

ENVIRONMENTAL ISSUES OF
SYNTHETIC TRANSPORTATION FUELS FROM COAL

SUMMARY REPORT

	Page
INTRODUCTION	1
1.0 OVERVIEW OF ENVIRONMENTAL CONCERNS	5
1.1 MINING	7
1.2 COAL LIQUEFACTION AND REFINING.	8
Air	9
Trace Organic Compounds	12
Water	13
Solid Wastes	15
Other Impacts	16
1.3 PRODUCT TRANSPORT AND END-USE	18
2.0 ARE THERE SIGNIFICANT ENVIRONMENTAL DIFFERENCES AMONG THE COAL LIQUEFACTION PROCESSES?	24
2.1 EMISSIONS DURING "ROUTINE" OPERATING CONDITIONS	29
Air Emissions	29
Water Effluents	29
2.2 UPSET/ACCIDENT RISKS.	30
2.3 ENVIRONMENTAL HEALTH RISKS.	33
2.4 PRODUCT AND CONVERSION EFFICIENCY DIFFERENCES	36
2.5 UPGRADING AND REFINING.	42
3.0 WHAT ARE THE IMPORTANT LOCATIONAL FACTORS AFFECTING ENVIRONMENTAL IMPACTS?	46
3.1 COAL CHARACTERISTICS.	46

3.2	REGIONAL DIFFERENCES IN ENVIRONMENTAL IMPACTS . . . . .	.50
	Air Resources . . . . .	.55
	Water Resources and Aquatic Ecosystems. . . . .	.55
	Terrestrial Ecosystems. . . . .	.57
	Linkages Between Air, Water, and Land Resources:	
	Acid Rain . . . . .	.62
	Overall Ecological Characteristics. . . . .	.64
3.3	LOCAL FACTORS AFFECTING ENVIRONMENTAL IMPACTS . . . . .	.65
4.0	ARE OUR INSTITUTIONAL MECHANISMS ADEQUATE TO ENSURE ENVIRONMENTAL PROTECTION? . . . . .	.71
4.1	MONITORING DIFFICULTIES . . . . .	.72
4.2	ENVIRONMENTAL STANDARDS AND COMPLIANCE INCENTIVES . . . . .	.74
	Construction Quality Control. . . . .	.75
	Environmental Standards . . . . .	.76
	Industry Consensus Standards. . . . .	.77
4.3	PUBLIC PERCEPTIONS. . . . .	.78
4.4	ENVIRONMENTAL RESEARCH PROGRAMS . . . . .	.82
	Technical Research Gaps . . . . .	.83
	Social and Policy Research Gaps . . . . .	.83
	Research Program Organization . . . . .	.85
5.0	WHAT ARE THE ENVIRONMENTAL RISKS OF AN ACCELERATED SYNFUELS COMMERCIALIZATION PROGRAM?	86
5.1	RISKS DUE TO TECHNICAL UNCERTAINTIES. . . . .	.88
5.2	DIFFICULTIES IN MONITORING.	90
5.3	REGULATORY LAG.	93
5.4	IMPACTS FROM RAPID CONSTRUCTION	94
	REFERENCES	97

LIST OF FIGURES

		Page
1-1 :	Coal Liquefaction Alternatives.	3
1-2 :	Surface Area Requirements for Coal-Strip Mining etc.	8
1-3 :	Range of Air Pollution Emission Levels .**.	10
1-4 :	Size Ranges of Coal-Fired Power Plants with Emission Equal etc.	11
1-5 :	Relative CO ₂ Emissions from Combustion of Various etc.	23
2-1 :	Simplified Direct Liquefaction Process-Waste Stream Sources etc.	24
2-2 :	Simplified Indirect Liquefaction Process-Waste Stream Sources etc.	25
2-3 :	Comparison of Product Outputs	38
2-4 :	Range of Product Outputs from the Exxon Donor Solvent Process	39
2-5 :	Comparison of Conversion Efficiencies	40
3-1 :	Distribution of Coal Resources in the Coterminous 48 States	48
3-2 :	Direct Coal Liquefaction Favors Bituminous Coals Due to Hydrogen Requirements for Oxygen Removals	50
5-1 :	Time Schedule for Two Direct Coal Liquefaction Processes	87
5-2 :	Synfuel Plant Construction Labor Requirement Near Owensboro, Kentucky	95
5-3 :	Workforce Schedules for Coal Gasification Projects.	96

LIST OF TABLES

	Page
1-1: Selected Environmental Issues for Coal Synfuels.	6
1-2: Summary of Transportation End-Use Problems	20
2-1: Estimated SO ₂ Emissions from the Flare in the SRC II etc. . * * * . * * * * .	32
2-2: Efficiency of Refining SRC II Liquids:	44
3-1: Regional Conditions Affecting Environmental Impacts	51
3-2: Factors Contributing to Regional Environmental Sensitivity to Synthetic Fuel Development	54
3-3: Air Quality Characteristics and Problems	56
3-4: Water Resources and Aquatic Ecosystems: Characteristics and Problems	58
3-5: Annual Pattern of Land Use for Coal Surface Mining Projected in 1985	59
3-6: Terrestrial Ecosystems: Characteristics and Problems	61
3-7: Examples of Potential Contributors to Acid Rain	63
3-8: Local Factors Affecting Environmental Impacts	65
3-9: Survey of Sites Selected for Coal Liquefaction Projects at Advanced Stage	67
3-10: Initial Site Requirements Specified for Coal Liquefaction Demonstration Plants	68
3-11: Siting Criteria for Coal Conversion Facility	70
4-1: Difficulty in Detecting Environmental Hazards	73
4-2: Range of Public Perceptions of Synthetic Fuels Industry	81
4-3: Selected Technical Information Gaps	84
5-1: Health Risks Potentially Resolved during a Normal Development Schedule	91
5-2: Typical Latency Periods in Cancer Detection	93