

CHAPTER ONE: INTRODUCTION.....	1
STUDY GOALS AND OBJECTIVES.....	1
STUDY GOALS AND OBJECTIVES (CONTINUED)	2
STUDY GOALS AND OBJECTIVES (CONTINUED)	3
STUDY GOALS AND OBJECTIVES (CONTINUED)	4
REASONS FOR DOING THE STUDY	5
INTENDED AUDIENCE.....	6
SCOPE AND FORMAT	6
SCOPE AND FORMAT (CONTINUED)	7
SCOPE AND FORMAT (CONTINUED)	8
OXYGEN AND WATER VAPOR BARRIER RESINS.....	9
OXYGEN AND WATER VAPOR ... (CONTINUED).....	10
METHODOLOGY AND INFORMATION SOURCES.....	11
RELATED BCC REPORTS	11
ABOUT THE AUTHOR.....	11
BCC ON-LINE SERVICES.....	12
DISCLAIMER	12
DISCLAIMER (CONTINUED).....	12
CHAPTER TWO: SUMMARY.....	13
SUMMARY.....	13
SUMMARY (CONTINUED)	14
<i>SUMMARY TABLE U.S. PACKAGING BARRIER RESIN MARKET</i>	
<i>VOLUME ESTIMATE BY TYPE, THROUGH 2016 (MILLION LBS).....</i>	<i>15</i>
<i>SUMMARY FIGURE U.S. PACKAGING BARRIER RESIN MARKET</i>	
<i>VOLUME ESTIMATE BY TYPE, 2011 AND 2016 (MILLION LBS).....</i>	<i>15</i>
CHAPTER THREE: OVERVIEW	16
THE U.S. CHEMICAL AND PETROCHEMICAL INDUSTRIES.....	16
CRUDE OIL AND NATURAL GAS	16
SOME INDUSTRY HISTORY	17
CRUDE OIL AND NATURAL GAS PRICES.....	18
Crude Oil and ... (Continued)	19
U.S. CHEMICAL INDUSTRY PRODUCTION.....	20
<i>TABLE 1 VALUE OF U.S. CHEMICAL INDUSTRY SHIPMENTS,</i>	
<i>THROUGH 2010 (\$ BILLIONS).....</i>	<i>20</i>
U.S. Chemical Industry Production (Continued)	21
THE U.S. PLASTIC RESIN INDUSTRY.....	22
U.S. PLASTIC RESIN INDUSTRY SIZE AND PRODUCTION.....	22
<i>TABLE 2 U.S. PRODUCTION OF MAJOR THERMOPLASTIC RESINS:</i>	
<i>2006-2010 (MILLION LBS).....</i>	<i>23</i>
BULK RESIN MANUFACTURE	23
PLASTIC RESIN FABRICATION.....	24
RIGID CONTAINERS.....	25

Blow Molding	26
Thermoforming	27
FLEXIBLE PACKAGING	27
RESIN MODIFICATION: CONVERTING AND COMPOUNDING	28
Converting	29
Compounding	29
BARRIER COATINGS: SOLUTION/EMULSION	29
END USERS	30
PLASTIC RESIN PRICES	31
<i>TABLE 3 PRICES OF BULK COMMODITY THERMOPLASTIC RESINS, 1992–2011 (CENTS/LB)</i>	32
BARRIER PACKAGING	33
HISTORY AND EVOLUTION OF BARRIER PACKAGING AND BARRIER PLASTICS	33
History and Evolution ... (Continued)	34
BARRIER PLASTICS AND TECHNOLOGY	35
Barrier Plastics and ... (Continued)	36
FOOD SPOILAGE	37
THE NEED FOR BARRIER PACKAGING	37
Socioeconomic Factors in the Growth of Barrier Plastics	38
Growth of Prepared, Convenient, Fast Foods	38
Shelf Life	39
Recycling	40
TERMS USED IN BARRIER PACKAGING	40
GAS PERMEABILITIES AND TRANSMISSION RATES	41
Permeability	41
Gas Transmission Rate	42
High vs. Moderate Barriers	42
Oxygen Barrier	43
Water Vapor Barrier	44
MATERIALS AND STRUCTURES	45
PLASTICS	45
Plastics (Continued)	46
Barrier Resins	47
Natural Polymers	47
Synthetic Polymers	47
Synthetic Polymers (Continued)	48
Vapor Permeability Values	49
<i>TABLE 4 VAPOR PERMEABILITIES OF PACKAGING RESINS</i>	49
<i>TABLE 4 (CONTINUED)</i>	50
Vapor Permeable Materials	50
Healthcare	51
Food	51

OTHER MATERIALS	52
Scavengers/Active Packaging.....	52
BARRIER STRUCTURES	53
Monolayer Structures.....	53
Multilayer Structures.....	54
Multilayer Structures (Continued)	55
CHAPTER FOUR: PACKAGING MARKETS BY BARRIER RESIN TYPES	56
OVERALL MARKET ESTIMATE AND FORECAST	56
<i>TABLE 5 U.S. PACKAGING BARRIER RESIN MARKET VOLUME</i>	
<i>ESTIMATE BY TYPE, THROUGH 2016 (MILLION LBS)</i>	57
REGENERATED CELLULOSE (CELLOPHANE)	58
<i>TABLE 6 TYPICAL PROPERTIES OF REGENERATED CELLULOSE</i>	
<i>(CELLOPHANE)</i>	59
ETHYLENE-VINYL ALCOHOL COPOLYMERS.....	59
EVOH BARRIER PACKAGING MARKET ESTIMATES.....	60
<i>TABLE 7 U.S. PACKAGING VOLUME ESTIMATE FOR EVOH</i>	
<i>BARRIER RESINS, THROUGH 2016 (MILLION LBS)</i>	60
EVOH PROPERTIES.....	61
<i>TABLE 8 TYPICAL EVOH PROPERTIES</i>	62
<i>TABLE 9 PROCESSES, ADVANTAGES AND LIMITATIONS OF EVOH</i>	62
EVOH Properties(Continued)	63
EVOH PRODUCERS	64
EVAL Americas	64
Noltex, LLC.....	65
EVOH STRUCTURES, FORMATS, AND APPLICATIONS.....	65
Food Packaging.....	66
Multilayer Barrier Structures.....	66
Film Orientation	67
Other Blends	68
Nonfood Packaging	68
FLUOROPOLYMERS—PCTFE.....	68
PCTFE BARRIER PACKAGING MARKET ESTIMATE.....	69
<i>TABLE 10 U.S. PACKAGING VOLUME ESTIMATE FOR PCTFE</i>	
<i>BARRIER RESINS, THROUGH 2016 (MILLION LBS)</i>	69
PCTFE PROPERTIES AND APPLICATIONS	70
<i>TABLE 11 TYPICAL PCTFE PROPERTIES</i>	70
<i>TABLE 12 PCTFE ADVANTAGES</i>	71
COMMERCIAL ACLAR BRAND PCTFE BARRIER RESINS	
AND FILMS	72
NITRILE POLYMERS (POLYACRYLONITRILE AND	
COPOLYMERS).....	73
NITRILE (AN-MA) BARRIER PACKAGING MARKET	
ESTIMATE.....	73

<i>TABLE 13 U.S. PACKAGING VOLUME ESTIMATE FOR NITRILE (AN-MA) BARRIER RESINS, THROUGH 2016 (MILLION LBS)</i>	74
NITRILE RESIN PROPERTIES	74
<i>TABLE 14 TYPICAL PROPERTIES OF AN-MA COPOLYMERS</i>	75
NITRILE RESIN APPLICATIONS	75
Nitrile Resin Applications (Continued)	76
AN-MA RESIN STRUCTURES AND FORMATS	77
NYLON RESINS.....	78
NYLON BARRIER PACKAGING MARKET ESTIMATE.....	79
<i>TABLE 15 U.S. PACKAGING VOLUME ESTIMATE FOR NYLON BARRIER RESINS, THROUGH 2016 (MILLION LBS)</i>	79
PROPERTIES OF CRYSTALLINE NYLON RESINS	80
Unoriented Nylons.....	81
<i>TABLE 16 TYPICAL PROPERTIES OF UNORIENTED NYLONS</i>	81
Oriented Nylon 6	81
<i>TABLE 17 TYPICAL PROPERTIES OF ORIENTED NYLON 6</i>	81
Properties.....	82
AMORPHOUS NYLONS	83
<i>TABLE 18 PROCESSING, ADVANTAGES, AND LIMITATIONS OF AMORPHOUS NYLONS</i>	83
DuPont's Selar Products.....	84
<i>TABLE 19 TYPICAL PROPERTIES OF SELAR PA AMORPHOUS NYLONS</i>	84
MXD6	84
NYLON STRUCTURES AND FORMATS	85
POLYOLEFINS.....	86
POLYOLEFIN PROPERTIES	87
<i>TABLE 20 TYPICAL PROPERTIES OF POLYETHYLENE FILMS</i>	87
<i>TABLE 21 TYPICAL PROPERTIES OF POLYPROPYLENE FILMS</i>	87
THERMOPLASTIC POLYESTERS	88
POLYESTER BARRIER PACKAGING MARKET ESTIMATE.....	89
<i>TABLE 22 U.S. PACKAGING VOLUME ESTIMATE FOR THERMOPLASTIC POLYESTER BARRIER RESINS, THROUGH 2016 (MILLION LBS)</i>	89
Polyester Barrier ... (Continued)	90
POLYETHYLENE TEREPHTHALATE	91
History.....	91
Properties.....	92
<i>TABLE 23 TYPICAL PROPERTIES OF POLYESTER</i>	92
<i>TABLE 24 SOME ADVANTAGES OF PET BARRIER RESINS</i>	92
<i>TABLE 24 (CONTINUED)</i>	93
Modified PET Resins	94
POLYETHYLENE NAPHTHALATE.....	94
Applications for PEN	95

POLYTRIMETHYLENE TEREPHTHALATE.....	96
POLYVINYLIDENE CHLORIDE AND COPOLYMERS.....	97
PVDC BARRIER PACKAGING MARKET ESTIMATE.....	97
<i>TABLE 25 U.S. PACKAGING VOLUME ESTIMATE FOR PVDC</i>	
<i>BARRIER RESINS, THROUGH 2016 (MILLION LBS)</i>	97
PVDC PROPERTIES	98
<i>TABLE 26 TYPICAL PROPERTIES OF POLYVINYLIDENE CHLORIDE</i>	98
Advantages and Limitations.....	99
<i>TABLE 27 PVDC PROCESSES, ADVANTAGES, AND LIMITATIONS</i>	99
Crystallinity.....	100
PVdC versus Other High Barrier Resins	100
Consumer Attitudes	101
PVDC PACKAGING FORMATS AND APPLICATIONS.....	101
PVDC COATINGS.....	102
PVDC-Coated Films	103
PVdC-Coated Rigid Containers.....	103
OTHER BARRIER MATERIALS AND SYSTEMS	103
ADHESIVE TIE LAYER RESINS.....	104
Chemistry.....	104
Ionomers.....	105
Properties.....	105
<i>TABLE 28 TYPICAL PROPERTIES OF ETHYLENE-VINYL ACETATE</i>	
<i>COPOLYMER AND IONOMER FILM RESINS</i>	105
Reactive Bonding.....	106
Tie Layer Resin Barrier Packaging Market Estimate.....	107
<i>TABLE 29 U.S. PACKAGING VOLUME ESTIMATE FOR BARRIER TIE</i>	
<i>LAYER RESINS, THROUGH 2016 (MILLION LBS)</i>	107
NONPOLYMERIC BARRIERS IN PLASTIC BARRIER	
STRUCTURES.....	108
FILM METALLIZATION.....	108
INORGANIC BARRIER COATINGS.....	109
Silicon Oxide Coatings.....	109
Aluminum Oxide Coatings.....	110
LIQUID CRYSTAL POLYMERS.....	111
POLYARYLATES.....	112
CYCLO OLEFIN COPOLYMER.....	112
POLYETHYLENE FURANOATE.....	113
OXYGEN AND ETHYLENE SCAVENGING SYSTEMS.....	114
STRUCTURAL RESINS.....	115
POLYETHYLENES	116
POLYPROPYLENE.....	117
THERMOPLASTIC POLYESTERS	118
POLYSTYRENE.....	119
POLYCARBONATE.....	119

OTHERS	119
VAPOR PERMEABLE RESINS	119
VAPOR PERMEABLE RESIN PACKAGING MARKET ESTIMATE	120
<i>TABLE 30 U.S. PACKAGING VOLUME ESTIMATE FOR VAPOR PERMEABLE RESINS, THROUGH 2016 (MILLION LBS)</i>	121
POLYVINYL CHLORIDE (PVC)	122
<i>TABLE 31 TYPICAL PROPERTIES OF POLYVINYL CHLORIDE FILMS</i> ...	122
DUPONT TYVEK	123
DuPont Tyvek (Continued)	124
CONTROLLED/MODIFIED ATMOSPHERE PACKAGING	125
Controlled/Modified ... (Continued)	126
<i>TABLE 32 OPTIMUM HEADSPACE PACKAGING ATMOSPHERES FOR PRODUCE (%)</i>	127
Commercial CAP/MAP Films	128
Blended and Composite CAP/MAP Films	129
Microporous or Microperforated CAP/MAP Films	129
CAP/MAP Films with Permeable Windows	130
Landec Intelimer Films	130
Other New Concepts and Materials	131
Other New ... (Continued)	132
 CHAPTER FIVE: PACKAGING MARKETS BY BARRIER RESIN	
APPLICATIONS	133
OVERALL MARKET ESTIMATE AND FORECAST	133
<i>TABLE 33 OVERALL U.S. MARKET ESTIMATE FOR PACKAGING BARRIER RESIN VOLUMES BY APPLICATIONS, THROUGH 2016 (MILLION LBS)</i>	133
FOOD PACKAGING	134
FOOD PACKAGING MARKETS	134
<i>TABLE 34 U.S. BARRIER PLASTIC FOOD PACKAGING MARKET VOLUME ESTIMATE, THROUGH 2016 (MILLION LBS)</i>	135
Barrier Resins	135
Vapor Permeable Resins	136
CHEMICAL/INDUSTRIAL PRODUCT PACKAGING	136
CHEMICAL/INDUSTRIAL BARRIER PACKAGING MARKET ESTIMATE	137
<i>TABLE 35 U.S. BARRIER PLASTIC CHEMICAL AND INDUSTRIAL PACKAGING MARKET VOLUME ESTIMATE, THROUGH 2016 (MILLION LBS)</i>	137
Automotive Fuel Tanks	138
HEALTHCARE PACKAGING	139
HEALTHCARE BARRIER PACKAGING MARKET ESTIMATE	140
<i>TABLE 36 U.S. BARRIER PLASTIC HEALTHCARE PACKAGING MARKET VOLUME ESTIMATE, THROUGH 2016 (MILLION LBS)</i>	140

Healthcare Barrier ... (Continued)	141
CHAPTER SIX: TECHNOLOGY	142
PLASTIC RESIN CHEMISTRY, MANUFACTURE, AND PROPERTIES	142
COMMODITY RESINS	143
REGENERATED CELLULOSE (CELLOPHANE)	144
ETHYLENE-VINYL ALCOHOL COPOLYMERS	145
FLUOROPOLYMERS—BARRIER PCTFE	146
NITRILE POLYMERS (POLYACRYLONITRILE AND COPOLYMERS)	147
NYLON (POLYAMIDE) RESINS	148
POLYOLEFINS	149
Polyethylene	149
Polyethylene (Continued)	150
Polypropylene	151
THERMOPLASTIC POLYESTERS	152
Modified Polyester Resins	153
Modified Polyester ... (Continued)	154
Polyethylene Naphthalate	155
Polytrimethylene Terephthalate	155
VINYL POLYMERS	156
Polyvinyl Chloride and Copolymers	156
Polyvinylidene Chloride and Copolymers	156
OTHER BARRIER MATERIALS	157
Adhesive Tie Layer Resins	157
Ethylene-Vinyl Acetate Resins	157
Acrylic Comonomer Tie Resins	158
OTHER STRUCTURAL RESINS	158
Ionomers	158
Polycarbonate	159
Polystyrene	160
NEWER POLYMERIZATION TECHNOLOGIES	161
POLYOLEFIN PROCESSES	161
Gas Phase Processes	161
Liquid Phase Processes	162
NEW AND IMPROVED POLYESTER RESINS AND PROCESSES	163
DuPont's NG-3 Process	163
IntegRex Process	164
DAK's Melt-Tek Process	165
Teijin's Titanium-Based Catalyst	165
METALLOCENE/SINGLE-SITE CATALYST TECHNOLOGY	166
Metallocene/Single-... (Continued)	167
POLYMER FABRICATION TECHNOLOGY	168

RIGID STRUCTURES - PLASTICS MOLDING	168
Blow Molding	169
Extrusion Molding	169
Injection Molding.....	169
Extrusion Blow Molding.....	170
Injection Blow Molding.....	170
Stretch Blow Molding	171
FLEXIBLE STRUCTURES	171
Roll Goods Manufacture.....	171
Film Extrusion.....	172
The Film Extruder	172
Polymer Drying	173
Melt Film Fabrication	173
Blown Films	173
Blown Films (Continued).....	174
Film Casting	175
Extrusion.....	176
Production	177
Solvent Casting.....	177
Thickness Downgauging.....	178
Form/Fill/Seal Packaging	178
THERMOFORMING TECHNOLOGY	179
Thermoform/Fill/Seal Packaging	180
Web Operation	181
POLYMER AND FILM ORIENTATION	182
BIAXIAL ORIENTATION—THE TENTER FRAME	183
BARRIER TECHNOLOGY.....	184
MOISTURE (WATER VAPOR) AND OXYGEN	185
OTHER GASES	185
LIGHT (VISIBLE AND ULTRAVIOLET).....	185
ODORS, AROMAS, SOLVENT VAPORS, AND OTHERS.....	186
Organic Permeation Detection Systems.....	186
TESTING GAS PERMEABILITY.....	187
Oxygen Permeability Testing.....	187
Water Vapor Permeability Testing.....	188
NONPOLYMERIC BARRIER SURFACE FILMS AND COATINGS.....	189
METALLIZED FILMS	189
SILICON AND OTHER METAL OXIDE COATINGS	190
Silicon Oxide Coatings.....	190
Silicon Oxide ... (Continued)	191
Other Metal Oxide Coatings	192
PLASMA TREATMENT	192
MULTILAYER LAMINATION AND COEXTRUSION	193
LAMINATION.....	193

COEXTRUSION	194
Feed Block Coextrusion.....	195
Multimanifold Die Coextrusion	195
Coextrusion vs. Lamination	196
FOOD PROCESSING METHODS	196
THERMAL PROCESSING	197
Aseptic Processing	197
Hot-Fill Processing	198
Retort Processing.....	199
NONTHERMAL PROCESSING.....	199
FOOD PACKAGING.....	200
NEW DEVELOPMENTS IN BARRIER PACKAGING.....	201
MORE AND THINNER LAYERS IN MULTILAYER	
STRUCTURES.....	202
More and Thinner ... (Continued).....	203
NEW BARRIER POLYMERS.....	204
OXYGEN SCAVENGERS.....	204
Systems	204
Systems (Continued).....	205
Systems (Continued).....	206
NANOCOMPOSITE BARRIERS.....	207
Products	208
Nanoclay Barrier Coatings.....	209
NEW CLOSURE DESIGNS.....	210
NEW PET BARRIER METHODS AND MATERIALS.....	211
New PET Barrier ... (Continued).....	212
Chemical Vapor Deposition.....	213
Coca-Cola/Krones BestPET Coating System.....	214
Plasmax Plasma Coating System	215
Dow's Blox Barrier Plastics.....	216
Indspec Resorcinol-Based PET Copolymers	216
Invista's Polyshield PET Resin and Barrier Structure.....	217
M&G's ActiTUF Barrier Resins and PolyProtect Products	217
nGimat's "Open Atmosphere" System	218
ORMOCER Ceramic Coatings	219
Owens-Illinois/Graham Packaging SurShot System and	
SurShield Barrier Structure	220
Plastlac's PetSkin UV Coating.....	220
Polymer and Processing Modifications	221
PPG Bairocade Coatings	221
Sidel's Actis System.....	222
RWTH Aachen University's Double-Sided Coating System	223
Tetra Pak's Glaskin and Sealice Systems	223
APPE's Combination Barrier System	224

PLASTIC BEER BOTTLES	225
Technologies Used	226
Some History and Background	226
Some History ... (Continued).....	227
Some History ... (Continued).....	228
Some History ... (Continued).....	229
The Current Situation.....	230
CHAPTER SEVEN: INDUSTRY STRUCTURE AND COMPETITIVE ANALYSIS.....	231
TRENDS IN THE U.S. BARRIER PLASTIC RESINS INDUSTRY.....	231
TRENDS IN THE U.S. BARRIER ... (CONTINUED).....	232
BARRIER PLASTIC RESIN AND PACKAGING SUPPLIERS	233
INTEGRATION: HORIZONTAL AND VERTICAL.....	233
INDUSTRY CONCENTRATION AND CONSOLIDATION	234
Recent Organizational Changes.....	234
Recent Organizational ... (Continued).....	235
Investment Drivers.....	236
IMPACT OF LARGE RESIN PRODUCERS AND END USERS.....	237
CASE STUDY: PET BOTTLE RESIN PRODUCERS	238
PRODUCT DIFFERENTIATION AND SUBSTITUTION.....	239
MARKET ENTRY FACTORS.....	239
COMPOUNDERS/CONVERTERS/MOLDERS AND DISTRIBUTORS	240
MARKETING	240
FACTORS AFFECTING MARKET SIZE AND GROWTH	240
Factors Affecting ... (Continued)	241
END USER RESIN SELECTION CRITERIA	242
INTERNATIONAL ASPECTS	243
GLOBAL USE OF BARRIER PACKAGING AND RESINS	244
<i>TABLE 37 INTERNATIONAL MAJOR BARRIER RESIN MARKETS,</i>	
<i>2011 (MILLION LBS)</i>	245
MAJOR FOREIGN PLAYERS.....	245
IMPORTS AND EXPORTS.....	246
Imports and Exports (Continued).....	247
CHAPTER EIGHT: ENVIRONMENTAL, REGULATORY, AND PUBLIC POLICY ISSUES.....	248
ENVIRONMENTAL CONSIDERATIONS	248
DISPOSAL OF WASTE PLASTICS	248
MATERIALS SUBSTITUTION.....	249
Paper	250
Glass.....	250
Metals.....	251
Inter-plastic Competition	251
Thermoplastic Polyesters	251

Polyolefins	252
Specialty Barrier Packaging Resins.....	253
Biodegradable Resins and other “Sustainable Packaging”	253
RECYCLING	254
Plastics Recycling Symbols	255
PET Container Recycling	256
EVOH	257
Nitrile (AN-MA) Resins	258
PVdC	258
Multilayer Structures.....	259
SOURCE REDUCTION	260
BIODEGRADABILITY AND OTHER FACTORS	261
Biodegradability .. (Continued)	262
ENVIRONMENTAL LAWS AND REGULATIONS	263
Environmental Laws ... (Continued)	264
Environmental Laws ... (Continued)	265
Recycling	266
FEDERAL LAWS AND REGULATORY PROCESSES	266
FOOD SAFETY MODERNIZATION ACT OF 2011	267
PACKAGING LAW	267
Packaging Law (Continued)	268
CODE OF FEDERAL REGULATIONS	269
THE FOOD AND DRUG ADMINISTRATION (FDA).....	270
Food Additive Categories	271
Regulation of Food Packaging Materials.....	271
Food Additive Petitions	272
Premarket or Food Contact Notification System	273
Use of Recycled Plastics in Packaging.....	274
FDA Rules	275
New Rules on Reporting Contamination	276
DEPARTMENT OF AGRICULTURE	277
ENVIRONMENTAL PROTECTION AGENCY (EPA)	277
OTHER FEDERAL AGENCIES	278
STATE AND LOCAL AGENCIES	279
CASE STUDY: POLYACRYLONITRILE RESINS.....	279
PUBLIC PERCEPTIONS	280
PUBLIC PERCEPTIONS (CONTINUED).....	281
PUBLIC PERCEPTIONS (CONTINUED).....	282
“GREENWASHING”	283
CHAPTER NINE: COMPANY PROFILES	284
INTRODUCTION	284
SUPPLIER COMPANIES.....	285
AMCOR FLEXIBLES AMERICAS.....	285

Ampcor Rigid Plastics.....	285
AMPAC HOLDINGS, LLC/AMPAC FLEXIBLES	286
APPLIED EXTRUSION TECHNOLOGIES, INC./AET FILMS	287
ARKEMA, INC.	288
ASCEND PERFORMANCE MATERIALS, LLC	288
BALL CORP.	289
BASF CORP.....	290
BAYER CORP.....	291
BEMIS CO., INC.	292
BILCARE RESEARCH, INC.	293
CELANESE CORP.....	294
Celanese EVA Performance Polymers	294
Ticona	294
Ticona (Continued).....	295
CHEVRON PHILLIPS CHEMICAL CO.	296
COLORMATRIX CORP.	297
CONSTAR INTL., LLC	298
DAIKIN AMERICA, INC.	299
DAK AMERICAS, LLC	300
THE DOW CHEMICAL CO.....	301
The Dow Chemical Co. (continued).....	302
DSM	303
DSM Engineering Plastics	303
E.I. DUPONT DE NEMOURS AND CO.	304
DuPont Teijin Films U.S., Ltd.	304
DuPont ... (Continued)	305
ELEMENTIS SPECIALTIES, INC.	306
EMS-CHEMIE HOLDING AG	307
EMS-Grivory	307
EMS-Chemie (North America).....	307
EVAL AMERICAS—SEE KURARAY	308
EXXONMOBIL CORP.....	308
ExxonMobil Chemical.....	308
GRAHAM PACKAGING CO.....	309
Graham Packaging Co. (Continued)	310
GRAPHIC PACKAGING HOLDING CO.	311
GRUPPO MOSSI & GHISOLFI	311
Gruppo Mossi & Ghisolfi (Continued)	312
HONEYWELL, INC.	313
INDORAMA POLYMERS PUBLIC CO., LTD.....	314
StarPet	314
AlphaPet	314
INEOS USA, LLC/INEOS BAREX.....	315
INERGY AUTOMOTIVE SYSTEMS (USA), LLC	316

KLÖCKNER-PENTAPLAST OF AMERICA, INC.....	316
Klöckner-Pentaplast ... (continued)	317
KOCH INDUSTRIES, INC.	318
Invista	318
Invista (Continued)	319
KURARAY CO., LTD.	320
Eval Americas.....	320
KUREHA CORP.	321
LANDEC CORP.	322
LANXESS CORP.	323
LYONDELLBASELL INDUSTRIES.....	324
MITSUBISHI CHEMICAL CORP.....	325
Mitsubishi Chemical.....	325
Mitsubishi Polyester Film	325
Mitsubishi ... (Continued)	326
MITSUBISHI GAS CHEMICAL AMERICA, INC.....	327
Mitsubishi Engineering-Plastics Corp.....	327
MEP America.....	327
MITSUBISHI PLASTICS, INC.	328
MITSUI CHEMICALS AMERICA, INC.	329
Mitsui Plastics	329
MULTISORB TECHNOLOGIES.....	330
NANOCOR.....	331
NOLTEX, LLC.....	331
Soarus, LLC	331
MSI Technology, LLC.....	332
PERLEN CONVERTING, LLC	333
PPG INDUSTRIES.....	333
PRETIUM CONTAINER CORP.	334
Novapak	334
PRINTPACK, INC.....	335
REXAM, PLC.....	336
ROLLPRINT PACKAGING PRODUCTS, INC.	336
SCHOLLE PACKAGING, INC.	337
SEALED AIR CORP.....	337
Cryovac.....	338
SKC, INC.	339
SOLVAY GROUP	340
Solvay Specialty Polymers/SolVin	340
SOUTHERN CLAY PRODUCTS, INC.....	341
SPARTECH CORP./SPARTECH PLASTICS	341
TIEPET USA/STARPET, INC.—SEE INDORAMA	342
TEKNI-FILMS U.S.	342
TETRA LAVAL.....	343

Sidel.....	343
Tetra Pak	343
Tetra Pak (Continued)	344
TOPAS ADVANCED POLYMERS, INC.	345
TORAY INDUSTRIES (AMERICA), INC.	346
Toray Plastics (America)	346
VIFAN USA, INC.	347
WINPAK, LTD.....	347
Winpak, Ltd. (Continued).....	348

APPENDIX: GLOSSARY OF IMPORTANT TERMS, ABBREVIATIONS,
AND ACRONYMS.....

APPENDIX.....	349
APPENDIX (CONTINUED)	350
APPENDIX (CONTINUED)	351
APPENDIX (CONTINUED)	352
APPENDIX (CONTINUED)	353
APPENDIX (CONTINUED)	354
APPENDIX (CONTINUED)	355
APPENDIX (CONTINUED)	356
APPENDIX (CONTINUED)	357
APPENDIX (CONTINUED)	358
APPENDIX (CONTINUED)	359
APPENDIX (CONTINUED)	360
APPENDIX (CONTINUED)	361
APPENDIX (CONTINUED)	362
APPENDIX (CONTINUED)	363
APPENDIX (CONTINUED)	364
APPENDIX (CONTINUED)	365
APPENDIX (CONTINUED)	366
APPENDIX (CONTINUED)	367