

TABLE OF CONTENTS

LIST OF TABLES	ix
SECTION 1	
PURPOSE OF GUIDELINES	1
1.1 Guideline Objectives.....	1
1.2 Background	1
1.3 Dealing with Nuisances	1
1.4 Dealing with the Environment	2
SECTION 2	
ACTS, REGULATIONS AND BY-LAWS	3
2.1 <i>The Farm Practices Protection Act</i>	3
2.2 <i>The Environment Act</i>	4
2.3 <i>The Pesticides and Fertilizers Control Act</i>	6
2.4 <i>The Planning Act</i>	7
2.4.1 Provincial Land Use Policies	7
2.4.2 Development Plan	8
2.4.2.1 Livestock Operation Policy	8
2.4.3 Zoning By-law	8
2.5 <i>The Water Rights Act</i>	9
2.6 <i>The Water Protection Act</i>	10
SECTION 3	
MANURE HANDLING AND STORAGE	11
3.1 Solids Content.....	11
3.2 System Components	11
3.3 Equipment Selection and Maintenance	11
3.4 Planning a Manure Storage Structure	12
3.4.1 Permits	13
3.4.2 Location	13
3.4.3 Size	14
3.5 Storage Types	15
3.5.1 Earthen Storage Structures	15
3.5.1.1 Protection of Earthen Storage Structures	16
3.5.1.2 Earthen Storage Designs	16
3.5.1.3 Construction Requirements	17
3.5.1.4 Groundwater Pollution Concerns	18

3.5.2	Concrete and Steel Structures for Liquid Manure	18
3.5.3	Field Storage	19
3.5.4	Earthen and Concrete Pads for Solid Manure	20
3.5.5	Alternative Housing Systems	20
3.6	Manure Pathogens	21
3.7	Safety	22
3.7.1	Dangerous Manure Gases	22
3.8	Reporting Spills	24
3.9	Registration of a Manure Storage Structure Without a Permit	24
3.10	Decommissioning Manure Storage Structures	24

SECTION 4
APPLICATION OF MANURE **25**

4.1	Manure – An Agronomic Resource	25
4.1.1	Manure as a Fertilizer	25
4.1.2	Manure Content	25
4.2	Manure and Soils	30
4.2.1	Manure Nitrogen (N) after Application	30
4.2.2	Manure Phosphorus (P) after Application	31
4.3	Using Manure as a Fertilizer	32
4.3.1	Test the Soil	32
4.3.2	Test the Manure	33
4.3.3	Crop Selection and Rotation	33
4.3.4	How to Calculate the Manure Application Rate	35
4.3.5	Calibrate Field Equipment to Deliver Target Rate	41
4.3.6	Record Keeping	41
4.4	Benefits of Using Manure as a Fertilizer	41
4.5	Environmental Health Concerns	42
4.5.1	Odour	42
4.5.2	Nitrate Contamination of Drinking Water	42
4.5.3	Sensitive Groundwater Areas	43
4.5.4	Nutrient Loss to Surface Water	43
4.5.5	Pathogen Transfer to Surface Water or Groundwater	44
4.5.6	Setback Requirements for Livestock Manure Application on Land Adjacent to Surface Water or a Surface Watercourse.	45
4.5.7	Greenhouse Gas Emissions	46

4.6	Regulations on Manure Application	47
4.6.1	General Rules Regarding Pollution of Water	47
4.6.2	Prohibition on Winter Application.....	47
4.6.3	Registering Manure Management Plans	48
4.6.4	Soil Nitrate-N Limits	48
4.7	Training And Licencing of Manure Applicators	48
SECTION 5		
ODOUR CONTROL		49
5.1	Sources of Odours	49
5.2	Human Response to Odours.....	50
5.2.1	Other Air Quality Concerns	50
5.3	Sites of Odour Production	50
5.4	Livestock Operation Design	51
5.4.1	Manure Management System	51
5.4.2	Environmental Control In Barns	52
5.4.3	Landscaping	53
5.4.4	Setbacks from Neighbours	54
5.5	Storage Odour Control.....	55
5.6	Odour Control with Manure Application	57
5.6.1	Equipment Selection	57
5.6.2	Consideration for Neighbours	59
5.6.3	Weather Conditions.....	60
5.7	Odour Control Plan	60
SECTION 6		
SITE SELECTION		61
6.1	Setback of Facilities from Physical Features	61
6.1.1	Separation Between Livestock Operations	62
6.2	Setbacks and Other Steps to Avoid Conflicts	62
6.2.1	Using the Landscape	63
6.3	Avoiding Contamination of Wells.....	65
6.4	Environmental Considerations for Siting	66
6.4.1	Siting of Manure Storage Structures.....	66
6.4.2	Considerations for Application of Livestock Manure	66
6.5	Water Resource Availability	67
6.6	Professional Support	67

SECTION 7	
MORTALITY DISPOSAL	69
7.1 Rendering	69
7.2 Burial	69
7.3 Composting	70
7.3.1 Windrow or Static Composting	71
7.3.2 Bin Composting	71
7.3.3 In-vessel Composting	71
7.4 Incineration.....	72
7.5 Disposal of Mass Mortalities	72
SECTION 8	
PREPARING A LIVESTOCK OPERATION PROPOSAL	73
8.1 Public Relations	73
8.1.1 Public Consultation Process	73
8.2 Site Assessment	75
8.3 Provincial Review Processes for Livestock Operations	75
8.3.1 Structure of the Technical Review Committees	76
8.3.2 Technical Review Process.....	76
8.3.3 Basis of Assessing the Proposal	77
8.3.4 Recommendations	77
8.4 Landbase Requirements for Manure Application	78
8.5 Provincial Permits and Licences	78
SECTION 9	
REFERENCES	81
Appendix A <i>The Farm Practices Protection Act</i>	82
Appendix B Livestock Manure and Mortalities Management Regulation.....	95
Appendix C Imperial Units.....	147
Appendix D Alternate Methods of Manure Treatment and Use	160
Appendix E Nitrogen Losses from Manure Storages and Dangerous Gas Production	165
Appendix F Soil Sampling Programs	166
Appendix G Manure Management Plan	173
Appendix H Technical Review Application Form for Livestock Operation Proposals	178
Appendix I Development of the Animal Unit	191
Appendix J Shelterbelt Guidelines for Manitoba Pig Producers	193
Appendix K Contact Information	195