

## **APPENDIX B**

### **Online Survey**

Murdoch University

**ASHRAE Project RP 921**W\_\_ SUB \_\_\_\_\_  
Australia

Building \_\_\_\_\_ Kalgoorlie, Western

**Comfort Study - Online Survey**

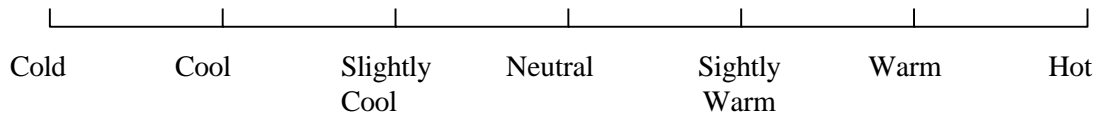
Please note: All survey responses will remain confidential.  
Participants will remain anonymous and will only be identified as an assigned ID code.

1. Name \_\_\_\_\_ 2. Date: \_\_\_\_\_

3. Time: \_\_\_\_\_

In this part of the survey we would like to know how you feel RIGHT NOW, at this moment.

4a. (Thermal environment) Please tick the scale below at the place that best represents how you feel at this moment. You may tick in an appropriate place between two categories, if you wish.



4b. Is the thermal environment acceptable to you?      1  unacceptable      2  acceptable

4c. Please select the box below that best represents how you feel at this moment.

I would like to be:

- 3            warmer  
2            no change  
1            cooler

5. Please select the boxes that best represent how you feel at the moment about the AIR MOVEMENT in your office.

- |   |                          |                         |
|---|--------------------------|-------------------------|
| 6 | <input type="checkbox"/> | very acceptable         |
| 5 | <input type="checkbox"/> | moderately acceptable   |
| 4 | <input type="checkbox"/> | slightly acceptable     |
| 3 | <input type="checkbox"/> | slightly unacceptable   |
| 2 | <input type="checkbox"/> | moderately unacceptable |
| 1 | <input type="checkbox"/> | very unacceptable       |

I would like:

- |   |                          |                   |
|---|--------------------------|-------------------|
| 3 | <input type="checkbox"/> | more air movement |
| 2 | <input type="checkbox"/> | no change         |
| 1 | <input type="checkbox"/> | less air movement |

6. (General Comfort) How comfortable is your office right now?

- |   |                          |                          |
|---|--------------------------|--------------------------|
| 6 | <input type="checkbox"/> | very comfortable         |
| 5 | <input type="checkbox"/> | moderately comfortable   |
| 4 | <input type="checkbox"/> | slightly comfortable     |
| 3 | <input type="checkbox"/> | slightly uncomfortable   |
| 2 | <input type="checkbox"/> | moderately uncomfortable |
| 1 | <input type="checkbox"/> | very uncomfortable       |

7. (Temperature) What would you estimate the temperature to be RIGHT now? \_\_\_\_\_

8. (Activity) What activities have you been engaged in during the preceding hour?

	sitting quietly	sitting typing	standing still	on your feet working	driving a car	walking around
Last 10 minutes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The 10 minutes preceding?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The 10 minutes before that?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The half hour before that?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. (Clothing) Please indicate whether you are wearing any of the items listed below by circulating the appropriate number. 0 = not wearing item, 1 = light weight item, 2 - medium weight item, 3 = heavy weight item.

**FEMALES:**

## Underlayer:

0 1 2 3 top  
 0 1 2 3 bottom  
 0 1 2 3 slip

## Footwear:

0 1 2 3 socks  
 0 1 2 3 pantyhose  
 0 1 2 3 shoes

## Midlayer

0 1 2 3 short sleeved shirt  
 0 1 2 3 long sleeved shirt  
 0 1 2 3 dress  
 0 1 2 3 skirt  
 0 1 2 3 pants or slacks  
 0 1 2 3 shorts

## Outerlayers

0 1 2 3 sweater  
 0 1 2 3 vest  
 0 1 2 3 jacket

**MALES:**

## Underlayer

0 1 2 3 top  
 0 1 2 3 bottom

0 1 2 3 socks

0 1 2 3 shoes

## Midlayer

0 1 2 3 short sleeved shirt  
 0 1 2 3 long sleeved shirt  
 0 1 2 3 pants  
 0 1 2 3 shorts

## Outerlayers

0 1 2 3 sweater  
 0 1 2 3 vest  
 0 1 2 3 jacket

10. Please indicate whether you have consumed any of the following items within the last 15 minutes.

Hot drink                       Caffeinated drink                       Snack or Meal  
 Cold drink                       Cigarette

11. Are you presently using air conditioning at home and/or in your car?

	Compressor based air conditioning		Evaporative air conditioning		Not available
	Yes	No	Yes	No	
at home in my bedroom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
at home in my living area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
in may car	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>

**APPENDIX C**

**BACKGROUND SURVEY**

Murdoch University

**ASHRAE Project RP 921**

Building \_\_\_\_\_ Kalgoorlie, Western Australia

**Comfort Study - Background Survey**

*Please note: All survey responses will remain confidential.  
Participants will remain anonymous and will only be identified as an assigned ID code.*

This is a standard questionnaire developed by the *American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)*. The questionnaire was already used in three identical benchmark studies in San Francisco (USA), Townsville (Australia) and Montreal (Canada).

**Background Characteristics**

1. Name: \_\_\_\_\_ 2. Date: \_\_\_\_\_
3. Department or group: \_\_\_\_\_
4. Occupation: \_\_\_\_\_
5. Company name or organisation \_\_\_\_\_
6. Work phone number: \_\_\_\_\_ 7. Location in Building \_\_\_\_\_
8. How long have you lived in the Goldfields? \_\_\_\_\_ Years \_\_\_\_\_ Months
9. Are you using your home air-conditioner at this time of year?  
1  Yes      2  No      3  not available
10. On the average, how many hours per week do you work at this job? \_\_\_\_\_ Hours at work
11. On the average, how many hours per day do you sit at your work area? \_\_\_\_\_ Hours at desk
12. What is your approximate height? \_\_\_\_\_ Centimetres
13. What is your approximate weight? \_\_\_\_\_ Kilograms
14. What is your age? \_\_\_\_\_ Years

Please tick the following

15. What is your gender?       Male       Female

16. Your ethnic background?

- 1  Asian  
 2  Indigenous (Aboriginal)  
 3  Caucasian  
 4  Indigenous (Torres Strait Islander)  
 5  Other (please specify: \_\_\_\_\_)

17. Is English your primary language?      1  Yes    2  No

18. What is the highest grade of school you completed?

- 1  school leaving certificate or less      5  university/college bachelors degree  
 2  higher school certificate (Yr. 12)      6  some graduate school  
 3  some college      7  university higher degree  
 4  college diploma      8  PhD

### Work Area Satisfaction

Using the scale below, please indicate how SATISFYING YOUR WORK AREA IS with respect to each characteristic by circling the number that reflects how you feel.

- 6      very satisfied  
 5      moderately satisfied  
 4      slightly satisfied  
 3      slightly dissatisfied  
 2      moderately dissatisfied  
 1      very dissatisfied

(circle one number for each item)

How satisfied are you with:

- |     |   |   |   |   |   |   |   |
|-----|---|---|---|---|---|---|---|
| 1.  | The type and levels of sounds? .....        | 1 | 2 | 3 | 4 | 5 | 6 |
| 2.  | The lighting? .....                         | 1 | 2 | 3 | 4 | 5 | 6 |
| 3.  | The temperature? .....                      | 1 | 2 | 3 | 4 | 5 | 6 |
| 4.  | The air quality? .....                      | 1 | 2 | 3 | 4 | 5 | 6 |
| 5.  | The ventilation and air circulation? .....  | 1 | 2 | 3 | 4 | 5 | 6 |
| 6.  | The colours of walls or partitions? .....   | 1 | 2 | 3 | 4 | 5 | 6 |
| 7.  | The furniture and equipment? .....          | 1 | 2 | 3 | 4 | 5 | 6 |
| 8.  | The amount of space available to you? ..... | 1 | 2 | 3 | 4 | 5 | 6 |
| 9.  | The level of privacy? .....                 | 1 | 2 | 3 | 4 | 5 | 6 |
| 10. | The comfort of your chair? .....            | 1 | 2 | 3 | 4 | 5 | 6 |
| 11. | Provision of non-smoking work areas? .....  | 1 | 2 | 3 | 4 | 5 | 6 |

In terms of comfort, how acceptable is your office work area overall? (check one below)

- 6  very acceptable  
 5  moderately acceptable  
 4  slightly acceptable  
 3  slightly unacceptable  
 2  moderately unacceptable  
 1  very unacceptable

Do you have any additional comments about the comfort of your office work area?

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### **Personal Comfort**

Please complete each of the following statements by checking the box that best expresses your personal feelings or preferences.

1. On average, I perceive my work area to be: (check one)

- 6  very comfortable  
 5  moderately comfortable  
 4  slightly comfortable  
 3  slightly uncomfortable  
 2  moderately uncomfortable  
 1  very uncomfortable

2. On average, I perceive the TEMPERATURE of my work area to be: (disregarding the effects of air movement, lighting and humidity)

- 6  very warm  
 5  moderately warm  
 4  slightly warm  
 3  slightly cool  
 2  moderately cool  
 1  very cool

3. On average, I perceive the AIR MOVEMENT of my work area to be: (disregarding the effects of temperature, lighting and humidity. Answer on both scales)

- |                                       |  |
|---------------------------------------|--|
| 3 <input type="checkbox"/> too much   | 6 <input type="checkbox"/> very acceptable         |
| 2 <input type="checkbox"/> just right | 5 <input type="checkbox"/> moderately acceptable   |
| 1 <input type="checkbox"/> too little | 4 <input type="checkbox"/> slightly acceptable     |
|                                       | 3 <input type="checkbox"/> slightly unacceptable   |
|                                       | 2 <input type="checkbox"/> moderately unacceptable |
|                                       | 1 <input type="checkbox"/> very unacceptable       |

4. On average, I perceive the LIGHTING of my work area to be: (disregarding the effects of temperature, air movement and humidity)

- |   |                          |                   |
|---|--------------------------|-------------------|
| 6 | <input type="checkbox"/> | very bright       |
| 5 | <input type="checkbox"/> | moderately bright |
| 4 | <input type="checkbox"/> | slightly bright   |
| 3 | <input type="checkbox"/> | slightly dim      |
| 2 | <input type="checkbox"/> | moderately dim    |
| 1 | <input type="checkbox"/> | very dim          |

5. On average, I perceive the HUMIDITY of my work area to be: (disregarding the effects of temperature, air movement, and lighting)?

- |   |                          |                  |
|---|--------------------------|------------------|
| 6 | <input type="checkbox"/> | very humid       |
| 5 | <input type="checkbox"/> | moderately humid |
| 4 | <input type="checkbox"/> | slightly humid   |
| 3 | <input type="checkbox"/> | slightly dry     |
| 2 | <input type="checkbox"/> | moderately dry   |
| 1 | <input type="checkbox"/> | very dry         |

### Personal Control

To what extent are you able to control the environment of the office space where you usually work? For each question below make a check mark next to the statement that best expresses your personal feelings or behaviour patterns.

1. HOW MUCH CONTROL do you feel you have over the thermal conditions of your workplace? (check one).

- |   |                          |                        |
|---|--------------------------|------------------------|
| 5 | <input type="checkbox"/> | complete control       |
| 4 | <input type="checkbox"/> | high degree of control |
| 3 | <input type="checkbox"/> | moderate control       |
| 2 | <input type="checkbox"/> | slight control         |
| 1 | <input type="checkbox"/> | no control             |

2. HOW SATISFIED ARE YOU with this level of control? (check one)

- |   |                          |                         |
|---|--------------------------|-------------------------|
| 6 | <input type="checkbox"/> | very satisfied          |
| 5 | <input type="checkbox"/> | moderately satisfied    |
| 4 | <input type="checkbox"/> | slightly satisfied      |
| 3 | <input type="checkbox"/> | slightly dissatisfied   |
| 2 | <input type="checkbox"/> | moderately dissatisfied |
| 1 | <input type="checkbox"/> | very dissatisfied       |

3. CAN YOU EXERCISE ANY OF THE FOLLOWING OPTIONS to adjust the thermal environment at your workplace? (check Y = yes or N = no for each item)

- |   |                            |                            |   |
|---|----------------------------|----------------------------|---|
| 1 | Y <input type="checkbox"/> | N <input type="checkbox"/> | open or close a window                    |
| 2 | Y <input type="checkbox"/> | N <input type="checkbox"/> | open or close a door to the outside       |
| 3 | Y <input type="checkbox"/> | N <input type="checkbox"/> | open or close a door to an interior space |
| 4 | Y <input type="checkbox"/> | N <input type="checkbox"/> | adjust a thermostat                       |
| 5 | Y <input type="checkbox"/> | N <input type="checkbox"/> | adjust the drapes or blinds               |

- 6 Y  N  turn a local space heater on or off  
 7 Y  N  turn a local fan on or off
4. In general, how often DO YOU EXERCISE ANY OF THE FOLLOWING OPTIONS to adjust the thermal environment at your workplace?

- 6 always  
 5 often  
 4 sometimes  
 3 rarely  
 2 never  
 1 not available

(circle one number for each item)

- |    |  |   |   |   |   |   |   |
|----|--|---|---|---|---|---|---|
| 1. | open or close a window.....                    | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. | open or close a door to the outside.....       | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. | open or close a door to an interior space..... | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. | adjust a thermostat.....                       | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. | adjust the drapes or blinds.....               | 1 | 2 | 3 | 4 | 5 | 6 |
| 6. | turn a local space heater on or off .....      | 1 | 2 | 3 | 4 | 5 | 6 |
| 7. | turn a local fan on or off .....               | 1 | 2 | 3 | 4 | 5 | 6 |

### **Job satisfaction**

The questions below ask about different characteristics of your job. Please indicate how SATISFYING YOUR JOB IS with respect to each characteristic by circling the number that reflects how you feel:

- 6 very satisfied  
 5 moderately satisfied  
 4 slightly satisfied  
 3 slightly dissatisfied  
 2 moderately dissatisfied  
 1 very dissatisfied

(circle one number for each item)

How generally satisfied are you with:

- |     |  |   |   |   |   |   |   |
|-----|--|---|---|---|---|---|---|
| 1.  | Your job overall?.....                                   | 1 | 2 | 3 | 4 | 5 | 6 |
| 2.  | Your company's policies?.....                            | 1 | 2 | 3 | 4 | 5 | 6 |
| 3.  | The degree of access to other people you work with?..... | 1 | 2 | 3 | 4 | 5 | 6 |
| 4.  | The opportunity to develop your skills?.....             | 1 | 2 | 3 | 4 | 5 | 6 |
| 5.  | Your job security? .....                                 | 1 | 2 | 3 | 4 | 5 | 6 |
| 6.  | Your relations with your co-workers?.....                | 1 | 2 | 3 | 4 | 5 | 6 |
| 7.  | Your relations with your supervisors? .....              | 1 | 2 | 3 | 4 | 5 | 6 |
| 8.  | Your pay? .....  | 1 | 2 | 3 | 4 | 5 | 6 |
| 9.  | Your chances of advancement? .....                       | 1 | 2 | 3 | 4 | 5 | 6 |
| 10. | Your level of responsibility?.....                       | 1 | 2 | 3 | 4 | 5 | 6 |
| 11. | Your independence or autonomy?.....                      | 1 | 2 | 3 | 4 | 5 | 6 |

- |     |   |   |   |   |   |   |   |
|-----|---|---|---|---|---|---|---|
| 12. | The degree of recognition for good work?..... | 1 | 2 | 3 | 4 | 5 | 6 |
| 13. | Your interest in the work itself?.....        | 1 | 2 | 3 | 4 | 5 | 6 |
| 14. | The quality of equipment you work with?.....  | 1 | 2 | 3 | 4 | 5 | 6 |
| 15. | The time pressures of your job? .....         | 1 | 2 | 3 | 4 | 5 | 6 |

### Health Characteristics

Below are some symptoms that people experience at different times. Please indicate how often YOU HAVE EXPERIENCED EACH SYMPTOM IN THE PAST MONTH by circling the appropriate number for the scale below

- |   |            |
|---|------------|
| 5 | very often |
| 4 | often      |
| 3 | sometimes  |
| 2 | rarely     |
| 1 | never      |

(circle one number for each symptom)

- |     |  |   |   |   |   |   |
|-----|--|---|---|---|---|---|
| 1.  | Headache.....                          | 1 | 2 | 3 | 4 | 5 |
| 2.  | Dizziness.....                         | 1 | 2 | 3 | 4 | 5 |
| 3.  | Sleepiness.....                        | 1 | 2 | 3 | 4 | 5 |
| 4.  | Sore or irritated throat .....         | 1 | 2 | 3 | 4 | 5 |
| 5.  | Nose irritation (itch or running)..... | 1 | 2 | 3 | 4 | 5 |
| 6.  | Eye irritation .....                   | 1 | 2 | 3 | 4 | 5 |
| 7.  | Trouble focusing eyes.....             | 1 | 2 | 3 | 4 | 5 |
| 8.  | Difficulty concentrating .....         | 1 | 2 | 3 | 4 | 5 |
| 9.  | Skin dryness, rash or itch.....        | 1 | 2 | 3 | 4 | 5 |
| 10. | Fatigue.....                           | 1 | 2 | 3 | 4 | 5 |

11. Do you take over-the-counter or prescription medication that might influence your comfort while at work?

(check one)      1  Yes      2  No

On the average:

12. How many cigarettes do you smoke per day? \_\_\_\_\_ Cigarettes
13. How many cups of caffeinated beverages do you drink per day? \_\_\_\_\_ Cups per day
14. How many hours do you exercise per week? \_\_\_\_\_ Hours

**Your Environmental Sensitivity**

A number of questions related to YOUR TYPICAL RESPONSE TO ENVIRONMENTAL CONDITIONS are given below. To indicate your answer to a question circle the number from the following scale which best expresses how you TYPICALLY feel.

- 6 very sensitive
- 5 moderately sensitive
- 4 slightly sensitive
- 3 slightly insensitive
- 2 moderately insensitive
- 1 very insensitive

(circle one number for each question)

1. Do you tend to be SENSITIVE to environments which are  
TOO NOISY? ..... 1 2 3 4 5 6
2. Do you tend to be SENSITIVE to environments which are  
TOO HOT? ..... 1 2 3 4 5 6
3. Do you tend to be SENSITIVE to environments which are  
TOO COLD?..... 1 2 3 4 5 6
4. Do you tend to be SENSITIVE to environments which have  
TOO LITTLE AIR MOVEMENT? ..... 1 2 3 4 5 6
5. Do you tend to be SENSITIVE to environments which have  
too MUCH AIR MOVEMENT?..... 1 2 3 4 5 6
6. Do you tend to be SENSITIVE to environments which are  
TOO DIMLY LIT?..... 1 2 3 4 5 6
7. Do you tend to be SENSITIVE to environments which are  
TOO BRIGHT?..... 1 2 3 4 5 6
8. Do you tend to be SENSITIVE to environments which have  
POOR AIR QUALITY? ..... 1 2 3 4 5 6

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Do you have any other comments about sensitivity to environmental conditions?

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**APPENDIX D**

**CODING OF VARIABLES**

## RP-921 "CODEBOOK" -- Code Names for All Variables

Data Source	Variable code name	Description of variable
<b>Mobile measurement system</b>		
	TA_H	AIR TEMPERATURE AT 1.1M [degC]
	TA_M	AIR TEMPERATURE AT 0.6M [degC]
	TA_L	AIR TEMPERATURE AT 0.1M [degC]
	DEWPT	DEWPOINT [degC]
	PRTA_B	PLANE RADIANT ASYMMETRY TEMPERATURE [degC]
	TG_H	GLOBE TEMPERATURE AT 1.1M [degC]
	TG_M	GLOBE TEMPERATURE AT 0.6M [degC]
	TG_L	GLOBE TEMPERATURE AT 0.1M [degC]
	VEL_H	AIR VELOCITY AT 1.1M [m/s]
	VEL_M	AIR VELOCITY AT 0.6M [m/s]
	VEL_L	AIR VELOCITY AT 0.1M [m/s]
	TURB_H	TURBULENCE INTENSITY AT 1.1M [frac]
	TURB_M	TURBULENCE INTENSITY AT 0.6M [frac]
	TURB_L	TURBULENCE INTENSITY AT 0.1M [frac]
<b>CALCULATED INDICES</b>		
	TAAV	AVERAGES OF TEMPS TAKEN AT THE 3 HEIGHTS [degC]
	TRAV	AVERAGE MEAN RADIANT TEMPS TAKEN AT THE 3 HEIGHTS [degC]
	TOP	OPERATIVE TEMPERATURE - MEAN OF AIR AND RADIANT TEMP [degC]
	VELAV	AVERAGE VELOCITY AT 3 HEIGHTS [m/s]
	TUAV	AVERAGE TURBULENCE AT 3 HEIGHTS [frac]
	PA	VAPOUR PRESSURE [torr]
	RH	HUMIDITY [%]
	MET	METABOLIC RATE OF SUBJECT [W/m*m]
	CLO	CLOTHING INSULATION [clo]
	ET	NEW EFFECTIVE TEMPERATURE (ASHRAE) [degC]
	SET	NEW STANDARD EFFECTIVE TEMPERATURE (ASHRAE) [degC]
	DISC	PREDICTED DISCOMFORT USING 2 NODE MODEL [-4,+4 range]
	PMVF	PREDICTED MEAN VOTE (FANGER) [-3,+3 range]
	PPDF	PREDICTED % OF DISSATISFIED (FANGER AND ISO) [%]
	PD	% DISSATISFIED DRAUGHT (FANGER) [%]
<b>CALCULATED INDICES BASED ON CHAIR + CLO INSULATION</b>		
	CLOCHR	COMBINED CLOTHING + CHAIR INSULATION (TANABE) [clo]
	C_ET	NEW EFFECTIVE TEMPERATURE + CHAIR (ASHRAE) [degC]

	C_SET	NEW STANDARD EFFECTIVE TEMPERATURE + CHAIR (ASHRAE) [degC]
	C_DISC	PREDICTED DISCOMFORT + CHAIR USING 2 NODE MODEL [-4,+4 range]
	C_PMFV	PREDICTED MEAN VOTE + CHAIR (FANGER) [-3, +3 range]
	C_PPDF	PREDICTED % OF DISSATISFIED + CHAIR (FANGER AND ISO) [%]
<b>OUTDOOR METEOROLOGICAL OBSERVATIONS</b>		
	OUT_TA	SIMULTANEOUS (with ONLINE) OUTDOOR AIR TEMPERATURE (min, max, average) [degC]
	OUT_RH	SIMULTANEOUS (with ONLINE) OUTDOOR RELATIVE HUMIDITY(at Tmin, Tmax, average) [degC]
	OUT_ET	SIMULTANEOUS (with ONLINE) OUTDOOR EFFECTIVE TEMPERATURE (min, max, average) [degC]
<b>ONLINE QUESTIONNAIRE</b>		
	BLCODE	BUILDING CODE
	SUB	SUBJECT NUMBER (FILLED IN BEFORE SUBJECT ANSWERS)
	SEASON	SEASON OF SURVEY [1 (WINTER) or 2(SUMMER)]
	DATE	JULIAN DATE
	TIME	TIME
	ASH	THERMAL SENSATION (ASHRAE) SCALE [-3+3 range]
	TSA	THERMAL ENVIRONMENT ACCEPTABILITY [1 (unacc) or 2(acc)]
	MCI	TEMPERATURE PREFERENCE [3(warmer),2(no change), 1 (cooler)]
	VENT	AIR MOVEMENT ACCEPTABILITY [6(very acc),1 (very unacc) range]
	AVM	AIR MOVEMENT PREFERENCE [3(more),2(no change), 1 (less)]
	COMF	GENERAL COMFORT [6(very comf), 1 (very uncomf) range]
	ETEMP	ESTIMATED TEMPERATURE [degC]
	ACT10	ACTIVITY IN LAST 10 MINUTES [met]
	ACT20	ACTIVITY 20 MINS AGO [met]
	ACT30	ACTIVITY 30 MINS AGO [met]
	ACT60	ACTIVITY AN HOUR AGO [met]
	CL1	Fem/Mal:UNDERLAYER TOP
	CL2	Fem/Mal:UNDERLAYER BOTTOM
	CL3	F:SLIP;M:SOCKS
	CL4	F:SOCKS;M:SHOES
	CL5	F:PANTYHOSE;M:SHORT SLEEVED SHIRT
	CL6	F:SHOES;M:LONG SLEEVED SHIRT
	CL7	F:SHORT SLEEVED SHIRT;M:PANTS
	CL8	F:LONG SLEEVED SHIRT;M:SHORTS
	CL9	F:DRESS;M:SWEATER
	CL10	F:SKIRT;M:VEST

	CL11	F:PANTS OR SLACKS;M:JACKET
	CL12	F:SHORTS
	CL13	F:SWEATER
	CL14	F:VEST
	CL15	F:JACKET
	DHOT	CONSUMPTION OF HOT DRINK (within the last 15 min) [0(no), 1 (yes)]
	DCOLD	CONSUMPTION OF COLD DRINK (within the last 15 min) [0(no), 1 (yes)]
	DCAF	CONSUMPTION OF CAFFEINATED DRINK (within the last 15 min) [0(no),1 (yes)]
	CIG	SMOKING A CIGARETTE (within the last 15 min) [0(no), 1 (yes)]
	FOOD	CONSUMPTION OF FOOD (within the last 15 min) [0(no), 1(yes)]
	CHAIR	CHAIR THERMAL INSULATION [0 =no chair, 1=standard, 2=armchair]
<b>BACKGROUND QUESTIONNAIRE</b>		
	BLCODE	BUILDING CODE
	SUB	SUBJECT NUMBER
	SEASON	SEASON OF SURVEY [1 (winter) or 2(summer)]
	ACCLIM_Y	LENGTH OF TIME SPENT IN GOLDFIELDS [years]
	ACCLIM_M	LENGTH OF TIME SPENT IN GOLDFIELDS [months]
	AC_BED	HOME AIR CONDITIONING (BEDROOM)[1 = using compressor based, 2 = not using compressor based, 3 = using evaporative, 4 = not using evaporative,5 = none available]
	AC_LIV	HOME AIR CONDITIONING (LIVING AREA)[1 = using compressor based, 2 = not using compressor based, 3 = using evaporative, 4 = not using evaporative,5 = none available]
	AC_CAR	CAR AIR CONDITIONING [1 = using compressor based, 2 = not using compressor based, 3 = using evaporative, 4 = not using evaporative,5 = none available]
	WORKHR	HOURS AT WORK PER WEEK [hrs]
	AREAHR	HOURS AT DESK PER DAY [hrs]
	HGHT	HEIGHT [cm]
	WGHT	WEIGHT [kg]
	AGE	AGE [years]
	SEX	GENDER [1 (male), 2(female)]
	ETHNIC	ETHNIC BACKGROUND [1 (Asian), 2(Aborigine), 3(Caucasian), 4(TS Is.), 5(other)]
	ENGLISH	ENGLISH AS PRIMARY LANGUAGE [1(yes), 2(no)]
	SCH	HIGHEST EDUCATION LEVEL [1 (school leaving cert. or less). 8(PhD) range]
<b>WORK AREA SATISFACTION</b>		
	WSO	TYPE AND LEVEL OF SOUNDS [1(very dissatisfied),6(very satisfied) range]

	WLI	LIGHTING [1 (very dissatisfied),6(very satisfied) range]
	WTE	TEMPERATURE [1 (very dissatisfied)16(very satisfied) range]
	WAI	AIR QUALITY [1 (very dissatisfied), 6(very satisfied) range]
	WVE	VENTILATION AND AIR CIRCULATION [1(very dissatisfied),6(very satisfied) range]
	WCO	COLORS OF WALLSJPARTITIONS [1 (very dissatisfied),6(very satisfied) range]
	WFU	FURNITURE/EQUIPMENT [1 (very dissatisfied),6(very satisfied) range]
	WSP	SPACE AVAILABLE TO YOU [1(very dissatisfied),6(very satisfied) range]
	WPR	PRIVACY [1 (very dissatisfied),6(very satisfied) range]
	WCH	COMFORT OF CHAIR [1 (very dissatisfied),6(very satisfied) range]
	SMOKE	NON-SMOKING AREAS [1 (very dissatisfied) 16(very satisfied) range]
	OVEA	COMFORT ACCEPTABILITY OVERALL [1 (very unacceptable), 6(very acceptable) range]
<b>PERSONAL COMFORT</b>		
	P0	PERCEIVED OVERALL COMFORT [1 (very uncomf),6(very comf) range]
	PTE	ERCEIVED TEMPERATURE [1 (very cool)16(very warm) range]
	PAIM	PREFERRED AIR MOVEMENT (MCINTYRE) [1 (want more),2 (just right),3(want less)]
	PAIA	AIR MOVEMENT ACCEPTABILITY [1 (very unacceptable),6(very acceptable) range]
	PLI	PERCEIVED LIGHTING [1 (very dim),6(very bright) range]
	PHU	PERCEIVED HUMIDITY [1 (very dry),6(very humid) range]
<b>PERSONAL CONTROL</b>		
	PCC	CONTROL OVER THERMAL CONDITIONS [1 (no control),5(complete control) range]
	PCS	SATISFACTION WITH LEVEL OF CONTROL [1 (very dissatisfied),6(very satisfied) range]
	PCEC1	OPEN/CLOSE WINDOW [1(yes),2(no)]
	PCEC2	OPEN/CLOSE' DOOR TO OUTSIDE [1(yes),2(no)]
	PCEC3	OPEN/CLOSE INTERIOR DOOR [1(yes),2(no)]
	PCEC4	ADJUST THERMOSTAT [(yes),2(no)]
	PCEC5	ADJUST DRAPES/BLINDS [1(yes),2(no)]
	PCEC6	TURN LOCAL HEATER ON/OFF [1(yes),2(no)]
	PCEC7	TURN LOCAL FAN ON/OFF [1(yes),2(no)]
<b>DO YOU EXERCISE THESE OPTIONS</b>		
	PCED1	USE WINDOW [1 (n/a),2(never),S(rarely),4(sometimes), 5(often),6(always)]
	PCED2	USE OUTSIDE DOOR [1(n/a),2(never),3(rarely),4(sometimes),5(often),6(always)]

	PCED3	USE INTERIOR DOOR [1(n/a),2(never),3(rarely),4(sometimes),5(often),6(always)]
	PCED4	ADJUST THERMOSTAT [1(n/a),2(never),3(rarely),4(sometimes),5(often), 6(always)]
	PCED5	ADJUST DRAPES/BLINDS [1(n/a),2(never),3(rarely),4(sometimes),5(often), 6(always)]
	PCED6	USE LOCAL HEATER [1(n/a),2(never),3(rarely),4(sometimes),5(often),6(always)]
	PCED7	USE LOCAL FAN [1(n/a),2(never),3(rarely),4(sometimes), 5(often),6(always)]
<b>JOB SATISFACTION</b>		
	JOV	JOB OVERALL [1 (very dissatisfied),6(very Satisfied) range]
	JPO	COMPANY'S POLICIES [1 (very dissatisfied),6(very satisfied) range]
	JA	ACCESS TO OTHER PEOPLE [1(very dissatisfied),6(very satisfied) range]
	JSK	OPPORTUNITY TO DEVELOP SKILLS [1 (very dissatisfied).6(very satisfied) range]
	JSE	JOB SECURITY [1 (very dissatisfied),6(very satisfied) range]
	JPE	RELATIONS WITH CO-WORKERS [1 (very dissatisfied),6(very satisfied) range]
	JBO	RELATIONS WITH SUPERVISORS [1 (very dissatisfied),6(very satisfied) range]
	JPA	YOUR PAY [1 (very dissatisfied),6(very satisfied) range]
	JAD	CHANCES FOR ADVANCEMENT [1 (very dissatisfied),6(very Satisfied) range]
	JRE	LEVEL OF RESPONSIBILITY [1 (very dissatisfied),6(very satisfied) range]
	JIN	INDEPENDENCE/AUTONOMY [1 (very dissatisfied) ,6(very satisfied) range]
	JREA	RECOGNITION FOR GOOD WORK [1 (very dissatisfied),6(very satisfied) range]
	JWO	INTEREST IN WORK ITSELF [1 (very dissatisfied),6(very satisfied) range]
	JEQ	QUALITY OF EQUIPMENT [1 (very dissatisfied),6(very satisfied) range]
	JTI	TIME, PRESSURES OF JOB [1(very dissatisfied),6(very satisfied) range]
<b>HEALTH</b>		
	HHE	HEADACHE [1 (never), 5(very often) range]
	HDI	DIZZINESS [1 (never) 5(very often) range]
	HSL	SLEEPINESS (1(never), 5(very often) range]
	HTH	SORE THROAT [1(never), 5(very often) range]
	TNO	NOSE IRRITATION [1(never), 5(very often) range]
	NEY	EYE IRRITATION (1(never), 5(very often) range]
	HFO	TROUBLE FOCUSING EYES [1(never), 5(very often)

		range]
	HCO	DIFFICULTY CONCENTRATING [1(never), 5(very often) range]
	HSK	SKIN DRYNESS/RASH/ITCH [1(never), 5(very often) range]
	HFA	FATIGUE [1(never), 5(very often) range]
	HDR	CURRENTLY ON MEDICATION [1(yes), 2(no)]
	HCI	CIGARETTES PER DAY [cigarettes]
	HCAF	CAFFEINATED BEVS PER DAY [cups]
	HEXER	HOURS OF EXERCISE PER WEEK [hrs]
<b>ENVIRONMENTAL SENSITIVITY</b>		
	NOISE1	SENSITIVE TO NOISE [1 (very sensitive),6(very insensitive) range]
	HOT1	SENSITIVE TO HOT [1 (very sensitive),6(very insensitive) range]
	COLD1	SENSITIVE TO COLD [1 (very sensitive),6(very insensitive) range]
	STUFFY1	SENSITIVE TO TOO LITTLE AIR MOVEMENT [1 (very sensitive),6(very insensitive) range]
	WINDY1	SENSITIVE TO TOO MUCH AIR MOVEMENT [1 (very sensitive),6(very insensitive) range]
	DIM1	SENSITIVE TO DIMLY LIT [1 (very sensitive),6(very insensitive) range]
	BRIGHT1	SENSITIVE TO BRIGHTNESS [1 (very sensitive),6(very insensitive) range]
	AIR1	SENSITIVE TO POOR AIR QUALITY [1 (very sensitive),6(very insensitive) range]



## **APPENDIX E**

### **Sourcecode (QBASIC) for wet bulb temperature calculations**

'This program converts inputs of dry bulb and RH (and/or dew point)  
'to a wet bulb temperature, using a Newton-Raphson iterative  
'approach to the correct value. The algorithm was validated  
'against the (1992) ASHRAE Psychrometric Chart No. 1 (normal  
'temperature at a sea level pressure of 1013 hPa).  
'PROGRAMMERS: Richard de Dear and Ron McTaggart-Cowan (c1997)

' Subroutine declarations

```
    DECLARE SUB RHTOTW (DRY!, RH!, WET!)  
    DECLARE SUB CALCRH (TA!, TDP!, RH!)
```

' Open input and output files

```
    CLEAR  
    CLS  
    LOCATE 10, 10: INPUT "Input File Name"; IN$  
    OPEN IN$ FOR INPUT AS #1  
    LOCATE 11, 10: INPUT "Output File Name"; OUT$  
    OPEN OUT$ FOR OUTPUT AS #2  
    CLS
```

' Print table header to output file

```
    WRITE #2, "Ta", "RH", "Td", "Tw (from RH)", "Tw (from Td)"
```

' Choose file length, and begin to read one line of data at a time

```
    LOCATE 2, 2: PRINT "Input file to read: "; IN$  
    LOCATE 3, 2: PRINT "Output file to write: "; OUT$  
    DO  
        INPUT #1, DRYI!, RHII!, DEWPTI!
```

' Calculate relative humidity from temperature and dewpoint

```
    CALL CALCRH(DRYI!, DEWPTI!, RHC!)
```

' Calculate wetbulb temperature from both Input and Calculated RH's

```
    CALL RHTOTW(DRYI!, RHII!, WETRH!)  
    CALL RHTOTW(DRYI!, RHC!, WETDP!)
```

' Write to output file

```
    WRITE #2, DRYI!, RHII!, DEWPTI!, WETRH!, WETDP!
```

```
    LOOP UNTIL (EOF(1))
```

```
    END
```

SUB CALCRH (TA!, TDP!, RH!)

```
' Input variables:   TA!   => Ambient air temperature
'                   TDP!  => Dewpoint temperature
' Output variables:  RH!   => Calculated relative humidity

PA! = EXP(18.956 - (4030.18 / (TDP! + 235)))
PAS! = EXP(18.956 - (4030.18 / (TA! + 235)))
RH! = 100 * PA! / PAS!
```

END SUB

SUB RHTOTW (DRY!, RH!, WET!)

```
' Input variables:   DRY!   => Dry bulb temperature
'                   RH!    => Relative humidity (direct or calc)
' Output variables:  WET!   => Calculated wetbulb temperature
```

```
' WET will be the first guess for the wet bulb temperature
```

```
WET! = DRY! - ((100! - RH!) / 100! * DRY!)
ESATA! = EXP(1.8096 + ((17.27 * DRY!) / (237.3 + DRY!)))
```

```
' calculate the Newton Raphson constant
```

```
c! = (RH! * .01 * ESATA!) + (998.3 * .000799 * DRY!)
DIFF! = 10000!
```

```
' set up a DO loop for the Newton Raphson method
```

```
K% = 1
DO WHILE K% < 201
WET! = WETB!
F1! = (1.8096 + ((17.27 * WET!) / (237.3 + WET!)))
FX! = EXP(F1!) + (998.3 * .000799 * WET!) - c!
```

```
' calculate the derivative
```

```
FDX! = EXP(F1) * ((17.27 * 237.3) / ((237.3 + WET!) ^ 2)) +
(998.3 * .000799)
```

```
' Newton Raphson formula
```

```
WET1! = WETB! - (FX! / FDX!)
DIFF! = WETB! - WET1!
```

' assign new guess

WETB! = WET1!

' Increment loop counter

K% = K% + 1

LOOP

' Empirical adjustment for humidity-dependant error

WET! = WET! - ((100 - RH!) / 100)

END SUB