HIGHER TECHNICAL INSTITUTE

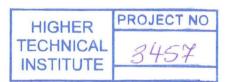
CIVIL ENGINEERING COURSE

DIPLOMA PROJECT

TREATMENT OF WASTEWATER SLUDGE C/982

CHARALAMBOS CONSTANTINOU

JUNE 2004



SUMMARY

STUDENT NAME: Charalambos Constantinou.

TITLE: Treatment of Wastewater Sludge

DIPLOMA PROJECT NO.: C/982

OBJECTIVES:

- 1. To state waste water sludge characteristics, treatment objectives and disposal methods.
- 2. To state local and European standards as applicable to sludge disposal.
- 3. To design a sludge application system on agriculture land or forest land.

CONTENTS

ACKNOWLEDGEMENTS			
Sum	MARY	2	
Introduction			
CHA	APTER 1 GENERAL INFORMATION ABOUT SLUDGE	6-8	
1.1	WHAT IS SLUDGE?	6-7	
1.2	Types of sewage \$Ludge	7-,8	
CHA	APTER 2 WASTEWATER SLUDGE CHARACTERISTICS	9-25	
2.1	PHYSICAL CHARACTERISTICS OF THE SLUDGE.	10-12	
2.2	CHEMICAL CHARACTERISTICS OF THE SLUDGE.	13-15	
2.3	BIOLOGICAL CHARACTERISTICS OF THE SLUDGE.	16-22	
CHA	APTER 3 SLUDGE TREATMENT	26-38	
3.1	SLUDGE PRELIMINARY OPERATIONS	29-32	
3.2	THICKENING	33-34	
3.3	STABILIZATION	34	
3.4	CONDITIONING	35	
3.5	DISINFECTION	35	
3.6	DEWATERING	36	
3.7	HEAT DRYING	37	
3.8	COMPOSTING	37	
3.9	THERMAL REDUCTION	38	
CHAPTER 4 DISPOSAL METHODS OF SLUDGE			
4.1	Landfilling	40-41	
4.2	AGRICULTURE USE	42-44	
4.3	LAGOONING	45	
4.4	Incineration	45-47	
4.5	DISPOSAL AT SEA	47	
CHA	APTER 5 STANDARDS AS APPLICABLE TO SLUDGE DISPOSAL	48	
CHAPTER 6 EXPERIMENT			
6.1	Amiantos Mine	49-52	
62	WASTEWATER TREATMENT DI ANT AT VATHIA GONIA	53	

		CONTENTS
6	.3 Procedure	54
6	.4 Results/Measurements	55
6	.4.1 LETTUCE HEIGHT AND LEAVES NUMBER	56-58
6	.4.2 LETTUCE NET WEIGHT AND DRY WEIGHT	58
6	.4.3 LETTUCE PICTURES	59-68
6	.4.4 LETTUCE PICTURES	69-73
C	CHAPTER 7 Conclusions	74-77
7	.1 EXPERIMENT COMMENTS / CONCLUSIONS	74-75
7	.2 GENERAL CONCLUŞIONS	75-77
F	REFERENCES	78
A	APPENDIXES	79-113
A	APPENDIX A	79-88
A	APPENDIX B	89-101
Δ	APPENDIX C	102-11