ENVIRONMENT SURVEY

AND

TESTING OF ULTRA VIOLET SANITISING EQUIPMENT

CARRIED OUT BY ILS

AT

LONDON ROAD NEUROLOGICAL AND SPECIALIST CARE UNIT

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This report has been compiled by I.L.S. Subsequent comments and explanations have been added by The London Road Neurological and Specialist Care Unit and Vesey Airflow Design and have had no influence on the results given.

The London Road Neurological and Specialist Care Unit (LRNS) and Vesey Airflow Design (VAD) comments are so marked and are in red italics.

INTRODUCTION

LRNS & VAD - The London Road Neurological and Specialist Care Unit is a privately owned unit, providing sub acute care to clients with genetic and acquired neurological conditions as well as palliative care.

The standard of care and hygiene is extremely high, and the proprietors saw this test as an opportunity to verify their own standards and to test the equipment offered by Vesey Airflow Design.

This report describes the results of a survey conducted to quantify the environmental cleanliness and to determine the levels of microbial contamination present of designated areas within the London Road Neurological and Specialist Care Unit, Leicester.

VAD - The tests were commissioned to verify the bactericidal efficiency of the three pieces of equipment:

1) The Purist transportable air handler (see description in Appendix 1)

2) *The Sanidyne irradiant sanitiser (see description in Appendix 2)*

3) *The Consort Cumulus ozone deodouriser (see description in Appendix 3)*

SAMPLING AND OBSERVATION METHODS

Sampling was conducted at various locations around the facility. Specific sampling positions are identified in Table 1.

Settle plate sampling of static airborne microbial contamination was undertaken using 90mm diameter settle plates containing Tryptone Soya Agar (TSA) nutrient medium with incubation at 30°C for 48hrs.

Levels of active airborne microbial contamination were measured using an SAS Super 180 sampler. The system draws air through a stainless steel impactor head and impinges the air stream on a 55 mm contact plate. All samples were taken with a volume of 500litres. TSA nutrient medium was used and incubated at 30°C for 48hrs. The use of an impaction type air sampler, such as used in these measurements, leads to the possibility of multiple airborne particles passing through one of the 219 holes in the impactor head. Thus the observed total count must be corrected by the use of a statistical formula to arrive at a probability count. It is this figure which is then compared to any specified acceptance criteria.

Sampling of surfaces was undertaken at various points including walls, worksurfaces, etc. This was undertaken using 55mm contact plates with TSA nutrient medium and these were again incubated at 30°C for 48hrs.

RESULTS

Table 1 describes the specific sample locations and the results are shown in Tables 2 - 9

DISCUSSION

Sanidyne System (Room 15)

VAD - Table 2 (San 15)

It was decided to use the Sanidyne equipment to provide "second pass" sanitising in an empty patient room. The rooms are vacated daily and chemically sanitised. On this occasion the mattress was not chemically sanitised.

Chemical cleaning efficiency average – 80.5%

UV cleaning efficiency average – 97.8%

The sequence of the sampling runs was as follows. Run 1 was undertaken shortly after the room had been vacated. Run 2 was undertaken after a full clean down. Run 3 was undertaken after UV irradiation. It should be noted that the areas sampled at location 5 and 6 were not included in the clean down protocol.

There was a significant reduction in contact plate counts between Runs 1 and 2, which should be expected after a full clean down.

There was limited evidence of contact plate counts reducing after UV irradiation, between Runs 2 and 3. As the plate counts had been reduced to low levels after the clean down it was not possible to draw conclusions from the change in counts between Runs 2 and 3. As a result it was decided that the test should be repeated with a change in the sequence of cleaning and UV irradiation.

Sanidyne System (Room 25)

VAD - Table 3 (San 25)

It was decided to prove the efficiency of the Sanidyne by using Ultra Violet radiation as the primary cleaning medium and cleaning chemically as the secondary process.

The results show that even with the best cleaning procedures errors can occur that may have a dramatic (but not visible) effect on the bacteria count in the area.

UV cleaning efficiency average – 76%

Chemical cleaning efficiency average – reversal to a level 17% above the original

The combination of the tests tabulated in tables 2 and 3 attest to the quality and reliability of chemical cleaning followed by Ultra Violet irradiation.

The sequence of the sampling runs was as follows. Run 1 was undertaken shortly after the room had been vacated. Run 2 was undertaken after UV irradiation. Run 3 was undertaken after a full clean down. It should be noted that the areas sampled at location 5 and 6 were again not included in the clean down protocol.

There was evidence of a reduction in contact plate counts at all sample locations after the UV irradiation cycle, between Runs 1 and 2. The reduction in counts at four of the six locations could be considered as substantial.

However, there was also a significant rise in plate counts between Runs 2 and 3 between which the room underwent a full clean down. This may suggest that contaminants were reintroduced to the room at some point during or after the clean down.

Purist System (Room 7A)

VAD - It was decided to locate the Purist air sanitiser in a single patient room, and to measure the reduction of airborne bacteria within that room over a 2-day period.

With the exception of the table location at the bottom of the bed, there was a considerable reduction in airborne bacteria.

The reduction against the original count was measured at 79% (this figure does not include for the location mentioned above).

During the initial sample run the patient occupied the room for the majority of the sample time and the room door was open. The patient was removed from the room at 09.45 hours and the door was closed. The Purist air handling unit was switched on at 10.00 hours. The patient was returned to the room at 13.42 hours and the door left open again. The patient did not leave the room for the remainder of the sampling runs.

A significant reduction in counts was noted between runs 1 and 2. After the patient was returned to the room, and the door left open, counts then fluctuate but were generally lower than the Run 1, taken prior to the activation of the unit. Factors such as the open door to the corridor and the intermittent presence of nurses and visitors may have reduced the potential overall reduction of airborne microbial contaminants. Unfortunately the patients condition required frequent observation and thus it was not possible to close the door during the survey.

LRNS - The client concerned has a tracheostomy in situ and requires nursing in a sitting position. Tests carried out by the nursing staff, following the test results, have shown that the trajectory area when he coughs covers the table on a frequent basis. This has alerted staff to the constant contamination of the table area, and so enabled them to rectify the situation. This is a fundamental step in preventing cross contamination.

Corridor System

VAD - The odour control unit was positioned in the corridor. Odour control is effected by the generation of ozone. The unit is fitted with a 0.3 micron electrostatic filter (claimed), and it was anticipated that a reduction in airborne bacteria might well result.

The odour control efficiency was proved beyond doubt, however, there was no reduction in airborne pathogens.

All of the plate counts fluctuated in this area. Activation of the air handling unit appeared to have little or no affect on the airborne environmental microbial contamination.

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TABLE 1

Sample Reference	Description
Sanidyne System – Room 15	
SAN(15) – C1 - #	Surface next to wash basin
SAN(15) – C2 - #	Top of chest of draws in front of television
SAN(15) – C3 - #	Top of chest of draws in front of radio
SAN(15) – C4 - #	Wall to rear left hand side of bed
SAN(15) – C5 - #	Ceiling beam
SAN(15) – C6 - #	Bed cushion
Sanidyne System – Room 25	
SAN(25) – C1 - #	Surface next to wash basin
SAN(25) – C2 - #	Table top next to chair at window
SAN(25) – C3 - #	Bedside table
SAN(25) – C4 - #	Wall to rear left hand side of bed
SAN(25) – C5 - #	Ceiling near smoke detector
SAN(25) – C6 - #	Bed cover (rubberised)
Purist System – Room 7A	
PUR-S1/CAS1 - #	Bedside table on left hand side
PUR-S2/CAS2 - #	Table at bottom of bed
PUR-S3/CAS3 - #	Television cabinet
Corridor System	
COR-S1/CAS1 - #	Top of display unit outside of room 11
COR-S2/CAS2 - #	Top of fan (switched off) outside of room 17
COR-S3/CAS3 - #	Hand rail between rooms 16 and 17

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ENVIRONMENTAL MICROBIOLOGICAL SAMPLING RESULTS

TABLE 2

Sample Reference	Lab Reference	Sample Type	Time & Date	Bacilli cfu/plate	Micrococci cfu/plate	Moulds cfu/plate	Others cfu/plate	Total Count	
								Plate	Probability
SAN(15) – C1 – 1	64112834	Contact	08.45 05/09/2005	15	25	0	0	40	
SAN(15) – C1 – 2	64112835	Contact	10.36 05/09/2005	1	1	1	0	3	
SAN(15) – C1 – 3	64112836	Contact	11.53 05/09/2005	0	1	1	0	2	
SAN(15) – C2 – 1	64112837	Contact	08.45 05/09/2005	13	22	0	0	35	
SAN(15) – C2 – 2	64112838	Contact	10.36 05/09/2005	18	1	0	0	19	
SAN(15) – C2 – 3	64112839	Contact	11.53 05/09/2005	0	0	0	0	0	
SAN(15) – C3 – 1	64112840	Contact	08.46 05/09/2005	18	12	1	0	31	
SAN(15) – C3 – 2	64112841	Contact	10.37 05/09/2005	1	4	0	0	5	
SAN(15) – C3 – 3	64112842	Contact	11.54 05/09/2005	2	0	0	0	2	
SAN(15) – C4 – 1	64112843	Contact	08.46 05/09/2005	1	26	2	0	29	
SAN(15) – C4 – 2	64112844	Contact	10.37 05/09/2005	0	0	0	0	0	
SAN(15) – C4 – 3	64112845	Contact	11.54 05/09/2005	0	0	0	0	0	
SAN(15) – C5 – 2	64112846	Contact	10.34 05/09/2005	0	0	0	0	0	
SAN(15) – C5 – 3	64112847	Contact	11.55 05/09/2005	0	0	0	0	0	
SAN(15) – C6 – 2	64112848	Contact	10.40 05/09/2005	0	21	1	0	22	
SAN(15) – C6 – 3	64112849	Contact	11.55 05/09/2005	0	0	0	0	0	

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ENVIRONMENTAL MICROBIOLOGICAL SAMPLING RESULTS

TABLE 3

Sample Reference	Lab Reference	Sample Type	Time & Date	Bacilli cfu/plate	Micrococci cfu/plate	Moulds cfu/plate	Others cfu/plate	Total Count	
								Plate	Probability
SAN(25) – C1 – 1	64112850	Contact	08.42 06/09/2005	2	40	0	0	42	
SAN(25) – C1 – 2	64112865	Contact	09.40 06/09/2005	0	1	2	0	3	
SAN(25) – C1 – 3	64112851	Contact	10.51 06/09/2005	34	4	0	0	38	
SAN(25) – C2 – 1	64112852	Contact	08.42 06/09/2005	11	8	1	1	21	
SAN(25) – C2 – 2	64112853	Contact	09.40 06/09/2005	6	2	2	0	10	
SAN(25) – C2 – 3	64112854	Contact	10.51 06/09/2005	21	5	0	0	26	
SAN(25) – C3 – 1	64112855	Contact	08.43 06/09/2005	14	70	0	0	84	
SAN(25) – C3 – 2	64112856	Contact	09.41 06/09/2005	0	2	3	0	5	
SAN(25) – C3 – 3	64112857	Contact	10.52 06/09/2005	13	0	0	0	13	
SAN(25) – C4 – 1	64112858	Contact	08.43 06/09/2005	4	0	0	1	5	
SAN(25) – C4 – 2	64112859	Contact	09.42 06/09/2005	2	0	1	0	3	
SAN(25) – C4 – 3	64112860	Contact	10.52 06/09/2005	9	3	0	0	12	
SAN(25) – C5 – 1	64112861	Contact	08.44 06/09/2005	0	0	0	0	0	
SAN(25) – C5 – 2	64112862	Contact	09.44 06/09/2005	0	0	0	0	0	
SAN(25) – C6 – 1	64112863	Contact	08.44 06/09/2005	38	0	0	0	38	
SAN(25) – C6 – 2	64112864	Contact	09.43 06/09/2005	0	0	0	0	0	

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ENVIRONMENTAL MICROBIOLOGICAL SAMPLING RESULTS

TABLE 4

Sample Reference	Lab Reference	Sample Type	Time & Date	Bacilli cfu/plate	Micrococci cfu/plate	Moulds cfu/plate	Others cfu/plate	Total Count	
								Plate	Probability
PUR – S1 – 1	64112918	Settle	08.54 – 09.54 05/09/2005	0	54	0	2	56	
PUR – S1 – 2	64112919	Settle	11.00 – 12.15 05/09/2005	0	2*	0	0	2*	
PUR – S1 – 3	64112920	Settle	13.00 – 14.00 05/09/2005	1	14	0	0	15	
PUR – S1 – 4	64112921	Settle	15.00 – 16.00 05/09/2005	1	3	0	0	4	
PUR – S1 – 5	64112922	Settle	08.26 – 09.26 06/09/2005	0	1	0	0	1	
PUR – S1 – 6	64112923	Settle	10.31 – 11.31 06/09/2005	0	18	0	1	19	
PUR – S1 – 7	64112924	Settle	12.29 – 13.29 06/09/2005	0	6	0	0	6	
PUR – S1 – 8	64112925	Settle	14.29 – 15.29 06/09/2005	0	3	1	0	4	
PUR – S2 – 1	64112926	Settle	08.54 – 09.54 05/09/2005	0	6	0	0	6	
PUR – S2 – 2	64112927	Settle	11.00 – 12.15 05/09/2005	0	2*	1*	0	3*	
PUR – S2 – 3	64112928	Settle	13.00 – 14.00 05/09/2005	1	22	1	1	25	
PUR – S2 – 4	64112929	Settle	15.00 – 16.00 05/09/2005	0	7	1	0	8	
PUR – S2 – 5	64112930	Settle	08.26 – 09.26 06/09/2005	0	9	0	0	9	
PUR – S2 – 6	64112931	Settle	10.31 – 11.31 06/09/2005	2	42	2	0	46	
PUR – S2 – 7	64112932	Settle	12.29 – 13.29 06/09/2005	0	25	1	0	26	
PUR – S2 – 8	64112933	Settle	14.29 – 15.29 06/09/2005	0	48	2	0	50	

* - Plate counts reduced by 20% due to over exposure.

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ENVIRONMENTAL MICROBIOLOGICAL SAMPLING RESULTS

TABLE 5

Sample Reference	Lab Reference	Sample Type	Time & Date	Bacilli cfu/plate	Micrococci cfu/plate	Moulds cfu/plate	Others cfu/plate	Total Count	
								Plate	Probability
PUR – S3 – 1	64112934	Settle	08.54 – 09.54 05/09/2005	0	72	0	0	72	
PUR – S3 – 2	64112935	Settle	11.00 – 12.15 05/09/2005	0	6*	0	0	6*	
PUR – S3 – 3	64112936	Settle	13.00 – 14.00 05/09/2005	1	14	0	0	15	
PUR – S3 – 4	64112937	Settle	15.00 – 16.00 05/09/2005	0	2	0	0	2	
PUR – S3 – 5	64112938	Settle	08.26 – 09.26 06/09/2005	1	8	0	0	9	
PUR – S3 – 6	64112939	Settle	10.31 – 11.31 06/09/2005	1	21	0	0	22	
PUR – S3 – 7	64112940	Settle	12.29 – 13.29 06/09/2005	1	8	0	0	9	
PUR – S3 – 8	64112941	Settle	14.29 – 15.29 06/09/2005	1	18	1	0	20	
PUR – CAS1 – 1	64112870	Air	09.28 05/09/2005	6	99	0	15	120	173
PUR – CAS1 – 2	64112871	Air	11.33 05/09/2005	0	8	0	1	9	9
PUR – CAS1 – 3	64112872	Air	13.32 05/09/2005	0	4	1	0	5	5
PUR – CAS1 – 4	64112873	Air	15.32 05/09/2005	0	9	1	0	10	10
PUR – CAS1 – 5	64112874	Air	08.54 06/09/2005	1	15	1	0	17	18
PUR – CAS1 – 6	64112875	Air	11.06 06/09/2005	1	38	0	1	40	44
PUR – CAS1 – 7	64112876	Air	12.51 06/09/2005	0	11	1	1	13	13
PUR – CAS1 – 8	64112877	Air	14.51 06/09/2005	0	19	0	0	19	20

* - Plate counts reduced by 20% due to over exposure.

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ENVIRONMENTAL MICROBIOLOGICAL SAMPLING RESULTS

TABLE 6

Sample Reference	Lab Reference	Sample Type	Time & Date	Bacilli cfu/plate	Micrococci cfu/plate	Moulds cfu/plate	Others cfu/plate	Total Count	
								Plate	Probability
PUR – CAS2 – 1	64112878	Air	09.32 05/09/2005	0	98	2	10	110	152
PUR – CAS2 – 2	64112879	Air	11.37 05/09/2005	1	4	0	1	6	6
PUR – CAS2 – 3	64112880	Air	13.35 05/09/2005	1	35	0	4	40	44
PUR – CAS2 – 4	64112881	Air	15.35 05/09/2005	0	10	1	0	11	11
PUR – CAS2 – 5	64112882	Air	08.57 06/09/2005	3	29	0	0	32	34
PUR – CAS2 – 6	64112883	Air	11.09 06/09/2005	1	1	3	0	5	5
PUR – CAS2 – 7	64112884	Air	12.54 06/09/2005	3	20	0	0	23	24
PUR – CAS2 – 8	64112885	Air	14.54 06/09/2005	1	17	2	1	21	22
PUR – CAS3 – 1	64112886	Air	09.35 05/09/2005	6	65	4	5	80	99
PUR – CAS3 – 2	64112887	Air	11.40 05/09/2005	0	20	1	0	21	22
PUR – CAS3 – 3	64112888	Air	13.38 05/09/2005	0	98	1	1	100	133
PUR – CAS3 – 4	64112889	Air	15.38 05/09/2005	2	7	0	0	9	9
PUR – CAS3 – 5	64112890	Air	09.00 06/09/2005	0	56	2	2	60	70
PUR – CAS3 – 6	64112891	Air	11.12 06/09/2005	3	39	1	0	43	48
PUR – CAS3 – 7	64112892	Air	12.57 06/09/2005	3	0	0	0	3	3
PUR – CAS3 – 8	64112893	Air	14.58 06/09/2005	2	37	1	0	40	44

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ENVIRONMENTAL MICROBIOLOGICAL SAMPLING RESULTS

TABLE 7

Sample Reference	Lab Reference	Sample Type	Time & Date	Bacilli cfu/plate	Micrococci cfu/plate	Moulds cfu/plate	Others cfu/plate	Total Count	
								Plate	Probability
COR – S1 – 1	64112942	Settle	09.02 – 10.02 05/09/2005	1	17	2	0	20	
COR – S1 – 2	64112943	Settle	11.30 – 12.30 05/09/2005	0	10	0	0	10	
COR – S1 – 3	64112944	Settle	13.30 – 14.30 05/09/2005	0	10	0	0	10	
COR – S1 – 4	64112945	Settle	15.30 – 16.30 05/09/2005	0	7	0	0	7	
COR – S1 – 5	64112946	Settle	08.28 – 09.28 06/09/2005	0	8	0	0	8	
COR – S1 – 6	64112947	Settle	10.29 – 11.29 06/09/2005	2	15	0	0	17	
COR – S1 – 7	64112948	Settle	12.30 – 13.30 06/09/2005	0	1	1	0	2	
COR – S1 – 8	64112949	Settle	14.30 – 15.30 06/09/2005	1	10	1	0	12	
COR – S2 – 1	64112950	Settle	09.02 – 10.02 05/09/2005	0	19	1	1	21	
COR – S2 – 2	64112951	Settle	11.30 – 12.30 05/09/2005	0	10	1	1	12	
COR – S2 – 3	64112952	Settle	13.30 – 14.30 05/09/2005	0	18	0	2	20	
COR – S2 – 4	64112953	Settle	15.30 – 16.30 05/09/2005	0	8	0	0	8	
COR – S2 – 5	64112954	Settle	08.28 – 09.28 06/09/2005	0	9	0	0	9	
COR – S2 – 6	64112955	Settle	10.29 – 11.29 06/09/2005	3	39	0	0	43	
COR – S2 – 7	64112956	Settle	12.30 – 13.30 06/09/2005	0	3	1	0	4	
COR – S2 – 8	64112957	Settle	14.30 – 15.30 06/09/2005	3	23	0	0	26	

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ENVIRONMENTAL MICROBIOLOGICAL SAMPLING RESULTS

TABLE 8

Sample Reference	Lab Reference	Sample Type	Time & Date	Bacilli cfu/plate	Micrococci cfu/plate	Moulds cfu/plate	Others cfu/plate	Total Count	
								Plate	Probability
COR – S3 – 1	64112958	Settle	09.02 – 10.02 05/09/2005	3	28	1	0	32	
COR – S3 – 2	64112959	Settle	11.30 – 12.30 05/09/2005	0	69	1	0	70	
COR – S3 – 3	64112960	Settle	13.30 – 14.30 05/09/2005	1	22	2	0	25	
COR – S3 – 4	64112961	Settle	15.30 – 16.30 05/09/2005	1	8	0	1	10	
COR – S3 – 5	64112962	Settle	08.28 – 09.28 06/09/2005	0	54	1	0	55	
COR – S3 – 6	64112963	Settle	10.29 – 11.29 06/09/2005	2	35	4	1	40	
COR – S3 – 7	64112964	Settle	12.30 – 13.30 06/09/2005	0	2	2	0	4	
COR – S3 – 8	64112965	Settle	14.30 – 15.30 06/09/2005	2	26	1	0	29	
COR – CAS1 – 1	64112894	Air	09.40 05/09/2005	2	21	5	0	28	30
COR – CAS1 – 2	64112895	Air	12.00 05/09/2005	3	28	5	2	38	42
COR – CAS1 – 3	64112896	Air	14.02 05/09/2005	0	23	0	0	23	24
COR – CAS1 – 4	64112897	Air	16.03 05/09/2005	1	33	0	1	35	38
COR – CAS1 – 5	64112898	Air	09.04 05/09/2005	0	53	2	5	60	70
COR – CAS1 – 6	64112899	Air	10.55 05/09/2005	0	23	4	1	28	30
COR – CAS1 – 7	64112900	Air	13.01 05/09/2005	1	17	0	0	18	19
COR – CAS1 – 8	64112901	Air	15.02 05/09/2005	2	18	1	0	21	22

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ENVIRONMENTAL MICROBIOLOGICAL SAMPLING RESULTS

TABLE 9

Sample Reference	Lab Reference	Sample Type	Time & Date	Bacilli cfu/plate	Micrococci cfu/plate	Moulds cfu/plate	Others cfu/plate	Total Count	
								Plate	Probability
COR – CAS2 – 1	64112902	Air	09.44 05/09/2005	4	33	3	0	40	44
COR – CAS2 – 2	64112903	Air	12.04 05/09/2005	4	27	3	1	35	38
COR – CAS2 – 3	64112904	Air	14.05 05/09/2005	1	67	0	2	70	84
COR – CAS2 – 4	64112905	Air	16.06 05/09/2005	0	40	2	0	42	46
COR – CAS2 – 5	64112906	Air	09.07 06/09/2005	2	35	1	2	40	44
COR – CAS2 – 6	64112907	Air	10.58 06/09/2005	0	63	1	0	64	76
COR – CAS2 – 7	64112908	Air	13.04 06/09/2005	0	34	1	0	35	38
COR – CAS2 – 8	64112909	Air	15.05 06/09/2005	4	33	0	0	37	40
COR – CAS3 – 1	64112910	Air	09.47 05/09/2005	7	34	1	2	44	49
COR – CAS3 – 2	64112911	Air	12.08 05/09/2005	1	21	3	0	25	26
COR – CAS3 – 3	64112912	Air	14.08 05/09/2005	0	60	0	0	60	70
COR – CAS3 – 4	64112913	Air	16.10 05/09/2005	1	38	0	2	41	45
COR – CAS3 – 5	64112914	Air	09.10 06/09/2005	0	37	1	0	38	42
COR – CAS3 – 6	64112915	Air	11.01 06/09/2005	8	64	0	0	72	87
COR – CAS3 – 7	64112916	Air	13.07 06/09/2005	1	32	0	0	33	36
COR – CAS3 – 8	64112917	Air	15.08 06/09/2005	3	18	1	0	22	23