

## CONTENTS

I.	Executive Summary	1
	Stratospheric Effects	1
	Climatic Effects of Ozone Reduction	3
	Biological and Health Effects of Ozone Reduction	3
	The Fluorocarbon Industry	3
	Federal Authorities and Recommended Federal Actions	5
	Research Programs	6
II.	Conclusions and Federal Actions	7
	Effects of Ozone Reduction	9
	Assessment of Validity of Stratospheric Models	10
	Assessment of Validity of Expected Effects of Ozone Reduction	11
	Considerations in Reaching a Decision	12
	Timetable for Action	13
	Critical Research Areas	13
	Impacts of Federal Restrictions	17
	International Actions	18
III.	Stratospheric Effects	21
	Summary	21
	Introduction	22
	Ozone Reduction by Stratospheric Chlorine	23
	Sources of Stratospheric Chlorine	24
	Modeling	25
	Measurements	29
	Assessment of Possible Climatic Effects Resulting	
	From Large Decreases of Stratospheric Ozone	41
	Industry Research Program	42
	Federal Stratospheric Research Efforts	43
IV.	Biological Effects of Ozone Reduction	53
	Introduction	53
	Biological Effects of Increased UV-B Radiation	53
V.	Human Health Effects of Ozone Reduction	65
	Introduction	65
	Human Health Effects	65
VI.	The Fluorocarbon Industry	77
	Introduction	77
	History of Fluorocarbons	77
	Physical and Chemical Properties	78

Toxicological Properties	80
Methods of Manufacture	80
Production	80
Future Plans for Expansion	83
Uses	84
Release into the Atmosphere	92
Substitutes for F-11 and F-12	93
Effects on Industry of any Restrictions on Fluorocarbon Production	97
VII. Federal Authorities	101
Introduction	101
Potential Regulatory Agencies	101
Timetables	101
Labeling	102