target organisms from one or more categories.

### **Test Protocol:**

Diluent for plate counts:  
Difco Universal Quenching Agent (DUQA)

#### **Recovery:**

- A) Multiple 20 gram samples of microfibre utility were stomached for one minute in 180ml of DUQA.
- B) Decimal serial dilutions down to  $10^8$  were prepared.
- C) Aliquots of all dilutions were plated out and incubated as per Table 1. below.
- D) 100ml DUQA was subjected to membrane filtration and was then examined using the incubation conditions detailed in Table 1. below.
- E) Positive and negative controls were employed for all determinations. NCTC or ATCC strains were used at  $10^1$  and  $10^4$  levels of inoculation for positive controls.
- F) Confirmation and identification strategies are summarised in Table 1.

Note: All protocols are based on UKAS approved methodology conducted under a BS17025 quality system.

**Table 1.**

Target Organism	Culture Media	Incubation	I.D. Confirmation
MRSA	BAIRD PARKER	48 HOURS 37°C AEROBIC	MORPHOLOGY PROBE
MRSA	BIOMERIEUX CHROMOGENIC AGAR	24 and 48 HOURS 37°C AEROBIC	CHROMOGENIC REACTION PROBE (DNA)
C.difficile	CYCLOSERINE AGAR	24 and 48 HOURS 35°C ANAEROBIC	MICROSCOPY BIOCHEMICAL PROFILE
YEASTS MOLDS A. Niger	R.B.C.A. ROSEBENGAL CHLORAMPHENICOL AGAR	5 DAYS 25°C	MICROSCOPY

**TEST RESULTS:**

The test results showing 'after OTEX' and 'after drying' merely indicate that some of the microfibre samples were recovered straight after the wash process and others after washing and then tumble drying. It is interesting to note that on page 18 of the report the first two results show no growth after the OTEX process but <2.5VSG after tumble drying.



 .....  
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