



INVESTIGATION OF THE DIFFERENT METHODS FOR HEAT STORAGE AS PART OF A NOVEL SUSTAINABLE GREENHOUSE APPROACH

By

Esraa Mohamed Rashad Nasr ElMitainy

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
CHEMICAL ENGINEERING

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Title of Thesis:

Investigation of the Different Methods for Heat Storage as Part of a Novel Sustainable Greenhouse Approach

Key Words:

Heat Storage; Greenhouse; Soil; Phase Change Material

Summary:

This thesis investigates two heat storage methods to be used as a part of a greenhouse system that aims to achieve water desalination and climate control inside the greenhouse enclosure. The first method tested is the utilization of the greenhouse ground as a heat storage medium, in the course of this work two typical Egyptian soils, clay and sand based, were investigated using different pipe materials as heat transfer mediums. While the second method is an experimental study to use a phase change material which is sodium carbonate hydrated salt after stabilization with charcoal particles to prevent salt precipitation. The obtained study results showed that although the sand based soil stored a larger amount of heat than the clay based soil, it was still not enough for the targeted greenhouse application. And the phase change material mixture showed signs of salt sedimentation with repeated heating and cooling.

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Dedication

To my Mother, wishing she was here.
To my Father, for getting me here.

Table of Contents

Acknowledgments.....	ii
Dedication	iii
Table of Contents.....	iv
List of Tables	vii
List of Figures	viii
Nomenclature	xvii
Abstract.....	xviii
Chapter 1 : Introduction.....	1
1.1 Water and Energy use in Agriculture.....	1
1.2 Novel Greenhouse Approach.....	2
Chapter 2 : Literature Review	3
2.1 Greenhouse Climate Control Systems	3
2.1.1 Heating Systems	3
2.1.2 Cooling Systems	5
2.1.3 Water desalination and climate control systems.....	7
2.2 Soil as a Heat Storage material	10
2.3 Phase Change Materials.....	12
Chapter 3 : Greenhouse Project Overview.....	17
3.1 Liquid desiccant definition and properties.....	17
3.2 Greenhouse Operating System.....	18
3.2.1 Greenhouse design and location	18
3.2.2 Day-time Cycle.....	20
3.2.3 Night-time Cycle (Regeneration Cycle).....	22
3.3 Statement of the Problem.....	24
Chapter 4 : Testing Soil as a Heat Storage Medium and Results	25
4.1 Pipes Layout in the Greenhouse Ground	25
4.2 Model Set-up and Design.....	26
4.2.1 COMSOL Model	26
4.2.2 Model Geometry	27
4.2.3 Governing Equations and boundary conditions.....	29
4.3 Modeled Parameters.....	32
4.3.1 Soil Type.....	32
4.3.2 Pipe Material.....	33
4.3.3 Liquid Velocity	33
4.3.4 Pipe length	33

4.4	Materials Properties	35
4.4.1	Liquid Phase (Desiccant).....	35
4.4.2	Soil Properties	35
4.4.3	Pipe Materials Properties.....	37
4.5	Desiccant velocity and flow rate.....	39
4.6	Study Results	40
4.6.1	Effect of Soil Type	40
4.6.2	Effect of Pipe Material	47
4.6.3	Effect of Desiccant velocity	61
4.6.4	Pipe Length Needed for Target Temperature	73
Chapter 5 : Experiment of Phase Change Material and Results		81
5.1	PCM choice method and properties	81
5.1.1	PCM Choice Criteria	81
5.1.2	Sodium carbonate properties	81
5.2	Stage 1: Beaker Scale Experiments	84
5.2.1	Experimental set-up.....	84
5.2.2	Results and observations	85
5.3	Stage 2: Small Scale Experiment.....	95
5.3.1	Experimental design and set-up.....	95
5.3.2	Results and observations	97
5.4	Stage 3: Pilot Heat Exchanger	106
5.4.1	Experiment Set-up	108
5.4.2	Experimental results	112
5.4.3	System dismantling.....	149
Chapter 6 : Analysis of the Results.....		153
6.1	Performance of Soil as Heat Storage Medium.....	153
6.2	Performance of PCM with Suspension Material	154
Chapter 7 : Conclusions and Recommendations		157
7.1	Conclusions.....	157
7.2	Recommendations.....	158
References.....		159
Appendix A : Soil Model Additional Results		165
A.1.	Effect of Soil Type.....	165
A.1.1.	Using Copper Pipe.....	165
A.1.2.	Using HDPE Pipe	169
A.1.3.	Using PVC Pipe.....	171
A.2.	Effect of desiccant velocity.....	172

A.2.1.	Delta Soil	173
A.2.2.	Nubaria Soil.....	191
Appendix B :Additional PCM Experiment Results		209
B.1.	Stage 3: Pilot Heat Exchanger	209
B.1.1.	Results at 40 °C water temperature.....	209
B.1.2.	Results at 60 °C water temperature.....	211
B.1.3.	Results at 52 °C water temperature.....	215
B.1.4.	Results at 60 – 20 °C water temperature.....	221

List of Tables

Table 2.1: List of Desired Properties in PCMs for Heat Storage [43–45]	14
Table 3.13: Concentrations of the most abundant ions in bitterns [66]	17
Table 3.2: Results obtained at different desiccant to air mass flow ratios [67]	20
Table 4.1: Schedule 40 pipes with the external, internal diameters and wall thickness defined	28
Table 4.2: Desiccant (MgCl_2 Solution) thermophysical properties [68]	35
Table 4.3: Analysis results for the Delta and Nubaria soil samples	35
Table 4.4: Dry density and moisture content values for the Delta and Nubaria Soil Samples	36
Table 4.5: The individual Heat Capacity and normalized mass fraction of each component for the two soils	37
Table 4.6: Calculated Thermophysical Properties for the Delta and Nubaria Soils	37
Table 4.7: Copper thermophysical data at a temperature of 300 K [74]	38
Table 4.8: HDPE thermophysical properties at 0 °C to 49 °C temperature [75]	38
Table 4.9: PVC thermophysical properties [16, 17]	38
Table 4.10: Total desiccant flow rate calculated based on the average flow velocity ...	39
Table 4.11: Reynolds number calculation and Laminar flow check	39
Table 4.12: Total amount of Heat transferred from one desiccant pipe to the soil over 10 hours	61
Table 4.13: Total amount of Heat transferred from the desiccant piping system to the soil over 10 hours	61
Table 4.14: Calculated Pipe length to reach target temperature using different pipe materials in Delta Soil	73
Table 4.15: Calculated Pipe length to reach target temperature using different pipe materials in Nubaria Soil	77
Table 5.1: Solubility of $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ in water at different temperatures [80]	82
Table 5.2: Heat Transfer properties of sodium carbonate decahydrate [81]	82
Table 5.3: Temperature and concentration points where more than one hydrate is formed and the formed hydrates at each point [79]	83
Table 5.4: The different Charcoal sizes used in the experiment	110
Table 5.5: Mass fractions of the different PCM mixture components	110
Table 5.6: Summary of the results obtained from the experiment	113
Table 5.7: 40 °C Run 1 Conditions	114
Table 5.8: 40 °C Run 2 Conditions	121
Table 5.9: 60 °C Run 3 Conditions	124
Table 5.10: 60 °C Run 4 Conditions	127
Table 5.11: 60 °C Run 5 Conditions	130
Table 5.12: 52 °C Run 6 Conditions	134
Table 5.13: 52 °C Run 7 Conditions	136
Table 5.14: 52 °C Run 8 Conditions	139
Table 5.15: 60 - 20 °C Run 9 Conditions	141
Table 5.16: 60 - 20 °C Run 10 Conditions	144
Table 5.17: Summary of the Findings calculated from Pilot Heat Exchanger stage ...	148

List of Figures

Figure 2.1: Greenhouse diagram comparing air heater to plastic pipes [5]	4
Figure 2.2: Heating using a flat plate collector system [6]	5
Figure 2.3: Schematic diagram for a forced ventilation system for rose crops [13].....	6
Figure 2.4: Isometric view of a greenhouse equipped with a cooling pad with a fan and trickling water system	7
Figure 2.5: Typical Desiccant Dehumidification and regeneration cycle [28].....	8
Figure 2.6: Schematic diagram of the system suggested by Davies to improve evaporative cooling performance [29].....	9
Figure 2.7: Measured ERH vs. total mass fraction for bittern solutions together with the corresponding curve for pure magnesium chloride solution [31].....	10
Figure 2.8: A schematic diagram representing a Ground air collector [36]	11
Figure 2.9: Use of ground air tunnel for greenhouse heating or cooling [42]	12
Figure 2.10: The different types of PCMs and latent heat of fusion per unit mass/volume in the temperature range (0 – 120 °C)[54]	15
Figure 3.1: Solar Radiation intensity in kWh/m ² on Africa and the Middle East [65]..	17
Figure 3.2: ERH% of MgCl ₂ in relation with its mass concentrations [30], [68].....	18
Figure 3.3: A Google Earth map showing the Greenhouse prototype location	19
Figure 3.4: A schematic drawing showing the different parts of the Greenhouse System	20
Figure 3.5: A schematic drawing of the day-cycle of the suggested greenhouse system with the operating conditions.....	22
Figure 3.6: A schematic diagram for the desiccant regeneration cycle (night-cycle) with conditions).....	23
Figure 3.7: Psychrometric chart showing the saturated air path line (from A to B) during the night cycle.....	24
Figure 4.1: The proposed pipes arrangement in the greenhouse soil (Top view).....	26
Figure 4.2: A side view of the pipes arrangement inside the soil (not to scale)	26
Figure 4.3: COMSOL Model Parameters definition in term of space dimension (1), model Physics (2) and type (3)	27
Figure 4.4: COMSOL Model showing the axis of symmetry, liquid pipe and surrounding soil (all dimensions are in meter).....	28
Figure 4.5: Liquid desiccant flow area (marked in blue) and the defined inlet temperature and flow direction.....	29
Figure 4.6: The defined Heat outflow boundary condition from the system soil	32
Figure 4.7: Schematic diagram showing the different parameters that were changed during the study	34
Figure 4.8: Overall Surface temperature scheme for the heat transfer process in Delta soil using copper pipe after 1 hour	41
Figure 4.9: Overall Surface temperature scheme for the heat transfer process in Delta soil using copper pipe after 5 hours.....	42
Figure 4.10: Overall Surface temperature scheme for the heat transfer process in Delta soil using copper pipe after 10 hours.....	42
Figure 4.11: Simulation result for Heat Progression in Delta soil with time at the desiccant entrance (a), mid-section (b) and exit (c) using a Copper pipe.....	43
Figure 4.12: Overall Surface temperature scheme for the heat transfer process in Nubaria soil using copper pipe after 1 hour	43
Figure 4.13: Overall Surface temperature scheme for the heat transfer process in Nubaria soil using copper pipe after 5 hours.....	44

Figure 4.14: Overall Surface temperature scheme for the heat transfer process in Nubaria soil using copper pipe after 10 hours	44
Figure 4.15: Simulation result for Heat Progression in Nubaria soil with time at the desiccant entrance (a), mid-section (b) and exit (c) using a Copper pipe.....	45
Figure 4.16: Overall Surface temperature in Delta Soil (1) and Nubaria Soil (2) after (a) 1, (b) 5, and (c) 10 hours	46
Figure 4.17: Heat Transfer effect on Delta Soil when using (a) Copper, (b) HDPE and (c) PVC pipes at the desiccant entrance (10 m)	48
Figure 4.18: Heat Transfer effect on Delta Soil when using (a) Copper, (b) HDPE and (c) PVC pipes at desiccant pipe mid- section (5 m)	49
Figure 4.19: Heat Transfer effect on Delta Soil when using (a) Copper, (b) HDPE and (c) PVC pipes at desiccant pipe outlet (0 m).....	50
Figure 4.20: Desiccant temperature change with pipe length at sample simulation times when using (a) Copper, (b) HDPE and (c) PVC pipes in Delta Soil.....	52
Figure 4.21: Heat Transfer effect on Nubaria Soil when using (a) Copper, (b) HDPE and (c) PVC pipes at the desiccant entrance (10 m)	54
Figure 4.22: Heat Transfer effect on Nubaria Soil when using (a) Copper, (b) HDPE and (c) PVC pipes at desiccant pipe mid- section (5 m)	55
Figure 4.23: Heat Transfer effect on Nubaria Soil when using (a) Copper, (b) HDPE and (c) PVC pipes at desiccant pipe outlet (0 m).....	56
Figure 4.24: Desiccant temperature change with pipe length at sample simulation times when using (a) Copper, (b) HDPE and (c) PVC pipes in Nubaria Soil.....	58
Figure 4.25: Calculated amount of heat transferred from desiccant to Delta soil using (a) Copper, (b) HDPE and (c) PVC pipes	60
Figure 4.26: Temperature profile in Delta soil using Copper pipe at a desiccant average velocity of 1 cm/s at (a) liquid entrance (10 m) and (b) mid-section (5 m).....	62
Figure 4.27: Liquid desiccant temperature profile at an average velocity of 1 cm/s when using Copper pipe	63
Figure 4.28: Temperature profile in Delta soil using Copper pipe at a desiccant average velocity of 11 cm/s at mid-section (5 m)	63
Figure 4.29: Liquid desiccant temperature profile at an average velocity of 11 cm/s when using Copper pipe	64
Figure 4.30: Temperature profile in Delta soil using Copper pipe at a desiccant average velocity of 20 cm/s at mid-section (5 m)	64
Figure 4.31: Liquid desiccant temperature profile at an average velocity of 20 cm/s when using Copper pipe	65
Figure 4.32: Temperature profile in Delta soil using Copper pipe at a desiccant average velocity of 30 cm/s at mid-section (5 m)	65
Figure 4.33: Liquid desiccant temperature profile at an average velocity of 30 cm/s when using (a) Copper pipe.....	66
Figure 4.34: Temperature profile in Delta soil using Copper pipe at a desiccant average velocity of 40 cm/s at mid-section (5 m)	66
Figure 4.35: Liquid desiccant temperature profile at an average velocity of 40 cm/s when using Copper pipe	67
Figure 4.36: Temperature profile in Nubaria soil using Copper pipe at a desiccant average velocity of 1 cm/s at (a) liquid entrance (10 m) and (b) mid-section (5 m).....	68
Figure 4.37: Liquid desiccant temperature profile at an average velocity of 1 cm/s when using Copper pipe	69
Figure 4.38: Temperature profile in Nubaria soil using Copper pipe at a desiccant average velocity of 11 cm/s at mid-section (5 m)	69

Figure 4.39: Liquid desiccant temperature profile at an average velocity of 11 cm/s when using Copper pipe	70
Figure 4.40: Temperature profile in Nubaria soil using Copper pipe at a desiccant average velocity of 20 cm/s at mid-section (5 m)	70
Figure 4.41: Liquid desiccant temperature profile at an average velocity of 20 cm/s when using Copper pipe	71
Figure 4.42: Temperature profile in Nubaria soil using Copper pipe at a desiccant average velocity of 30 cm/s at mid-section (5 m)	71
Figure 4.43: Liquid desiccant temperature profile at an average velocity of 30 cm/s when using Copper pipe	72
Figure 4.44: Temperature profile in Nubaria soil using Copper pipe at a desiccant average velocity of 40 cm/s at mid-section (5 m)	72
Figure 4.45: Liquid desiccant temperature profile at an average velocity of 40 cm/s when using Copper pipe	73
Figure 4.46: System geometry and temperature profile when using a Copper pipe in Delta Soil	74
Figure 4.47: Desiccant temperature profile relative to Copper pipe length buried in Delta Soil	74
Figure 4.48: System geometry and temperature profile when using a HDPE pipe in Delta Soil	75
Figure 4.49: Desiccant temperature profile relative to HDPE pipe length buried in Delta Soil	75
Figure 4.50: System geometry and temperature profile when using a PVC pipe in Delta Soil	76
Figure 4.51: Desiccant temperature profile relative to PVC pipe length buried in Delta Soil	77
Figure 4.52: System geometry and temperature profile when using a Copper pipe in Nubaria Soil	78
Figure 4.53: Desiccant temperature profile relative to Copper pipe length buried in Nubaria Soil	78
Figure 4.54: System geometry and temperature profile when using a HDPE pipe in Nubaria Soil	79
Figure 4.55: Desiccant temperature profile relative to HDPE pipe length buried in Nubaria Soil	79
Figure 4.56: System geometry and temperature profile when using a PVC pipe in Nubaria Soil	80
Figure 4.57: Desiccant temperature profile relative to PVC pipe length buried in Nubaria Soil	80
Figure 5.1: Solubility of sodium carbonate in water and the behavior of different hydrates with temperature [79].....	83
Figure 5.2: The experimental setting for the beaker scale thermometer.....	84
Figure 5.3: $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ showing solid particles at the bottom of the beaker.....	85
Figure 5.4: PCM and Carbon (1:1 ratio) before solidification.....	86
Figure 5.5: PCM and Carbon after solidification (no visible change).....	86
Figure 5.6: PCM and Carbon (ratio 2:1) before solidification, showing a free liquid layer	87
Figure 5.7: Salt solid particles can be seen from the bottom of the beaker	87
Figure 5.8: PCM and Carbon mixture after solidification (in air temperature)	88
Figure 5.9: PCM and Carbon (1:1 ratio) before solidification.....	89
Figure 5.10: PCM and Carbon (1:1 ratio) after solidification	89

Figure 5.11: Salt to Water ratio is increased to 1:13.5 (by mole), showing free liquid even with cooling	90
Figure 5.12: PCM and Coal (ratio 2.7:1) yielding a paste like mixture.....	91
Figure 5.13: PCM and Coal after solidification, no visible change.....	91
Figure 5.14: PCM and Coal (ratio 3.6:1) initial observation	92
Figure 5.15: PCM and Coal nearly 90% is solid	92
Figure 5.16: The remaining free PCM after 20 minutes.....	93
Figure 5.17: PCM:Coal ratio is 1.7:1 (Initial Observation)	94
Figure 5.18: Bottom of the beaker after solidification showing some salt crystals	94
Figure 5.19: The experimental set of trials used to reduce the number of parameters..	95
Figure 5.20: The Final experimental setting for stage 2 set of experiments.....	96
Figure 5.21: Water around the copper tube, stirrer and thermometer positions	96
Figure 5.22: The temperature change and heat absorbed or released during the (a) Heating and (b) cooling of $\text{Na}_2\text{CO}_3 \cdot 10 \text{ H}_2\text{O}$ PCM at 1.5 times the charcoal amount	98
Figure 5.23: The temperature change and heat absorbed or released during the (a) Heating and (b) cooling of $\text{Na}_2\text{CO}_3 \cdot 10 \text{ H}_2\text{O}$ PCM at 3 times the charcoal amount	99
Figure 5.24: The temperature change and heat absorbed or released during the (a) Heating and (b) cooling of $\text{Na}_2\text{CO}_3 \cdot 14 \text{ H}_2\text{O}$ PCM at 1.5 times the charcoal amount	100
Figure 5.25: The temperature change and heat absorbed or released during the (a) Heating and (b) cooling of $\text{Na}_2\text{CO}_3 \cdot 14 \text{ H}_2\text{O}$ PCM at 3 times the charcoal amount	101
Figure 5.26: The temperature change and heat absorbed or released during the (a) Heating and (b) cooling of $\text{Na}_2\text{CO}_3 \cdot 10 \text{ H}_2\text{O}$ PCM at 1.5 times the carbon amount	102
Figure 5.27: The temperature change and heat absorbed or released during the (a) Heating and (b) cooling of $\text{Na}_2\text{CO}_3 \cdot 10 \text{ H}_2\text{O}$ PCM at 3 times the carbon amount	103
Figure 5.28: The temperature change and heat absorbed or released during the (a) Heating and (b) cooling of $\text{Na}_2\text{CO}_3 \cdot 14 \text{ H}_2\text{O}$ PCM at 1.5 times the carbon amount.....	104
Figure 5.29: The temperature change and heat absorbed or released during the (a) Heating and (b) cooling of $\text{Na}_2\text{CO}_3 \cdot 14 \text{ H}_2\text{O}$ PCM at 3 times the carbon amount	105
Figure 5.30: Top view of the greenhouse layout and the associated PCM storage area to the West	107
Figure 5.31: Experimental Box Design and hole for passing a pipe	108
Figure 5.32: PCM Complete Experimental setting.....	109
Figure 5.33: Sensors positions inside the PCM box	109
Figure 5.34: PCM - Charcoal mixture after mixing and before filling a layer of the box	110
Figure 5.35: The sensors after being placed in the box with the PCM mixture	111
Figure 5.36: The experimental box after being completely filled and insulated	111
Figure 5.37: Complete Experimental Setting including: PCM box, water tank and measurement sensors	112
Figure 5.38: Temperature Sensors numbers and positions	113
Figure 5.39: Run 1: Sensors 1 to 5 results (below the pipe at 10 cm in x-direction), with the heat flow diagram	114
Figure 5.40: Run 1: Sensors 6 to 10 results (above the pipe at 10 cm in x-direction), with the heat flow diagram	115
Figure 5.41: Run 1: Sensors 11 and 12 results (above the pipe at 50 cm in x-direction), with the heat flow diagram.....	115
Figure 5.42: Run 1: Sensors 13 and 14 results (above the pipe at 90 cm in x-direction), with the heat flow diagram.....	116
Figure 5.43: Run 1: Sensors 5 and 6 results (1 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	117

Figure 5.44: Run 1: Sensors 4 and 7 results (3 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	118
Figure 5.45: Run 1: Sensors 3 and 8 results (7 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	118
Figure 5.46: Run 1: Sensors 2 and 9 results (12 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	119
Figure 5.47: Run 1: Sensors 1 and 10 results (18 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	119
Figure 5.48: Run 1: Sensors 11 and 13 results (3 cm above the pipe at 50 and 90 cm in x-direction), with the heat flow diagram.....	120
Figure 5.49: Run 1: Sensors 12 and 14 results (7 cm above the pipe at 50 and 90 cm in x-direction), with the heat flow diagram.....	120
Figure 5.50: Run 2: Sensors 5 and 6 results (1 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	122
Figure 5.51: Run 2: Sensors 3 and 8 results (7 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	122
Figure 5.52: Run 2: Sensors 11 and 13 results (3 cm above the pipe at 50 and 90 cm in x-direction), with the heat flow diagram.....	123
Figure 5.53: Run 2: Sensors 12 and 14 results (7 cm above the pipe at 50 and 90 cm in x-direction), with the heat flow diagram.....	123
Figure 5.54: Run 3: Sensors 5 and 6 results (1 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	125
Figure 5.55: Run 3: Sensors 3 and 8 results (7 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	125
Figure 5.56: Run 3: Sensors 11 and 13 results (3 cm above the pipe at 50 and 90 cm in x-direction), with the heat flow diagram.....	126
Figure 5.57: Run 3: Sensors 12 and 14 results (7 cm above the pipe at 50 and 90 cm in x-direction), with the heat flow diagram.....	126
Figure 5.58: Run 4: Sensors 5 and 6 results (1 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	128
Figure 5.59: PCM box wall after 5.5 hours of heating with no visible change	128
Figure 5.60: Run 4: Sensors 3 and 8 results (7 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	129
Figure 5.61: Run 4: Sensors 11 and 13 results (3 cm above the pipe at 50 and 90 cm in x-direction), with the heat flow diagram.....	129
Figure 5.62: Run 4: Sensors 12 and 14 results (7 cm above the pipe at 50 and 90 cm in x-direction), with the heat flow diagram.....	130
Figure 5.63: Run 5: Sensors 5 and 6 results (1 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	131
Figure 5.64: Salt hydrate drops apparent from the side of the box at 50 cm	132
Figure 5.65: Run 5: Sensors 3 and 8 results (7 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	132
Figure 5.66: Run 5: Sensors 11 and 13 results (3 cm above the pipe at 50 and 90 cm in x-direction), with the heat flow diagram.....	133
Figure 5.67: Run 5: Sensors 12 and 14 results (7 cm above the pipe at 50 and 90 cm in x-direction), with the heat flow diagram.....	133
Figure 5.68: Run 6: Sensors 5 and 6 results (1 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	135
Figure 5.69: Run 6: Sensors 3 and 8 results (7 cm above and below the pipe at 10 cm in x-direction), with the heat flow diagram.....	135