TABLE OF CONTENTS

	Page No.
Abstract	i-iv
Declaration	V
Certificate of Supervisor	vi
Acknowledgements	vii-ix
Table of contents	x-xiv
List of Tables	XV-XX
List of Figures	xxi-xxiv
List of Abbreviations	xxv-xxvi
CHAPTER 1: Introduction	1-27
1.1 Polycyclic Aromatic Hydrocarbon (PAHs)	1-2
1.2 Structure of PAHs	2-3
1.3 Physico-chemical properties of PAHs	3-4
1.4 Sources of PAHs in the environment	4-5
1.5 Toxicity of PAHs	5-7
1.6 PAHs in different environmental matrix	7-11
1.7 PAHs degradation	11-12
1.7 PAHs and soil organic carbon	12
1.8 PAHs and black carbon	13
1.9 PAHs and heavy metal	13-14
1.10 Hypothesis of the study	14
1.11 Background and objectives of the study	14-15
1.12 Scope of the study	15
1.13 Innovation and contribution to knowledge	15
References	16-27

	Page No
CHAPTER 2: Review of Literature	1-51
2.1 Worldwide scenario of PAHs	1-6
	1-0
2.1.1 PAHs surface soil	
2.1.2 PAHs in Groundwater	3-6
2.2 Indian Scenario of PAHs	6-8
2.2.1 PAHs in surface soil	6-8
2.2.2 PAHs in groundwater	8
2.3 PAHs in oilfield	9-11
2.3.1 PAHs in oilfield surface soil	9-10
2.3.2 PAHs in oilfield groundwater	11
2.4 Atmospheric signature of soil PAHs	12-14
2.5 PAHs toxicity assessment	14-15
2.6 Analytical Techniques	16-17
2.6.1 PAH extraction	16
2.6.2 Clean up	17
2.6.3 PAHs quantification	17
2.7 PAHs source apportionment	17-21
2.7.1 Diagnostic ratios	17-21
2.7.2 Principle component analysis/ Multiple Linear Regression (PCA/MLR)	21-22
2.8 Relationship of PAH-OC-BC	22-23
2.9 Distributions of heavy metals	23-26
2.9.1 Heavy metal in surface soil	24-26
2.9.2 Heavy metal in groundwater	26-27
2.10 Analytical methods for determination of heavy metals	28
2.11 Application of pollution indices in metal toxicity studies	27
2.12 Heavy metal and PAHs	27-29
References	30-51

CHAPTER 3: Materials and methods	1-20
3.1 Description of study area	1-2
3.2 Geology of the study area	3
3.3 Climate of the study area	3
3.4 Site Description	3-5
3.5 Sampling	6
3.5.1 Soil sampling	6
3.5.2 Water sampling	6
3.6 Chemicals and standards for PAHs analysis	6
3.7 Preparations of silica gel and sodium sulfate (Na ₂ SO ₄) for	7
column chromatography	
3.8 Cleaning of glassware	7
3.9 Polycyclic Aromatic Hydrocarbon Determination	7-10
3.9.1 PAHs extraction	7-8
3.9.2 Clean up	8
3.9.3 PAHs analysis	8-9
3.9.4 Quantification of PAHs	9-10
3.10 Analysis of total organic carbon (TOC)	11-12
3.11 Determination of black carbon (BC)	12
3.12 Determination of Heavy metals	12-13
3.13 Determination of major cations and anions	14-16
3.14 Back trajectory analysis	16
3.15 Quality control	16-17
3.16 Statistical Analysis	18
3.17 Preparation of Maps	18
References	19-20

CHAPTER 3: Results and Discussion	
4.1 Assessment of PAHs and heavy metals in surface soil	1-78
4.1.1 PAHs Scenario around oilfield soil	1-52
4.1.1.1 Concentrations of PAHs and seasonal variations	1-10
4.1.1.2Atmospheric conditions and seasonal variations of	10-13
PAHs	
4.1.1.3 Spatial variation of soil PAHs	14-20
4.1.1.4 Profiles of PAHs in soil around oilfields	21-25
4.1.1.5 Assessment of PAHs toxicity in surface soil	25-31
4.1.1.6 PAHs source assessment based on diagnostic ratio	32-40
4.1.1.7 Source apportionment by multivariate analysis	40-43
4.1.1.8 Seasonal association of Carbon and PAHs	44-52
4.1.2 Assessment of heavy metals around oilfield surface soil	52-78
4.1.2.1 Seasonal variation of metal concentration	52-57
4. 1.2.2 Assessment of metal pollution indices in soil	58-65
4.1.2.3 Source identification	66-78
4.2 Assessment of PAHs and heavy metals in groundwater	79-130
4.2.1 PAHs scenario in groundwater	79-110
4.2.1.1Concentrations of PAHs and seasonal variations	79-87
4.2.1.2 Spatial variation of PAHs in groundwater	88-94
4.2.1.3 Profile of PAHs in groundwater around oilfields	94-98
4.2.1.4 Assessment of PAHs toxicity in groundwater	99-105
4.2.1.5 PAHs source assessment based on diagnostic ratio	105-110
4.2.2 Assessment of heavy metals in groundwater	111-116
4.2.2.1 Seasonal variation of metal concentration	111-114
4.2.2.2 Heavy metal toxicity in groundwater	115-117
4.2.3 Transport of PAHs into groundwater	118-127
4.2.3.1 PAHs and Carbon	117-121
4.2.3.2 Correlation between PAHs and heavy metals	121-124