

TABLE OF CONTENTS

	<u>PAGE</u>
I. GENERAL INTRODUCTION.....	1
A. Fusion Advantages.....	1
B. Program History.....	2
C. Long Range Planning Projections	3
D. Division Organization and Management	7
E. Organization of Reports.....	9
F. Foreign Efforts.....	11
G. Budget Summary.....	12
II. CONFINEMENT SYSTEMS	15
A. Introduction.....	15
B. Problem Areas.....	16
1. Tokamaks.....	16
2. Magnetic Mirror Systems.....	19
3. High Density Systems.....	22
C. Recent Achievements.....	27
1. Tokamaks.....	27
2. Magnetic Mirror Systems.....	33
3. High Density Systems.....	36
D. Program Structure and Major Milestones.....	39
1. Tokamaks.....	39
2. Magnetic Mirror Systems.....	42
3. High Density Systems.....	45
E. Budget Summary.....	49

	<u>PAGE</u>
III. TECHNICAL PROJECT OFFICE	53
A. Introduction.....	53
B. Tokamak Fusion Test Reactor.....	54
1. Introduction.....	54
2. Objectives.....	54
3. Principal Design Features.....	56
4. Project Milestones.....	58
5. Projected Budgets.....	59
C. Rotating Target Neutron Source.....	60
1. Introduction.....	60
2. Objectives.....	60
3. Principal Design Features.....	61
4. Project Milestones.....	61
5. Projected Budgets.....	62
D. Intense Neutron Source.....	62
1. Introduction.....	62
2. Objectives.....	63
3. Principal Design Features.....	64
4. Project Milestones.....	64
5. Projected Budgets.....	65
IV. DEVELOPMENT AND TECHNOLOGY PROGRAM	66
A. Introduction.....	66
B. Magnetic Systems	72
1. Magnetics	74
2. Energy Storage	81
C. Plasma Engineering	86
1. Neutral Beam Development	92
2. Alternate Heating Technology	100
3. Direct Energy Conversion	106
4. Vacuum Technology	111
5. Plasma Maintenance and Control	114
D. Fusion Reactor Materials	119
1. Alloy Development and Irradiation Performance	121
2. Plasma-Materials Interaction	129
3. Special Purpose Materials Development	135
4. Damage Analysis and Dosimetry	138
5. Radiation Facilities Development and Operation	141

	<u>PAGE</u>
E. Fusion Systems Engineering.....	147
1. Advanced Design.....	150
2. Systems Studies.....	156
3. Blanket and Shield Engineering.....	163
4. Tritium Processing and Control.....	172
5. Plasma Systems.....	179
6. Plant Systems.....	186
7. Environment and Safety.....	190
V. APPLIED PLASMA PHYSICS PROGRAM	200
A. Introduction.....	200
B. Problem Areas.....	202
1. Fusion Plasma Theory.....	202
2. Experimental Plasma Research.....	208
3. Computer Services and Technology.....	213
C. Recent Achievements.....	214
1. Fusion Plasma Theory.....	214
2. Experimental Plasma Research.....	221
3. Computer Services and Technology.....	230
D. Program Structure, Budget Summary and Milestones.....	232
1. Fusion Plasma Theory.....	232
2. Experimental Plasma Research.....	238
3. Computer Services and Technology.....	249
4. Possible Future Experiments	250
E. Applied Plasma Physics Operating Budget Summary.....	252