

HAZARDOUS WASTES
BY
GEORGE S. KOUTSONICOLAS

Project Report
Submitted to

the Department of Civil Engineering
of the Higher Technical Institute
Nicosia Cyprus

In partial fulfillment of the
requirements for the diploma of

TECHNICIAN ENGINEER
IN
CIVIL ENGINEERING

JUNE 1996



SUMMARY

This project deals with one of the special subjects of Environmental Engineering the Hazardous Wastes.

The project is composed from five parts. The first part defines and classifies the Hazardous Wastes and the second part explains methods used for their management.

The third part refers to treatment technologies.

The fourth part explains (and illustrates) land disposal methods and also refers to the possibility of ground water contamination by leachate.

The last fifth part but not least refers to the sea pollution and estimation of pollutants in the Ayia Napa area.

CONTENTS

	PAGE
Summary	1
Introduction	2
PART I	
1.1 Definitions	3
1.2 Definition & clarification of HAZARDOUS WASTES characteristics	4
PART II	
2.1 General	6
2.2 Wastewater management alternatives	6
2.2.1 Physical Processes	9
2.2.2 Chemical Processes	10
2.2.3 Biological Processes	10
PART III	
3.0 Chemical/Physical Systems	13
3.1 Adsorption	13
3.2 Distillation & stripping	16
3.3 Evaporation	16
3.4 Solvent Extraction	17
3.5 Membrane Separation	18
3.5.1 Reverse osmosis	18
3.5.2 Ultrafiltration	19
3.6 Electrodialysis	21
3.7 Filtration	21
3.8 Chemical oxidation	22
3.9 Ion exchange	23
3.10 Disposal of Residuals	25

PART IV

LAND DISPOSAL METHODS & POSSIBILITIES FOR GROUNDWATER CONTAMINATION

Landfill (General)	26
Disposal of oily sludges and residues	27
LAND DISPOSAL OF TOXIC SLUDGES	28
CHEMICAL SLUDGES	30
GROUNDWATER PROTECTION	
Leachate in Landfills	32

PART V

The pollution of Natural Resources	38
The phenomenon of Ephyrophism in the sea are of Ayia Napa	39
References	42