# APPENDIX A

## LIST OF INTERVIEWS

I. ERDA - Washington, D.C.

June 14, 1976

Mr. Neil Cochran - MFPM, Fossil Energy

Subjects discussed:

(1) Changes in process descriptor definitions.

(2) Risk values for process type, gasifier type, liquefaction type, and reactor temperature.

II. ERDA - Washington, D.C.

June 16, 1976

Mr. Dave Garrett - MFPM, Fossil Energy

Subjects discussed:

(1) Possible liquefaction processes.

(2) Liquefaction process characteristics.

III. ERDA - Washington, D.C.

June 16, 1976

Mr. Martin Adams - Assistant Director, Long Range Planning, Fossil Energy

Dr. Fred Abel - Long Range Planning - Fossil Energy

Mr. Nello Del Gobbo - Long Range Planning, Fossil Energy

Mr. Dave Beecy - Long Range Planning, Fossil Energy

Subjects discussed:

(1) Econergy portfolio evaluation methodology.

(2) Possibility of incorporating different product prices in model to reflect market effects and geographical location.

IV. ERDA - Washington, D.C.

June 16, 1976

Mr. Zeke Clark - Branch Chief, Gasification, Coal Conversion and Utilization, Fossil Energy (Telephone Interview)

Subjects discussed:

(1) Anticipated commercial size of fuel gas plants.

(2) Commercial scale investment cost range.

V. BERC - Bartlesville, Oklahoma

June 24, 1976

Mr. Richard Hurn - Program Manager

Subject discussed:

(1) Inforem computer program which can trace the effect of additional ton of coal from source to end use on economy.

VI. Oakridge National Laboratory - Oakridge, Tennessee

July 1, 1976

Mr. John Holms

Mr. Royce Salmon

Subjects discussed:

(1) Clean Coke-Carbonization process economics

(2) Synthoil process economics

VII. University of Wyoming - Laramie, Wyoming

July 23, 1976

Mr. Ralph D'Arge - Professor of Resource and Environmental Economics

Subjects discussed:

(1) Econometric model development of energy resources and utilization.

(2) Wyoming environmental pressures against coal mine development.

VIII. Wyoming Geographical Survey - Laramie, Wyoming

July 23, 1976

Mr. Daniel Miller - State Geologist

Subjects discussed:

(1) Extent of Wyoming coal fields.

(2) Possibility of coal slurry pipelines.

IX. LERC - Laramie, Wyoming

July 23, 1976

Mr. Charles Brandenberg, Program Manager

Subject discussed:

(1) In-situ gasification of coal.

X. Arch Mineral Corporation Mine - Hanna, Wyoming

July 23, 1976

Gary --- - Mine Manager

Subjects discussed:

(1) Had tour of Arch mine #2.

(2) 200,000 - 250,000 tons of coal/month; 9,000 - 11,000 BTU/lb. subbituminous coal.

(3) This rather large mine could only supply a 10,000 ton/day coal conversion facility.

(4) Environmentally reclaimed mining areas indistinguishable from surrounding high plateau prairie land.

XI. University of California - Los Angeles, California

August 2, 1976

Dr. Ed Coleman - Professor of Statistics

Subject discussed:

(1) Log normal probability density function as possible distribution of investment cost overruns.

XII. Ralph M. Parsons - Pasadena, California

August 3, 1976

Mr. Dick Howell - Principal Project Engineer, Energy Department

Mr. Bob Teeple - Economic Analyst, Energy Department

Subjects discussed:

(1) Detailed review of process descriptors.

(2) Mechanical aspects of pilot plants which have led to plant shutdowns.

XIII. Coalcon - New York, New York

October 11, 1976

Mr. Ed Paulsen - Vice-President, Technical Operations

Mr. Mike Elling - Manager, Economic Planning

Mr. John Nagra - Manager, Technical Sales Services

Mr. Tony Fiochi - Manager, Financial Administration

Subjects discussed:

(1) Econergy portfolio model.

(2) Technical risks associated with 21 components in Clean Boiler Fuel process.

XIV. Hudson Institute - Croton-on-Hudson, New York

October 11, 1976

Mr. Frank Armbruster - Director of Interdisciplinary Studies

Subject discussed:

(1) Economics of various energy alternatives.

XV. ERDA - Washington, D.C.

October 12, 1976

Dr. Chris Knudsen

Subject discussed:

(1) Economic effect of project delay and process contingencies.

XVI. ERDA - Washington, D.C.

October 13, 1976

Dr. Paul Hedman

Subject discussed:

(1) Process evaluation and process economics.

XVII. Ralph M. Parsons - Pasadena, California

January 31, 1977

Dr. James B. O'Hara

Mr. Dick Howell

Mr. Bob Teeple

Mr. Gene Becker

Mr. Norm Jentz

Subjects discussed:

(1) Government-industry investment participation.

(2) Process risks as a function of process component failure probability.

(3) Implications of cost escalation for cost-based gas pricing formulae.

# APPENDIX B

## INPUT DATA REQUIREMENTS FOR PORTFOLIO MODEL

The data input format on the following pages was used to obtain fuel gas process data and economics. The form was self-contained and structured so that data definitions occurred on the left side of each page opposite the corresponding data request. A similar format could be used for any of the different product types -- high BTU gasification, liquefaction, and direct combustion as well as medium-to-low BTU gasification.

Investment decisions for demonstration plant funding are based on commercial scale economics and risks. Land and working capital are separated from the rest of plant investment costs because they are non-depreciable items.

Process data are assumed to be equivalent for commercial and demonstration scale facilities. Thirteen process descriptors are currently defined. The computer program allows these thirteen to be redefined easily or other descriptors to be added.

INPUT DATA FOR PORTFOLIO MODEL

| INVESTMENT COST DEFINITION | INVESTMENT COSTS - COMMERCIAL SCALE | | |
|---|---|---|---|
| | Utility | Industrial | Small Scale Industrial |
| The investment cost definition should be consistent from one fuel gas project to another. For commercial plant design, the information is defined in the Fuel Gas Program RFP, Subpart 3.3, Section 1.1.1 and 1.1.2; capital costs and other investment costs (page 59). However, the capital costs of Section 1.1.1 should include the depreciable item, start-up costs, from 1.1.2. Total capital costs include plant engineering, equipment, construction and start-up costs. Other investment costs are nondepreciable and include land and working capital. Preferably, these two cost types, i.e., total capital costs and land and working capital can be shown separately as indicated. Otherwise, the sum of these two cost types, total investment cost, can be given. | Total Capital Costs | | |
| | ______ | ______ | ______ |
| | Land and Working Capital | | |
| | ______ | ______ | ______ |
| Demonstration scale projects evaluation will require the same investment cost information as the commercial plant. | | | |

OPERATING COST DEFINITION

For commercial scale plant design, the operating costs are defined in the Fuel Gas Program RFP, Subpart 3.3, Section 1.1.3, (page 59). Operating costs include coal, labor, chemicals and catalysts, repairs and replacement, utilities, property taxes and insurance, other operating costs and finally, a credit for by-products.

OPERATING COSTS - COMMERCIAL SCALE

| Utility | Industrial | Small Scale Industrial |
|---|---|---|
| ______ | ______ | ______ |

PLANT CAPACITY

The information defined in the Fuel Gas Program RFP, Subpart 3.2, Section 1.2, Process Block-Flow diagrams. Specifically, the primary product output in terms of heat content (BTU/Day) is desired. The same plant stream factor (Days/Year operation) will be assumed for each project. The utility fuel gas projects may show plant capacity in terms of electrical power (kw). If so, this value can be used.

PLANT CAPACITY - COMMERCIAL SCALE

| Utility | Industrial | Small Scale Industrial |
|---|---|---|
| ______ | ______ | ______ |

| PROCESS RISK DEFINITIONS | | RISK ASSIGNMENTS | | |
|---|---|---|---|---|
| Process Description | Risk | Utility | Industrial | Small Scale Industrial |
| I. Process Type | | | | |
| 1. Liquefaction With Gasification | 10 | | | |
| 2. Pipeline Gas | 9 | | | |
| 3. Liquefaction | 7 | | | |
| 4. Fuel Gas | 5 | | | |
| 5. Direct Combustion | 2 | ______ | ______ | ______ |
| II. Process Status | | | | |
| 1. PDU Operating | 9-10 | | | |
| 2. Pilot Plant - Design, Start Construction | 7-8 | | | |
| 3. Pilot Plant - Construction, Start Operation | 5-6 | | | |
| 4. Pilot Plant - Uninterrupted Self Sustained Operation 0-100 Hours | 3-4 | | | |
| 5. Pilot Plant - Uninterrupted Operation - 1 month or longer | 1-2 | | | |
| 6. Commercial Plants in Operation | 0 | ______ | ______ | ______ |
| III. Coal Pretreatment | | | | |
| 1. Oxidation - High Pressure 800 psi - 1500 psi | 7-10 | | | |
| 2. Oxidation - Med. Pressure 300 psi - 800 psi | 4-7 | | | |
| 3. Oxidation - Low Pressure - Atmos. - 300 psi | 1-4 | | | |
| 4. No pretreatment | 0 | ______ | ______ | ______ |

| PROCESS RISK DEFINITION | | RISK ASSIGNMENTS | | |
|---|---|---|---|---|
| Process Description | Risk | Utility | Industrial | Small Scale Industrial |
| IV. Feedstock Technique | | | | |
| 1. Lock Hoppers - 1000-1500 psi | 10 | | | |
| 2. Fluidized Flow - 1000-1500 psi | 8 | | | |
| 3. Oil or Water Slurry 1000-1500 psi | 7 | | | |
| 4. Lock Hoppers, Fluidized Flow, Slurry 300-500 psi | 4 | | | |
| 5. Lock Hoppers, Fluidized Flow, Slurry, Atmos. - 50 psi Screw or Star Feeder | 1 | | | |
| 6. No pressure | 0 | ______ | ______ | ______ |
| V. Gasifier Type | | | | |
| 1. Molten Salt or Iron | 10 | | | |
| 2. Fluidized Bed | 7 | | | |
| 3. Ebullated Bed | 6 | | | |
| 4. Entrained Bed | 4 | | | |
| 5. Moving, Fixed Bed | 2 | | | |
| 6. No Gasification but Fluidized Bed | 0 | ______ | ______ | ______ |
| VI. Liquefaction Type | | | | |
| 1. Hydrogenation With Catalyst (H-Coal) | 10 | | | |
| 2. Indirect Liquefaction (Fischer-Tropsch) | 8 | | | |
| 3. Hydrogenation Without Catalyst (SRC) | 6 | | | |
| 4. Hydrocarbonization (Coed) | 4 | | | |
| 5. Solvent Extraction | 3 | | | |
| 6. No liquefaction | 0 | ______ | ______ | ______ |

PROCESS RISK DEFINITIONS / RISK ASSIGNMENTS

| | Process Description | Risk | Utility | Industrial | Small Scale Industrial |
|---|---|---|---|---|---|
| VII. | Reactor Temperature | | | | |
| | 1. 2500 F - 4000 F | 7-10 | | | |
| | 2. 1500 F - 2500 F | 4-7 | | | |
| | 3. 500 F - 1500 F | 1-4 | ____ | ____ | ____ |
| VIII. | Reactor Pressure | | | | |
| | 1. 2500 psi - 4000 psi | 8-10 | | | |
| | 2. 1500 psi - 2500 psi | 5-8 | | | |
| | 3. 800 psi - 1500 psi | 3-5 | | | |
| | 4. 350 psi - 700 psi | 2-3 | | | |
| | 5. Atmos - 350 psi | 0-2 | ____ | ____ | ____ |
| IX. | Reactor Complexity - No. of Stages | | | | |
| | 1. Four | 10 | | | |
| | 2. Three | 8 | | | |
| | 3. Two | 6 | | | |
| | 4. One | 4 | | | |
| | 5. No Stages but Multiple Beds | 0 | ____ | ____ | ____ |
| X. | Process Complexity - No. of Unit Processes | | | | |
| | 1. Eight to Ten | 8-10 | | | |
| | 2. Five to Seven | 5-7 | | | |
| | 3. Two to Four | 2-4 | ____ | ____ | ____ |
| XI. | Mechanical Reliability - Redundancy | | | | |
| | 1. Very Poor | 10 | | | |
| | 2. Poor | 8 | | | |
| | 3. Moderate | 6 | | | |
| | 4. Good | 4 | | | |
| | 5. Very Good | 2 | ____ | ____ | ____ |

PROCESS RISK DEFINITIONS / RISK ASSIGNMENTS

| Process Description | Risk | Utility | Industrial | Small Scale Industrial |
|---|---|---|---|---|
| XII. Process Technical Feasibility | | | | |
| 1. Very Poor | 10 | | | |
| 2. Poor | 8 | | | |
| 3. Moderate | 6 | | | |
| 4. Good | 4 | | | |
| 5. Very Good | 2 | ______ | ______ | ______ |
| XIII. Scale-Up Required for Demonstration Plant | | | | |
| 1. 1000-10,000 or more | 7-10 | | | |
| 2. 100-1000 | 4-7 | | | |
| 3. 10-100 | 2-4 | | | |
| 4. 1-10 | 1-2 | | | |
| 5. No Scale-Up Required | 0 | ______ | ______ | ______ |

# APPENDIX C

## DATA FOR TWENTY-ONE COAL CONVERSION PROCESSES

Appendix C lists the basic input data for the coal conversion processes. Coalcon data is repeated for "old and "new" costs so twenty-two sets of data are included. The output data resulting from the Cost Program and the Core Program is also listed.

| | R | O | I |
|---|---|---|---|
| COGAS | 313.80 | 114.60 | 1144.50 |
| LURGI | 315.50 | 102.60 | 920.50 |
| HYGAS | 329.90 | 117.30 | 825.30 |
| SYNTHANE | 312.40 | 85.10 | 1201.50 |
| TEXACO | 335.10 | 190.50 | 1086.70 |
| INDUST. FUEL GAS A | 105.60 | 62.80 | 263.00 |
| INDUST. FUEL GAS B | 65.60 | 32.40 | 102.00 |
| INDUST. FUEL GAS C | 127.30 | 99.10 | 343.00 |
| SMALL SCALE FUEL D | 26.40 | 14.90 | 47.20 |
| SMALL SCALE FUEL DX | 8.80 | 6.80 | 21.90 |
| SMALL SCALE FUEL E | 11.30 | 5.70 | 21.30 |
| SMALL SCALE FUEL F | 7.90 | 4.30 | 9.64 |
| UTILITY FUEL GAS G | 88.30 | 29.00 | 72.00 |
| UTILITY FUEL GAS H | 63.10 | 52.00 | 367.00 |
| UTILITY FUEL GAS I | 29.00 | 15.10 | 23.00 |
| UTILITY FUEL GAS J | 176.60 | 125.00 | 448.00 |
| UTILITY FUEL GAS K | 141.30 | 50.00 | 117.00 |
| ATMOS FLUIDIZED BED | 151.40 | 126.10 | 250.00 |
| COALCON - OLD COST | 329.50 | 130.10 | 450.30 |
| COALCON - NEW COST | 329.50 | 151.80 | 525.20 |
| SRC | 750.30 | 192.90 | 1414.00 |
| FISCHER-TROPSCH | 549.00 | 190.60 | 1769.00 |

REVENUE, OPERATING COST AND INVESTMENT COST
INPUT DATA FOR COST PROGRAM ($\$ \times 10^6$)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COGAS | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| LURGI | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| HYGAS | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| SYNTHANE | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| TEXACO | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| INDUST. FUEL GAS A | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| INDUST. FUEL GAS B | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| INDUST. FUEL GAS C | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| SMALL SCALE FUEL D | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| SMALL SCALE FUEL DX | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| SMALL SCALE FUEL E | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| SMALL SCALE FUEL F | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| UTILITY FUEL GAS G | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| UTILITY FUEL GAS H | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| UTILITY FUEL GAS I | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| UTILITY FUEL GAS J | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| UTILITY FUEL GAS K | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| ATMOS FLUIDIZED BED | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| COALCON - OLD COST | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| COALCON - NEW COST | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| SRC | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |
| FISCHER-TROPSCH | .00 | .00 | .00 | .00 | .25 | .50 | 1.00 | 1.00 | 1.00 | 1.00 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COGAS | .06 | .17 | .37 | .29 | .11 | .00 | .00 | .00 | .00 | .00 |
| LURGI | .08 | .11 | .17 | .39 | .25 | .00 | .00 | .00 | .00 | .00 |
| HYGAS | .04 | .13 | .37 | .30 | .13 | .03 | .00 | .00 | .00 | .00 |
| SYNTHANE | .06 | .06 | .10 | .44 | .35 | .00 | .00 | .00 | .00 | .00 |
| TEXACO | .04 | .13 | .31 | .36 | .12 | .04 | .00 | .00 | .00 | .00 |
| INDUST. FUEL GAS A | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| INDUST. FUEL GAS B | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| INDUST. FUEL GAS C | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| SMALL SCALE FUEL D | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| SMALL SCALE FUEL DX | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| SMALL SCALE FUEL E | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| SMALL SCALE FUEL F | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| UTILITY FUEL GAS G | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| UTILITY FUEL GAS H | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| UTILITY FUEL GAS I | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| UTILITY FUEL GAS J | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| UTILITY FUEL GAS K | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| ATMOS FLUIDIZED BED | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| COALCON - OLD COST | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| COALCON - NEW COST | .08 | .22 | .33 | .24 | .13 | .00 | .00 | .00 | .00 | .00 |
| SRC | .02 | .09 | .28 | .44 | .14 | .03 | .00 | .00 | .00 | .00 |
| FISCHER-TROPSCH | .02 | .06 | .16 | .50 | .22 | .04 | .00 | .00 | .00 | .00 |

REVENUE, OPERATING COST AND INVESTMENT COST CASH FLOW INPUT DATA FOR COST PROGRAM

PROCESS DESCRIPTORS

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| REVENUE | 10 | 0 | 0 | 2 | 8 | 10 | 3 | 4 | 2 | 4 | 10 | 10 | 0 |
| OPERATING COST | 7 | 7 | 4 | 5 | 8 | 9 | 5 | 8 | 8 | 10 | 10 | 7 | 5 |
| INVESTMENT COST | 8 | 10 | 2 | 4 | 10 | 9 | 4 | 6 | 8 | 10 | 5 | 8 | 8 |
| TIME COST | 8 | 10 | 2 | 6 | 8 | 10 | 1 | 4 | 6 | 10 | 3 | 5 | 10 |

RISK WEIGHTING VECTORS FOR CORE PROGRAM

PROCESS DESCRIPTORS

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COGAS | 9 | 4 | 0 | 1 | 7 | 4 | 4 | 1 | 4 | 7 | 5 | 5 | 3 |
| LURGI | 9 | 1 | 0 | 4 | 2 | 0 | 5 | 2 | 4 | 4 | 2 | 1 | 0 |
| HYGAS | 9 | 3 | 1 | 7 | 7 | 0 | 5 | 5 | 10 | 6 | 6 | 5 | 4 |
| SYNTHANE | 9 | 3 | 8 | 10 | 7 | 0 | 4 | 3 | 4 | 6 | 4 | 4 | 3 |
| TEXACO | 9 | 1 | 0 | 7 | 4 | 0 | 6 | 4 | 4 | 4 | 4 | 5 | 1 |
| INDUST. FUEL GAS A | 5 | 2 | 0 | 2 | 4 | 0 | 7 | 1 | 1 | 4 | 4 | 4 | 1 |
| INDUST. FUEL GAS B | 5 | 5 | 2 | 1 | 7 | 0 | 5 | 0 | 1 | 4 | 6 | 8 | 2 |
| INDUST. FUEL GAS C | 5 | 4 | 0 | 10 | 4 | 0 | 8 | 8 | 1 | 7 | 6 | 6 | 2 |
| SMALL SCALE FUEL D | 5 | 0 | 0 | 1 | 2 | 0 | 3 | 0 | 6 | 3 | 4 | 2 | 0 |
| SMALL SCALE FUEL DX | 5 | 0 | 0 | 1 | 2 | 0 | 3 | 0 | 6 | 3 | 4 | 2 | 0 |
| SMALL SCALE FUEL E | 5 | 0 | 0 | 1 | 2 | 0 | 3 | 0 | 6 | 4 | 4 | 2 | 0 |
| SMALL SCALE FUEL F | 5 | 0 | 0 | 1 | 2 | 0 | 3 | 0 | 4 | 3 | 4 | 4 | 0 |
| UTILITY FUEL GAS G | 5 | 5 | 0 | 1 | 7 | 0 | 4 | 0 | 6 | 2 | 4 | 8 | 2 |
| UTILITY FUEL GAS H | 5 | 6 | 0 | 2 | 4 | 0 | 8 | 1 | 4 | 5 | 6 | 6 | 1 |
| UTILITY FUEL GAS I | 5 | 5 | 0 | 4 | 4 | 0 | 7 | 2 | 6 | 6 | 6 | 4 | 2 |
| UTILITY FUEL GAS J | 5 | 5 | 0 | 6 | 4 | 0 | 7 | 4 | 6 | 10 | 8 | 6 | 3 |
| UTILITY FUEL GAS K | 5 | 8 | 0 | 1 | 4 | 0 | 8 | 0 | 6 | 5 | 4 | 4 | 2 |
| ATMOS FLUIDIZED BED | 2 | 5 | 0 | 1 | 0 | 0 | 3 | 0 | 2 | 2 | 4 | 4 | 3 |
| COALCON - OLD COST | 10 | 3 | 0 | 5 | 7 | 4 | 3 | 3 | 4 | 8 | 6 | 2 | 4 |
| COALCON - NEW COST | 10 | 3 | 0 | 5 | 7 | 4 | 3 | 3 | 4 | 8 | 6 | 2 | 4 |
| SRC | 10 | 1 | 0 | 7 | 4 | 6 | 7 | 6 | 4 | 6 | 5 | 3 | 4 |
| FISCHER-TROPSCH | 10 | 3 | 0 | 4 | 4 | 8 | 8 | 2 | 4 | 6 | 5 | 2 | 4 |

PROCESS RISK INPUT DATA FOR CORE PROGRAM

| | R | O | I | T |
|---|---|---|---|---|
| COGAS | 1526.27 | 557.39 | 833.98 | 298.92 |
| LURGI | 1534.54 | 499.03 | 645.68 | 296.79 |
| HYGAS | 1604.58 | 570.53 | 588.55 | 291.18 |
| SYNTHANE | 1519.46 | 413.91 | 822.69 | 329.18 |
| TEXACO | 1629.87 | 926.56 | 769.75 | 232.17 |
| INDUST. FUEL GAS A | 513.62 | 305.45 | 193.75 | 65.57 |
| INDUST. FUEL GAS B | 319.07 | 157.59 | 75.14 | 43.92 |
| INDUST. FUEL GAS C | 619.17 | 482.01 | 252.69 | 54.75 |
| SMALL SCALE FUEL D | 128.41 | 72.47 | 34.77 | 16.02 |
| SMALL SCALE FUEL DX | 42.80 | 33.07 | 16.13 | 3.72 |
| SMALL SCALE FUEL E | 54.96 | 27.72 | 15.69 | 7.69 |
| SMALL SCALE FUEL F | 38.42 | 20.91 | 7.10 | 4.67 |
| UTILITY FUEL GAS G | 429.48 | 141.05 | 53.04 | 70.96 |
| UTILITY FUEL GAS H | 306.91 | 252.92 | 270.37 | 37.33 |
| UTILITY FUEL GAS I | 141.05 | 73.44 | 16.94 | 17.05 |
| UTILITY FUEL GAS J | 858.95 | 607.98 | 330.04 | 87.96 |
| UTILITY FUEL GAS K | 687.26 | 243.19 | 86.19 | 109.67 |
| ATMOS FLUIDIZED BED | 736.38 | 613.33 | 184.18 | 45.19 |
| COALCON - OLD COST | 1602.63 | 632.78 | 331.74 | 252.76 |
| COALCON - NEW COST | 1602.63 | 738.33 | 386.92 | 233.68 |
| SRC | 3649.33 | 938.23 | 983.48 | 711.75 |
| FISCHER-TROPSCH | 2670.24 | 927.05 | 1196.38 | 509.73 |

PRESENT VALUE OF REVENUE, OPERATING COST, INVESTMENT COST AND TIME COST OUTPUT FROM COST PROGRAM

| | | | | |
|---|---|---|---|---|
| COGAS | 340 | 418 | 435 | 386 |
| LURGI | 191 | 246 | 240 | 210 |
| HYGAS | 349 | 499 | 494 | 430 |
| SYNTHANE | 302 | 441 | 430 | 396 |
| TEXACO | 284 | 351 | 338 | 289 |
| INDUST. FUEL GAS A | 209 | 255 | 250 | 203 |
| INDUST. FUEL GAS B | 281 | 338 | 346 | 285 |
| INDUST. FUEL GAS C | 308 | 439 | 412 | 356 |
| SMALL SCALE FUEL D | 161 | 203 | 190 | 153 |
| SMALL SCALE FUEL DX | 161 | 203 | 190 | 153 |
| SMALL SCALE FUEL E | 165 | 213 | 200 | 163 |
| SMALL SCALE FUEL F | 177 | 201 | 190 | 151 |
| UTILITY FUEL GAS G | 260 | 325 | 348 | 284 |
| UTILITY FUEL GAS H | 262 | 356 | 354 | 288 |
| UTILITY FUEL GAS I | 255 | 379 | 372 | 315 |
| UTILITY FUEL GAS J | 323 | 484 | 466 | 401 |
| UTILITY FUEL GAS K | 220 | 344 | 362 | 304 |
| ATMOS FLUIDIZED BED | 123 | 188 | 194 | 169 |
| COALCON - OLD COST | 347 | 453 | 456 | 423 |
| COALCON - NEW COST | 347 | 453 | 456 | 423 |
| SRC | 363 | 464 | 449 | 409 |
| FISCHER-TROPSCH | 354 | 447 | 447 | 411 |

| | | | | |
|---|---|---|---|---|
| COGAS | .271 | .396 | .825 | .858 |
| LURGI | .085 | .175 | .248 | .290 |
| HYGAS | .282 | .500 | 1.000 | 1.000 |
| SYNTHANE | .224 | .425 | .811 | .890 |
| TEXACO | .201 | .310 | .538 | .545 |
| INDUST. FUEL GAS A | .107 | .186 | .278 | .268 |
| INDUST. FUEL GAS B | .197 | .293 | .562 | .532 |
| INDUST. FUEL GAS C | .231 | .423 | .757 | .761 |
| SMALL SCALE FUEL D | .047 | .119 | .100 | .106 |
| SMALL SCALE FUEL DX | .047 | .119 | .100 | .106 |
| SMALL SCALE FUEL E | .052 | .132 | .130 | .139 |
| SMALL SCALE FUEL F | .067 | .117 | .100 | .100 |
| UTILITY FUEL GAS G | .171 | .276 | .568 | .529 |
| UTILITY FUEL GAS H | .174 | .316 | .586 | .542 |
| UTILITY FUEL GAS I | .165 | .346 | .639 | .629 |
| UTILITY FUEL GAS J | .250 | .481 | .917 | .906 |
| UTILITY FUEL GAS K | .121 | .301 | .609 | .594 |
| ATMOS FLUIDIZED BED | .000 | .100 | .112 | .158 |
| COALCON - OLD COST | .280 | .441 | .887 | .977 |
| COALCON - NEW COST | .280 | .441 | .887 | .977 |
| SRC | .300 | .455 | .867 | .932 |
| FISCHER-TROPSCH | .289 | .433 | .861 | .939 |

INDIVIDUAL PROCESS RISKS AND STANDARD DEVIATIONS - OUTPUT FROM CORE PROGRAM

K=1 L=1

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.00 | .76 | .89 | .89 | .87 | .87 | .79 | .70 | .85 | .85 | .85 | .85 | .78 | .79 | .81 | .71 | .86 | .58 | .94 | .94 | .89 | .85 |
| .76 | 1.00 | .82 | .87 | .89 | .72 | .46 | .55 | .83 | .83 | .83 | .74 | .47 | .57 | .65 | .51 | .72 | .36 | .83 | .83 | .81 | .72 |
| .89 | .82 | 1.00 | .97 | .95 | .94 | .84 | .85 | .93 | .93 | .93 | .92 | .83 | .88 | .92 | .84 | .93 | .66 | .86 | .86 | .75 | .61 |
| .89 | .87 | .97 | 1.00 | .95 | .90 | .78 | .77 | .88 | .88 | .87 | .86 | .78 | .79 | .84 | .73 | .88 | .53 | .88 | .88 | .76 | .64 |
| .87 | .89 | .95 | .95 | 1.00 | .92 | .79 | .83 | .91 | .91 | .90 | .93 | .79 | .84 | .85 | .77 | .90 | .67 | .82 | .82 | .79 | .65 |
| .87 | .72 | .94 | .90 | .92 | 1.00 | .93 | .90 | .90 | .90 | .90 | .95 | .89 | .96 | .96 | .89 | .98 | .78 | .78 | .78 | .69 | .58 |
| .79 | .46 | .84 | .78 | .79 | .93 | 1.00 | .87 | .76 | .76 | .76 | .89 | .97 | .96 | .89 | .88 | .91 | .82 | .62 | .62 | .51 | .41 |
| .70 | .55 | .85 | .77 | .83 | .90 | .87 | 1.00 | .77 | .77 | .78 | .87 | .80 | .92 | .91 | .94 | .85 | .84 | .62 | .62 | .57 | .41 |
| .85 | .83 | .93 | .88 | .91 | .90 | .76 | .77 | 1.00 | 1.00 | 1.00 | .95 | .71 | .87 | .93 | .84 | .92 | .74 | .85 | .85 | .76 | .67 |
| .85 | .83 | .93 | .88 | .91 | .90 | .76 | .77 | 1.00 | 1.00 | 1.00 | .95 | .71 | .87 | .93 | .84 | .92 | .74 | .85 | .85 | .76 | .67 |
| .85 | .83 | .93 | .87 | .90 | .90 | .76 | .78 | 1.00 | 1.00 | 1.00 | .94 | .70 | .87 | .93 | .85 | .92 | .73 | .85 | .85 | .76 | .67 |
| .85 | .74 | .92 | .86 | .93 | .95 | .89 | .87 | .95 | .95 | .94 | 1.00 | .85 | .95 | .94 | .90 | .95 | .87 | .76 | .76 | .71 | .60 |
| .78 | .47 | .83 | .78 | .79 | .89 | .97 | .80 | .71 | .71 | .70 | .85 | 1.00 | .90 | .81 | .78 | .88 | .75 | .58 | .58 | .49 | .38 |
| .79 | .57 | .88 | .79 | .84 | .96 | .96 | .92 | .87 | .87 | .87 | .95 | .90 | 1.00 | .97 | .95 | .96 | .91 | .67 | .67 | .59 | .48 |
| .81 | .65 | .92 | .84 | .85 | .96 | .89 | .91 | .93 | .93 | .93 | .94 | .81 | .97 | 1.00 | .97 | .96 | .84 | .76 | .76 | .65 | .54 |
| .71 | .51 | .84 | .73 | .77 | .89 | .88 | .94 | .84 | .84 | .85 | .90 | .78 | .95 | .97 | 1.00 | .89 | .90 | .64 | .64 | .55 | .43 |
| .86 | .72 | .93 | .88 | .90 | .98 | .91 | .85 | .92 | .92 | .92 | .95 | .88 | .96 | .96 | .89 | 1.00 | .78 | .76 | .76 | .66 | .57 |
| .58 | .36 | .66 | .53 | .67 | .78 | .82 | .84 | .74 | .74 | .73 | .87 | .75 | .91 | .84 | .90 | .78 | 1.00 | .43 | .43 | .44 | .34 |
| .94 | .83 | .86 | .88 | .82 | .78 | .62 | .62 | .85 | .85 | .85 | .76 | .58 | .67 | .76 | .64 | .76 | .43 | 1.00 | 1.00 | .93 | .89 |
| .94 | .83 | .86 | .88 | .82 | .78 | .62 | .62 | .85 | .85 | .85 | .76 | .58 | .67 | .76 | .64 | .76 | .43 | 1.00 | 1.00 | .93 | .89 |
| .89 | .81 | .75 | .76 | .79 | .69 | .51 | .57 | .76 | .76 | .76 | .71 | .49 | .59 | .65 | .55 | .66 | .44 | .93 | .93 | 1.00 | .97 |
| .85 | .72 | .61 | .64 | .65 | .58 | .41 | .41 | .67 | .67 | .67 | .60 | .38 | .48 | .54 | .43 | .57 | .34 | .89 | .89 | .97 | 1.00 |



K=1 L=2

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .78 | .52 | .40 | .46 | .61 | .62 | .61 | .17 | .48 | .48 | .46 | .64 | .51 | .42 | .30 | .23 | .23 | .13 | .66 | .66 | .68 | .64 |
| .55 | .84 | .49 | .61 | .76 | .54 | .31 | .23 | .51 | .51 | .49 | .57 | .28 | .32 | .31 | .20 | .26 | .08 | .59 | .59 | .62 | .54 |
| .67 | .66 | .66 | .67 | .84 | .72 | .68 | .40 | .62 | .62 | .59 | .77 | .63 | .55 | .49 | .40 | .33 | .24 | .63 | .63 | .53 | .40 |
| .67 | .69 | .58 | .73 | .82 | .69 | .62 | .36 | .51 | .51 | .49 | .66 | .55 | .45 | .39 | .31 | .27 | .11 | .64 | .64 | .53 | .41 |
| .57 | .68 | .51 | .59 | .83 | .66 | .57 | .36 | .51 | .51 | .47 | .69 | .51 | .46 | .36 | .28 | .25 | .22 | .51 | .51 | .52 | .39 |
| .66 | .54 | .49 | .55 | .76 | .83 | .80 | .42 | .54 | .54 | .51 | .76 | .64 | .65 | .49 | .41 | .37 | .36 | .53 | .53 | .44 | .38 |
| .58 | .25 | .41 | .43 | .58 | .72 | .86 | .34 | .43 | .43 | .40 | .69 | .74 | .61 | .41 | .36 | .31 | .39 | .38 | .38 | .22 | .18 |
| .47 | .43 | .49 | .50 | .78 | .76 | .71 | .69 | .44 | .44 | .43 | .69 | .49 | .60 | .48 | .52 | .22 | .37 | .44 | .44 | .47 | .22 |
| .68 | .69 | .62 | .58 | .78 | .72 | .64 | .32 | .73 | .73 | .70 | .85 | .57 | .62 | .57 | .46 | .42 | .42 | .64 | .64 | .55 | .51 |
| .68 | .69 | .62 | .58 | .78 | .72 | .64 | .32 | .73 | .73 | .70 | .85 | .57 | .62 | .57 | .46 | .42 | .42 | .64 | .64 | .55 | .51 |
| .72 | .71 | .64 | .61 | .79 | .75 | .65 | .35 | .75 | .75 | .72 | .86 | .56 | .65 | .60 | .50 | .45 | .43 | .67 | .67 | .57 | .54 |
| .63 | .55 | .52 | .50 | .74 | .72 | .72 | .34 | .62 | .62 | .58 | .82 | .63 | .63 | .49 | .42 | .37 | .47 | .50 | .50 | .43 | .38 |
| .53 | .26 | .42 | .41 | .57 | .62 | .79 | .23 | .41 | .41 | .37 | .65 | .79 | .53 | .33 | .25 | .29 | .30 | .30 | .30 | .16 | .12 |
| .60 | .42 | .49 | .45 | .70 | .80 | .83 | .44 | .58 | .58 | .55 | .81 | .68 | .71 | .54 | .49 | .39 | .50 | .45 | .45 | .36 | .30 |
| .67 | .55 | .62 | .57 | .79 | .85 | .80 | .51 | .68 | .68 | .66 | .86 | .64 | .73 | .64 | .58 | .43 | .47 | .60 | .60 | .49 | .41 |
| .63 | .45 | .58 | .52 | .74 | .82 | .80 | .61 | .64 | .64 | .63 | .84 | .59 | .75 | .66 | .68 | .40 | .54 | .56 | .56 | .46 | .34 |
| .71 | .59 | .58 | .56 | .77 | .85 | .80 | .37 | .66 | .66 | .64 | .84 | .71 | .71 | .58 | .47 | .48 | .40 | .55 | .55 | .44 | .42 |
| .40 | .23 | .33 | .21 | .52 | .62 | .69 | .40 | .50 | .50 | .47 | .74 | .53 | .65 | .48 | .48 | .31 | .66 | .24 | .24 | .23 | .18 |
| .77 | .63 | .46 | .55 | .65 | .59 | .49 | .23 | .51 | .51 | .49 | .60 | .36 | .36 | .33 | .26 | .19 | .06 | .78 | .78 | .73 | .73 |
| .77 | .63 | .46 | .55 | .65 | .59 | .49 | .23 | .51 | .51 | .49 | .60 | .36 | .36 | .33 | .26 | .19 | .06 | .78 | .78 | .73 | .73 |
| .62 | .57 | .27 | .31 | .58 | .44 | .28 | .16 | .38 | .38 | .36 | .49 | .17 | .21 | .15 | .10 | .04 | -.00 | .62 | .62 | .79 | .77 |
| .62 | .49 | .16 | .20 | .41 | .36 | .22 | .00 | .35 | .35 | .32 | .42 | .12 | .16 | .10 | .03 | .04 | -.03 | .60 | .60 | .75 | .85 |

CORRELATION COEFICIENTS - OUTPUT FROM CORE PROGRAM

K=1 L=3

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .71 | .56 | .42 | .53 | .69 | .65 | .55 | .23 | .52 | .52 | .49 | .69 | .44 | .36 | .26 | .20 | .14 | -.04 | .64 | .64 | .66 | .62 |
| .54 | .87 | .51 | .63 | .82 | .58 | .28 | .28 | .59 | .59 | .56 | .65 | .23 | .30 | .31 | .20 | .19 | -.01 | .60 | .60 | .70 | .58 |
| .58 | .66 | .60 | .65 | .84 | .70 | .56 | .40 | .63 | .63 | .59 | .78 | .51 | .44 | .39 | .31 | .20 | .01 | .55 | .55 | .52 | .34 |
| .64 | .72 | .60 | .76 | .87 | .74 | .58 | .43 | .58 | .58 | .55 | .73 | .49 | .42 | .37 | .29 | .20 | -.03 | .63 | .63 | .59 | .42 |
| .52 | .69 | .50 | .59 | .85 | .68 | .50 | .40 | .55 | .55 | .51 | .74 | .42 | .40 | .31 | .24 | .16 | .07 | .47 | .47 | .55 | .37 |
| .54 | .52 | .44 | .53 | .74 | .78 | .65 | .42 | .51 | .51 | .48 | .74 | .50 | .50 | .36 | .32 | .21 | .12 | .44 | .44 | .41 | .29 |
| .49 | .26 | .37 | .44 | .59 | .69 | .75 | .37 | .40 | .40 | .36 | .67 | .62 | .50 | .31 | .29 | .19 | .17 | .30 | .30 | .20 | .11 |
| .31 | .36 | .31 | .38 | .66 | .63 | .51 | .58 | .36 | .36 | .35 | .61 | .32 | .38 | .26 | .34 | .03 | .07 | .25 | .25 | .30 | .06 |
| .52 | .66 | .51 | .51 | .73 | .61 | .44 | .25 | .67 | .67 | .63 | .77 | .39 | .43 | .39 | .31 | .23 | .13 | .50 | .50 | .49 | .40 |
| .52 | .66 | .51 | .51 | .73 | .61 | .44 | .25 | .67 | .67 | .63 | .77 | .39 | .43 | .39 | .31 | .23 | .13 | .50 | .50 | .49 | .40 |
| .55 | .68 | .53 | .53 | .74 | .64 | .45 | .29 | .69 | .69 | .66 | .79 | .38 | .45 | .43 | .36 | .25 | .14 | .53 | .53 | .51 | .43 |
| .49 | .54 | .44 | .45 | .72 | .65 | .55 | .32 | .58 | .58 | .54 | .79 | .47 | .48 | .35 | .31 | .21 | .23 | .38 | .38 | .40 | .29 |
| .51 | .30 | .46 | .48 | .64 | .68 | .76 | .32 | .44 | .44 | .40 | .71 | .72 | .51 | .32 | .26 | .22 | .16 | .30 | .30 | .21 | .11 |
| .44 | .38 | .37 | .38 | .63 | .69 | .63 | .39 | .49 | .49 | .46 | .73 | .50 | .51 | .35 | .34 | .19 | .20 | .29 | .29 | .27 | .16 |
| .47 | .50 | .45 | .46 | .68 | .69 | .56 | .41 | .58 | .58 | .56 | .75 | .43 | .48 | .41 | .39 | .19 | .12 | .41 | .41 | .36 | .24 |
| .40 | .37 | .37 | .37 | .60 | .64 | .53 | .49 | .50 | .50 | .50 | .71 | .36 | .47 | .39 | .46 | .15 | .17 | .33 | .33 | .28 | .13 |
| .59 | .58 | .52 | .55 | .77 | .79 | .65 | .39 | .64 | .64 | .61 | .83 | .56 | .56 | .46 | .39 | .29 | .15 | .47 | .47 | .42 | .33 |
| .17 | .15 | .13 | .07 | .39 | .42 | .42 | .27 | .34 | .34 | .32 | .59 | .31 | .39 | .21 | .27 | .08 | .34 | .01 | .01 | .06 | -.01 |
| .67 | .65 | .42 | .56 | .66 | .57 | .38 | .21 | .52 | .52 | .49 | .60 | .26 | .25 | .23 | .17 | .08 | -.15 | .71 | .71 | .73 | .68 |
| .67 | .65 | .42 | .56 | .66 | .57 | .38 | .21 | .52 | .52 | .49 | .60 | .26 | .25 | .23 | .17 | .08 | -.15 | .71 | .71 | .73 | .68 |
| .51 | .59 | .22 | .32 | .58 | .41 | .18 | .12 | .40 | .40 | .37 | .50 | .08 | .10 | .04 | -.00 | -.07 | -.18 | .54 | .54 | .77 | .71 |
| .52 | .51 | .14 | .23 | .44 | .33 | .12 | -.03 | .35 | .35 | .33 | .42 | .03 | .06 | .00 | -.06 | -.06 | -.20 | .54 | .54 | .76 | .80 |

K=1 L=4

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .63 | .55 | .35 | .36 | .58 | .62 | .48 | .11 | .55 | .55 | .51 | .69 | .40 | .30 | .18 | .10 | .10 | -.13 | .53 | .53 | .52 | .51 |
| .53 | .86 | .54 | .56 | .80 | .63 | .32 | .25 | .68 | .68 | .63 | .74 | .29 | .32 | .31 | .19 | .20 | -.02 | .56 | .56 | .58 | .48 |
| .45 | .62 | .50 | .46 | .71 | .65 | .49 | .24 | .64 | .64 | .58 | .76 | .46 | .35 | .28 | .18 | .13 | -.10 | .41 | .41 | .34 | .21 |
| .54 | .71 | .57 | .61 | .80 | .74 | .55 | .35 | .63 | .63 | .58 | .77 | .48 | .38 | .33 | .23 | .17 | -.10 | .53 | .53 | .46 | .32 |
| .42 | .67 | .44 | .45 | .74 | .62 | .43 | .25 | .58 | .58 | .53 | .74 | .38 | .32 | .22 | .14 | .11 | -.05 | .38 | .38 | .39 | .25 |
| .38 | .46 | .31 | .32 | .55 | .61 | .51 | .18 | .49 | .49 | .45 | .66 | .40 | .33 | .19 | .13 | .09 | -.06 | .29 | .29 | .20 | .12 |
| .29 | .21 | .21 | .20 | .39 | .52 | .56 | .13 | .34 | .34 | .30 | .54 | .48 | .30 | .13 | .09 | .07 | -.03 | .14 | .14 | .03 | -.02 |
| .15 | .32 | .18 | .21 | .48 | .47 | .34 | .31 | .33 | .33 | .31 | .53 | .19 | .21 | .10 | .15 | -.07 | -.13 | .11 | .11 | .10 | -.08 |
| .41 | .62 | .42 | .35 | .61 | .56 | .38 | .12 | .66 | .66 | .61 | .75 | .35 | .33 | .27 | .17 | .16 | .00 | .37 | .37 | .32 | .26 |
| .41 | .62 | .42 | .35 | .61 | .56 | .38 | .12 | .66 | .66 | .61 | .75 | .35 | .33 | .27 | .17 | .16 | .00 | .37 | .37 | .32 | .26 |
| .45 | .64 | .44 | .38 | .63 | .59 | .39 | .16 | .69 | .69 | .64 | .78 | .35 | .36 | .31 | .23 | .18 | .01 | .41 | .41 | .35 | .28 |
| .36 | .50 | .33 | .28 | .56 | .55 | .44 | .14 | .56 | .56 | .51 | .72 | .39 | .34 | .21 | .15 | .12 | .05 | .26 | .26 | .23 | .17 |
| .31 | .25 | .28 | .24 | .43 | .51 | .57 | .09 | .39 | .39 | .33 | .58 | .58 | .31 | .14 | .06 | .09 | -.03 | .14 | .14 | .04 | -.01 |
| .25 | .31 | .20 | .17 | .42 | .49 | .44 | .12 | .43 | .43 | .39 | .61 | .35 | .29 | .14 | .12 | .05 | -.02 | .13 | .13 | .06 | -.01 |
| .31 | .43 | .30 | .26 | .50 | .55 | .41 | .18 | .53 | .53 | .50 | .66 | .32 | .30 | .22 | .19 | .07 | -.07 | .24 | .24 | .15 | .06 |
| .23 | .33 | .23 | .19 | .42 | .50 | .38 | .25 | .45 | .45 | .44 | .61 | .24 | .29 | .21 | .25 | .04 | -.03 | .17 | .17 | .09 | -.01 |
| .41 | .49 | .37 | .32 | .56 | .62 | .50 | .14 | .59 | .59 | .55 | .74 | .45 | .37 | .25 | .19 | .15 | -.05 | .30 | .30 | .20 | .13 |
| .02 | .11 | -.01 | -.07 | .21 | .24 | .23 | .03 | .25 | .25 | .23 | .43 | .15 | .17 | .02 | .05 | -.04 | .10 | -.10 | -.10 | -.08 | -.13 |
| .63 | .65 | .41 | .44 | .63 | .60 | .38 | .17 | .58 | .58 | .55 | .66 | .29 | .26 | .22 | .13 | .10 | -.18 | .62 | .62 | .62 | .59 |
| .63 | .65 | .41 | .44 | .63 | .60 | .38 | .17 | .58 | .58 | .55 | .66 | .29 | .26 | .22 | .13 | .10 | -.18 | .62 | .62 | .62 | .59 |
| .50 | .58 | .21 | .24 | .54 | .41 | .16 | .05 | .46 | .46 | .42 | .56 | .09 | .09 | .02 | -.04 | -.06 | -.24 | .50 | .50 | .65 | .63 |
| .53 | .50 | .13 | .17 | .42 | .34 | .12 | -.06 | .41 | .41 | .37 | .48 | .05 | .05 | -.01 | -.08 | -.06 | -.23 | .51 | .51 | .67 | .72 |

=2 L=1

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .78 | .55 | .67 | .67 | .57 | .66 | .58 | .49 | .68 | .68 | .72 | .63 | .53 | .60 | .67 | .63 | .71 | .40 | .77 | .77 | .62 | .62 |
| .52 | .84 | .66 | .69 | .68 | .54 | .25 | .43 | .69 | .69 | .71 | .55 | .26 | .42 | .55 | .45 | .59 | .23 | .63 | .63 | .57 | .49 |
| .40 | .49 | .66 | .58 | .51 | .49 | .41 | .49 | .62 | .62 | .64 | .52 | .42 | .49 | .62 | .58 | .58 | .33 | .46 | .46 | .27 | .16 |
| .46 | .61 | .67 | .73 | .59 | .55 | .43 | .50 | .58 | .58 | .61 | .50 | .41 | .45 | .57 | .52 | .56 | .21 | .55 | .55 | .31 | .20 |
| .61 | .76 | .84 | .82 | .83 | .76 | .58 | .78 | .78 | .78 | .79 | .74 | .57 | .70 | .79 | .74 | .77 | .52 | .65 | .65 | .58 | .41 |
| .62 | .54 | .72 | .69 | .66 | .83 | .72 | .76 | .72 | .72 | .75 | .72 | .62 | .80 | .85 | .82 | .85 | .62 | .59 | .59 | .44 | .36 |
| .61 | .31 | .68 | .62 | .57 | .80 | .86 | .71 | .64 | .64 | .65 | .72 | .79 | .83 | .80 | .80 | .80 | .69 | .49 | .49 | .28 | .22 |
| .17 | .23 | .40 | .36 | .36 | .42 | .34 | .69 | .32 | .32 | .35 | .34 | .23 | .44 | .51 | .61 | .37 | .40 | .23 | .23 | .16 | .00 |
| .48 | .51 | .62 | .51 | .51 | .54 | .43 | .44 | .73 | .73 | .75 | .62 | .41 | .58 | .68 | .64 | .66 | .50 | .51 | .51 | .38 | .35 |
| .48 | .51 | .62 | .51 | .51 | .54 | .43 | .44 | .73 | .73 | .75 | .62 | .41 | .58 | .68 | .64 | .66 | .50 | .51 | .51 | .38 | .35 |
| .46 | .49 | .59 | .49 | .47 | .51 | .40 | .43 | .70 | .70 | .72 | .58 | .37 | .55 | .66 | .63 | .64 | .47 | .49 | .49 | .36 | .32 |
| .64 | .57 | .77 | .66 | .69 | .76 | .69 | .69 | .85 | .85 | .86 | .82 | .65 | .81 | .86 | .84 | .84 | .74 | .60 | .60 | .49 | .42 |
| .51 | .28 | .63 | .55 | .51 | .64 | .74 | .49 | .57 | .57 | .56 | .63 | .79 | .68 | .64 | .59 | .71 | .53 | .36 | .36 | .17 | .12 |
| .42 | .32 | .55 | .45 | .46 | .65 | .61 | .60 | .62 | .62 | .65 | .63 | .53 | .71 | .73 | .75 | .71 | .65 | .36 | .36 | .21 | .16 |
| .30 | .31 | .49 | .39 | .36 | .49 | .41 | .48 | .57 | .57 | .60 | .49 | .33 | .54 | .64 | .66 | .58 | .48 | .33 | .33 | .15 | .10 |
| .23 | .20 | .40 | .31 | .28 | .41 | .36 | .52 | .46 | .46 | .50 | .42 | .25 | .49 | .58 | .68 | .47 | .48 | .26 | .26 | .10 | .03 |
| .23 | .26 | .33 | .27 | .25 | .37 | .31 | .22 | .42 | .42 | .45 | .37 | .29 | .39 | .43 | .40 | .48 | .31 | .19 | .19 | .04 | .04 |
| .13 | .08 | .24 | .11 | .22 | .36 | .39 | .37 | .42 | .42 | .43 | .47 | .30 | .50 | .47 | .54 | .40 | .66 | .06 | .06 | -.00 | -.03 |
| .66 | .59 | .63 | .64 | .51 | .53 | .38 | .44 | .64 | .64 | .67 | .50 | .30 | .45 | .60 | .56 | .55 | .24 | .78 | .78 | .62 | .60 |
| .66 | .59 | .63 | .64 | .51 | .53 | .38 | .44 | .64 | .64 | .67 | .50 | .30 | .45 | .60 | .56 | .55 | .24 | .78 | .78 | .62 | .60 |
| .60 | .62 | .53 | .53 | .52 | .44 | .22 | .47 | .55 | .55 | .57 | .43 | .16 | .36 | .49 | .46 | .44 | .23 | .73 | .73 | .79 | .75 |
| .64 | .54 | .40 | .41 | .39 | .38 | .18 | .22 | .51 | .51 | .54 | .38 | .12 | .30 | .41 | .34 | .42 | .18 | .73 | .73 | .77 | .85 |

K=2 L=2

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.00 | .60 | .60 | .54 | .56 | .74 | .68 | .31 | .65 | .65 | .69 | .72 | .58 | .68 | .67 | .63 | .62 | .34 | .90 | .90 | .62 | .74 |
| .60 | 1.00 | .74 | .72 | .86 | .60 | .23 | .42 | .73 | .73 | .74 | .69 | .29 | .48 | .61 | .53 | .49 | .12 | .69 | .69 | .69 | .56 |
| .60 | .74 | 1.00 | .69 | .80 | .57 | .42 | .45 | .87 | .87 | .87 | .81 | .63 | .61 | .80 | .71 | .59 | .28 | .66 | .66 | .48 | .28 |
| .54 | .72 | .69 | 1.00 | .75 | .61 | .47 | .50 | .53 | .53 | .57 | .57 | .36 | .43 | .54 | .54 | .34 | .04 | .66 | .66 | .37 | .19 |
| .56 | .86 | .80 | .75 | 1.00 | .73 | .46 | .66 | .70 | .70 | .69 | .78 | .46 | .58 | .65 | .61 | .40 | .21 | .63 | .63 | .66 | .38 |
| .74 | .60 | .57 | .61 | .73 | 1.00 | .83 | .66 | .59 | .59 | .62 | .76 | .58 | .86 | .78 | .74 | .66 | .49 | .66 | .66 | .46 | .44 |
| .68 | .23 | .42 | .47 | .46 | .83 | 1.00 | .43 | .43 | .43 | .44 | .65 | .78 | .83 | .64 | .58 | .63 | .62 | .47 | .47 | .09 | .18 |
| .31 | .42 | .45 | .50 | .66 | .66 | .43 | 1.00 | .24 | .24 | .30 | .39 | .12 | .55 | .59 | .74 | .27 | .31 | .46 | .46 | .47 | .13 |
| .65 | .73 | .87 | .53 | .70 | .59 | .43 | .24 | 1.00 | 1.00 | .99 | .93 | .60 | .68 | .82 | .69 | .65 | .41 | .63 | .63 | .48 | .47 |
| .65 | .73 | .87 | .53 | .70 | .59 | .43 | .24 | 1.00 | 1.00 | .99 | .93 | .60 | .68 | .82 | .69 | .65 | .41 | .63 | .63 | .48 | .47 |
| .69 | .74 | .87 | .57 | .69 | .62 | .44 | .30 | .99 | .99 | 1.00 | .93 | .56 | .70 | .85 | .76 | .67 | .41 | .68 | .68 | .51 | .50 |
| .72 | .69 | .81 | .57 | .78 | .76 | .65 | .39 | .93 | .93 | .93 | 1.00 | .68 | .78 | .81 | .74 | .63 | .52 | .64 | .64 | .49 | .46 |
| .58 | .29 | .63 | .36 | .46 | .58 | .78 | .12 | .60 | .60 | .56 | .68 | 1.00 | .73 | .62 | .42 | .71 | .53 | .31 | .31 | -.02 | .07 |
| .68 | .48 | .61 | .43 | .58 | .86 | .83 | .55 | .68 | .68 | .70 | .78 | .73 | 1.00 | .92 | .83 | .89 | .79 | .52 | .52 | .24 | .32 |
| .67 | .61 | .80 | .54 | .65 | .78 | .64 | .59 | .82 | .82 | .85 | .81 | .62 | .92 | 1.00 | .93 | .86 | .67 | .65 | .65 | .37 | .36 |
| .63 | .53 | .71 | .54 | .61 | .74 | .58 | .74 | .69 | .69 | .76 | .74 | .42 | .83 | .93 | 1.00 | .69 | .61 | .67 | .67 | .43 | .33 |
| .62 | .49 | .59 | .34 | .40 | .66 | .63 | .27 | .65 | .65 | .67 | .63 | .71 | .89 | .86 | .69 | 1.00 | .71 | .44 | .44 | .10 | .29 |
| .34 | .12 | .28 | .04 | .21 | .49 | .62 | .31 | .41 | .41 | .41 | .52 | .53 | .79 | .67 | .61 | .71 | 1.00 | .18 | .18 | -.06 | .10 |
| .90 | .69 | .66 | .66 | .63 | .66 | .47 | .46 | .63 | .63 | .68 | .64 | .31 | .52 | .65 | .67 | .44 | .18 | 1.00 | 1.00 | .79 | .77 |
| .90 | .69 | .66 | .66 | .63 | .66 | .47 | .46 | .63 | .63 | .68 | .64 | .31 | .52 | .65 | .67 | .44 | .18 | 1.00 | 1.00 | .79 | .77 |
| .62 | .69 | .48 | .37 | .66 | .46 | .09 | .47 | .48 | .48 | .51 | .49 | -.02 | .24 | .37 | .43 | .10 | -.06 | .79 | .79 | 1.00 | .84 |
| .74 | .56 | .28 | .19 | .38 | .44 | .18 | .13 | .47 | .47 | .50 | .46 | .07 | .32 | .36 | .33 | .29 | .10 | .77 | .77 | .84 | 1.00 |

2 L=3

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .92 | .63 | .63 | .64 | .62 | .78 | .63 | .44 | .67 | .67 | .71 | .74 | .51 | .65 | .69 | .67 | .52 | .20 | .87 | .87 | .68 | .73 |
| .53 | .98 | .70 | .68 | .85 | .60 | .17 | .45 | .80 | .80 | .81 | .75 | .20 | .42 | .59 | .53 | .36 | .00 | .65 | .65 | .70 | .54 |
| .48 | .69 | .89 | .64 | .74 | .52 | .32 | .42 | .87 | .87 | .87 | .79 | .48 | .49 | .71 | .65 | .42 | .08 | .55 | .55 | .41 | .21 |
| .51 | .71 | .67 | .89 | .76 | .65 | .43 | .57 | .59 | .59 | .63 | .63 | .31 | .40 | .53 | .55 | .27 | -.09 | .64 | .64 | .39 | .19 |
| .44 | .80 | .68 | .67 | .92 | .67 | .34 | .62 | .71 | .71 | .71 | .79 | .32 | .44 | .52 | .52 | .22 | -.01 | .51 | .51 | .57 | .29 |
| .59 | .54 | .47 | .56 | .66 | .89 | .67 | .66 | .52 | .52 | .56 | .68 | .42 | .69 | .64 | .65 | .45 | .24 | .53 | .53 | .37 | .31 |
| .60 | .23 | .39 | .49 | .46 | .80 | .89 | .51 | .36 | .36 | .37 | .58 | .68 | .76 | .60 | .56 | .52 | .44 | .40 | .40 | .07 | .11 |
| .14 | .29 | .23 | .33 | .45 | .50 | .27 | .88 | .14 | .14 | .20 | .28 | -.01 | .36 | .39 | .58 | .11 | .09 | .24 | .24 | .22 | -.06 |
| .45 | .66 | .71 | .43 | .60 | .45 | .22 | .15 | .94 | .94 | .92 | .85 | .38 | .46 | .63 | .55 | .39 | .11 | .46 | .46 | .39 | .32 |
| .45 | .66 | .71 | .43 | .60 | .45 | .22 | .15 | .94 | .94 | .92 | .85 | .38 | .46 | .63 | .55 | .39 | .11 | .46 | .46 | .39 | .32 |
| .49 | .67 | .72 | .46 | .61 | .49 | .24 | .23 | .93 | .93 | .94 | .85 | .35 | .48 | .68 | .64 | .41 | .12 | .52 | .52 | .42 | .36 |
| .52 | .63 | .65 | .47 | .69 | .62 | .42 | .32 | .86 | .86 | .86 | .92 | .46 | .56 | .62 | .60 | .37 | .20 | .46 | .46 | .40 | .31 |
| .58 | .32 | .69 | .50 | .54 | .65 | .80 | .27 | .63 | .63 | .58 | .72 | .94 | .78 | .70 | .50 | .66 | .45 | .34 | .34 | .05 | .10 |
| .51 | .41 | .48 | .39 | .48 | .74 | .66 | .56 | .57 | .57 | .59 | .66 | .56 | .86 | .81 | .75 | .70 | .56 | .37 | .37 | .12 | .17 |
| .47 | .52 | .63 | .46 | .51 | .63 | .45 | .54 | .71 | .71 | .74 | .68 | .43 | .74 | .85 | .83 | .64 | .41 | .46 | .46 | .22 | .20 |
| .41 | .42 | .51 | .40 | .45 | .57 | .37 | .67 | .56 | .56 | .64 | .59 | .23 | .61 | .74 | .88 | .46 | .34 | .44 | .44 | .25 | .15 |
| .57 | .48 | .59 | .43 | .41 | .65 | .60 | .41 | .62 | .62 | .64 | .60 | .64 | .91 | .93 | .77 | .92 | .65 | .43 | .43 | .10 | .27 |
| .19 | .06 | .15 | .01 | .10 | .34 | .45 | .30 | .23 | .23 | .24 | .33 | .38 | .67 | .56 | .53 | .59 | .85 | .02 | .02 | -.18 | -.02 |
| .77 | .67 | .60 | .66 | .61 | .62 | .36 | .47 | .62 | .62 | .67 | .60 | .21 | .41 | .57 | .62 | .31 | -.02 | .90 | .90 | .76 | .71 |
| .77 | .67 | .60 | .66 | .61 | .62 | .36 | .47 | .62 | .62 | .67 | .60 | .21 | .41 | .57 | .62 | .31 | -.02 | .90 | .90 | .76 | .71 |
| .45 | .63 | .34 | .32 | .56 | .35 | -.05 | .35 | .47 | .47 | .50 | .46 | -.15 | .05 | .19 | .29 | -.08 | -.28 | .63 | .63 | .89 | .71 |
| .60 | .55 | .23 | .23 | .36 | .37 | .07 | .10 | .45 | .45 | .48 | .42 | -.03 | .19 | .27 | .26 | .15 | -.07 | .68 | .68 | .82 | .91 |

K=2 L=4

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .85 | .59 | .56 | .46 | .54 | .80 | .65 | .35 | .71 | .71 | .74 | .77 | .53 | .64 | .62 | .59 | .50 | .15 | .75 | .75 | .54 | .60 |
| .51 | .93 | .69 | .61 | .83 | .65 | .23 | .43 | .86 | .86 | .85 | .84 | .25 | .44 | .55 | .49 | .33 | -.03 | .59 | .59 | .55 | .40 |
| .37 | .62 | .76 | .49 | .64 | .54 | .31 | .36 | .84 | .84 | .82 | .78 | .46 | .45 | .60 | .53 | .35 | .01 | .41 | .41 | .24 | .08 |
| .46 | .76 | .73 | .85 | .83 | .77 | .49 | .65 | .69 | .69 | .71 | .74 | .37 | .49 | .60 | .59 | .30 | -.07 | .58 | .58 | .36 | .15 |
| .33 | .76 | .61 | .55 | .82 | .63 | .29 | .50 | .73 | .73 | .71 | .80 | .28 | .36 | .42 | .41 | .15 | -.12 | .40 | .40 | .38 | .14 |
| .43 | .44 | .35 | .36 | .47 | .71 | .56 | .40 | .49 | .49 | .52 | .62 | .35 | .51 | .45 | .46 | .30 | .07 | .37 | .37 | .14 | .09 |
| .41 | .18 | .25 | .26 | .28 | .65 | .77 | .28 | .30 | .30 | .31 | .47 | .60 | .60 | .42 | .37 | .42 | .27 | .23 | .23 | -.09 | -.04 |
| .06 | .29 | .21 | .29 | .39 | .44 | .22 | .70 | .17 | .17 | .23 | .28 | -.04 | .31 | .33 | .50 | .08 | .01 | .16 | .16 | .08 | -.14 |
| .33 | .56 | .55 | .27 | .47 | .40 | .17 | .07 | .86 | .86 | .84 | .79 | .32 | .35 | .45 | .38 | .27 | -.02 | .31 | .31 | .20 | .15 |
| .33 | .56 | .55 | .27 | .47 | .40 | .17 | .07 | .86 | .86 | .84 | .79 | .32 | .35 | .45 | .38 | .27 | -.02 | .31 | .31 | .20 | .15 |
| .39 | .58 | .57 | .31 | .49 | .46 | .20 | .15 | .88 | .88 | .88 | .81 | .30 | .40 | .52 | .49 | .30 | .00 | .38 | .38 | .25 | .19 |
| .37 | .54 | .49 | .28 | .53 | .52 | .32 | .17 | .80 | .80 | .78 | .83 | .35 | .41 | .43 | .40 | .24 | .02 | .31 | .31 | .20 | .13 |
| .37 | .23 | .47 | .24 | .33 | .51 | .68 | .08 | .52 | .52 | .47 | .57 | .84 | .60 | .48 | .29 | .51 | .28 | .16 | .16 | -.12 | -.06 |
| .34 | .31 | .31 | .18 | .29 | .57 | .56 | .31 | .48 | .48 | .50 | .55 | .48 | .68 | .58 | .53 | .55 | .36 | .20 | .20 | -.10 | -.04 |
| .35 | .43 | .49 | .30 | .38 | .55 | .42 | .39 | .64 | .64 | .67 | .62 | .39 | .63 | .68 | .65 | .53 | .28 | .31 | .31 | .03 | .02 |
| .32 | .37 | .42 | .30 | .36 | .54 | .35 | .54 | .54 | .54 | .61 | .56 | .20 | .55 | .64 | .75 | .40 | .23 | .33 | .33 | .10 | .02 |
| .45 | .37 | .45 | .25 | .26 | .56 | .59 | .26 | .55 | .55 | .57 | .52 | .63 | .80 | .75 | .60 | .79 | .53 | .29 | .29 | -.06 | .08 |
| .11 | .02 | .08 | -.06 | -.00 | .25 | .40 | .16 | .15 | .15 | .16 | .22 | .35 | .56 | .44 | .38 | .52 | .70 | -.04 | -.04 | -.24 | -.11 |
| .77 | .69 | .63 | .58 | .63 | .75 | .46 | .49 | .70 | .70 | .75 | .72 | .29 | .50 | .60 | .62 | .36 | .01 | .83 | .83 | .68 | .63 |
| .77 | .69 | .63 | .58 | .63 | .75 | .46 | .49 | .70 | .70 | .75 | .72 | .29 | .50 | .60 | .62 | .36 | .01 | .83 | .83 | .68 | .63 |
| .47 | .61 | .35 | .29 | .55 | .40 | -.02 | .30 | .54 | .54 | .56 | .55 | -.13 | .07 | .19 | .27 | -.07 | -.29 | .60 | .60 | .75 | .63 |
| .64 | .52 | .25 | .19 | .36 | .40 | .11 | .10 | .50 | .50 | .52 | .50 | .01 | .21 | .25 | .24 | .14 | -.08 | .65 | .65 | .73 | .81 |

K=3 L=1

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .71 | .54 | .58 | .64 | .52 | .54 | .49 | .31 | .52 | .52 | .55 | .49 | .51 | .44 | .47 | .40 | .59 | .17 | .67 | .67 | .51 | .52 |
| .56 | .87 | .66 | .72 | .69 | .52 | .26 | .36 | .66 | .66 | .68 | .54 | .30 | .38 | .50 | .37 | .58 | .15 | .65 | .65 | .59 | .51 |
| .42 | .51 | .60 | .60 | .50 | .44 | .37 | .31 | .51 | .51 | .53 | .44 | .46 | .37 | .45 | .37 | .52 | .13 | .42 | .42 | .22 | .14 |
| .53 | .63 | .65 | .76 | .59 | .53 | .44 | .38 | .51 | .51 | .53 | .45 | .48 | .38 | .46 | .37 | .55 | .07 | .56 | .56 | .32 | .23 |
| .69 | .82 | .84 | .87 | .85 | .74 | .59 | .66 | .73 | .73 | .74 | .72 | .64 | .63 | .68 | .60 | .77 | .39 | .66 | .66 | .58 | .44 |
| .65 | .58 | .70 | .74 | .68 | .78 | .69 | .63 | .61 | .61 | .64 | .65 | .68 | .69 | .69 | .64 | .79 | .42 | .57 | .57 | .41 | .33 |
| .55 | .28 | .56 | .58 | .50 | .65 | .75 | .51 | .44 | .44 | .45 | .55 | .76 | .63 | .56 | .53 | .65 | .42 | .38 | .38 | .18 | .12 |
| .23 | .28 | .40 | .43 | .40 | .42 | .37 | .58 | .25 | .25 | .29 | .32 | .32 | .39 | .41 | .49 | .39 | .27 | .21 | .21 | .12 | -.03 |
| .52 | .59 | .63 | .58 | .55 | .51 | .40 | .36 | .67 | .67 | .69 | .58 | .44 | .49 | .58 | .50 | .64 | .34 | .52 | .52 | .40 | .35 |
| .52 | .59 | .63 | .58 | .55 | .51 | .40 | .36 | .67 | .67 | .69 | .58 | .44 | .49 | .58 | .50 | .64 | .34 | .52 | .52 | .40 | .35 |
| .49 | .56 | .59 | .55 | .51 | .48 | .36 | .35 | .63 | .63 | .66 | .54 | .40 | .46 | .56 | .50 | .61 | .32 | .49 | .49 | .37 | .33 |
| .69 | .65 | .78 | .73 | .74 | .74 | .67 | .61 | .77 | .77 | .79 | .79 | .71 | .73 | .75 | .71 | .83 | .59 | .60 | .60 | .50 | .42 |
| .44 | .23 | .51 | .49 | .42 | .50 | .62 | .32 | .39 | .39 | .38 | .47 | .72 | .50 | .43 | .36 | .56 | .31 | .26 | .26 | .08 | .03 |
| .36 | .30 | .44 | .42 | .40 | .50 | .50 | .38 | .43 | .43 | .45 | .48 | .51 | .51 | .48 | .47 | .56 | .39 | .25 | .25 | .10 | .06 |
| .26 | .31 | .39 | .37 | .31 | .36 | .31 | .26 | .39 | .39 | .43 | .35 | .32 | .35 | .41 | .39 | .46 | .21 | .23 | .23 | .04 | .00 |
| .20 | .20 | .31 | .29 | .24 | .32 | .29 | .34 | .31 | .31 | .36 | .31 | .26 | .34 | .39 | .46 | .39 | .27 | .17 | .17 | -.00 | -.06 |
| .14 | .19 | .20 | .20 | .16 | .21 | .19 | .03 | .23 | .23 | .25 | .21 | .22 | .19 | .19 | .15 | .29 | .08 | .08 | .08 | -.07 | -.06 |
| -.04 | -.01 | .01 | -.03 | .07 | .12 | .17 | .07 | .13 | .13 | .14 | .23 | .16 | .20 | .12 | .17 | .15 | .34 | -.15 | -.15 | -.18 | -.20 |
| .64 | .60 | .55 | .63 | .47 | .44 | .30 | .25 | .50 | .50 | .53 | .38 | .30 | .29 | .41 | .33 | .47 | .01 | .71 | .71 | .54 | .54 |
| .64 | .60 | .55 | .63 | .47 | .44 | .30 | .25 | .50 | .50 | .53 | .38 | .30 | .29 | .41 | .33 | .47 | .01 | .71 | .71 | .54 | .54 |
| .66 | .70 | .52 | .59 | .55 | .41 | .20 | .30 | .49 | .49 | .51 | .40 | .21 | .27 | .36 | .28 | .42 | .06 | .73 | .73 | .77 | .76 |
| .62 | .58 | .34 | .42 | .37 | .29 | .11 | .06 | .40 | .40 | .43 | .29 | .11 | .16 | .24 | .13 | .33 | -.01 | .68 | .68 | .71 | .80 |

K=3 L=2

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .92 | .53 | .48 | .51 | .44 | .59 | .60 | .14 | .45 | .45 | .49 | .52 | .58 | .51 | .47 | .41 | .57 | .19 | .77 | .77 | .45 | .60 |
| .63 | .98 | .69 | .71 | .80 | .54 | .23 | .29 | .66 | .66 | .67 | .63 | .32 | .41 | .52 | .42 | .48 | .06 | .67 | .67 | .63 | .55 |
| .63 | .70 | .89 | .67 | .68 | .47 | .39 | .23 | .71 | .71 | .72 | .65 | .69 | .48 | .63 | .51 | .59 | .15 | .60 | .60 | .34 | .23 |
| .64 | .68 | .64 | .89 | .67 | .56 | .49 | .33 | .43 | .43 | .46 | .47 | .50 | .39 | .46 | .40 | .43 | .01 | .66 | .66 | .32 | .23 |
| .62 | .85 | .74 | .76 | .92 | .66 | .46 | .45 | .60 | .60 | .61 | .69 | .54 | .48 | .51 | .45 | .41 | .10 | .61 | .61 | .56 | .36 |
| .78 | .60 | .52 | .65 | .67 | .89 | .80 | .50 | .45 | .45 | .49 | .62 | .65 | .74 | .63 | .57 | .65 | .34 | .62 | .62 | .35 | .37 |
| .63 | .17 | .32 | .43 | .34 | .67 | .89 | .27 | .22 | .22 | .24 | .42 | .80 | .66 | .45 | .37 | .60 | .45 | .36 | .36 | -.05 | .07 |
| .44 | .45 | .42 | .57 | .62 | .66 | .51 | .88 | .15 | .15 | .23 | .32 | .27 | .56 | .54 | .67 | .41 | .30 | .47 | .47 | .35 | .10 |
| .67 | .80 | .87 | .59 | .71 | .52 | .36 | .14 | .94 | .94 | .93 | .86 | .63 | .57 | .71 | .56 | .62 | .23 | .62 | .62 | .47 | .45 |
| .67 | .80 | .87 | .59 | .71 | .52 | .36 | .14 | .94 | .94 | .93 | .86 | .63 | .57 | .71 | .56 | .62 | .23 | .62 | .62 | .47 | .45 |
| .71 | .81 | .87 | .63 | .71 | .56 | .37 | .20 | .92 | .92 | .94 | .86 | .58 | .59 | .74 | .64 | .64 | .24 | .67 | .67 | .50 | .48 |
| .74 | .75 | .79 | .63 | .79 | .68 | .58 | .28 | .85 | .85 | .85 | .92 | .72 | .66 | .68 | .59 | .60 | .33 | .60 | .60 | .46 | .42 |
| .51 | .20 | .48 | .31 | .32 | .42 | .68 | -.01 | .38 | .38 | .35 | .46 | .94 | .56 | .43 | .23 | .64 | .38 | .21 | .21 | -.15 | -.03 |
| .65 | .42 | .49 | .40 | .44 | .69 | .76 | .36 | .46 | .46 | .48 | .56 | .78 | .86 | .74 | .61 | .91 | .67 | .41 | .41 | .05 | .19 |
| .69 | .59 | .71 | .53 | .52 | .64 | .60 | .39 | .63 | .63 | .68 | .62 | .70 | .81 | .85 | .74 | .93 | .56 | .57 | .57 | .19 | .27 |
| .67 | .53 | .65 | .55 | .52 | .65 | .56 | .58 | .55 | .55 | .64 | .60 | .50 | .75 | .83 | .88 | .77 | .53 | .62 | .62 | .29 | .26 |
| .52 | .36 | .42 | .27 | .22 | .45 | .52 | .11 | .39 | .39 | .41 | .37 | .66 | .70 | .64 | .46 | .92 | .59 | .31 | .31 | -.08 | .15 |
| .20 | .00 | .08 | -.09 | -.01 | .24 | .44 | .09 | .11 | .11 | .12 | .20 | .45 | .56 | .41 | .34 | .65 | .85 | -.02 | -.02 | -.28 | -.07 |
| .87 | .65 | .55 | .64 | .51 | .53 | .40 | .24 | .46 | .46 | .52 | .46 | .34 | .37 | .46 | .44 | .43 | .02 | .90 | .90 | .63 | .68 |
| .87 | .65 | .55 | .64 | .51 | .53 | .40 | .24 | .46 | .46 | .52 | .46 | .34 | .37 | .46 | .44 | .43 | .02 | .90 | .90 | .63 | .68 |
| .68 | .70 | .41 | .39 | .57 | .37 | .07 | .22 | .39 | .39 | .42 | .40 | .05 | .12 | .22 | .25 | .10 | -.18 | .76 | .76 | .89 | .82 |
| .73 | .54 | .21 | .19 | .29 | .31 | .11 | -.06 | .32 | .32 | .36 | .31 | .10 | .17 | .20 | .15 | .27 | -.02 | .71 | .71 | .71 | .91 |

=3 L=3

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.00 | .63 | .69 | .76 | .65 | .80 | .72 | .43 | .59 | .59 | .63 | .67 | .64 | .68 | .70 | .63 | .62 | .25 | .92 | .92 | .68 | .75 |
| .63 | 1.00 | .74 | .75 | .88 | .63 | .26 | .42 | .79 | .79 | .80 | .76 | .30 | .46 | .60 | .51 | .43 | .04 | .72 | .72 | .73 | .61 |
| .69 | .74 | 1.00 | .81 | .80 | .62 | .49 | .41 | .85 | .85 | .85 | .79 | .68 | .59 | .78 | .66 | .58 | .17 | .70 | .70 | .49 | .35 |
| .76 | .75 | .81 | 1.00 | .83 | .78 | .63 | .59 | .60 | .60 | .62 | .65 | .57 | .56 | .66 | .60 | .49 | .08 | .81 | .81 | .52 | .39 |
| .65 | .88 | .80 | .83 | 1.00 | .77 | .50 | .59 | .75 | .75 | .74 | .85 | .52 | .54 | .59 | .54 | .36 | .05 | .65 | .65 | .65 | .42 |
| .80 | .63 | .62 | .78 | .77 | 1.00 | .84 | .71 | .53 | .53 | .57 | .72 | .64 | .80 | .73 | .70 | .61 | .30 | .69 | .69 | .46 | .42 |
| .72 | .26 | .49 | .63 | .50 | .84 | 1.00 | .55 | .29 | .29 | .30 | .52 | .85 | .83 | .65 | .56 | .66 | .50 | .49 | .49 | .11 | .18 |
| .43 | .42 | .41 | .59 | .59 | .71 | .55 | 1.00 | .19 | .19 | .27 | .38 | .29 | .61 | .60 | .75 | .40 | .29 | .44 | .44 | .31 | .10 |
| .59 | .79 | .85 | .60 | .75 | .53 | .29 | .19 | 1.00 | 1.00 | .99 | .92 | .50 | .50 | .69 | .58 | .47 | .08 | .58 | .58 | .51 | .43 |
| .59 | .79 | .85 | .60 | .75 | .53 | .29 | .19 | 1.00 | 1.00 | .99 | .92 | .50 | .50 | .69 | .58 | .47 | .08 | .58 | .58 | .51 | .43 |
| .63 | .80 | .85 | .62 | .74 | .57 | .30 | .27 | .99 | .99 | 1.00 | .91 | .46 | .53 | .73 | .67 | .48 | .09 | .63 | .63 | .54 | .46 |
| .67 | .76 | .79 | .65 | .85 | .72 | .52 | .38 | .92 | .92 | .91 | 1.00 | .60 | .62 | .68 | .63 | .45 | .19 | .58 | .58 | .52 | .41 |
| .64 | .30 | .68 | .57 | .52 | .64 | .85 | .29 | .50 | .50 | .46 | .60 | 1.00 | .78 | .68 | .47 | .73 | .48 | .38 | .38 | .05 | .13 |
| .68 | .46 | .59 | .56 | .54 | .80 | .83 | .61 | .50 | .50 | .53 | .62 | .78 | 1.00 | .91 | .79 | .92 | .71 | .47 | .47 | .13 | .25 |
| .70 | .60 | .78 | .66 | .59 | .73 | .65 | .60 | .69 | .69 | .73 | .68 | .68 | .91 | 1.00 | .91 | .90 | .58 | .61 | .61 | .27 | .32 |
| .63 | .51 | .66 | .60 | .54 | .70 | .56 | .75 | .58 | .58 | .67 | .63 | .47 | .79 | .91 | 1.00 | .71 | .51 | .60 | .60 | .31 | .27 |
| .62 | .43 | .58 | .49 | .36 | .61 | .66 | .40 | .47 | .47 | .48 | .45 | .73 | .92 | .90 | .71 | 1.00 | .74 | .44 | .44 | .07 | .28 |
| .25 | .04 | .17 | .08 | .05 | .30 | .50 | .29 | .08 | .08 | .09 | .19 | .48 | .71 | .58 | .51 | .74 | 1.00 | .04 | .04 | -.19 | .01 |
| .92 | .72 | .70 | .81 | .65 | .69 | .49 | .44 | .58 | .58 | .63 | .58 | .38 | .47 | .61 | .60 | .44 | .04 | 1.00 | 1.00 | .81 | .79 |
| .92 | .72 | .70 | .81 | .65 | .69 | .49 | .44 | .58 | .58 | .63 | .58 | .38 | .47 | .61 | .60 | .44 | .04 | 1.00 | 1.00 | .81 | .79 |
| .68 | .73 | .49 | .52 | .65 | .46 | .11 | .31 | .51 | .51 | .54 | .52 | .05 | .13 | .27 | .31 | .07 | -.19 | .81 | .81 | 1.00 | .88 |
| .75 | .61 | .35 | .39 | .42 | .42 | .18 | .10 | .43 | .43 | .46 | .41 | .13 | .25 | .32 | .27 | .28 | .01 | .79 | .79 | .88 | 1.00 |

K=3 L=4

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .96 | .62 | .67 | .59 | .59 | .87 | .80 | .40 | .67 | .67 | .69 | .74 | .71 | .73 | .70 | .61 | .64 | .27 | .84 | .84 | .59 | .66 |
| .62 | .97 | .76 | .68 | .87 | .72 | .35 | .43 | .88 | .88 | .87 | .87 | .37 | .51 | .60 | .51 | .42 | .04 | .67 | .67 | .60 | .49 |
| .60 | .69 | .92 | .65 | .72 | .69 | .54 | .40 | .86 | .86 | .84 | .82 | .71 | .60 | .73 | .60 | .55 | .16 | .58 | .58 | .36 | .25 |
| .72 | .79 | .88 | .92 | .87 | .92 | .73 | .67 | .71 | .71 | .72 | .77 | .67 | .67 | .74 | .66 | .53 | .14 | .76 | .76 | .49 | .35 |
| .55 | .85 | .75 | .70 | .92 | .78 | .49 | .51 | .80 | .80 | .77 | .89 | .51 | .50 | .53 | .47 | .31 | -.01 | .57 | .57 | .49 | .30 |
| .66 | .56 | .54 | .57 | .62 | .89 | .79 | .51 | .55 | .55 | .58 | .70 | .62 | .70 | .61 | .57 | .51 | .20 | .56 | .56 | .27 | .24 |
| .57 | .23 | .40 | .41 | .36 | .75 | .94 | .37 | .29 | .29 | .29 | .46 | .83 | .74 | .55 | .44 | .60 | .40 | .36 | .36 | .00 | .07 |
| .37 | .43 | .43 | .52 | .55 | .72 | .56 | .86 | .27 | .27 | .34 | .42 | .30 | .61 | .60 | .71 | .40 | .25 | .39 | .39 | .20 | .03 |
| .49 | .70 | .71 | .43 | .63 | .53 | .28 | .14 | .97 | .97 | .94 | .90 | .46 | .44 | .55 | .45 | .36 | -.01 | .46 | .46 | .34 | .27 |
| .49 | .70 | .71 | .43 | .63 | .53 | .28 | .14 | .97 | .97 | .94 | .90 | .46 | .44 | .55 | .45 | .36 | -.01 | .46 | .46 | .34 | .27 |
| .54 | .72 | .73 | .46 | .63 | .58 | .31 | .22 | .97 | .97 | .97 | .91 | .43 | .48 | .61 | .55 | .40 | .01 | .52 | .52 | .38 | .31 |
| .54 | .68 | .65 | .45 | .69 | .66 | .45 | .25 | .89 | .89 | .88 | .95 | .52 | .50 | .52 | .47 | .34 | .04 | .45 | .45 | .34 | .25 |
| .47 | .24 | .52 | .33 | .35 | .56 | .79 | .15 | .44 | .44 | .39 | .50 | .95 | .68 | .54 | .32 | .62 | .38 | .24 | .24 | -.07 | .01 |
| .55 | .39 | .47 | .37 | .38 | .72 | .81 | .44 | .48 | .48 | .50 | .56 | .77 | .91 | .77 | .65 | .83 | .59 | .34 | .34 | -.02 | .09 |
| .61 | .54 | .70 | .50 | .49 | .74 | .70 | .52 | .68 | .68 | .71 | .67 | .72 | .89 | .91 | .81 | .84 | .52 | .50 | .50 | .14 | .18 |
| .57 | .49 | .63 | .49 | .47 | .74 | .61 | .67 | .60 | .60 | .69 | .65 | .49 | .80 | .87 | .93 | .69 | .46 | .52 | .52 | .21 | .19 |
| .55 | .36 | .51 | .34 | .27 | .60 | .73 | .33 | .45 | .45 | .46 | .43 | .79 | .91 | .82 | .63 | .95 | .70 | .36 | .36 | -.02 | .15 |
| .24 | .04 | .17 | .05 | .01 | .30 | .54 | .25 | .06 | .06 | .07 | .13 | .54 | .70 | .56 | .46 | .74 | .94 | .05 | .05 | -.17 | .00 |
| .94 | .74 | .77 | .73 | .70 | .86 | .63 | .51 | .71 | .71 | .74 | .73 | .51 | .61 | .70 | .66 | .53 | .14 | .96 | .96 | .76 | .75 |
| .94 | .74 | .77 | .73 | .70 | .86 | .63 | .51 | .71 | .71 | .74 | .73 | .51 | .61 | .70 | .66 | .53 | .14 | .96 | .96 | .76 | .75 |
| .74 | .74 | .55 | .50 | .68 | .58 | .20 | .34 | .63 | .63 | .65 | .66 | .13 | .23 | .34 | .36 | .13 | -.13 | .82 | .82 | .92 | .83 |
| .83 | .61 | .42 | .37 | .46 | .53 | .30 | .16 | .53 | .53 | .55 | .53 | .23 | .35 | .38 | .32 | .33 | .08 | .81 | .81 | .84 | .94 |

K=4 L=1

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .63 | .53 | .45 | .54 | .42 | .38 | .29 | .15 | .41 | .41 | .45 | .36 | .31 | .25 | .31 | .23 | .41 | .02 | .63 | .63 | .50 | .53 |
| .55 | .86 | .62 | .71 | .67 | .46 | .21 | .32 | .62 | .62 | .64 | .50 | .25 | .31 | .43 | .33 | .49 | .11 | .65 | .65 | .58 | .50 |
| .35 | .54 | .50 | .57 | .44 | .31 | .21 | .18 | .42 | .42 | .44 | .33 | .28 | .20 | .30 | .23 | .37 | -.01 | .41 | .41 | .21 | .13 |
| .36 | .56 | .46 | .61 | .45 | .32 | .20 | .21 | .35 | .35 | .38 | .28 | .24 | .17 | .26 | .19 | .32 | -.07 | .44 | .44 | .24 | .17 |
| .58 | .80 | .71 | .80 | .74 | .55 | .39 | .48 | .61 | .61 | .63 | .56 | .43 | .42 | .50 | .42 | .56 | .21 | .63 | .63 | .54 | .42 |
| .62 | .63 | .65 | .74 | .62 | .61 | .52 | .47 | .56 | .56 | .59 | .55 | .51 | .49 | .55 | .50 | .62 | .24 | .60 | .60 | .41 | .34 |
| .48 | .32 | .49 | .55 | .43 | .51 | .56 | .34 | .38 | .38 | .39 | .44 | .57 | .44 | .41 | .38 | .50 | .23 | .38 | .38 | .16 | .12 |
| .11 | .25 | .24 | .35 | .25 | .18 | .13 | .31 | .12 | .12 | .16 | .14 | .09 | .12 | .18 | .25 | .14 | .03 | .17 | .17 | .05 | -.06 |
| .55 | .68 | .64 | .63 | .58 | .49 | .34 | .33 | .66 | .66 | .69 | .56 | .39 | .43 | .53 | .45 | .59 | .25 | .58 | .58 | .46 | .41 |
| .55 | .68 | .64 | .63 | .58 | .49 | .34 | .33 | .66 | .66 | .69 | .56 | .39 | .43 | .53 | .45 | .59 | .25 | .58 | .58 | .46 | .41 |
| .51 | .63 | .58 | .58 | .53 | .45 | .30 | .31 | .61 | .61 | .64 | .51 | .33 | .39 | .50 | .44 | .55 | .23 | .55 | .55 | .42 | .37 |
| .69 | .74 | .76 | .77 | .74 | .66 | .54 | .53 | .75 | .75 | .78 | .72 | .58 | .61 | .66 | .61 | .74 | .43 | .66 | .66 | .56 | .48 |
| .40 | .29 | .46 | .48 | .38 | .40 | .48 | .19 | .35 | .35 | .35 | .39 | .58 | .35 | .32 | .24 | .45 | .15 | .29 | .29 | .09 | .05 |
| .30 | .32 | .35 | .38 | .32 | .33 | .30 | .21 | .33 | .33 | .36 | .34 | .31 | .29 | .30 | .29 | .37 | .17 | .26 | .26 | .09 | .05 |
| .18 | .31 | .28 | .33 | .22 | .19 | .13 | .10 | .27 | .27 | .31 | .21 | .14 | .14 | .22 | .21 | .25 | .02 | .22 | .22 | .02 | -.01 |
| .10 | .19 | .18 | .23 | .14 | .13 | .09 | .15 | .17 | .17 | .23 | .15 | .06 | .12 | .19 | .25 | .19 | .05 | .13 | .13 | -.04 | -.08 |
| .10 | .20 | .13 | .17 | .11 | .09 | .07 | -.07 | .16 | .16 | .18 | .12 | .09 | .05 | .07 | .04 | .15 | -.04 | .10 | .10 | -.06 | -.06 |
| -.13 | -.02 | -.10 | -.10 | .05 | .06 | -.03 | .13 | .00 | .00 | .01 | .05 | -.03 | -.02 | -.07 | -.03 | -.05 | .10 | -.18 | -.18 | -.24 | -.23 |
| .53 | .56 | .41 | .53 | .38 | .29 | .14 | .11 | .37 | .37 | .41 | .26 | .14 | .13 | .24 | .17 | .30 | -.10 | .62 | .62 | .50 | .51 |
| .53 | .56 | .41 | .53 | .38 | .29 | .14 | .11 | .37 | .37 | .41 | .26 | .14 | .13 | .24 | .17 | .30 | -.10 | .62 | .62 | .50 | .51 |
| .52 | .58 | .34 | .46 | .39 | .20 | .03 | .10 | .32 | .32 | .35 | .23 | .04 | .06 | .15 | .09 | .20 | -.08 | .62 | .62 | .65 | .67 |
| .51 | .48 | .21 | .32 | .25 | .12 | -.02 | -.08 | .26 | .26 | .28 | .17 | -.01 | -.01 | .06 | -.01 | .13 | -.13 | .59 | .59 | .63 | .72 |

K=4 L=2

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .85 | .51 | .37 | .46 | .33 | .43 | .41 | .06 | .33 | .33 | .39 | .37 | .37 | .34 | .35 | .32 | .45 | .11 | .77 | .77 | .47 | .64 |
| .59 | .93 | .62 | .76 | .76 | .44 | .18 | .29 | .56 | .56 | .58 | .54 | .23 | .31 | .43 | .37 | .37 | .02 | .69 | .69 | .61 | .52 |
| .56 | .69 | .76 | .73 | .61 | .35 | .25 | .21 | .55 | .55 | .57 | .49 | .47 | .31 | .49 | .42 | .45 | .08 | .63 | .63 | .35 | .25 |
| .46 | .61 | .49 | .85 | .55 | .36 | .26 | .29 | .27 | .27 | .31 | .28 | .24 | .18 | .30 | .30 | .25 | -.06 | .58 | .58 | .29 | .19 |
| .54 | .83 | .64 | .83 | .82 | .47 | .28 | .39 | .47 | .47 | .49 | .53 | .33 | .29 | .38 | .36 | .26 | -.00 | .63 | .63 | .55 | .36 |
| .80 | .65 | .54 | .77 | .63 | .71 | .65 | .44 | .40 | .40 | .46 | .52 | .51 | .57 | .55 | .54 | .56 | .25 | .75 | .75 | .40 | .40 |
| .65 | .23 | .31 | .49 | .29 | .56 | .77 | .22 | .17 | .17 | .20 | .32 | .68 | .56 | .42 | .35 | .59 | .40 | .46 | .46 | -.02 | .11 |
| .35 | .43 | .36 | .65 | .50 | .40 | .28 | .70 | .07 | .07 | .15 | .17 | .08 | .31 | .39 | .54 | .26 | .16 | .49 | .49 | .30 | .10 |
| .71 | .86 | .84 | .69 | .73 | .49 | .30 | .17 | .86 | .86 | .88 | .80 | .52 | .48 | .64 | .54 | .55 | .15 | .70 | .70 | .54 | .50 |
| .71 | .86 | .84 | .69 | .73 | .49 | .30 | .17 | .86 | .86 | .88 | .80 | .52 | .48 | .64 | .54 | .55 | .15 | .70 | .70 | .54 | .50 |
| .74 | .85 | .82 | .71 | .71 | .52 | .31 | .23 | .84 | .84 | .89 | .78 | .47 | .50 | .67 | .61 | .57 | .16 | .75 | .75 | .56 | .52 |
| .77 | .84 | .78 | .74 | .80 | .62 | .47 | .28 | .79 | .79 | .81 | .83 | .57 | .55 | .62 | .56 | .52 | .22 | .72 | .72 | .55 | .50 |
| .53 | .25 | .46 | .37 | .28 | .35 | .60 | -.04 | .32 | .32 | .30 | .35 | .84 | .48 | .39 | .20 | .63 | .35 | .29 | .29 | -.13 | .01 |
| .64 | .44 | .45 | .49 | .36 | .51 | .60 | .31 | .35 | .35 | .40 | .41 | .60 | .68 | .63 | .55 | .80 | .56 | .50 | .50 | .07 | .21 |
| .62 | .55 | .60 | .60 | .42 | .45 | .42 | .33 | .45 | .45 | .52 | .43 | .48 | .58 | .68 | .64 | .75 | .44 | .60 | .60 | .19 | .25 |
| .59 | .49 | .53 | .59 | .41 | .46 | .37 | .50 | .38 | .38 | .49 | .40 | .29 | .53 | .65 | .75 | .60 | .38 | .62 | .62 | .27 | .24 |
| .50 | .33 | .35 | .30 | .15 | .30 | .42 | .08 | .27 | .27 | .30 | .24 | .51 | .55 | .53 | .40 | .79 | .52 | .36 | .36 | -.07 | .14 |
| .15 | -.03 | .01 | -.07 | -.12 | .07 | .27 | .01 | -.02 | .02 | .00 | .02 | .28 | .36 | .28 | .23 | .53 | .70 | .01 | .01 | -.29 | -.08 |
| .75 | .59 | .41 | .58 | .40 | .37 | .23 | .16 | .31 | .31 | .38 | .31 | .16 | .20 | .31 | .33 | .29 | -.04 | .83 | .83 | .60 | .65 |
| .75 | .59 | .41 | .58 | .40 | .37 | .23 | .16 | .31 | .31 | .38 | .31 | .16 | .20 | .31 | .33 | .29 | -.04 | .83 | .83 | .60 | .65 |
| .54 | .55 | .24 | .36 | .38 | .14 | -.09 | .08 | .20 | .20 | .25 | .20 | -.12 | -.10 | .03 | .10 | -.06 | -.24 | .68 | .68 | .75 | .73 |
| .60 | .40 | .08 | .15 | .14 | .09 | -.04 | -.14 | .15 | .15 | .19 | .13 | -.06 | -.04 | .02 | .02 | .08 | -.11 | .63 | .63 | .63 | .81 |

=4 L=3

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .96 | .62 | .60 | .72 | .55 | .66 | .57 | .37 | .49 | .49 | .54 | .54 | .47 | .55 | .61 | .57 | .55 | .24 | .94 | .94 | .74 | .83 |
| .62 | .97 | .69 | .79 | .85 | .56 | .23 | .43 | .70 | .70 | .72 | .68 | .24 | .39 | .54 | .49 | .36 | .04 | .74 | .74 | .74 | .61 |
| .67 | .76 | .92 | .88 | .75 | .54 | .40 | .43 | .71 | .71 | .73 | .65 | .52 | .47 | .70 | .63 | .51 | .17 | .77 | .77 | .55 | .42 |
| .59 | .68 | .65 | .92 | .70 | .57 | .41 | .52 | .43 | .43 | .46 | .45 | .33 | .37 | .50 | .49 | .34 | .05 | .73 | .73 | .50 | .37 |
| .59 | .87 | .72 | .87 | .92 | .62 | .36 | .55 | .63 | .63 | .63 | .69 | .35 | .38 | .49 | .47 | .27 | .01 | .70 | .70 | .68 | .46 |
| .87 | .72 | .69 | .92 | .78 | .89 | .75 | .72 | .53 | .53 | .58 | .66 | .56 | .72 | .74 | .74 | .60 | .30 | .86 | .86 | .58 | .53 |
| .80 | .35 | .54 | .73 | .49 | .79 | .94 | .56 | .28 | .28 | .31 | .45 | .79 | .81 | .70 | .61 | .73 | .54 | .63 | .63 | .20 | .30 |
| .40 | .43 | .40 | .67 | .51 | .51 | .37 | .86 | .14 | .14 | .22 | .25 | .15 | .44 | .52 | .67 | .33 | .25 | .51 | .51 | .34 | .16 |
| .67 | .88 | .86 | .71 | .80 | .55 | .29 | .27 | .97 | .97 | .97 | .89 | .44 | .48 | .68 | .60 | .45 | .06 | .71 | .71 | .63 | .53 |
| .67 | .88 | .86 | .71 | .80 | .55 | .29 | .27 | .97 | .97 | .97 | .89 | .44 | .48 | .68 | .60 | .45 | .06 | .71 | .71 | .63 | .53 |
| .69 | .87 | .84 | .72 | .77 | .58 | .29 | .34 | .94 | .94 | .97 | .88 | .39 | .50 | .71 | .69 | .46 | .07 | .74 | .74 | .65 | .55 |
| .74 | .87 | .82 | .77 | .89 | .70 | .46 | .42 | .90 | .90 | .91 | .95 | .50 | .56 | .67 | .65 | .43 | .13 | .73 | .73 | .66 | .53 |
| .71 | .37 | .71 | .67 | .51 | .62 | .83 | .30 | .46 | .46 | .43 | .52 | .95 | .77 | .72 | .49 | .79 | .54 | .51 | .51 | .13 | .23 |
| .73 | .51 | .60 | .67 | .50 | .70 | .74 | .61 | .44 | .44 | .48 | .50 | .68 | .91 | .89 | .80 | .91 | .70 | .61 | .61 | .23 | .35 |
| .70 | .60 | .73 | .74 | .53 | .61 | .55 | .60 | .55 | .55 | .61 | .52 | .54 | .77 | .91 | .87 | .82 | .56 | .70 | .70 | .34 | .38 |
| .61 | .51 | .60 | .66 | .47 | .57 | .44 | .71 | .45 | .45 | .55 | .47 | .32 | .65 | .81 | .93 | .63 | .46 | .66 | .66 | .36 | .32 |
| .64 | .42 | .55 | .53 | .31 | .51 | .60 | .40 | .36 | .36 | .40 | .34 | .62 | .83 | .84 | .69 | .95 | .74 | .53 | .53 | .13 | .33 |
| .27 | .04 | .16 | .14 | -.01 | .20 | .40 | .25 | -.01 | -.01 | .01 | .04 | .38 | .59 | .52 | .46 | .70 | .94 | .14 | .14 | -.13 | .08 |
| .84 | .67 | .58 | .76 | .57 | .56 | .36 | .39 | .46 | .46 | .52 | .45 | .24 | .34 | .50 | .52 | .36 | .05 | .96 | .96 | .82 | .81 |
| .84 | .67 | .58 | .76 | .57 | .56 | .36 | .39 | .46 | .46 | .52 | .45 | .24 | .34 | .50 | .52 | .36 | .05 | .96 | .96 | .82 | .81 |
| .59 | .60 | .36 | .49 | .49 | .27 | .00 | .20 | .34 | .34 | .38 | .34 | -.07 | -.02 | .14 | .21 | -.02 | -.17 | .76 | .76 | .92 | .84 |
| .66 | .49 | .25 | .35 | .30 | .24 | .07 | .03 | .27 | .27 | .31 | .25 | .01 | .09 | .18 | .18 | .15 | .00 | .75 | .75 | .83 | .94 |

K=4 L=4

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.00 | .66 | .68 | .64 | .60 | .84 | .73 | .44 | .62 | .62 | .66 | .68 | .61 | .70 | .71 | .64 | .65 | .33 | .93 | .93 | .73 | .81 |
| .66 | 1.00 | .79 | .80 | .93 | .75 | .38 | .55 | .84 | .84 | .83 | .85 | .36 | .53 | .64 | .57 | .43 | .09 | .75 | .75 | .70 | .57 |
| .68 | .79 | 1.00 | .86 | .84 | .76 | .55 | .59 | .81 | .81 | .81 | .77 | .65 | .63 | .80 | .71 | .58 | .27 | .75 | .75 | .56 | .42 |
| .64 | .80 | .86 | 1.00 | .88 | .82 | .59 | .77 | .60 | .60 | .62 | .64 | .49 | .58 | .72 | .68 | .47 | .19 | .78 | .78 | .60 | .43 |
| .60 | .93 | .84 | .88 | 1.00 | .79 | .46 | .67 | .76 | .76 | .75 | .83 | .43 | .50 | .60 | .55 | .34 | .05 | .71 | .71 | .67 | .45 |
| .84 | .75 | .76 | .82 | .79 | 1.00 | .85 | .72 | .65 | .65 | .69 | .77 | .65 | .80 | .80 | .76 | .64 | .33 | .81 | .81 | .53 | .47 |
| .73 | .38 | .55 | .59 | .46 | .85 | 1.00 | .51 | .34 | .34 | .36 | .48 | .86 | .86 | .72 | .60 | .76 | .55 | .56 | .56 | .17 | .26 |
| .44 | .55 | .59 | .77 | .67 | .72 | .51 | 1.00 | .30 | .30 | .38 | .40 | .27 | .62 | .71 | .81 | .46 | .33 | .58 | .58 | .42 | .24 |
| .62 | .84 | .81 | .60 | .76 | .65 | .34 | .30 | 1.00 | 1.00 | .99 | .95 | .46 | .50 | .64 | .56 | .42 | .03 | .63 | .63 | .52 | .43 |
| .62 | .84 | .81 | .60 | .76 | .65 | .34 | .30 | 1.00 | 1.00 | .99 | .95 | .46 | .50 | .64 | .56 | .42 | .03 | .63 | .63 | .52 | .43 |
| .66 | .83 | .81 | .62 | .75 | .69 | .36 | .38 | .99 | .99 | 1.00 | .95 | .42 | .54 | .69 | .65 | .44 | .05 | .67 | .67 | .54 | .45 |
| .68 | .85 | .77 | .64 | .83 | .77 | .48 | .40 | .95 | .95 | .95 | 1.00 | .51 | .56 | .63 | .59 | .40 | .06 | .65 | .65 | .54 | .43 |
| .61 | .36 | .65 | .49 | .43 | .65 | .86 | .27 | .46 | .46 | .42 | .51 | 1.00 | .79 | .68 | .44 | .77 | .52 | .42 | .42 | .08 | .17 |
| .70 | .53 | .63 | .58 | .50 | .80 | .86 | .62 | .50 | .50 | .54 | .56 | .79 | 1.00 | .93 | .80 | .95 | .70 | .57 | .57 | .20 | .30 |
| .71 | .64 | .80 | .72 | .60 | .80 | .72 | .71 | .64 | .64 | .69 | .63 | .68 | .93 | 1.00 | .93 | .90 | .62 | .69 | .69 | .35 | .37 |
| .64 | .57 | .71 | .68 | .55 | .76 | .60 | .81 | .56 | .56 | .65 | .59 | .44 | .80 | .93 | 1.00 | .72 | .52 | .68 | .68 | .39 | .34 |
| .65 | .43 | .58 | .47 | .34 | .64 | .76 | .46 | .42 | .42 | .44 | .40 | .77 | .95 | .90 | .72 | 1.00 | .79 | .50 | .50 | .13 | .30 |
| .33 | .09 | .27 | .19 | .05 | .33 | .55 | .33 | .03 | .03 | .05 | .06 | .52 | .70 | .62 | .52 | .79 | 1.00 | .21 | .21 | -.02 | .14 |
| .93 | .75 | .75 | .78 | .71 | .81 | .56 | .58 | .63 | .63 | .67 | .65 | .42 | .57 | .69 | .68 | .50 | .21 | 1.00 | 1.00 | .87 | .84 |
| .93 | .75 | .75 | .78 | .71 | .81 | .56 | .58 | .63 | .63 | .67 | .65 | .42 | .57 | .69 | .68 | .50 | .21 | 1.00 | 1.00 | .87 | .84 |
| .73 | .70 | .56 | .60 | .67 | .53 | .17 | .42 | .52 | .52 | .54 | .54 | .08 | .20 | .35 | .39 | .13 | -.02 | .87 | .87 | 1.00 | .91 |
| .81 | .57 | .42 | .43 | .45 | .47 | .26 | .24 | .43 | .43 | .45 | .43 | .17 | .30 | .37 | .34 | .30 | .14 | .84 | .84 | .91 | 1.00 |

| | R | O | I | T |
|---|---|---|---|---|
| R | .90 | .85 | .90 | .30 |
| O | .85 | .80 | .20 | .30 |
| I | .90 | .20 | .75 | .70 |
| T | .30 | .30 | .70 | .60 |

CORMOD – MANAGEMENT MATRIX FOR PORT PROGRAM

# APPENDIX D

# MODEL CALCULATIONS

The model calculations are made on a step-by-step basis using the input data described in Section 3. Parameter values given in this report and referenced as necessary are used in the calculations. The final result will give two values, the expected net benefits and the risk in achieving those benefits for the sample portfolio. These two values may then be plotted as a single point on a benefit/risk map to be compared with other points or portfolios on the benefit/risk map. The sample portfolio is composed of just two coal conversion processes for arithmetic simplicity although the portfolio computer model can currently handle a portfolio of up to 22 processes. Data for the two processes are shown in Table D-1.*

## D.1 Portfolio Benefits and Costs

### D.1.1 Investment Cost

I(i,t): Investment cost cash flow for process i and time period t

Inv. Cost(i): Total undiscounted investment for process i as defined in this report.

CFP(t): Yearly cash flow percentages

$$I(i,t) = \text{Inv. Cost}(I) \times CFP(t) \qquad \text{(D-1)}$$

*See Appendix B for a complete description of the data requirements and process variables.

| | Process 1 | | Process 2 | |
|---|---|---|---|---|
| PROCESS NAMES | Slagging Lurgi | | HYGAS | |
| PROCESS ECONOMIC DATA | | | | |
| 1. Investment Cost | $920.5 MM | | $825.3 MM | |
| 2. Operating Cost | $102.6 MM | | $117.3 MM | |
| PROCESS RISK DATA | Descriptor | Risk | Descriptor | Risk |
| 1. Process Type | Pipeline Gas | 9 | Pipeline Gas | 9 |
| 2. Process Status | Commercial | 1 | Pilot Plant | 3 |
| 3. Coal Pretreatment | None | 0 | Oxidation | 1 |
| 4. Feedstock Technique | Lock Hoppers | 4 | Slurry | 7 |
| 5. Gasifier Type | Moving Bed | 2 | Fluidized Bed | 7 |
| 6. Liquefaction Type | N/A | 0 | N/A | 0 |
| 7. Reactor Temperature | 1500 - 1800°F | 5 | 1200 - 1800°F | 5 |
| 8. Reactor Pressure | 250 - 350 PSI | 2 | 1000 - 1500 PSI | 5 |
| 9. Reactor Complexity - No. of Stages | One | 4 | Four | 10 |
| 10. Reactor Complexity - No. of Unit Processes | Four | 4 | Six | 6 |
| 11. Mechanical Reliability - Redundancy | Very Good | 2 | Moderate | 6 |
| 12. Process Technical Feasibility | Very Good | 1 | Good - Moderate | 5 |
| 13. Scale-Up for Demonstration Plant | No Scale-Up | 0 | 100 | 4 |
| PROCESS CHARACTERISTICS | | | | |
| 1. Product Types | Pipeline Gas | | Pipeline Gas | |
| 2. Heating Value | 956.6 BTU/SCF | | 975.4 BTU/SCF | |
| 3. Plant Capacity | 250 MM SCF/Day | | 256.2 MM SCF/Day | |

Table D-1 Sample Calculation Processes and Data

$I(1,1) = (920.5)(.08) = 73.6$

$I(1,2) = (920.5)(.11) = 101.3$

$I(1,3) = (920.5)(.17) = 156.5$

$I(1,4) = (920.5)(.39) = 359.0$

$I(1,5) = (920.5)(.25) = 230.1$

$I(2,1) = (825.3)(.04) = 33.0$

$I(2,2) = (825.3)(.13) = 107.3$

$I(2,3) = (825.3)(.37) = 305.4$

$I(2,4) = (825.3)(.30) = 247.6$

$I(2,5) = (825.3)(.13) = 107.3$

$I(2,6) = (825.3)(.03) = 24.8$

$I(i)$: Present worth of the investment cost cash flows for process i discounted at rate r

$$I(i) = \sum_t I(i,t)e^{-rt} \qquad \text{(D-2)}$$

For $r = 0.10$

$$I(1) = 73.6e^{-.1} + 101.3e^{-.2} + 156.5e^{-.3} + 359.0e^{-.4} + 230.1e^{-.5}$$

$$I(1) = 66.60 + 82.94 + 115.94 + 240.64 + 139.56$$

$$I(1) = \$645.68 \text{ MM}$$

$$I(2) = 33.0e^{-.1} + 107.3e^{-.2} + 305.4e^{-.3} + 247.4e^{-.4} + 107.3e^{-.5} + 24.8e^{-.6}$$

$$I(2) = 29.86 + 87.85 + 226.25 + 165.97 + 13.61$$

$$I(2) = \$588.62 \text{ MM}$$

In other words, the present values of the investment costs for the two processes, Slagging Lurgi and HYGAS, are $645.8 MM and $588.62 MM respectively.

### D.1.2 Operating Cost

O(i,t): Operating cost cash flow for process i and period t

Op. Cost(i): Yearly operating cost as defined in this report

CFP(t): Yearly cash flow percentage

$$O(i,t) = \text{Op. Cost}(i) \times CFP(t) \qquad \text{(D-3)}$$

$$O(1,5) = (102.6)(.25) = 25.65$$
$$O(1,6) = (102.6)(.50) = 51.30$$
$$O(1,7) = (102.6)(1.00) = 102.60$$

.
.
.

$$O(1,25) = (102.6)(1.00) = 102.60$$

$$O(2,5) = (117.3)(.25) = 29.33$$
$$O(2,6) = (117.3)(.50) = 58.65$$
$$O(2,7) = (117.3)(1.00) = 117.30$$

.
.
.

$$O(2,25) = (117.3)(1.00) = 117.30$$

O(i): Present worth of operating cost cash flows for process i discounted at rate r

$$O(i) = \sum_t O(i,t)e^{-rt} \quad \text{(D-4)}$$

For r = 0.10

$$O(1) = 25.65e^{-.5} + 51.30e^{-.6} + 102.60e^{-.7} + \ldots + 102.60e^{-2.5}$$

O(1) = \$499.03 MM

$$O(2) = 29.33e^{-.5} + 58.65e^{-.6} + 117.30e^{-.7} + \ldots + 117.30e^{-2.5}$$

O(2) = \$570.53 MM

The present values of the operating costs for Lurgi* and HYGAS are \$499.03 and \$570.53 MM respectively.

D.1.3 Revenues

Rev(i): Yearly gross revenue stream as defined in this report

Rev(i) = Plant capacity(i) × Heating Value(i) × 330 days/year × Fuel Price(i) (D-5)

Rev(1) = (250 MM SCF/day)(956.6 BTU/SCF)(330 days/year)(\$4.00/ MM BTU)

Rev(1) = \$315.68 MM/year

Rev(2) = (256.2 MM SCF/day)(975.4 BTU SCF)(330 days/year)(\$4.00/ MM BTU)

Rev(2) = \$329.86 MM/year

---

*All references to Lurgi will be understood to mean the Slagging Lurgi Process.

Although the sample calculations above indicate a single product and price, the revenue calculations can easily accomodate multiple product streams and different market prices for each product.

R(i,t): Revenue cash flow for process i and period t

CFP(t): Yearly cash flow percentage

$$R(i,t) = Rev(i) \times CFP(t) \tag{D-6}$$

R(i): Present worth of the revenue cash flows for process i discounted at rate R

The revenue, R(i,t), is calculated equivalently to the operating costs, O(i,t). The discounting of these revenue cash flows is again equivalent. (Exponential discounting is used throughout the discounting calculations to reflect continuous cash flow.)

$$R(1) = \$1,534.54 \text{ MM}$$

$$R(2) = \$1,604.58 \text{ MM}$$

The present values of the revenue streams for Lurgi and HYGAS are $1,534.54 MM and $1,604.58 MM respectively.

### D.1.4 Time Costs

Time costs represent the costs of project delay. Two factors contribute to them: increased construction costs during the delay and a deferral of revenue because of the delay. A complete development of the time cost relationship in terms of these two factors is given in a previous report, English, et al (May, 1976).

The following formulas reflect this development and provide for calculating the present value of the time costs.

$E(T(i,d))$: Expected time costs for process i and delay d

$$E(T(i,1)) = 0.0625 \times I(i) + 0.155 \times (R(i)-O(i)) \quad \text{(D-7a)}$$

$$E(T(i,2)) = 0.0625 \times I(i) + 0.155 \times (R(i)-O(i)) \quad \text{(D-7b)}$$

$$E(T(i,3)) = 0.0375 \times I(i) + 0.093 \times (R(i)-O(i)) \quad \text{(D-7c)}$$

$$E(T(i,4)) = 0.025 \times I(i) + 0.062 \times (R(i)-O(i)) \quad \text{(D-7d)}$$

Using the present value results from Sections D.1.1 - D.1.3, the expected time costs are:

$$E(T(1,1)) = 200.86$$
$$E(T(1,2)) = 200.86$$
$$E(T(1,3)) = 120.52$$
$$E(T(1,4)) = 80.34$$

$$E(T(2,1)) = 197.06$$
$$E(T(2,2)) = 197.06$$
$$E(T(2,3)) = 118.24$$
$$E(T(2,4)) = 78.82$$

$T(i)$: Present worth of the time costs for process i discounted at rate r

$$T(i) = \sum_{t} T(i,d)e^{-rt} \quad \text{(D-8)}$$

For $r = 0.10$

$$T(1) = 200.86e^{-.6} + 200.86e^{-.7} + 120.52e^{-.8} + 80.34e^{-.9}$$

$$T(1) = \$296.79 \text{ MM}$$

$$T(2) = 197.06e^{-.6} + 197.06e^{-.7} + 118.24e^{-.8} + 78.82e^{-.9}$$

$$T(2) = \$291.18 \text{ MM}$$

The present values of the time costs for Lurgi and HYGAS are \$296.79 MM and \$291.18 MM respectively.

Parenthetically, it is easy to calculate the cost of a one year delay. Let the yearly delay cost be C(i)

$$C(i) = 0.125 \times I(i) + 0.31 \times (R(i)-O(i))$$

for Lurgi

$$C(1) = \$401.72 \text{ MM}$$

for HYGAS

$$C(2) = \$394.12 \text{ MM}$$

The expected time costs are significantly lower than the yearly cost of delay because the probability associated with a one, two, three, and four year delay is included in the expected time costs.

C.1.5 Portfolio Net Benefits (Unnormalized)

E(NB): Expected value of the portfolio net benefits

$$E(NB) = \sum_i R(i) - O(i) - I(i) - T(i) \qquad \text{(D-9)}$$

The present values calculated in the preceding sections are shown below.

| PROCESS | R(i) | O(i) | I(i) | T(i) |
|---|---|---|---|---|
| Lurgi | 1,534.54 | 499.03 | 645.68 | 296.79 |
| HYGAS | 1,604.58 | 570.53 | 588.62 | 291.18 |

$$E(NB) = (1{,}534.54 - 499.03 - 645.68 - 296.79) + (1{,}604.58 - 570.53 - 588.62 - 291.18)$$

$$E(NB) = 93.04 + 154.25$$

$$E(NB) = \$247.29 \text{ MM}$$

The E(NB) is the NPV of this portfolio based on the available input data. Since the NPV is positive, the internal ROR must be higher than 10%. (The internal rate of return is defined as that rate of return for which the present value is zero.) The E(NB) is one of the numbers which characterize the portfolio on the benefit/risk map.

If the financing arrangement between ERDA and the industry partners for each process is a straight 50/50 split, the model would simply apportion half the cash flow to ERDA and half to the industry partners. More complex financing alternatives can, of course, be easily accomodated by segmenting the positive and negative cash flows to conform to the specifics of the financing agreement. Therefore, the effect of sophisticated financing alternatives can be assessed for both ERDA and the potential industry partners.

## D.2 Portfolio Risk

### D.2.1 Individual Process Risk

The purpose of the individual process risk is to translate the technical risk associated with each process into the risk associated with the four model variables.

Risk(1,j): Revenue risk, $j^{th}$ process

Risk(2,j): Operating cost risk, $j^{th}$ process

Risk(3,j): Investment cost risk, $j^{th}$ process

Risk(4,j): Time cost risk, $j^{th}$ process

$$\text{Risk}(i,j) = \sum_k W(i,k)d(j,k) \qquad \text{(D-10)}$$

W(i,k): Model variable weight for $i^{th}$ variable and $k^{th}$ process descriptor

d(j,k): Process descriptor value for $j^{th}$ coal conversion process and $k^{th}$ process descriptor

Process descriptor values are shown in Table D-2. Model variable weights are shown in Table D-3. Using equation (D-10) the following calculations are made for the first process, Lurgi.

| PROCESS DESCRIPTORS | Lurgi | HYGAS |
|---|---|---|
| 1. Process Type | 9 | 9 |
| 2. Process Status | 1 | 3 |
| 3. Coal Pretreatment | 0 | 1 |
| 4. Feedstock Technique | 4 | 7 |
| 5. Gasifier Type | 2 | 7 |
| 6. Liquefaction Type | 0 | 0 |
| 7. Reactor Temperature | 5 | 5 |
| 8. Reactor Pressure | 2 | 5 |
| 9. Reactor Complexity - No. of Stages | 4 | 10 |
| 10. Reactor Complexity - No. of Unit Processes | 4 | 6 |
| 11. Mechanical Reliability - Redundancy | 2 | 6 |
| 12. Process Technical Feasibility | 1 | 5 |
| 13. Scale-up for Demonstration Plant | 0 | 4 |

Table D-2 Process Descriptor Values

| PROCESS DESCRIPTORS | REVENUE | OPERATING COST | INVESTMENT COST | TIME COST |
|---|---|---|---|---|
| 1. Process Type | 10 | 7 | 8 | 8 |
| 2. Process Status | 0 | 7 | 10 | 10 |
| 3. Coal Pretreatment | 0 | 4 | 2 | 2 |
| 4. Feedstock Technique | 2 | 5 | 4 | 6 |
| 5. Gasifier Type | 8 | 8 | 10 | 8 |
| 6. Liquefaction Type | 10 | 9 | 9 | 10 |
| 7. Reactor Temperature | 3 | 5 | 4 | 1 |
| 8. Reactor Pressure | 4 | 8 | 6 | 4 |
| 9. Reactor Complexity - No. of Stages | 2 | 8 | 8 | 6 |
| 10. Reactor Complexity - No. of Unit Processes | 4 | 10 | 10 | 10 |
| 11. Mechanical Reliability - Redundancy | 10 | 10 | 5 | 3 |
| 12. Process Technical Feasibility | 10 | 7 | 8 | 5 |
| 13. Scale-up for Demonstration Plant | 0 | 5 | 8 | 10 |

Table D-3 Model Variable Weights for Lurgi and HYGAS

$$Risk(1,1) = (10)(9) + (0)(1) + (0)(0) + (2)(4) + (8)(2) + (10)(0) + (3)(5) + (4)(2) + (2)(4) + (4)(4) + (10)(2) + (10)(1) + (0)(0)$$

$$Risk(1,1) = 191$$

$$Risk(2,1) = (7)(9) + (7)(1) + (4)(0) + (5)(4) + (8)(2) + (9)(0) + (5)(5) + (8)(2) + (8)(4) + (10)(4) + (10)(2) + (7)(1) + (5)(0)$$

$$Risk(2,1) = 246$$

$$Risk(3,1) = (8)(9) + (10)(1) + (2)(0) + (4)(4) + (10)(2) + (9)(0) + (4)(5) + (6)(2) + (8)(4) + (10)(4) + (5)(2) + (8)(1) + (8)(0)$$

$$Risk(3,1) = 240$$

$$Risk(4,1) = (8)(9) + (10)(1) + (2)(0) + (6)(4) + (8)(2) + (10)(0) + (1)(5) + (4)(2) + (6)(4) + (10)(4) + (3)(2) + (5)(1) + (10)(0)$$

$$Risk(4,1) = 210$$

Similarly, for the second process, HYGAS,

$$Risk(1,2) = 349$$

$$Risk(2,2) = 499$$

$$Risk(3,2) = 494$$

$$Risk(4,2) = 430$$

The individual process risks are tabulated below.

| PROCESS | R(i) | O(i) | I(i) | T(i) |
|---|---|---|---|---|
| Lurgi | 191 | 246 | 240 | 210 |
| HYGAS | 349 | 499 | 494 | 430 |

These individual process risks can be scaled to represent $\sigma(i,j)$, using the 90% confidence estimates for the maximum and minimum process risks (see Table D-3).

$\sigma(i,j)$: Standard deviation for the $i^{th}$ model variable and the $j^{th}$ process

$$\sigma(i,j) = (Risk(i,j) - minrisk(i)(maxpct(i) - minpct(i))/(maxrisk(i) - minrisk(i) + minpct(i) \qquad (D\text{-}11)$$

maxpct(i): 90% confidence estimate - maximum percentage; $i^{th}$ variable

minpct(i): 90% confidence estimate - minimum percentage; $i^{th}$ variable

maxrisk(i): risk of the maximum risk process; $i^{th}$ variable

minrisk(i): risk of the minimum risk process; $i^{th}$ variable

The maxrisk(i) and minrisk(i) values must be determined. These risks are determined from the entire set of individual process risks for the twenty-two processes currently under consideration. These risks are shown in Table D-5.

| | | |
|---|---|---|
| Revenue | Maximum Underrun | - 30% |
| | Minimum Underrun | - 0% |
| Operating Cost | Maximum Overrun | - 50% |
| | Minimum Overrun | - 10% |
| Investment Cost | Maximum Overrun | - 100% |
| | Minimum Overrun | 10% |
| Time Cost | Maximum Overrun | - 100% |
| | Minimum Overrun | - 10% |

Table D-4 90% Confidence Estimates for Process Risks

| PROCESS NAMES | REVENUE | OPERATING COST | INVESTMENT COST | TIME COST |
|---|---|---|---|---|
| 1. COGAS | 340 | 418 | 435 | 386 |
| 2. Lurgi (Slagging) | 191 | 246 | 240 | 210 |
| 3. HYGAS | 349 | 499 | 494 | 430 |
| 4. Synthane | 302 | 441 | 430 | 396 |
| 5. Texaco | 284 | 351 | 338 | 289 |
| 6. Indust. Fuel Gas A | 209 | 255 | 250 | 203 |
| 7. Indust. Fuel Gas B | 281 | 338 | 246 | 285 |
| 8. Indust. Fuel Gas C | 308 | 439 | 412 | 356 |
| 9. Small Scale Fuel D | 161 | 203 | 190 | 153 |
| 10. Small Scale Fuel DX | 161 | 203 | 190 | 153 |
| 11. Small Scale Fuel E | 165 | 213 | 200 | 163 |
| 12. Small Scale Fuel F | 177 | 201 | 190 | 151 |
| 13. Utility Fuel Gas G | 260 | 325 | 348 | 284 |
| 14. Utility Fuel Gas H | 262 | 356 | 354 | 288 |
| 15. Utility Fuel Gas I | 255 | 379 | 372 | 315 |
| 16. Utility Fuel Gas J | 323 | 484 | 466 | 401 |
| 17. Utility Fuel Gas K | 220 | 344 | 362 | 304 |
| 18. Atmos. Fluidized Bed | 123 | 188 | 194 | 169 |
| 19. Coalcon - Old Cost | 347 | 453 | 456 | 423 |
| 20. Coalcon - New Cost | 347 | 453 | 456 | 423 |
| 21. SRC II | 363 | 464 | 449 | 409 |
| 22. Fischer - Tropsch | 354 | 447 | 447 | 411 |

Table D-5 Individual Process Risks

Visually scanning Table D-5, the maxrisk(i) and minrisk(i) values are:

| | Revenue | Operating Cost | Investment Cost | Time Cost |
|---|---|---|---|---|
| maxrisk | 363 | 499 | 494 | 430 |
| minrisk | 123 | 188 | 190 | 151 |

Using Eqn. (D-11) to calculate the standard deviation, $\sigma(i,j)$:

$$\sigma(1,1) = (191-123)(0.30-0.00)/(363-123) + 0.00$$

$$\sigma(1,1) = 0.085$$

$$\sigma(2,1) = (246-188)(0.50-0.10)/(499-188) + 0.10$$

$$\sigma(2,1) = 0.175$$

$$\sigma(3,1) = (240-190)(1.00-0.10)/(494-190) + 0.10$$

$$\sigma(3,1) = 0.248$$

$$\sigma(4,1) = (210-151)(1.00-0.10)/(430-151) + 0.10$$

$$\sigma(4,1) = 0.290$$

Similarly, for the second process, HYGAS,

$$\sigma(1,2) = 0.282$$

$$\sigma(2,2) = 0.500$$

$$\sigma(3,2) = 1.000$$

$$\sigma(4,2) = 1.000$$

The individual process standard deviations are tabulated below.

| PROCESS | R(i) | O(i) | I(i) | T(i) |
|---|---|---|---|---|
| Lurgi | 0.085 | 0.175 | 0.248 | 0.290 |
| HYGAS | 0.282 | 0.500 | 1.000 | 1.000 |

The standard deviations reflect the relative riskiness of each process based on technical characteristics alone. The variance, calculated below, combines process technical risk with process economics to provide a measure of investment risk for each process.

$V(i,j)$: Variance of $i^{th}$ model variable and $j^{th}$ process

$$V(1,j) = \sigma(1,j) \cdot \sigma(1,j) \cdot R(j) \cdot R(j) \quad \text{(D-12a)}$$

$$V(2,j) = \sigma(2,j) \cdot \sigma(2,j) \cdot O(j) \cdot O(j) \quad \text{(D-12b)}$$

$$V(3,j) = \sigma(3,j) \cdot \sigma(3,j) \cdot I(j) \cdot I(j) \quad \text{(D-12c)}$$

$$V(4,j) = \sigma(4,j) \cdot \sigma(4,j) \cdot T(j) \cdot T(j) \quad \text{(D-12d)}$$

Using the calculated values for $\sigma(i,j)$, $R(j)$, $O(j)$, $I(j)$ and $T(j)$:

$$V(1,1) = (0.085)(0.085)(1534.54)(1534.54)$$

$$V(1,1) = 17,013$$

$$V(2,1) = (0.175)(0.175)(499.03)(499.03)$$

$$V(2,1) = 7,626$$

$$V(3,1) = (0.248)(0.248)(645.68)(645.68)$$

$$V(3,1) = 25,641$$

$V(4,1) = (0.290)(0.290)(296.79)(296.79)$

$V(4,1) = 7,407$

Similarly, for the second process,

$$V(1,2) = 204.748$$
$$V(2,2) = 81,376$$
$$V(3,2) = 346,473$$
$$V(4,2) = 84,785$$

Individual process risks are tabulated below. The units are $(\$MM)^2$.

| PROCESS | R(i) | O(i) | I(i) | T(i) |
|---|---|---|---|---|
| Lurgi | 17,013 | 7,626 | 25,641 | 7,407 |
| HYGAS | 204,748 | 81,376 | 346,473 | 84,785 |

D.2.2 Interrelated Process Risk

The correlation coefficient, $\rho$, provides the link between processes. The value of $\rho$ describes to what extent any pair of processes is related. The bounding values of $\rho$ are given below.

$$-1 \leq \rho \leq 1$$

If $\rho$ approaches 1 for processes A and B, it means that if process A is successful, there is a good chance process B will be successful and vice-versa. If $\rho \simeq 0$, it means that process A and B are unrelated so the success or failure of one says nothing about the potential success or failure of the other. The value of $\rho$ is calculated by Eqn. (D-13).

$$\frac{\sum_k (X(i,k)-\overline{X}(i)(Y(j,k)-\overline{Y}(j))}{\left|\sum_k (X(i,k)-\overline{X}(i)^2 \cdot \sum_k (Y(j,k)-\overline{Y}Ij)^2\right|^{1/2}} \qquad \text{(D-13)}$$

$\rho(X(i),Y(j))$: Correlation coefficient between model variable X, process i and model variable Y, process j.

$X(i,k),Y(j,k)$: Model variable R,O,I or T for process i or j, process descriptor k.

$X(i),Y(j)$: Individual process risks divided by the number of process descriptors (average process i or j risk).

For example, let X be the revenue, R.

$$\overline{R}(i) = Risk(1,i)/13$$

For Lurgi and HYGAS, the average process risks are:

$$\overline{R}(1) = 191/13 = 14.69$$

$$\overline{R}(2) = 246/13 = 18.92$$

Since X and Y can represent any combination of the four model variables between any two processes, there are 64 $(4+4)^2$ correlation coefficients for any two processes. These 64 correlation coefficients can be shown in a matrix. The matrix for Lurgi and HYGAS is shown in Table D-6. The

| | R(1) | O(1) | I(1) | T(1) | R(2) | O(2) | I(2) | T(2) |
|---|---|---|---|---|---|---|---|---|
| R(1) | 1 | .84 | .87 | .86 | .82 | .49 | .51 | .54 |
| O(1) | .84 | 1 | .98 | .93 | .66 | .74 | .70 | .69 |
| I(1) | .87 | .98 | 1 | .97 | .66 | .69 | .74 | .76 |
| T(1) | .86 | .93 | .97 | 1 | .62 | .62 | .69 | .79 |
| R(2) | .82 | .66 | .66 | .62 | 1 | .66 | .60 | .50 |
| O(2) | .49 | .74 | .69 | .62 | .66 | 1 | .89 | .76 |
| I(2) | .51 | .70 | .74 | .69 | .60 | .89 | 1 | .92 |
| T(2) | .54 | .69 | .76 | .79 | .50 | .76 | .92 | 1 |

Table D-6 Correlation Coefficient Matrix - Lurgi and HYGAS matrix is symmetric because the correlation of two variables is the same regardless of the order in which they are considered. The diagonal elements are 1 because the correlation of any variable with itself is perfect, i.e., unity. A sample calculation for one of these correlation coefficients is given below.

For example, the $\rho$'s for the investment cost of Lurgi, I(1), and of HYGAS, I(2), are:

$$\bar{I}(1) = 18.46$$

$$\bar{I}(2) = 38.00$$

$$\begin{aligned}\rho(I(1),I(2)) = \Big[&((8\cdot9)-18.46)(8\cdot9)-38.00) + ((10\cdot1)-18.46)((10\cdot3)-38.00)\\ &+ ((2\cdot0)-18.46)((2\cdot1)-38.00) + ((4\cdot4)-18.46)((4\cdot7)-38.00)\\ &+ ((10\cdot2)-18.46)((10\cdot7)-38.00) + ((9\cdot0)-18.46)((9\cdot0)-38.00)\\ &+ ((4\cdot5)-18.46)((4\cdot5)-38.00) + ((6\cdot2)-18.46)((6\cdot5)-38.00)\\ &+ ((8\cdot4)-18.46)((8\cdot10)-38.00 + ((10\cdot4)-18.46)((10\cdot6)-38.00)\\ &+ ((5\cdot2)-18.46)((5\cdot6)-38.00) + ((8\cdot1)-18.46)((8\cdot5)-38.00)\\ &+ ((8\ 0)-18.46)((8\ 4)-38.00)\Big] / \Big[(7824.00)\ (4841.23)\Big]^{\frac{1}{2}}\end{aligned}$$

$$\rho(I(1),I(2)) = 0.74$$

The correlation coefficients calculated above measure the technical relationship between two processes. The fact that each plant typically would be constructed and operated by two or more firms is reflected in a management matrix, CORMOD, shown on the following page.

| | R | O | I | T |
|---|---|---|---|---|
| R | 0.90 | 0.85 | 0.90 | 0.30 |
| O | 0.85 | 0.80 | 0.20 | 0.30 |
| I | 0.90 | 0.20 | 0.75 | 0.70 |
| T | 0.30 | 0.30 | 0.70 | 0.60 |

In addition, geographical differences are accounted for by a geographical factor which reduces the correlation coefficients for two different processes by 20%.

Using the correlation coefficients, Table D-6, the individual process risks (variances), the management matrix above and the geographical factor, the covariances which measure the dollar risk associated with process interrelationships can be calculated with Eqn. D-14.

$$Cov(X(i),Y(j)) = \rho(X(i),Y(j)) \cdot [V(X(i)) \cdot V(Y(j))]^{1/2} \cdot (CORMOD(X(i),Y(j)) \cdot \underset{i \neq j}{0.80} \quad \text{(D-14)}$$

The covariance matrix has the same dimensions as the correlation coefficient matrix. The covariance matrix for Lurgi and HYGAS is shown in Table D-7. A sample calculation is given below for the interrelated risk of investment, I(1), in Lurgi and investment, I(2), in HYGAS. The units of covariance are the same as for individual process risk, $(\$ MM)^2$.

$$Cov(I(1),I(2)) = (0.74)[25{,}641 \cdot 346{,}473]^{1/2}(0.75)(0.80)$$

$$Cov(I(1),I(2)) = 41{,}849$$

| | R(1) | O(1) | I(1) | T(1) | R(2) | O(2) | I(2) | T(2) |
|---|---|---|---|---|---|---|---|---|
| R(1) | 17013 | 9568 | 18171 | 9654 | 34846 | 12398 | 28192 | 4922 |
| O(1) | 9568 | 7626 | 13704 | 6990 | 17734 | 11798 | 5757 | 4211 |
| I(1) | 18171 | 13704 | 25641 | 13368 | 34431 | 5043 | 41849 | 19844 |
| T(1) | 9654 | 6990 | 13368 | 7407 | 5795 | 3653 | 19575 | 9503 |
| R(2) | 34846 | 17734 | 34431 | 5795 | 204748 | 85193 | 159807 | 65878 |
| O(2) | 12398 | 11798 | 5043 | 3653 | 85193 | 81376 | 149442 | 63128 |
| I(2) | 28192 | 5757 | 41849 | 19575 | 159807 | 149442 | 346473 | 157682 |
| T(2) | 4922 | 4211 | 19844 | 9503 | 65878 | 63128 | 157681 | 84785 |

Table D-7 Covariance Matrix - Lurgi and HYGAS ($ MM)$^2$

D.2.3 Portfolio Risk Calculation

V(NB): Variance of the portfolio net benefits

$$V(NB) = \sum_i V(RIi)) + V(O(i)) + V(I(i)) + V(t(i))$$

$$- 2 \cdot \sum_{i,j} Cov(R(i),O(j)) + Cov(R(i),I(i))$$

$$+ Cov(R(i),T(j)) + 2 \cdot \sum_{i,j} Cov(O(i),I(j))$$

$$+ Cov(O(i),T(j)) + Cov(I(i),T(j))$$

$$+ 2 \cdot \sum_{i \neq j} Cov(R(i),R(j)) + Cov(O(i),O(j))$$

$$+ Cov(I(i),I(j)) + Cov(T(i),T(j)) \qquad (D-15)$$

Using values from the covariance matrix, Table D-7, the variance of the net benefits, V(NB), is calculated.

$$V(NB) = (17013 + 7626 + 25641 + 7407 + 204748$$

$$+ 81376 + 346473 + 84785)$$

$$- 2 \cdot (9568 + 18171 + 9654 + 12398 + 28192 + 4922$$

$$+ 85193 + 159807 + 65878 + 17734 + 34431 + 5795)$$

$$+ 2 \cdot (13704 + 6990 + 13368 + 5757 + 4211 + 19844$$

$$+ 149442 + 63128 + 157682 + 5043 + 3653 + 19575)$$

$$+ 2 \cdot (34846 + 11798 + 41849 + 9503)$$

$$= 775{,}069 - 903{,}486 + 924{,}794 + 195{,}992$$

$$V(NB) = 992{,}369 \ (\$\ MM)^2 = (\$996.18\ MM)^2$$

The V(NB) is the portfolio risk for two processes, Lurgi and HYGAS, based on the available input data. At the present time, this risk value should be considered only as a means of comparing the risk of this portfolio with the risk of others. It would be difficult to assign some probability to losing ($\$996.18\ MM)^2$, for example, until theoretical work with an appropriate probability density function is accomplished.

## D.3 Portfolio Results

The unnormalized portfolio results for the Lurgi-HYGAS portfolio are the expected net benefits calculated in D.1 and the variance of the net benefits calculated in D.2.

$$\text{Unnormalized portfolio benefit} = E(NB) = \$247.29\ MM$$

$$\text{Unnormalized portfolio risk} = V(NB) = (\$996.18\ MM)^2$$

The normalized results are calculated by: 1.) dividing the expected portfolio net benefits by the present worth of the portfolio investment costs, I(1) + I(2), and 2.) dividing the portfolio variance by the square of the present worth of the portfolio investment costs.

$$I(1) + I(2) = 645.68 + 588.62$$

$$I(1) + I(2) = \$1{,}234.30\ MM$$

$$\text{Normalized portfolio benefit} = 247.29 / 1{,}234.30 = 0.20$$

$$\text{Normalized portfolio risk} = (996.18)^2 / (1{,}234.30)^2 = 0.65$$

In order to compare these hand calculated results with those obtained by the computer program, the computer results are shown in Table D-8.

PORTFOLIO NO. 1

LURGI
HYGAS

BNETPORT = 247.35
RISKPORT = 9.9224E5
RISKSDPT = 996.11

BNETNORM = 0.20041
RISKNORM = 0.65136
RISKSDNM = 0.80707

PW OF COMM SCALE INVEST = 1234.2
DEMO PLANT CAPITAL REQMTS = 706

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 291946 | ¯124459 | ¯241688 | ¯86173 |
| ¯124459 | 112593 | 174401 | 78287 |
| ¯241688 | 174401 | 455699 | 209965 |
| ¯86173 | 78287 | 209965 | 111337 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 540 | 353 | 492 | 294 |
| 353 | 336 | 418 | 280 |
| 492 | 418 | 675 | 458 |
| 294 | 280 | 458 | 334 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .192 | ¯.082 | ¯.159 | ¯.057 |
| ¯.082 | .074 | .114 | .051 |
| ¯.159 | .114 | .299 | .138 |
| ¯.057 | .051 | .138 | .073 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .438 | .286 | .398 | .238 |
| .286 | .272 | .338 | .227 |
| .398 | .338 | .547 | .371 |
| .238 | .227 | .371 | .270 |

Table D-8 Computer Portfolio Results - Lurgi and HYGAS

# APPENDIX E

## TEN BASELINE PORTFOLIO RESULTS

Appendix E lists the detailed baseline portfolio results for the ten portfolio structures defined in Section 4. The normalized portfolio results plotted in Figure 4-1 are given by *BNETNORM* and *RISKNORM*. The unnormalized portfolio results plotted in Figure 4-2 are given by *BNETPORT* and *RISKPORT*. Riskport was scaled to 0 - 100 scaling before plotting.

PORTFOLIO NO. 1

LURGI
HYGAS
INDUST. FUEL GAS B
SMALL SCALE FUEL E
SMALL SCALE FUEL F
UTILITY FUEL GAS K
ATMOS FLUIDIZED BED
COALCON - NEW COST

BNETPORT = 684.96
RISKPORT = 1.9161E6
RISKSDPT = 1384.2

BNETNORM = 0.34429
RISKNORM = 0.48412
RISKSDNM = 0.69579

PW OF COMM SCALE INVEST = 1989.5
DEMO PLANT CAPITAL REQMTS = 1223.9

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 1008949 | ¯461871 | ¯625242 | ¯195953 |
| ¯461871 | 409583 | 334040 | 185926 |
| ¯625242 | 334040 | 864491 | 449010 |
| ¯195953 | 185926 | 449010 | 261269 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 1004 | 680 | 791 | 443 |
| 680 | 640 | 578 | 431 |
| 791 | 578 | 930 | 670 |
| 443 | 431 | 670 | 511 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .255 | ¯.117 | ¯.158 | ¯.050 |
| ¯.117 | .103 | .084 | .047 |
| ¯.158 | .084 | .218 | .113 |
| ¯.050 | .047 | .113 | .066 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .505 | .342 | .397 | .223 |
| .342 | .322 | .291 | .217 |
| .397 | .291 | .467 | .337 |
| .223 | .217 | .337 | .257 |

PORTFOLIO NO. 2

LURGI
SMALL SCALE FUEL E
SMALL SCALE FUEL F
UTILITY FUEL GAS K
ATMOS FLUIDIZED BED
COALCON - NEW COST

BNETPORT = 488.23
RISKPORT = 5.8025E5
RISKSDPT = 761.74

BNETNORM = 0.36827
RISKNORM = 0.33013
RISKSDNM = 0.57457

PW OF COMM SCALE INVEST = 1325.8
DEMO PLANT CAPITAL REQMTS = 664.9

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 351564 | ¯185189 | ¯200813 | ¯87976 |
| ¯185189 | 177642 | 132565 | 84861 |
| ¯200813 | 132565 | 210808 | 132298 |
| ¯87976 | 84861 | 132298 | 88747 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 593 | 430 | 448 | 297 |
| 430 | 421 | 364 | 291 |
| 448 | 364 | 459 | 364 |
| 297 | 291 | 364 | 298 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .200 | ¯.105 | ¯.114 | ¯.050 |
| ¯.105 | .101 | .075 | .048 |
| ¯.114 | .075 | .120 | .075 |
| ¯.050 | .048 | .075 | .050 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .447 | .325 | .338 | .224 |
| .325 | .318 | .275 | .220 |
| .338 | .275 | .346 | .274 |
| .224 | .220 | .274 | .225 |

PORTFOLIO NO. 3

INDUST. FUEL GAS B
SMALL SCALE FUEL E
SMALL SCALE FUEL F
UTILITY FUEL GAS K
ATMOS FLUIDIZED BED
COALCON - NEW COST

BNETPORT = 437.61
RISKPORT = 4.9977E5
RISKSDPT = 706.94

BNETNORM = 0.57944
RISKNORM = 0.87623
RISKSDNM = 0.93607

PW OF COMM SCALE INVEST = 755.22
DEMO PLANT CAPITAL REQMTS = 517.9

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 289344 | ¯155579 | ¯136942 | ¯69601 |
| ¯155579 | 156004 | 113158 | 72302 |
| ¯136942 | 113158 | 145405 | 96548 |
| ¯69601 | 72302 | 96548 | 69245 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 538 | 394 | 370 | 264 |
| 394 | 395 | 336 | 269 |
| 370 | 336 | 381 | 311 |
| 264 | 269 | 311 | 263 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .507 | ¯.273 | ¯.240 | ¯.122 |
| ¯.273 | .274 | .198 | .127 |
| ¯.240 | .198 | .255 | .169 |
| ¯.122 | .127 | .169 | .121 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .712 | .522 | .490 | .349 |
| .522 | .523 | .445 | .356 |
| .490 | .445 | .505 | .411 |
| .349 | .356 | .411 | .348 |

PORTFOLIO NO. 4

LURGI
HYGAS
ATMOS FLUIDIZED BED
COALCON - NEW COST

BNETPORT = 384.74
RISKPORT = 1.7154E6
RISKSDPT = 1309.7

BNETNORM = 0.21311
RISKNORM = 0.52632
RISKSDNM = 0.72548

PW OF COMM SCALE INVEST = 1805.3
DEMO PLANT CAPITAL REQMTS = 1050

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 814922 | ¯381274 | ¯545898 | ¯182891 |
| ¯381274 | 337615 | 313259 | 168467 |
| ¯545898 | 313259 | 793200 | 399713 |
| ¯182891 | 168467 | 399713 | 226898 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 903 | 617 | 739 | 428 |
| 617 | 581 | 560 | 410 |
| 739 | 560 | 891 | 632 |
| 428 | 410 | 632 | 476 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .250 | ¯.117 | ¯.167 | ¯.056 |
| ¯.117 | .104 | .096 | .052 |
| ¯.167 | .096 | .243 | .123 |
| ¯.056 | .052 | .123 | .070 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .500 | .342 | .409 | .237 |
| .342 | .322 | .310 | .227 |
| .409 | .310 | .493 | .350 |
| .237 | .227 | .350 | .264 |

LURGI
INDUST. FUEL GAS B
SMALL SCALE FUEL E
SMALL SCALE FUEL F
UTILITY FUEL GAS K
ATMOS FLUIDIZED BED
SRC

BNETPORT = 1302.8
RISKPORT = 1.8108E6
RISKSDPT = 1345.7

BNETNORM = 0.65223
RISKNORM = 0.45385
RISKSDNM = 0.67369

PW OF COMM SCALE INVEST = 1997.5
DEMO PLANT CAPITAL REQMTS = 773.32

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 1562479 | ¯485506 | ¯914802 | ¯516200 |
| ¯485506 | 256344 | 360058 | 236827 |
| ¯914802 | 360058 | 893413 | 616661 |
| ¯516200 | 236827 | 616661 | 504508 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 1250 | 697 | 956 | 718 |
| 697 | 506 | 600 | 487 |
| 956 | 600 | 945 | 785 |
| 718 | 487 | 785 | 710 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .392 | ¯.122 | ¯.229 | ¯.129 |
| ¯.122 | .064 | .090 | .059 |
| ¯.229 | .090 | .224 | .155 |
| ¯.129 | .059 | .155 | .126 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .626 | .349 | .479 | .360 |
| .349 | .253 | .300 | .244 |
| .479 | .300 | .473 | .393 |
| .360 | .244 | .393 | .356 |

PORTFOLIO NO. 6

LURGI
HYGAS
INDUST. FUEL GAS B
SMALL SCALE FUEL E
SMALL SCALE FUEL F
UTILITY FUEL GAS K
ATMOS FLUIDIZED BED
COALCON - NEW COST
SRC

BNETPORT = 1700.8
RISKPORT = 4.6322E6
RISKSDPT = 2152.2

BNETNORM = 0.5721
RISKNORM = 0.5241
RISKSDNM = 0.72395

PW OF COMM SCALE INVEST = 2972.9
DEMO PLANT CAPITAL REQMTS = 1484.3

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 3707308 | ¯1291897 | ¯2103158 | ¯813057 |
| ¯1291897 | 844984 | 749475 | 478658 |
| ¯2103158 | 749475 | 2294651 | 1383030 |
| ¯813057 | 478658 | 1383030 | 979117 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 1925 | 1137 | 1450 | 902 |
| 1137 | 919 | 866 | 692 |
| 1450 | 866 | 1515 | 1176 |
| 902 | 692 | 1176 | 990 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .419 | ¯.146 | ¯.238 | ¯.092 |
| ¯.146 | .096 | .085 | .054 |
| ¯.238 | .085 | .260 | .156 |
| ¯.092 | .054 | .156 | .111 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .648 | .382 | .488 | .303 |
| .382 | .309 | .291 | .233 |
| .488 | .291 | .510 | .396 |
| .303 | .233 | .396 | .333 |

PORTFOLIO NO. 7

LURGI
INDUST. FUEL GAS B
SMALL SCALE FUEL E
SMALL SCALE FUEL F
ATMOS FLUIDIZED BED
SRC

BNETPORT = 1054.6
RISKPORT = 1.7196E6
RISKSDPT = 1311.3

BNETNORM = 0.55178
RISKNORM = 0.47073
RISKSDNM = 0.6861

PW OF COMM SCALE INVEST = 1911.3
DEMO PLANT CAPITAL REQMTS = 732.32

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 1450034 | ¯460631 | ¯885802 | ¯512308 |
| ¯460631 | 236045 | 353629 | 232112 |
| ¯885802 | 353629 | 879808 | 604387 |
| ¯512308 | 232112 | 604387 | 490909 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 1204 | 679 | 941 | 716 |
| 679 | 486 | 595 | 482 |
| 941 | 595 | 938 | 777 |
| 716 | 482 | 777 | 701 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .397 | ¯.126 | ¯.242 | ¯.140 |
| ¯.126 | .065 | .097 | .064 |
| ¯.242 | .097 | .241 | .165 |
| ¯.140 | .064 | .165 | .134 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .630 | .355 | .492 | .374 |
| .355 | .254 | .311 | .252 |
| .492 | .311 | .491 | .407 |
| .374 | .252 | .407 | .367 |

PORTFOLIO NO. 8

LURGI
HYGAS
INDUST. FUEL GAS A
INDUST. FUEL GAS B
SMALL SCALE FUEL E
SMALL SCALE FUEL F
UTILITY FUEL GAS K
ATMOS FLUIDIZED BED
COALCON - NEW COST
SRC

BNETPORT = 1649.7
RISKPORT = 4.7022E6
RISKSDPT = 2168.4

BNETNORM = 0.52094
RISKNORM = 0.46891
RISKSDNM = 0.68477

PW OF COMM SCALE INVEST = 3166.7
DEMO PLANT CAPITAL REQMTS = 1596.3

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 3851606 | ¯1367122 | ¯2187247 | ¯823235 |
| ¯1367122 | 902528 | 766270 | 487126 |
| ¯2187247 | 766270 | 2373050 | 1414529 |
| ¯823235 | 487126 | 1414529 | 994328 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 1963 | 1169 | 1479 | 907 |
| 1169 | 950 | 875 | 698 |
| 1479 | 875 | 1540 | 1189 |
| 907 | 698 | 1189 | 997 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .384 | ¯.136 | ¯.218 | ¯.082 |
| ¯.136 | .090 | .076 | .049 |
| ¯.218 | .076 | .237 | .141 |
| ¯.082 | .049 | .141 | .099 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .620 | .369 | .467 | .287 |
| .369 | .300 | .276 | .220 |
| .467 | .276 | .486 | .376 |
| .287 | .220 | .376 | .315 |

PORTFOLIO NO. 9

LURGI
HYGAS
INDUST. FUEL GAS B
SMALL SCALE FUEL E
SMALL SCALE FUEL F
ATMOS FLUIDIZED BED

BNETPORT = 193.05
RISKPORT = 1.0283E6
RISKSDPT = 1014.1

BNETNORM = 0.12731
RISKNORM = 0.44724
RISKSDNM = 0.66876

PW OF COMM SCALE INVEST = 1516.3
DEMO PLANT CAPITAL REQMTS = 928.9

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 340670 | ¯152486 | ¯267044 | ¯89969 |
| ¯152486 | 138889 | 181893 | 81992 |
| ¯267044 | 181893 | 479813 | 221383 |
| ¯89969 | 81992 | 221383 | 117423 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 584 | 390 | 517 | 300 |
| 390 | 373 | 426 | 286 |
| 517 | 426 | 693 | 471 |
| 300 | 286 | 471 | 343 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .148 | ¯.066 | ¯.116 | ¯.039 |
| ¯.066 | .060 | .079 | .036 |
| ¯.116 | .079 | .209 | .096 |
| ¯.039 | .036 | .096 | .051 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .385 | .258 | .341 | .198 |
| .258 | .246 | .281 | .189 |
| .341 | .281 | .457 | .310 |
| .198 | .189 | .310 | .226 |

PORTFOLIO NO. 10

LURGI
INDUST. FUEL GAS B
ATMOS FLUIDIZED BED
SRC

BNETPORT = 1045
RISKPORT = 1.7168E6
RISKSDPT = 1310.3

BNETNORM = 0.55336
RISKNORM = 0.4814
RISKSDNM = 0.69383

PW OF COMM SCALE INVEST = 1888.5
DEMO PLANT CAPITAL REQMTS = 701.43

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 1442436 | ¯457107 | ¯882697 | ¯511744 |
| ¯457107 | 233430 | 353020 | 231681 |
| ¯882697 | 353020 | 877822 | 603293 |
| ¯511744 | 231681 | 603293 | 490258 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 1201 | 676 | 940 | 715 |
| 676 | 483 | 594 | 481 |
| 940 | 594 | 937 | 777 |
| 715 | 481 | 777 | 700 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .404 | ¯.128 | ¯.248 | ¯.143 |
| ¯.128 | .065 | .099 | .065 |
| ¯.248 | .099 | .246 | .169 |
| ¯.143 | .065 | .169 | .137 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .636 | .358 | .498 | .379 |
| .358 | .256 | .315 | .255 |
| .498 | .315 | .496 | .411 |
| .379 | .255 | .411 | .371 |

# APPENDIX F

## INDIVIDUAL PROCESS RESULTS

Appendix F lists the detailed portfolio results for the twenty-two individual sets of process data. Each portfolio is constructed of just a single process so that individual process benefits and risks can be compared.

PORTFOLIO NO. 1

COGAS

BNETPORT = ¯164.03
RISKPORT = 7.9227E5
RISKSDPT = 890.1

BNETNORM = ¯0.19668
RISKNORM = 1.1391
RISKSDNM = 1.0673

PW OF COMM SCALE INVEST = 833.98
DEMO PLANT CAPITAL REQMTS = 229

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 171397 | ¯71004 | ¯203495 | ¯66383 |
| ¯71004 | 48677 | 139671 | 48181 |
| ¯203495 | 139671 | 473772 | 169348 |
| ¯66383 | 48181 | 169348 | 65790 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 414 | 266 | 451 | 258 |
| 266 | 221 | 374 | 220 |
| 451 | 374 | 688 | 412 |
| 258 | 220 | 412 | 256 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .246 | ¯.102 | ¯.293 | ¯.095 |
| ¯.102 | .070 | .201 | .069 |
| ¯.293 | .201 | .681 | .243 |
| ¯.095 | .069 | .243 | .095 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .496 | .320 | .541 | .309 |
| .320 | .265 | .448 | .263 |
| .541 | .448 | .825 | .493 |
| .309 | .263 | .493 | .308 |

LURGI

BNETPORT = 93.037
RISKPORT = 50693
RISKSDPT = 225.15

BNETNORM = 0.14409
RISKNORM = 0.1216
RISKSDNM = 0.3487

PW OF COMM SCALE INVEST = 645.68
DEMO PLANT CAPITAL REQMTS = 249

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 17013 | ¯9545 | ¯18212 | ¯9613 |
| ¯9545 | 7592 | 13606 | 6946 |
| ¯18212 | 13606 | 25647 | 13327 |
| ¯9613 | 6946 | 13327 | 7425 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 130 | 98 | 135 | 98 |
| 98 | 87 | 117 | 83 |
| 135 | 117 | 160 | 115 |
| 98 | 83 | 115 | 86 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .041 | ¯.023 | ¯.044 | ¯.023 |
| ¯.023 | .018 | .033 | .017 |
| ¯.044 | .033 | .062 | .032 |
| ¯.023 | .017 | .032 | .018 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .202 | .151 | .209 | .152 |
| .151 | .135 | .181 | .129 |
| .209 | .181 | .248 | .179 |
| .152 | .129 | .179 | .133 |

PORTFOLIO NO. 3

HYGAS

BNETPORT = 154.31
RISKPORT = 8.3629E5
RISKSDPT = 914.49

BNETNORM = 0.26219
RISKNORM = 2.4142
RISKSDNM = 1.5538

PW OF COMM SCALE INVEST = 588.55
DEMO PLANT CAPITAL REQMTS = 457

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 205475 | ¯84973 | ¯160863 | ¯65830 |
| ¯84973 | 81375 | 150024 | 63443 |
| ¯160863 | 150024 | 346397 | 157325 |
| ¯65830 | 63443 | 157325 | 84788 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 453 | 292 | 401 | 257 |
| 292 | 285 | 387 | 252 |
| 401 | 387 | 589 | 397 |
| 257 | 252 | 397 | 291 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .593 | ¯.245 | ¯.464 | ¯.190 |
| ¯.245 | .235 | .433 | .183 |
| ¯.464 | .433 | 1.000 | .454 |
| ¯.190 | .183 | .454 | .245 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .770 | .495 | .681 | .436 |
| .495 | .485 | .658 | .428 |
| .681 | .658 | 1.000 | .674 |
| .436 | .428 | .674 | .495 |

PORTFOLIO NO. 4

SYNTHANE

BNETPORT = ¯46.328
RISKPORT = 7.8153E5
RISKSDPT = 884.04

BNETNORM = ¯0.056312
RISKNORM = 1.1547
RISKSDNM = 1.0746

PW OF COMM SCALE INVEST = 822.69
DEMO PLANT CAPITAL REQMTS = 210.8

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 115586 | ¯43876 | ¯171385 | ¯61015 |
| ¯43876 | 31004 | 104043 | 43887 |
| ¯171385 | 104043 | 444642 | 180550 |
| ¯61015 | 43887 | 180550 | 85895 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 340 | 209 | 414 | 247 |
| 209 | 176 | 323 | 209 |
| 414 | 323 | 667 | 425 |
| 247 | 209 | 425 | 293 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .171 | ¯.065 | ¯.253 | ¯.090 |
| ¯.065 | .046 | .154 | .065 |
| ¯.253 | .154 | .657 | .267 |
| ¯.090 | .065 | .267 | .127 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .413 | .255 | .503 | .300 |
| .255 | .214 | .392 | .255 |
| .503 | .392 | .811 | .516 |
| .300 | .255 | .516 | .356 |

PORTFOLIO NO. 5

TEXACO

BNETPORT = ¯298.6
RISKPORT = 3.0346E5
RISKSDPT = 550.87

BNETNORM = ¯0.38792
RISKNORM = 0.51216
RISKSDNM = 0.71566

PW OF COMM SCALE INVEST = 769.75
DEMO PLANT CAPITAL REQMTS = 209.5

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 107591 | ¯77708 | ¯115917 | ¯30709 |
| ¯77708 | 82315 | 109385 | 29900 |
| ¯115917 | 109385 | 171599 | 48016 |
| ¯30709 | 29900 | 48016 | 16020 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 328 | 279 | 340 | 175 |
| 279 | 287 | 331 | 173 |
| 340 | 331 | 414 | 219 |
| 175 | 173 | 219 | 127 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .182 | ¯.131 | ¯.196 | ¯.052 |
| ¯.131 | .139 | .185 | .050 |
| ¯.196 | .185 | .290 | .081 |
| ¯.052 | .050 | .081 | .027 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .426 | .362 | .442 | .228 |
| .362 | .373 | .430 | .225 |
| .442 | .430 | .538 | .285 |
| .228 | .225 | .285 | .164 |

PORTFOLIO NO. 6

INDUST. FUEL GAS A

BNETPORT = ¯51.152
RISKPORT = 7065.4
RISKSDPT = 84.056

BNETNORM = ¯0.26401
RISKNORM = 0.18821
RISKSDNM = 0.43383

PW OF COMM SCALE INVEST = 193.75
DEMO PLANT CAPITAL REQMTS = 112

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 3049 | ¯2601 | ¯2304 | ¯596 |
| ¯2601 | 3234 | 2736 | 711 |
| ¯2304 | 2736 | 2894 | 844 |
| ¯596 | 711 | 844 | 308 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 55 | 51 | 48 | 24 |
| 51 | 57 | 52 | 27 |
| 48 | 52 | 54 | 29 |
| 24 | 27 | 29 | 18 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .081 | ¯.069 | ¯.061 | ¯.016 |
| ¯.069 | .086 | .073 | .019 |
| ¯.061 | .073 | .077 | .022 |
| ¯.016 | .019 | .022 | .008 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .285 | .263 | .248 | .126 |
| .263 | .293 | .270 | .138 |
| .248 | .270 | .278 | .150 |
| .126 | .138 | .150 | .091 |

PORTFOLIO NO. 7

INDUST. FUEL GAS B

BNETPORT = 42.412
RISKPORT = 4778.7
RISKSDPT = 69.128

BNETNORM = 0.56441
RISKNORM = 0.84631
RISKSDNM = 0.91995

PW OF COMM SCALE INVEST = 75.144
DEMO PLANT CAPITAL REQMTS = 102

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 3971 | ¯2508 | ¯1987 | ¯828 |
| ¯2508 | 2131 | 1735 | 831 |
| ¯1987 | 1735 | 1782 | 930 |
| ¯828 | 831 | 930 | 547 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 63 | 50 | 45 | 29 |
| 50 | 46 | 42 | 29 |
| 45 | 42 | 42 | 30 |
| 29 | 29 | 30 | 23 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .703 | ¯.444 | ¯.352 | ¯.147 |
| ¯.444 | .377 | .307 | .147 |
| ¯.352 | .307 | .316 | .165 |
| ¯.147 | .147 | .165 | .097 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .839 | .666 | .593 | .383 |
| .666 | .614 | .554 | .384 |
| .593 | .554 | .562 | .406 |
| .383 | .384 | .406 | .311 |

PORTFOLIO NO. 8

INDUST. FUEL GAS C

BNETPORT = ¯170.28
RISKPORT = 1.187E5
RISKSDPT = 344.53

BNETNORM = ¯0.67387
RISKNORM = 1.859
RISKSDNM = 1.3635

PW OF COMM SCALE INVEST = 252.69
DEMO PLANT CAPITAL REQMTS = 194

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 20501 | ¯20050 | ¯15964 | ¯1859 |
| ¯20050 | 41537 | 34233 | 5948 |
| ¯15964 | 34233 | 36613 | 6850 |
| ¯1859 | 5948 | 6850 | 1737 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 143 | 142 | 126 | 43 |
| 142 | 204 | 185 | 77 |
| 126 | 185 | 191 | 83 |
| 43 | 77 | 83 | 42 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .321 | ¯.314 | ¯.250 | ¯.029 |
| ¯.314 | .651 | .536 | .093 |
| ¯.250 | .536 | .573 | .107 |
| ¯.029 | .093 | .107 | .027 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .567 | .560 | .500 | .171 |
| .560 | .807 | .732 | .305 |
| .500 | .732 | .757 | .328 |
| .171 | .305 | .328 | .165 |

PORTFOLIO NO. 9

SMALL SCALE FUEL D

BNETPORT = 5.1397
RISKPORT = 100.39
RISKSDPT = 10.02

BNETNORM = 0.14781
RISKNORM = 0.08303
RISKSDNM = 0.28815

PW OF COMM SCALE INVEST = 34.772
DEMO PLANT CAPITAL REQMTS = 47.2

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 37 | ¯39 | ¯14 | ¯7 |
| ¯39 | 75 | 28 | 13 |
| ¯14 | 28 | 12 | 6 |
| ¯7 | 13 | 6 | 3 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 6 | 6 | 4 | 3 |
| 6 | 9 | 5 | 4 |
| 4 | 5 | 3 | 2 |
| 3 | 4 | 2 | 2 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .031 | ¯.032 | ¯.012 | ¯.006 |
| ¯.032 | .062 | .023 | .011 |
| ¯.012 | .023 | .010 | .005 |
| ¯.006 | .011 | .005 | .002 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .175 | .179 | .108 | .076 |
| .179 | .249 | .153 | .102 |
| .108 | .153 | .100 | .069 |
| .076 | .102 | .069 | .049 |

PORTFOLIO NO. 10

SMALL SCALE FUEL DX

BNETPORT = ¯10.124
RISKPORT = 21.054
RISKSDPT = 4.5884

BNETNORM = ¯0.62751
RISKNORM = 0.080883
RISKSDNM = 0.2844

PW OF COMM SCALE INVEST = 16.134
DEMO PLANT CAPITAL REQMTS = 21.9

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 4 | ¯6 | ¯2 | ¯1 |
| ¯6 | 16 | 6 | 1 |
| ¯2 | 6 | 3 | 1 |
| ¯1 | 1 | 1 | 0 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 2 | 2 | 1 | 1 |
| 2 | 4 | 2 | 1 |
| 1 | 2 | 2 | 1 |
| 1 | 1 | 1 | 0 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .016 | ¯.023 | ¯.008 | ¯.002 |
| ¯.023 | .060 | .023 | .005 |
| ¯.008 | .023 | .010 | .002 |
| ¯.002 | .005 | .002 | .001 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .126 | .150 | .092 | .045 |
| .150 | .245 | .151 | .072 |
| .092 | .151 | .100 | .049 |
| .045 | .072 | .049 | .025 |

PORTFOLIO NO. 11

SMALL SCALE FUEL E

BNETPORT = 3.8583
RISKPORT = 25.13
RISKSDPT = 5.013

BNETNORM = 0.24588
RISKNORM = 0.10206
RISKSDNM = 0.31946

PW OF COMM SCALE INVEST = 15.692
DEMO PLANT CAPITAL REQMTS = 21.3

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 8 | ¯8 | ¯4 | ¯2 |
| ¯8 | 13 | 7 | 3 |
| ¯4 | 7 | 4 | 2 |
| ¯2 | 3 | 2 | 1 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 3 | 3 | 2 | 1 |
| 3 | 4 | 3 | 2 |
| 2 | 3 | 2 | 1 |
| 1 | 2 | 1 | 1 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .034 | ¯.031 | ¯.016 | ¯.008 |
| ¯.031 | .055 | .029 | .014 |
| ¯.016 | .029 | .017 | .009 |
| ¯.008 | .014 | .009 | .005 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .184 | .176 | .125 | .090 |
| .176 | .233 | .169 | .118 |
| .125 | .169 | .130 | .092 |
| .090 | .118 | .092 | .068 |

PORTFOLIO NO. 12

SMALL SCALE FUEL F

BNETPORT = 5.7418
RISKPORT = 4.1163
RISKSDPT = 2.0289

BNETNORM = 0.8085
RISKNORM = 0.081614
RISKSDNM = 0.28568

PW OF COMM SCALE INVEST = 7.1018
DEMO PLANT CAPITAL REQMTS = 9.6

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 7 | ¯5 | ¯1 | ¯1 |
| ¯5 | 6 | 2 | 1 |
| ¯1 | 2 | 1 | 0 |
| ¯1 | 1 | 0 | 0 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 3 | 2 | 1 | 1 |
| 2 | 2 | 1 | 1 |
| 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 0 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .133 | ¯.103 | ¯.029 | ¯.017 |
| ¯.103 | .118 | .032 | .019 |
| ¯.029 | .032 | .010 | .006 |
| ¯.017 | .019 | .006 | .004 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .365 | .321 | .169 | .131 |
| .321 | .344 | .178 | .137 |
| .169 | .178 | .100 | .079 |
| .131 | .137 | .079 | .066 |

PORTFOLIO NO. 13

UTILITY FUEL GAS G

BNETPORT = 164.43
RISKPORT = 5165.1
RISKSDPT = 71.869

BNETNORM = 3.0999
RISKNORM = 1.8358
RISKSDNM = 1.3549

PW OF COMM SCALE INVEST = 53.043
DEMO PLANT CAPITAL REQMTS = 36

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 5409 | ¯2262 | ¯1596 | ¯1590 |
| ¯2262 | 1518 | 1102 | 1229 |
| ¯1596 | 1102 | 907 | 1077 |
| ¯1590 | 1229 | 1077 | 1409 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 74 | 48 | 40 | 40 |
| 48 | 39 | 33 | 35 |
| 40 | 33 | 30 | 33 |
| 40 | 35 | 33 | 38 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 1.923 | ¯.804 | ¯.567 | ¯.565 |
| ¯.804 | .539 | .392 | .437 |
| ¯.567 | .392 | .322 | .383 |
| ¯.565 | .437 | .383 | .501 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| 1.387 | .897 | .753 | .752 |
| .897 | .734 | .626 | .661 |
| .753 | .626 | .568 | .619 |
| .752 | .661 | .619 | .708 |

PORTFOLIO NO. 14

UTILITY FUEL GAS H

BNETPORT = ¯253.72
RISKPORT = 49270
RISKSDPT = 221.97

BNETNORM = ¯0.9384
RISKNORM = 0.67401
RISKSDNM = 0.82098

PW OF COMM SCALE INVEST = 270.37
DEMO PLANT CAPITAL REQMTS = 130

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 2844 | ¯3011 | ¯4265 | ¯309 |
| ¯3011 | 6391 | 10850 | 1097 |
| ¯4265 | 10850 | 25062 | 2920 |
| ¯309 | 1097 | 2920 | 409 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 53 | 55 | 65 | 18 |
| 55 | 80 | 104 | 33 |
| 65 | 104 | 158 | 54 |
| 18 | 33 | 54 | 20 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .039 | ¯.041 | ¯.058 | ¯.004 |
| ¯.041 | .087 | .148 | .015 |
| ¯.058 | .148 | .343 | .040 |
| ¯.004 | .015 | .040 | .006 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .197 | .203 | .242 | .065 |
| .203 | .296 | .385 | .123 |
| .242 | .385 | .586 | .200 |
| .065 | .123 | .200 | .075 |

PORTFOLIO NO. 15

UTILITY FUEL GAS I

BNETPORT = 33.614
RISKPORT = 1398
RISKSDPT = 37.39

BNETNORM = 1.9838
RISKNORM = 4.8694
RISKSDNM = 2.2067

PW OF COMM SCALE INVEST = 16.944
DEMO PLANT CAPITAL REQMTS = 23

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 542 | ¯378 | ¯102 | ¯54 |
| ¯378 | 644 | 234 | 185 |
| ¯102 | 234 | 117 | 105 |
| ¯54 | 185 | 105 | 115 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 23 | 19 | 10 | 7 |
| 19 | 25 | 15 | 14 |
| 10 | 15 | 11 | 10 |
| 7 | 14 | 10 | 11 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 1.887 | ¯1.315 | ¯.357 | ¯.190 |
| ¯1.315 | 2.245 | .815 | .643 |
| ¯.357 | .815 | .408 | .367 |
| ¯.190 | .643 | .367 | .401 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| 1.374 | 1.147 | .597 | .435 |
| 1.147 | 1.498 | .903 | .802 |
| .597 | .903 | .639 | .606 |
| .435 | .802 | .606 | .633 |

PORTFOLIO NO. 16

UTILITY FUEL GAS J

BNETPORT = ¯167.03
RISKPORT = 3.1121E5
RISKSDPT = 557.86

BNETNORM = ¯0.50609
RISKNORM = 2.857
RISKSDNM = 1.6903

PW OF COMM SCALE INVEST = 330.04
DEMO PLANT CAPITAL REQMTS = 196

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 46112 | ¯42363 | ¯29774 | ¯4352 |
| ¯42363 | 85416 | 77592 | 17370 |
| ¯29774 | 77592 | 91618 | 22378 |
| ¯4352 | 17370 | 22378 | 6357 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 215 | 206 | 173 | 66 |
| 206 | 292 | 279 | 132 |
| 173 | 279 | 303 | 150 |
| 66 | 132 | 150 | 80 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .423 | ¯.389 | ¯.273 | ¯.040 |
| ¯.389 | .784 | .712 | .159 |
| ¯.273 | .712 | .841 | .205 |
| ¯.040 | .159 | .205 | .058 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .651 | .624 | .523 | .200 |
| .624 | .886 | .844 | .399 |
| .523 | .844 | .917 | .453 |
| .200 | .399 | .453 | .242 |

PORTFOLIO NO. 17

UTILITY FUEL GAS K

BNETPORT = 248.21
RISKPORT = 30248
RISKSDPT = 173.92

BNETNORM = 2.8796
RISKNORM = 4.0714
RISKSDNM = 2.0178

PW OF COMM SCALE INVEST = 86.194
DEMO PLANT CAPITAL REQMTS = 41

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 6944 | ¯2920 | ¯1287 | ¯817 |
| ¯2920 | 5346 | 3517 | 3758 |
| ¯1287 | 3517 | 2757 | 3232 |
| ¯817 | 3758 | 3232 | 4237 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 83 | 54 | 36 | 29 |
| 54 | 73 | 59 | 61 |
| 36 | 59 | 53 | 57 |
| 29 | 61 | 57 | 65 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .935 | ¯.393 | ¯.173 | ¯.110 |
| ¯.393 | .720 | .473 | .506 |
| ¯.173 | .473 | .371 | .435 |
| ¯.110 | .506 | .435 | .570 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .967 | .627 | .416 | .332 |
| .627 | .848 | .688 | .711 |
| .416 | .688 | .609 | .660 |
| .332 | .711 | .660 | .755 |

PORTFOLIO NO. 18

ATMOS FLUIDIZED BED

BNETPORT = ¯106.31
RISKPORT = 7289.1
RISKSDPT = 85.376

BNETNORM = ¯0.57724
RISKNORM = 0.21489
RISKSDNM = 0.46356

PW OF COMM SCALE INVEST = 184.18
DEMO PLANT CAPITAL REQMTS = 90

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 3762 | 1079 | 308 |
| 0 | 1079 | 424 | 139 |
| 0 | 308 | 139 | 51 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 61 | 33 | 18 |
| 0 | 33 | 21 | 12 |
| 0 | 18 | 12 | 7 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .000 | .000 | .000 | .000 |
| .000 | .111 | .032 | .009 |
| .000 | .032 | .013 | .004 |
| .000 | .009 | .004 | .002 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .000 | .000 | .000 | .000 |
| .000 | .333 | .178 | .095 |
| .000 | .178 | .112 | .064 |
| .000 | .095 | .064 | .039 |

PORTFOLIO NO. 19

COALCON - OLD COST

BNETPORT = 385.35
RISKPORT = 3.0575E5
RISKSDPT = 552.95

BNETNORM = 1.1616
RISKNORM = 2.7783
RISKSDNM = 1.6668

PW OF COMM SCALE INVEST = 331.74
DEMO PLANT CAPITAL REQMTS = 164

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 201365 | ¯98037 | ¯94277 | ¯69266 |
| ¯98037 | 77815 | 74096 | 57072 |
| ¯94277 | 74096 | 86681 | 69838 |
| ¯69266 | 57072 | 69838 | 61036 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 449 | 313 | 307 | 263 |
| 313 | 279 | 272 | 239 |
| 307 | 272 | 294 | 264 |
| 263 | 239 | 264 | 247 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 1.830 | ¯.891 | ¯.857 | ¯.629 |
| ¯.891 | .707 | .673 | .519 |
| ¯.857 | .673 | .788 | .635 |
| ¯.629 | .519 | .635 | .555 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| 1.353 | .944 | .926 | .793 |
| .944 | .841 | .821 | .720 |
| .926 | .821 | .887 | .797 |
| .793 | .720 | .797 | .745 |

PORTFOLIO NO. 20

COALCON - NEW COST

BNETPORT = 243.7
RISKPORT = 3.7603E5
RISKSDPT = 613.22

BNETNORM = 0.62985
RISKNORM = 2.5118
RISKSDNM = 1.5849

PW OF COMM SCALE INVEST = 386.92
DEMO PLANT CAPITAL REQMTS = 254

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 201365 | ¯114389 | ¯109959 | ¯64038 |
| ¯114389 | 105939 | 100835 | 61566 |
| ¯109959 | 100835 | 117916 | 75307 |
| ¯64038 | 61566 | 75307 | 52170 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 449 | 338 | 332 | 253 |
| 338 | 325 | 318 | 248 |
| 332 | 318 | 343 | 274 |
| 253 | 248 | 274 | 228 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 1.345 | ¯.764 | ¯.735 | ¯.428 |
| ¯.764 | .708 | .674 | .411 |
| ¯.735 | .674 | .788 | .503 |
| ¯.428 | .411 | .503 | .348 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| 1.160 | .874 | .857 | .654 |
| .874 | .841 | .821 | .641 |
| .857 | .821 | .887 | .709 |
| .654 | .641 | .709 | .590 |

PORTFOLIO NO. 21

SRC

BNETPORT = 1015.9
RISKPORT = 1.5386E6
RISKSDPT = 1240.4

BNETNORM = 1.0329
RISKNORM = 1.5907
RISKSDNM = 1.2612

PW OF COMM SCALE INVEST = 983.48
DEMO PLANT CAPITAL REQMTS = 260.43

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 1198586 | ¯367317 | ¯718777 | ¯474733 |
| ¯367317 | 182227 | 322278 | 213366 |
| ¯718777 | 322278 | 726685 | 520600 |
| ¯474733 | 213366 | 520600 | 440282 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 1095 | 606 | 848 | 689 |
| 606 | 427 | 568 | 462 |
| 848 | 568 | 852 | 722 |
| 689 | 462 | 722 | 664 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 1.239 | ¯.380 | ¯.743 | ¯.491 |
| ¯.380 | .188 | .333 | .221 |
| ¯.743 | .333 | .751 | .538 |
| ¯.491 | .221 | .538 | .455 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| 1.113 | .616 | .862 | .701 |
| .616 | .434 | .577 | .470 |
| .862 | .577 | .867 | .734 |
| .701 | .470 | .734 | .675 |

PORTFOLIO NO. 22

FISCHER-TROPSCH

BNETPORT = 37.087
RISKPORT = 1.7229E6
RISKSDPT = 1312.6

BNETNORM = 0.030999
RISKNORM = 1.2037
RISKSDNM = 1.0972

PW OF COMM SCALE INVEST = 1196.4
DEMO PLANT CAPITAL REQMTS = 325.8

COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| 594491 | ¯263944 | ¯631884 | ¯264428 |
| ¯263944 | 161219 | 377903 | 155542 |
| ¯631884 | 377903 | 1060708 | 465590 |
| ¯264428 | 155542 | 465590 | 228955 |

STD DEV MATRIX

| | | | |
|---|---|---|---|
| 771 | 514 | 795 | 514 |
| 514 | 402 | 615 | 394 |
| 795 | 615 | 1030 | 682 |
| 514 | 394 | 682 | 478 |

NORMALIZED COVARIANCE MATRIX

| | | | |
|---|---|---|---|
| .415 | ¯.184 | ¯.441 | ¯.185 |
| ¯.184 | .113 | .264 | .109 |
| ¯.441 | .264 | .741 | .325 |
| ¯.185 | .109 | .325 | .160 |

NORMALIZED STD DEV MATRIX

| | | | |
|---|---|---|---|
| .644 | .429 | .664 | .430 |
| .429 | .336 | .514 | .330 |
| .664 | .514 | .861 | .570 |
| .430 | .330 | .570 | .400 |

# APPENDIX G

## SENSITIVITY RESULTS FOR TEN BASELINE PORTFOLIOS

Appendix G lists the sensitivity results of each baseline portfolio to non-optimal process economics and risks. The interpretation of these figures is given in Section 4.4. In addition to the baseline portfolio sensitivities, the sensitivity of small scale industrial fuel gas processes is included. The Slagging Lurgi process is denoted as Lurgi and the SRC II process is denoted as SRC.

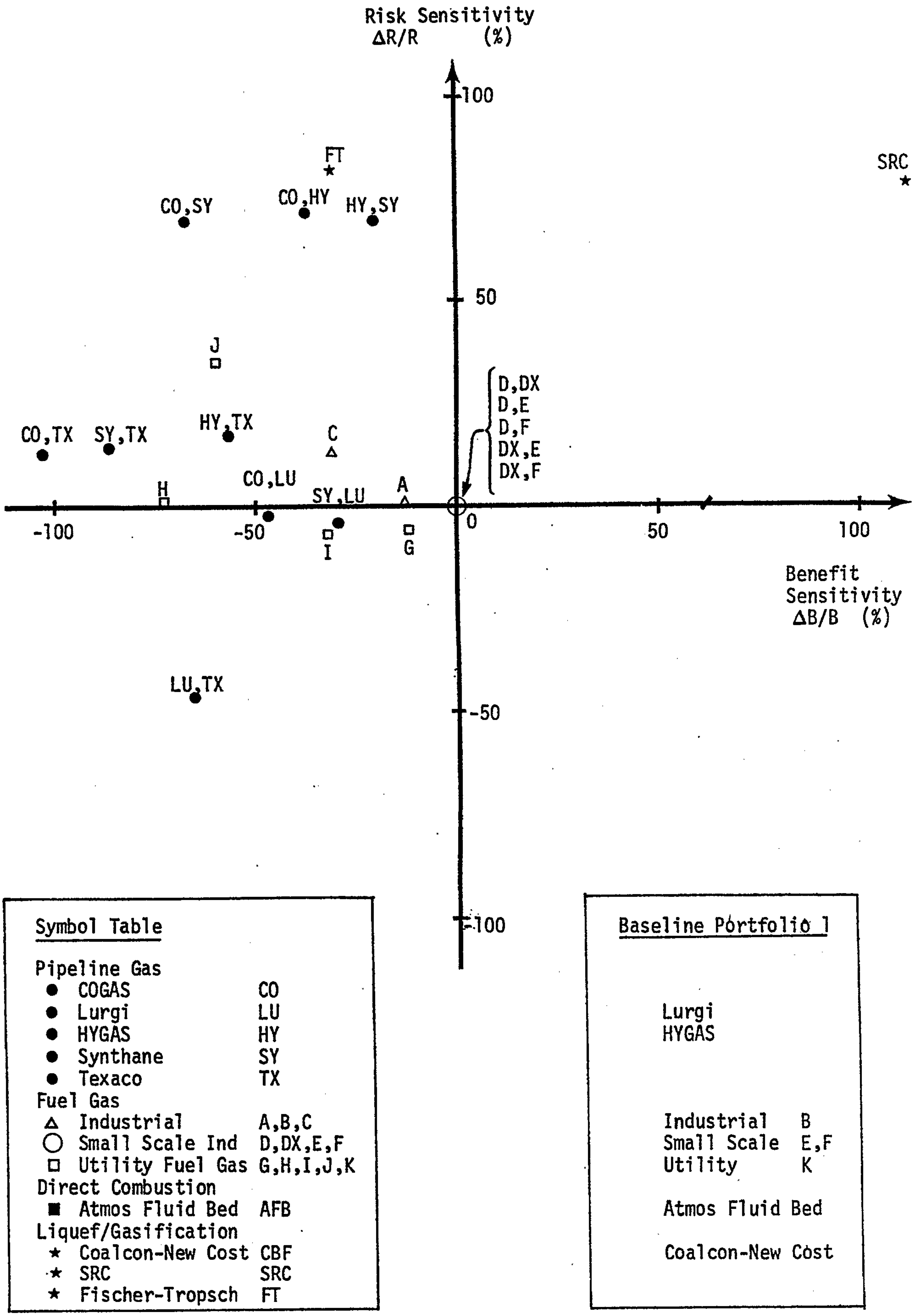
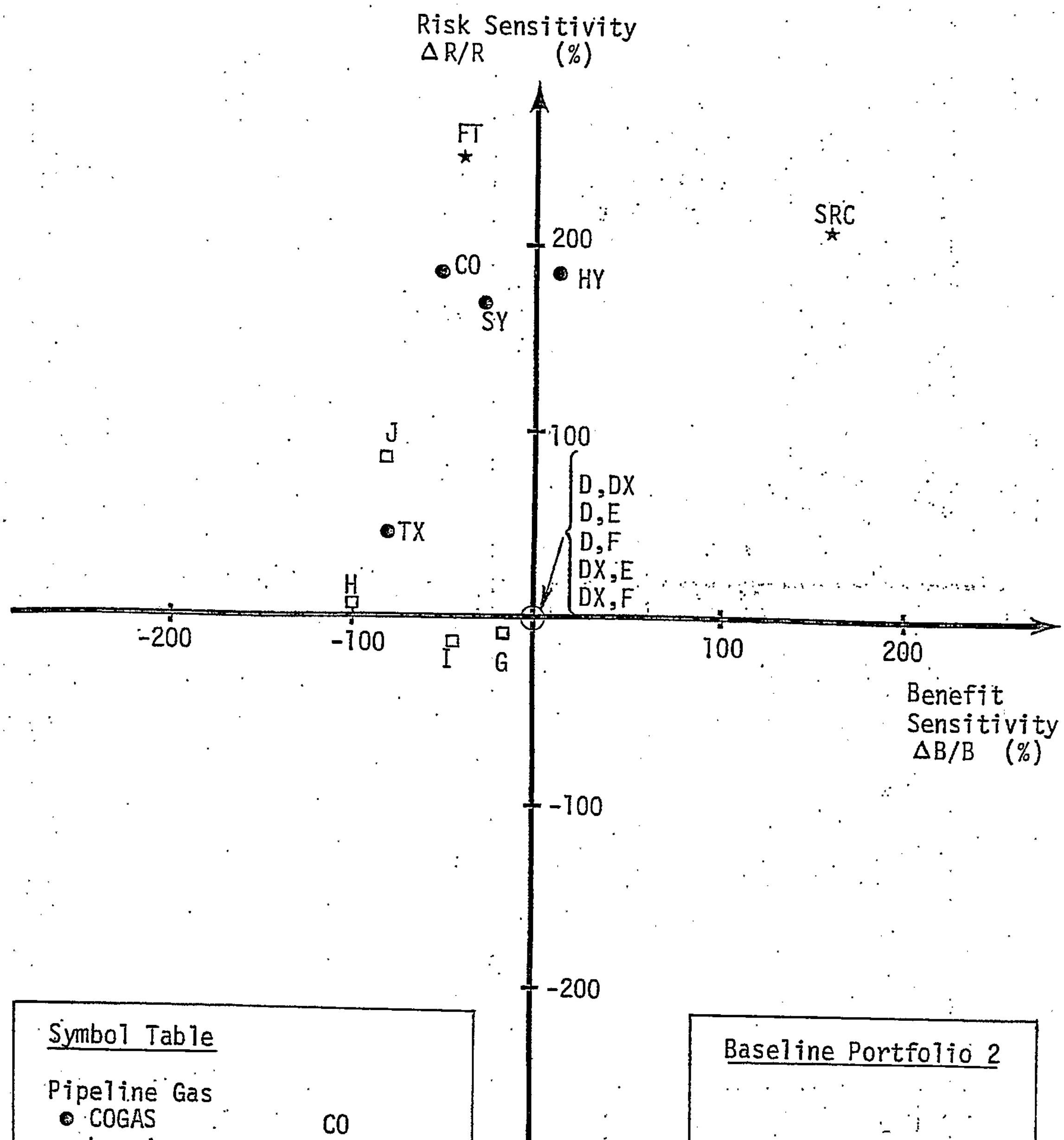



Figure G-1 Sensitivity of Program 1 to Process Economics and Risk




**Symbol Table**

Pipeline Gas
- COGAS — CO
- Lurgi — LU
- HYGAS — HY
- Synthane — SY
- Texaco — TX

Fuel Gas
- △ Industrial — A,B,C
- ○ Small Scale Ind — D,DX,E,F
- □ Utility Fuel Gas — G,H,I,J,K

Direct Combustion
- ▣ Atmos Fluid Bed — AFB

Liquef/Gasification
- ⋆ Coalcon-New Cost — CBF
- ⋆ SRC — SRC
- ⋆ Fischer-Tropsch — FT

**Baseline Portfolio 2**

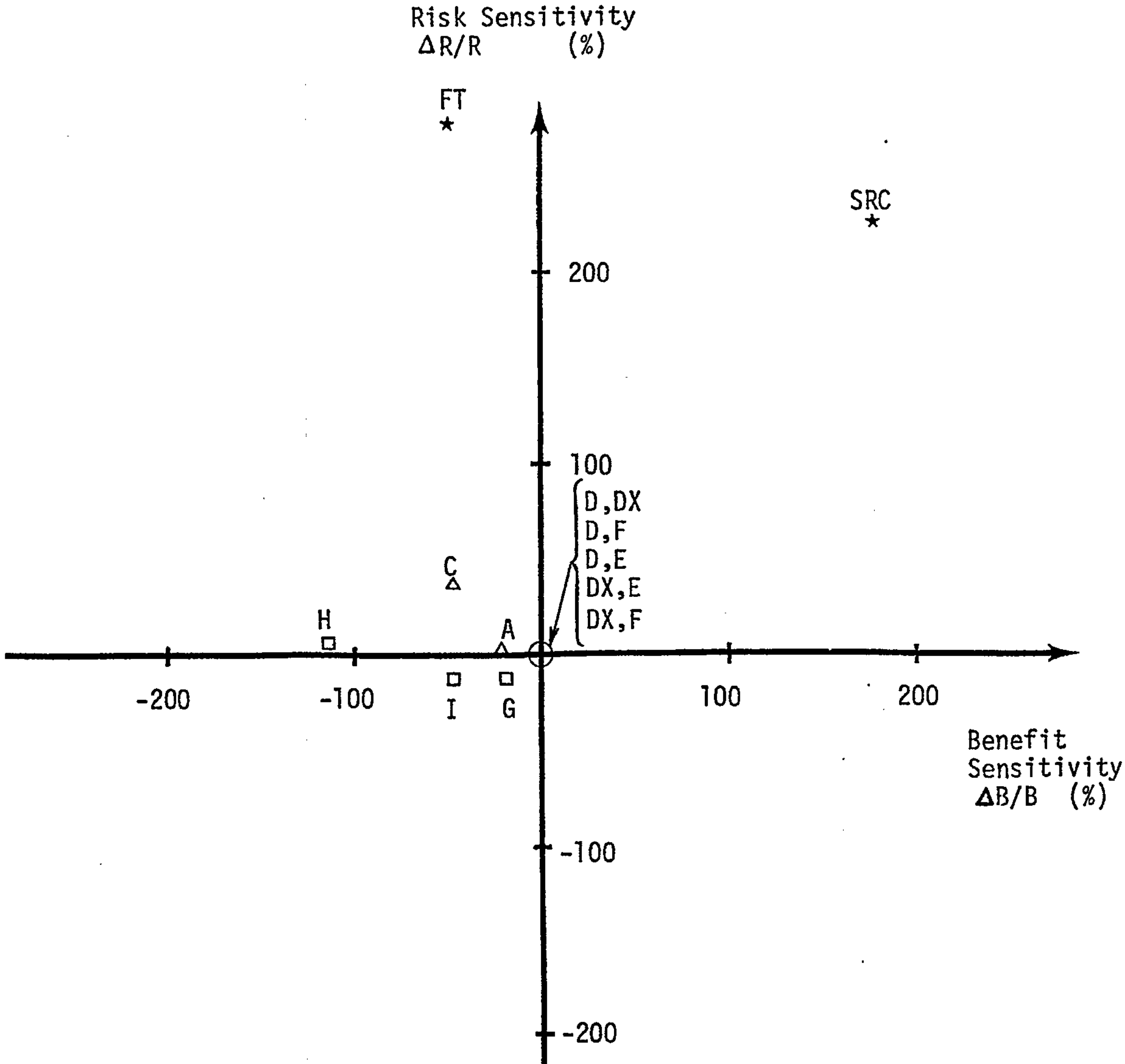
Lurgi

Small Scale E,F
Utility K

Atmos Fluid Bed

Coalcon-New Cost

Figure G-2 Sensitivity of Program 2 to Process Economics and Risk




**Symbol Table**

Pipeline Gas
- ● COGAS CO
- ● Lurgi LU
- ● HYGAS HY
- ● Synthane SY
- ● Texaco TX

Fuel Gas
- △ Industrial A,B,C
- ○ Small Scale Ind D,DX,E,F
- □ Utility Fuel Gas G,H,I,J,K

Direct Combustion
- ■ Atmos Fluid Bed AFB

Liquef/Gasification
- ★ Coalcon-New Cost CBF
- ★ SRC SRC
- ★ Fischer-Tropsch FT

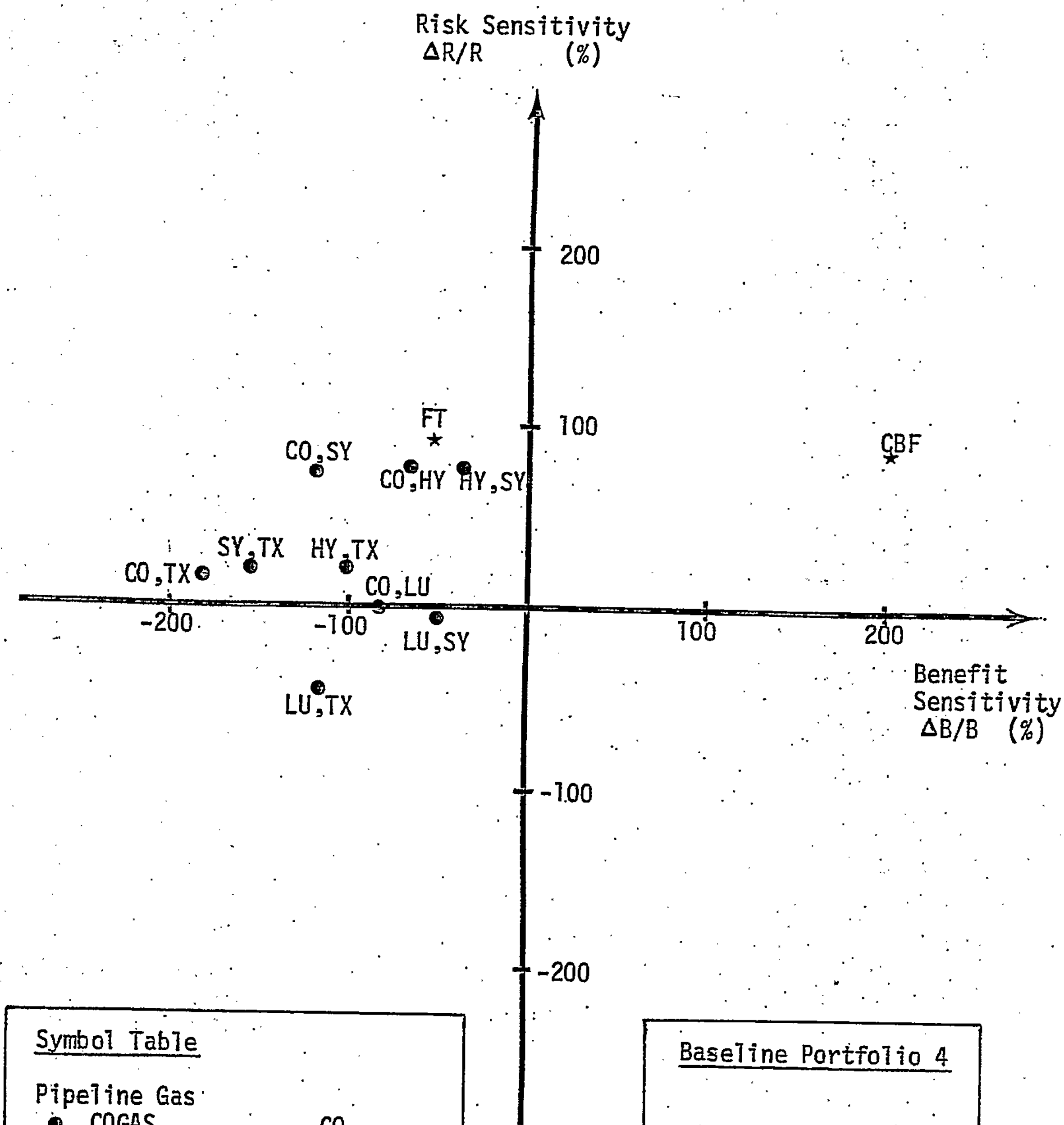
**Baseline Portfolio 3**

Industrial B
Small Scale E,F
Utility K

Atmos Fluid Bed

Coalcon-New Cost

Figure G-3 Sensitivity of Program 3 to Process Economics and Risk




**Symbol Table**

| | | |
|---|---|---|
| Pipeline Gas | | |
| ● | COGAS | CO |
| ● | Lurgi | LU |
| ● | HYGAS | HY |
| ● | Synthane | SY |
| ● | Texaco | TX |
| Fuel Gas | | |
| △ | Industrial | A,B,C |
| ○ | Small Scale Ind | D,DX,E,F |
| □ | Utility Fuel Gas | G,H,I,J,K |
| Direct Combustion | | |
| ■ | Atmos Fluid Bed | AFB |
| Liquef/Gasification | | |
| ☆ | Coalcon-New Cost | CBF |
| ★ | SRC | SRC |
| ★ | Fischer-Tropsch | FT |

**Baseline Portfolio 4**

Lurgi
HYGAS

Atmos Fluid Bed

Coalcon-New Cost

Figure G-4 Sensitivity of Program 4 to Process Economics and Risk

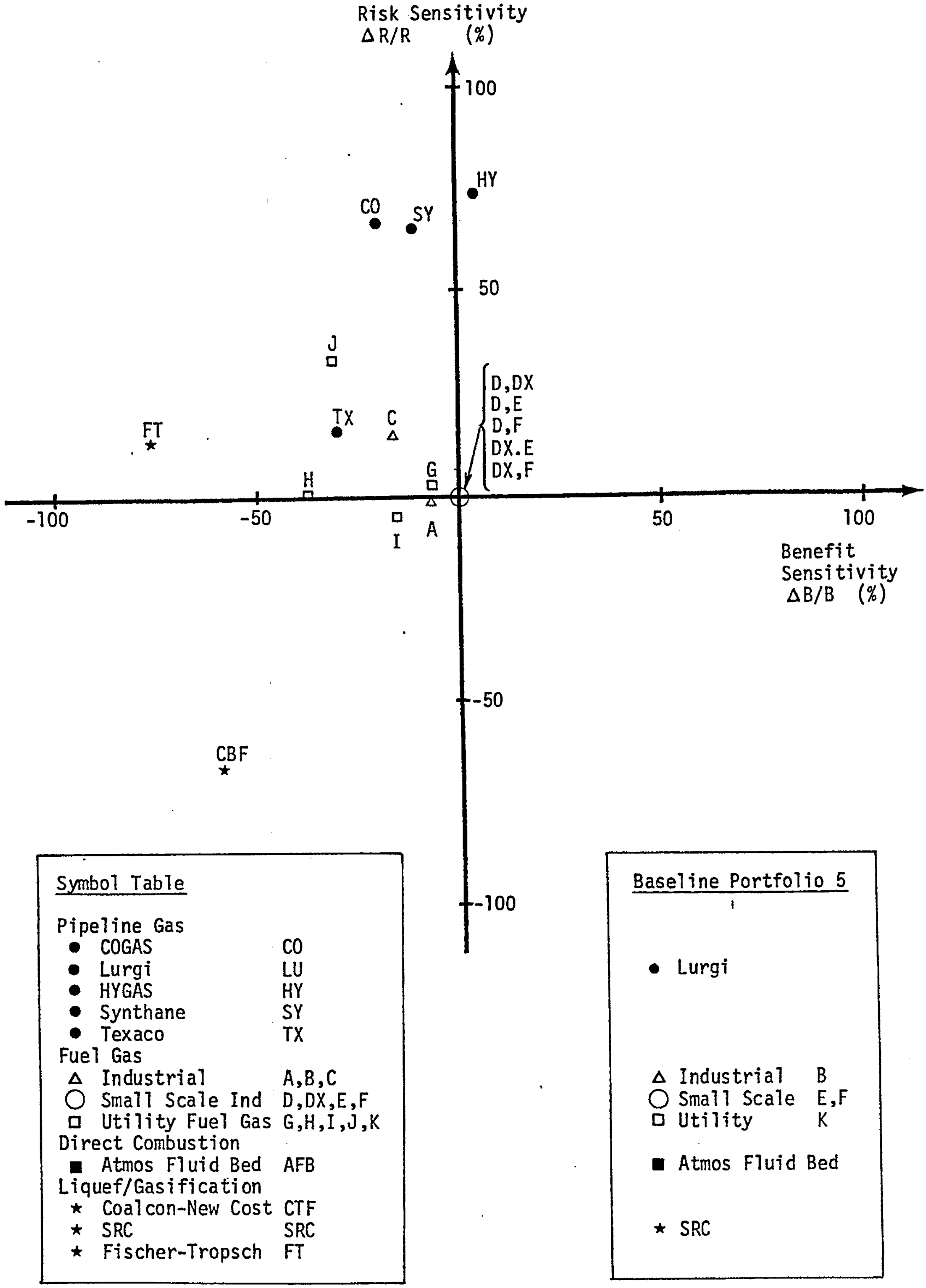
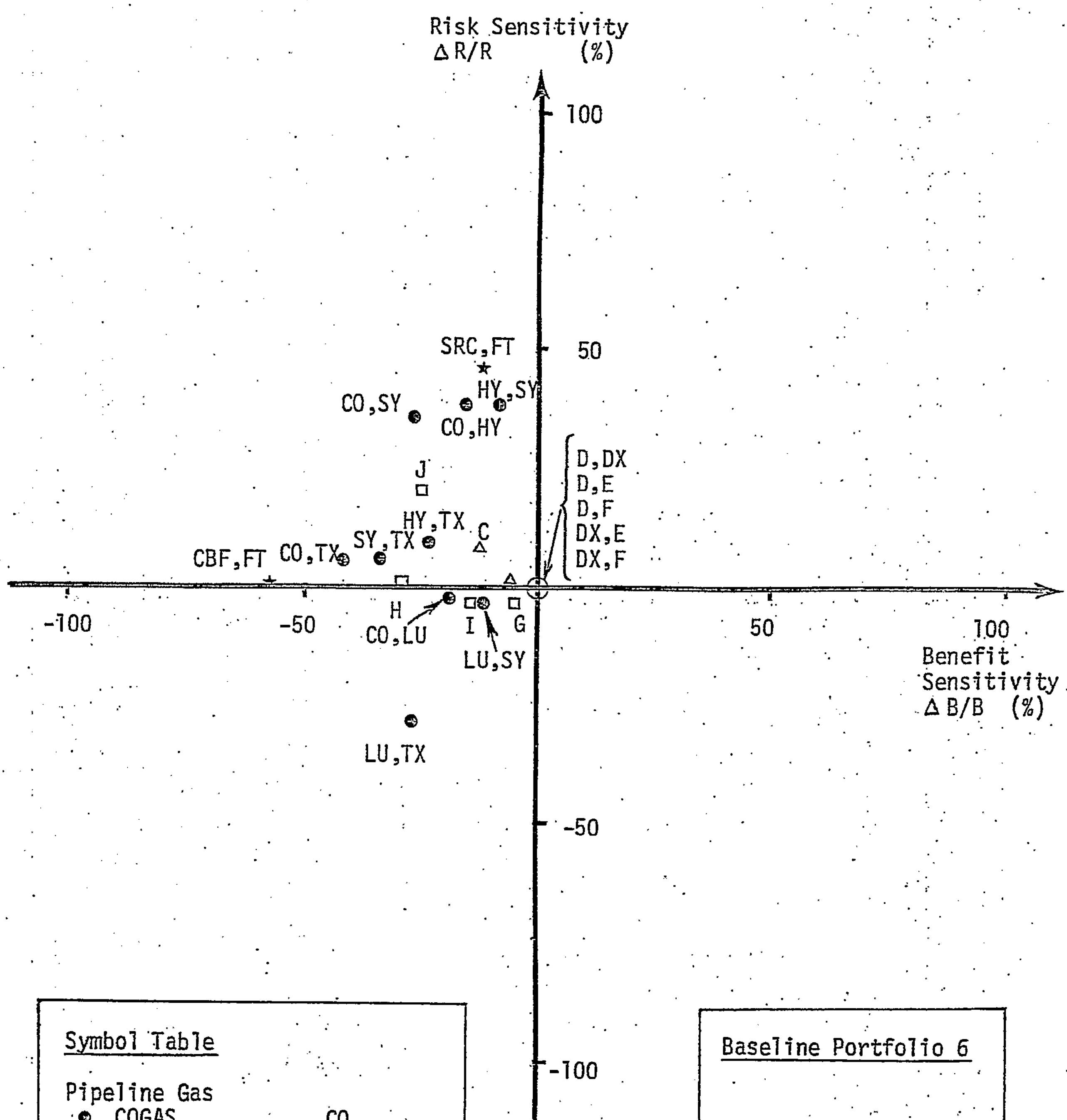



Figure G-5 Sensitivity of Program 5 to Process Economics and Risk




**Symbol Table**

Pipeline Gas

| | | |
|---|---|---|
| ⊙ | COGAS | CO |
| ⊙ | Lurgi | LU |
| ⊙ | HYGAS | HY |
| ⊙ | Synthane | SY |
| ⊙ | Texaco | TX |

Fuel Gas

| | | |
|---|---|---|
| △ | Industrial | A,B,C |
| ○ | Small Scale Ind | D,DX,E,F |
| □ | Utility Fuel Gas | G,H,I,J,K |

Direct Combustion

| | | |
|---|---|---|
| ◧ | Atmos Fluid Bed | AFB |

Liquef/Gasification

| | | |
|---|---|---|
| ☆ | Coalcon-New Cost | CBF |
| ☆ | SRC | SRC |
| ☆ | Fischer-Tropsch | FT |

**Baseline Portfolio 6**

Lurgi
HYGAS

Industrial B
Small Scale E,F
Utility K

Atmos Fluid Bed

Coalcon-New Cost
SRC

Figure G-6 Sensitivity of Program 6 to Process Economics and Risk

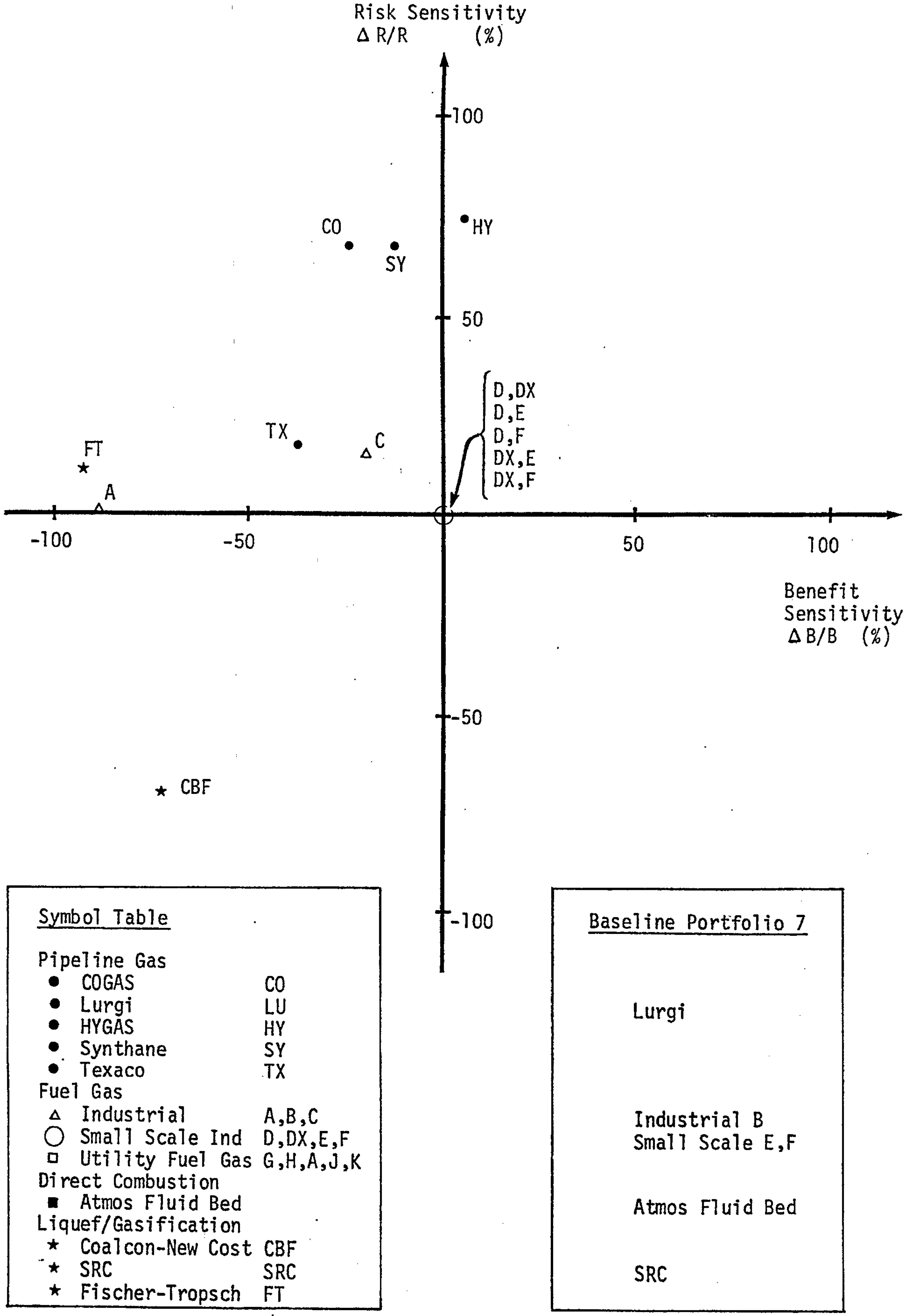
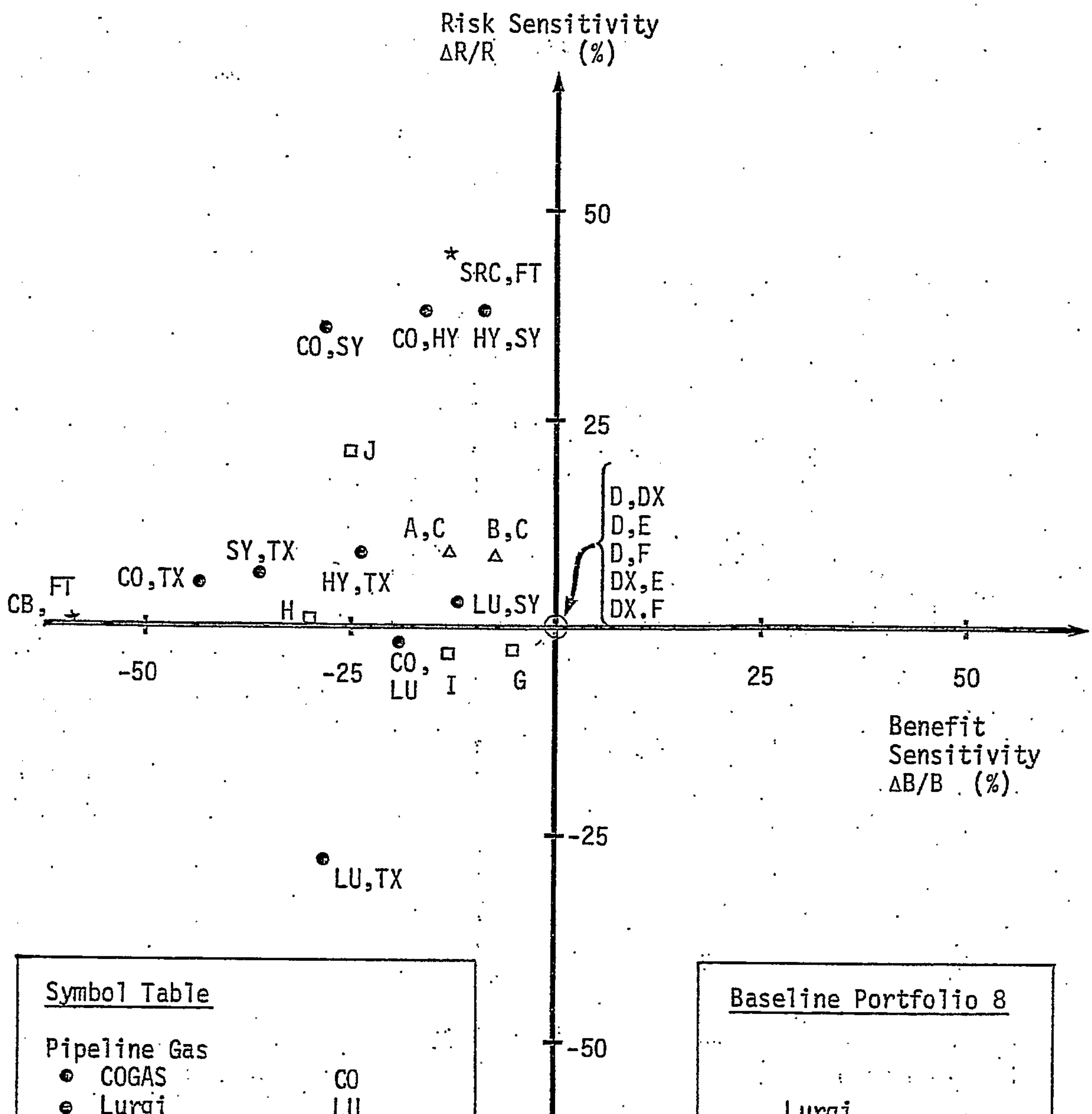



Figure G-7 Sensitivity of Program 7 to Process Economics and Risk




**Symbol Table**

| | | |
|---|---|---|
| Pipeline Gas | | |
| ⊕ | COGAS | CO |
| ⊖ | Lurgi | LU |
| ⊕ | HYGAS | HY |
| ● | Synthane | SY |
| ⊖ | Texaco | TX |
| Fuel Gas | | |
| △ | Industrial | A,B,C |
| ◯ | Small Scale Ind | D,DX,E,F |
| □ | Utility Fuel Gas | G,H,I,J,K |
| Direct Combustion | | |
| ▣ | Atmos Fluid Bed | AFB |
| Liquef/Gasification | | |
| ☆ | Coalcon-New Cost | CBF |
| ☆ | SRC | SRC |
| ☆ | Fischer-Tropsch | FT |

**Baseline Portfolio 8**

Lurgi
HYGAS

Industrial A,B
Small Scale E,F
Utility K

Atmos Fluid Bed

Coalcon-New Cost
SRC

Figure G-8 Sensitivity of Program 8 to Process Economics & Risk

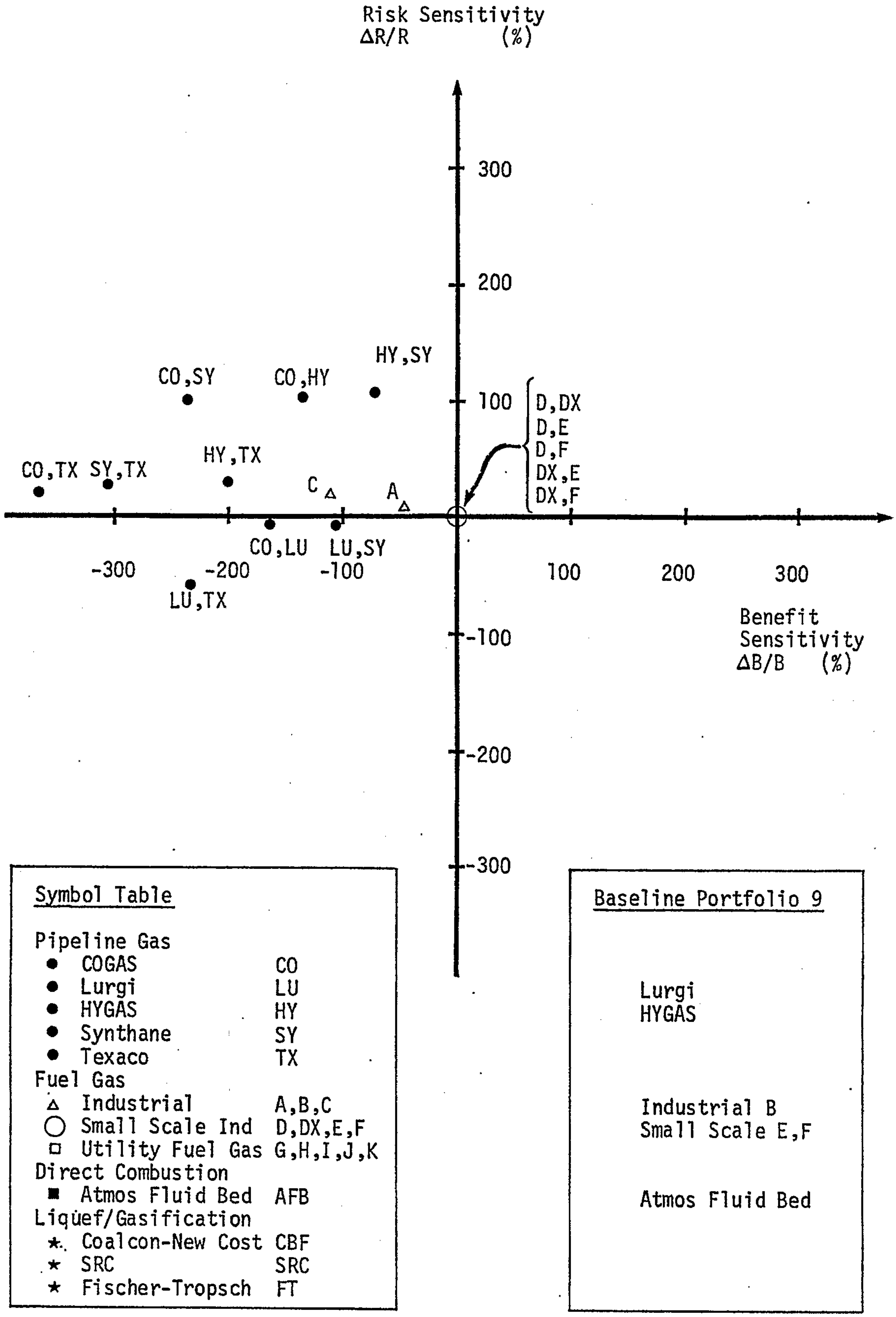



Figure G-9 Sensitivity of Program 9 to Process Economics & Risk

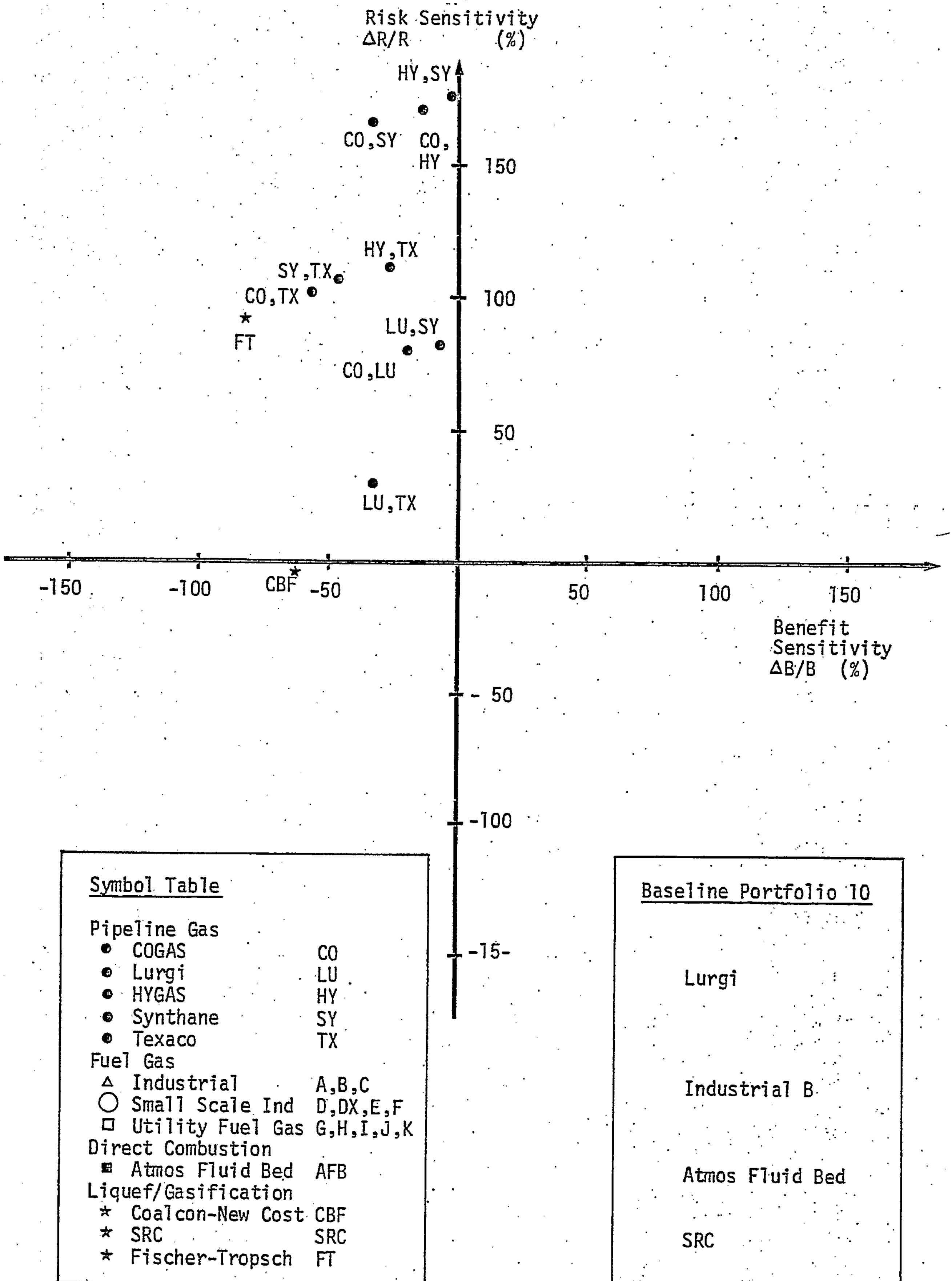



Figure G-10 Sensitivity of Program 10 to Process Economics & Risk

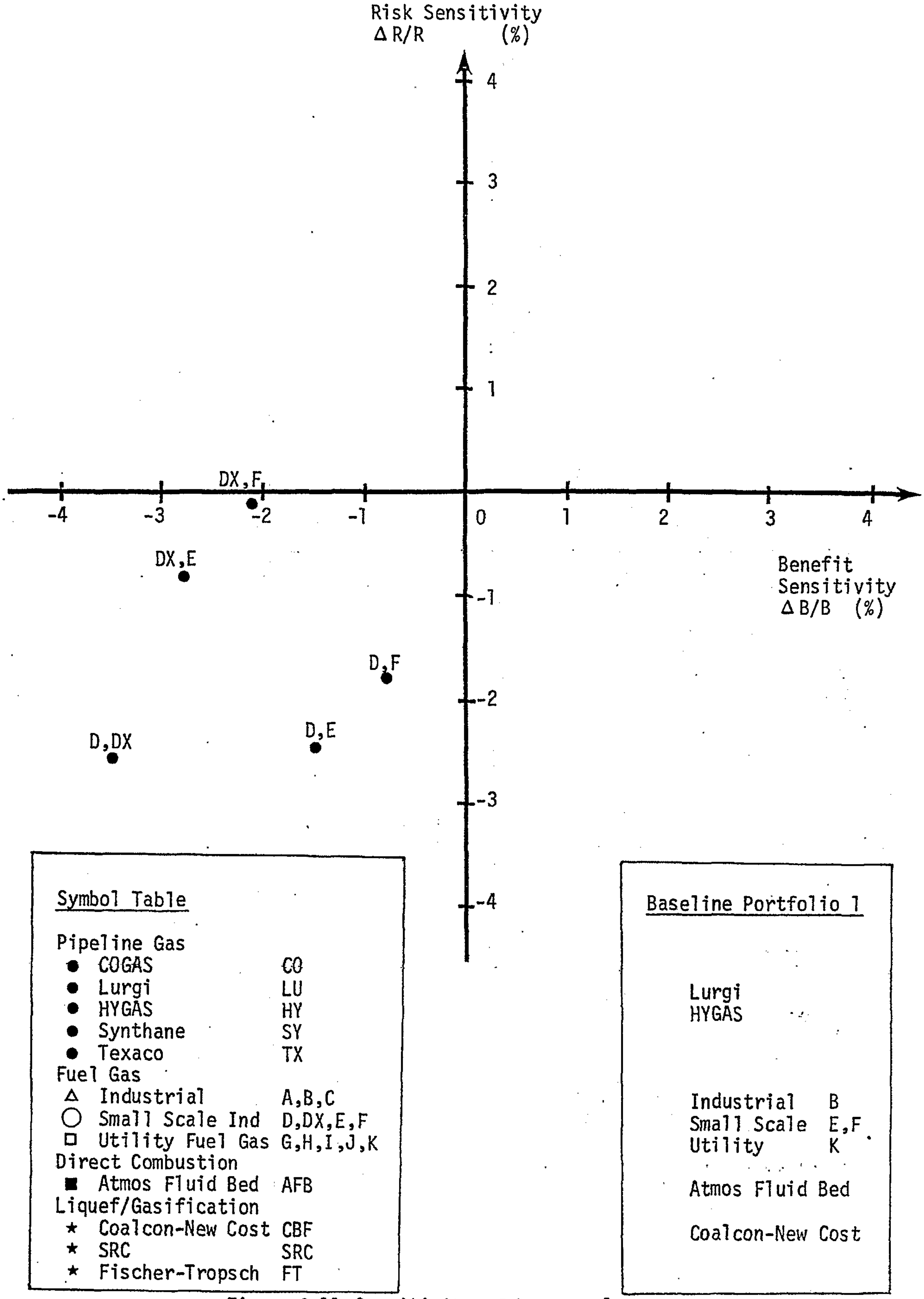



Figure G-11 Sensitivity of Program 1
Small Scale Industrial Fuel Gas Processes to Process Economics and Risk

APPENDIX H

APL PROGRAM LISTINGS

Appendix H gives the APL program listings for the three programs, *COST*, *CORE*, and *PORT*. Cost calculates expected benefits. Core calculates individual risk standard deviations and correlation coefficients. Port calculates the final portfolio results. These programs were developed on the Econergy IBM 5100 computer.

```
     ∇ COST;LYEAR;RATE;A1;T1;T2;T3;T4;I
[1]    LYEAR←25
[2]    RATE←0.1
[3]    A1←25ρ*-RATE×⍳LYEAR
[4]    I←1
[5]   LP1:→(I>22)/TIME
[6]    DATAEBC[I;1]←+/DATAROI[I;1]×(DATACFC[1;I;],(15ρ1))×A1
[7]    DATAEBC[I;2]←+/DATAROI[I;2]×(DATACFC[1;I;],(15ρ1))×A1
[8]    DATAEBC[I;3]←+/DATAROI[I;3]×(DATACFC[2;I;],(15ρ0))×A1
[9]    I←I+1
[10]   →LP1
[11]  TIME:
[12]   T1←((0.0625×DATAEBC[;3])+0.155×(DATAEBC[;1]-DATAEBC[;2]))×
*-RATE×6

[13]   T2←((0.0625×DATAEBC[;3])+0.155×(DATAEBC[;1]-DATAEBC[;2]))×
*-RATE×7
[14]   T3←((0.0375×DATAEBC[;3])+0.093×(DATAEBC[;1]-DATAEBC[;2]))×
*-RATE×8
[15]   T4←((0.025×DATAEBC[;3])+0.062×(DATAEBC[;1]-DATAEBC[;2]))××*
-RATE×9
[16]   DATAEBC[;4]←T1+T2+T3+T4
     ∇
```

COST PROGRAM LISTING

```
    ∇ CORE;K;L;ERR;T1
  K←1
  T1←⎕EX 'SHRCOR'
  T1←1 ⎕SVO 'SHRCOR'
  →(2≠T1)/SHAREΔERROR
  SHRCOR←'OUT 1003 ID=(DATACOR)'
  →(0 0 ≠+/SHRCOR)/OPENΔERROR
 LP1:→(K>4)/DONE1
  XSUM[;K]←+/[2](22 13 ⍴DATAWT[K;])×DATARISK
  XAVG[;K]←XSUM[;K]÷13
  T1←XSUM[;K]
  DATASIG[;K]←PCTSML[K]+(T1-(1↑T1[⍋T1]))×(PCTBIG[K]-PCTSML[K])÷((1↑T1[⍒T1])-(1↑T1[⍋T1]))
  K←K+1
  →LP1
 DONE1:K←1
  L←1
 LP2:→(K>4)/DONE2
 LP3:→(L>4)/NEXT
  KDIFF←((22 13 ⍴DATAWT[K;])×DATARISK)-⍉(13 22 ⍴XAVG[;K])
  LDIFF←((22 13 ⍴DATAWT[L;])×DATARISK)-⍉(13 22 ⍴XAVG[;L])
  'K=';K;'   L=';L
  ⎕← 6 2 ⍕COR←(KDIFF+.×⍉LDIFF)÷((+/[2] KDIFF*2)∘.×(+/[2] LDIFF*2))*0.5
  9⍴⎕AV[160]
 ⍝ WRITE COR OUT TO DATA FILE 'DATACOR'
  SHRCOR←COR
 ⍝ CHECK THE RETURN CODE FOR THE WRITE OPERATION
  →(0 0 ≠+/ERR←SHRCOR)/WRITEΔERROR
  L←L+1
  →LP3
 NEXT:L←1
  K←K+1
  →LP2
 DONE2:SHRCOR←⍳0
  T1←⎕SVR 'SHRCOR'
  →(2≠T1)/RETRACTΔERROR
  →0
 WRITEΔERROR:SHRCOR←⍳0
  'WRITE ERROR--THE RETURN CODE IS:  ';ERR
  →0
 SHAREΔERROR:'SHARE ERROR--THE RETURN CODE IS:  ';T1
  →0
 OPENΔERROR:'FILE OPENING ERROR--THE RETURN CODE IS:  ';SHRCOR
  →0
 RETRACTΔERROR:'RETRACT ERROR--THE RETURN CODE IS:  ';T1
    ∇
```

CORE PROGRAM LISTING.

```
    ∇ PORT;K;L;M;ICT;KDUM
[1]    ICT←1
[2]    MOD←CORMOD÷1.25
[3]    T1←⎕EX 'SHRCOR'
[4]    T1←1 ⎕SVO 'SHRCOR'
[5]    →(2≠T1)/SHAREΔERROR
[6]    M←PORTIN[1;1]
[7]    BNETPORT←22⍴0
[8]    RISKPORT←22⍴0
[9]    BNETNORM←22⍴0
[10]   RISKNORM←22⍴0
[11] LP0:→(ICT>M)/DONE
[12]   SHRCOR←'IN 1003 ID=(DATACOR)'
[13]   →(0 0 ≠+/SHRCOR)/OPENΔERROR


[14]   A←(×PORTIN[ICT+1;])/PORTIN[ICT+1;]
[15]   SIG←DATASIG[A;]
[16]   EBC←DATAEBC[A;]
[17]   SIGEBC←SIG×EBC
[18]   K←1
[19]   L←1
[20] LP1:→(K>4)/CHECK
[21] LP2:→(L>4)/NEXTK
[22] ⍝ READ DATACOR FOR CORRELATION COEFFICIENTS - ONE RECORD AT
 A TIME
[23]   DCOR←SHRCOR
[24] ⍝ CHECK FOR AN EMPTY VECTOR WHICH DENOTES THE END OF FILE
[25]   →(0=⍴DCOR)/DONE
[26]   COR←DCOR[A;A]


[27] ⍝ CALCULATE MODIFIED CORRELATION COEFFICIENT MATRIX
[28]   KDUM←1
[29] LP3:→(KDUM>⍴A)/CONTINUE
[30]   COR[KDUM;((⍳⍴A)≠KDUM)/⍳⍴A]←COR[KDUM;((⍳⍴A)≠KDUM)/⍳⍴A]×MOD[
K;L]
[31]   KDUM←KDUM+1
[32]   →LP3
[33] CONTINUE:
[34] ⍝ CALCULATE THE K,L COVARIANCE MATRIX ELEMENT
[35]   COV[K;L]←+/(+/(COR×SIGEBC[;K]∘.×SIGEBC[;L]))
[36]   →(((K=1)∧(L=1))∨((K>1)∧(L>1)))/PLUS
[37] NEG:COV[K;L]←-COV[K;L]
[38] PLUS:L←L+1
[39]   →LP2
```

FIRST THIRD OF PORT PROGRAM.

```
[40] NEXTK:L←1
[41]  K←K+1
[42]  →LP1
[43] ⍝ CHECK TO SEE THAT ALL RECORDS WERE READ
[44] CHECK:→((K=5)∧(L=1))/COMPUTE
[45]  'COMPLETE SET OF CORRELATION COEFFICIENTS NOT READ  -  K='
;K;'  L=';L
[46]  →DONE
[47] COMPUTE:BNETPORT[ICT]←+/(EBC[;1]-(EBC[;2]+EBC[;3]+EBC[;4]))
[48]  RISKPORT[ICT]←+/(+/COV)
[49]  PORTINV←+/EBC[;3]
[50]  BNETNORM[ICT]←BNETPORT[ICT]÷PORTINV
[51]  RISKNORM[ICT]←RISKPORT[ICT]÷PORTINV*2
[52]  '     PORTFOLIO NO.  ';ICT


[53]  ' '
[54]  ⎕←NAMES[A;]
[55]  ' '
[56]  '      BNETPORT =  ';BNETPORT[ICT]
[57]  '      RISKPORT =  ';RISKPORT[ICT]
[58]  '      RISKSDPT =  ';RISKPORT[ICT]*0.5
[59]  ' '
[60]  '      BNETNORM =  ';BNETNORM[ICT]
[61]  '      RISKNORM =  ';RISKNORM[ICT]
[62]  '      RISKSDNM =  ';RISKNORM[ICT]*0.5
[63]  ' '
[64]  '      PW OF COMM SCALE INVEST   =  ';PORTINV
[65]  '      DEMO PLANT CAPITAL REQMTS  =  ';+/DEMOINV[A]
[66]  2⍴⎕AV[160]


[67]  '      COVARIANCE MATRIX'
[68]  ' '
[69]  ⎕← 12 0 ⍕COV
[70]  ⎕AV[160]
[71]  '      STD DEV MATRIX'
[72]  ' '
[73]  ⎕← 12 0 ⍕(|COV)*0.5
[74]  ⎕AV[160]
[75]  '      NORMALIZED COVARIANCE MATRIX'
[76]  ' '
[77]  ⎕← 12 3 ⍕COV÷(PORTINV*2)
[78]  ⎕AV[160]
[79]  '      NORMALIZED STD DEV MATRIX'
[80]  ' '
```

SECOND THIRD OF PORT PROGRAM.

```
[81]  ⎕← 12 3 ⍕((|COV)*0.5)÷PORTINV
[82]  ICT←ICT+1
[83]  (19-⍴A)⍴⎕AV[160]
[84]  SHRCOR←⍳0
[85]  →LP0
[86] DONE:'     BNETPORTMAX =  ';1↑BNETPORT[⍒BNETPORT]
[87]  '     BNETPORTMIN =  ';1↑BNETPORT[⍋BNETPORT]
[88]  ' '
[89]  '     RISKPORTMAX =  ';1↑RISKPORT[⍒RISKPORT]
[90]  '     RISKPORTMIN =  ';1↑RISKPORT[⍋RISKPORT]
[91]  ⎕AV[160]
[92]  '     BNETNORMMAX =  ';1↑BNETNORM[⍒BNETNORM]
[93]  '     BNETNORMMIN =  ';1↑BNETNORM[⍋BNETNORM]
[94]  ' '


[95]  '     RISKNORMMAX =  ';1↑RISKNORM[⍒RISKNORM]
[96]  '     RISKNORMMIN =  ';1↑RISKNORM[⍋RISKNORM]
[97]  2⍴⎕AV[160]
[98]  T1←⎕SVR 'SHRCOR'
[99]  →(2≠T1)/RETRACT∆ERROR
[100] →0
[101]SHARE∆ERROR:'SHARE ERROR--THE RETURN CODE IS:  ';T1
[102] →0
[103]OPEN∆ERROR:'FILE OPENING ERROR--THE RETURN CODE IS:  ';SHRC
OR
[104] →0
[105]RETRACT∆ERROR:'RETRACT ERROR--THE RETURN CODE IS:  ';T1
[106] →0
[107]TAPE∆ERROR:'TAPE ERROR--THE RETURN CODE IS:  ';ERR
    ∇
```

LAST THIRD OF PORT PROGRAM

# APPENDIX I

## FORTRAN PROGRAMS AND DATA LISTINGS

Appendix I gives the Fortran program listings as well as data for the Econergy portfolio model. The three programs are *COST*, *CORE*, and *RSKBEN*. Cost calculates expected benefits. Core calculates individual risk standard deviations and correlation coefficients. RSKBEN calculates the final portfolio results. Data listings are unlabelled but are in order in terms of: 1.) input to Cost; 2.) output from Cost; 3.) input to Core; 4.) output from Core. The output from Cost and Core form the input to RSKBEN. These Fortran programs and data files reside on a Computer Science Corporation computer for interactive use by ERDA personnel.

| | |
|---|---|
| 1 | COGAS |
| 2 | LURGI |
| 3 | HYGAS |
| 4 | SYNTHANE |
| 5 | TEXCAO |
| 6 | INDUSTRY A |
| 7 | INDUSTRY B |
| 8 | INDUSTRY C |
| 9 | SMALL SCALE D |
| 10 | SMALL SCALE DX |
| 11 | SMALL SCALE E |
| 12 | SMALL SCALE F |
| 13 | UTILITY G |
| 14 | UTILITY H |
| 15 | UTILITY I |
| 16 | UTILITY J |
| 17 | UTILITY K |
| 18 | ATMOS FLUID BED |
| 19 | COALCON - OLD COST |
| 20 | COALCON - NEW COST |
| 21 | SRC 2 |
| 22 | FISCHER-TROPSCH |

```
      IMPLICIT REAL (I)
C     INPUT PARAMETERS R(J,K):J-YEARS,K-PLANT
C     SAME DEFINITION FOR OC4,K), IC(J,K),TC(J,K)
C     DISCOUNT RATE: RATE
C     UNIT OF DOLLSRS: MILLION
      DIMENSION RE(22),OC(22),IC(22)
      DIMENSION XR(22,30),XI(22,30),XO(22,30)
      DIMENSION PV(22,3,4),DEMINV(22)
      DATA PV/264*0./
      DATA DEMINV/229.0,249.0,457.0,210.8,209.5,112.0,102.0,
     *194.0,47.2,21.9,21.3,9.6,36.0,130.0,23.0,196.0,41.0,90.0,164.0,
     2 254.0,260.43,325.8/
       RATE=0.10
       LYEAR=25
      LYR3 = LYEAR - 3
      LYR4 = LYEAR - 4
           NP=22
       NSIZE=1
       DO 15 J = 1, NP
       READ(9,10) (XR(J,L),L=1,10), (XR(J,L),L=LYR3,LYEAR), RE(J)
       READ(9,10) (XO(J,L),L=1,10), (XO(J,L),L=LYR3,LYEAR), OC(J)
      READ(9,10) (XI(J,L),L=1,10), (XI(J,L),L=LYR3,LYEAR), IC(J)
      READ(9,11)
      READ(9,11)
11    FORMAT(10X)
      DO 15 LL = 11, LYR4
      XR(J,LL) = XR(J,10)
      XO(J,LL) = XO(J,10)
15    XI(J,LL) = XI(J,10)
10    FORMAT(10F5.2,3X,4F5.2,F7.2)
C      INPUT CASH FLOW IN YEARS
C      PRESENT VALUE
C      PV(20,3,1)-FOR REVENUE; PV(20,3,2)-FOR OPERATING COSTS, ETC.
       DO 21 J=1,NP
       DO 21 K=1,NSIZE
       DO 22 L=1,LYEAR
      DISCON=EXP(0.-RATE*FLOAT(L))
      PV(J,K,1)=PV(J,K,1)+RE(J)*XR(J,L)*DISCON
      PV(J,K,2)=PV(J,K,2)+OC(J)*XO(J,L)*DISCON
 22   PV(J,K,3)=PV(J,K,3)+IC(J)*XI(J,L)*DISCON
 21   CONTINUE
C     CALCULATION OF TIME COST
C     THE YEARS OF DELAY PROBABILITIES WHICH ACT AS CASH FLOW
C     PERCENTAGES ARE ALREADY INCLUDED IN THE PARAMETERS
      DO 23 J=1,NP
      DO 23 K=1,NSIZE
      PV42=(.0625*PV(J,K,3)+0.155*(PV(J,K,1)-PV(J,K,2)))*EXP(-RATE*6.)
      PV43=(.0625*PV(J,K,3)+0.155*(PV(J,K,1)-PV(J,K,2)))*EXP(-RATE*7.)
      PV44=(.0375*PV(J,K,3)+0.093*(PV(J,K,1)-PV(J,K,2)))*EXP(-RATE*8.)
      PV45=(.0250*PV(J,K,3)+0.062*(PV(J,K,1)-PV(J,K,2)))*EXP(-RATE*9.)
 23   PV(J,K,4)=PV42+PV43+PV44+PV45
C     OUTPUT
      DO 31 J=1,NP
      DO 31 K=1,NSIZE
      PVNET = PV(J,K,1) - PV(J,K,2) - PV(J,K,3) - PV(J,K,4)
C     FIFTH COLUMN OF PRINTED OUTPUT IS NET BENEFITS FOR COMM SCALE
C     FIFTH COLUMN OF OUTPUT FILE IS DEMO SCALE INVESTMENT COSTS
      WRITE (8,3101) (PV(J,K,L),L=1,4),DEMINV(J)
 31   WRITE (6,3102) (PV(J,K,L),L=1,4), PVNET
 3101 FORMAT(4F10.2,F15.2)
 3102   FORMAT(' ',4F10.2,F14.2)
      STOP
```

```
      DIMENSION W(4,15),D(22,15),Y(22,15),X(4,22,15),XB(22,4),
     $         COR(22,22,4,4),SD(22,4)
      DIMENSION  SGMA(22,4),PCTSML(4),PCTBIG(4)
      DATA PCTBIG/0.30,0.50,1.00,1.00/,PCTSML/0.0,0.10,0.10,0.10/
C     DESCRIPTION VECTOR D(22,15)
C     WEIGHTING FACTOR W/ W(1,15)_ R, W(2,15)_OC, W(3,15)_IC,W(4,15)_TC
      NJ=13
      NP=22
      DO 2 K=1,4
 2    READ(9,311) (W(K,J),J=1,NJ)
 311  FORMAT(15F5.2)
      READ(9,309)
309   FORMAT(15X)
      DO 3 I=1,NP
 3    READ(9,311) (D(I,J),J=1,NJ)
C     ************************************
C     ****************************************
C     ****************************************
C     CALCULATE STANDARD DEV. RISK
      DO 11 K=1,4
      DO 11 I=1,NP
      DO 11 J=1,NJ
 11   X(K,I,J)=W(K,J)*D(I,J)
C     ******************************
      DO 12 I=1,NP
      DO 12 K=1,4
      DO 121 J=1,NJ
 121  Y(I,J)=X(K,I,J)
      SD(I,K)=SUM2(I,NJ,Y)
 12   XB(I,K)=SD(I,K)/FLOAT(NJ)
      WRITE(6,90) ((SD(I,K),K=1,4),I=1,NP)
 90   FORMAT(4F10.3)
      DO 13 I=1,NP
      DO 13 K=1,4
 13   SGMA(I,K)=PCTSML(K)+(SD(I,K)-SMIN(NP,K,SD))*(PCTBIG(K)-PCTSML(K))
     $/(SMAX(NP,K,SD)-SMIN(NP,K,SD))
C     SGMA IS UNITLESS
C     CALCULATE COR CKOEF
      DO 21 I=1,NP
      DO 21 J=1,NP
      DO 21 K=1,4
      DO 21 L=1,4
 21   COR(I,J,K,L)=SUMXY(NJ,I,J,K,L,X,XB)/SQRT(SUMXY(NJ,I,I,K,K,X,XB)*
     $                                 SUMXY(NJ,J,J,L,L,X,XB))
      DO 22 I=1,NP
      DO 22 K=1,4
 22   COR(I,I,K,K)=1.
        DO 23 K=1,4
        DO 23 L=1,4
        WRITE (8,2313) K,L
 2313    FORMAT(//////////'K= ',I1,'     L= ',I1)
        DO 23 I=1,NP
 23         WRITE(8,2311)  (COR(I,J,K,L),J=1,NP)
 2311    FORMAT(22F6.4)
         WRITE(6,71)
 71      FORMAT(/'              ')
            DO 24 J1=1,NP
      WRITE(7,241) (SGMA(J1,J3),J3=1,4)
 241  FORMAT(4F10.4)
 24   WRITE (6,241) (SGMA(J1,J3),J3=1,4)
      STOP
      END
```

```
        IMPLICIT REAL (I)
      REAL NCOV(4,4),NSTD(4,4)
      DIMENSION A(22,22,4,4),E(22,5),V(22,4),SMTRIX(4,4),CORMOD(4,4)
      DIMENSION NAME1(22),NAME2(22),NAME3(22),NAME4(22),NAME5(22)
      DIMENSION STDMTX(4,4)
      DIMENSION B(22,22,4,4),EB(22,3,5),VB(22,4)
      DIMENSION  X(22,22,4,4),NPT(22),NSIZ(22),NPA(22)
C     NUMBER OF PLANTS NP
      DIMENSION ALFA(22),BETA(22),GAMA(22),DETA(22)
      DIMENSION CRR1(22,22),CRO1(22,22),CRI1(22,22),CRT1(22,22),
     1COO1(22,22),COI1(22,22),COT1(22,22),
     2CII1(22,22),CIT1(22,22),CTT1(22,22),
     3CRR2(22,22),CRO2(22,22),CRI2(22,22),CRT2(22,22),
     4COO2(22,22),COI2(22,22),COT2(22,22),
     5CII2(22,22),CIT2(22,22),CTT2(22,22)
      DIMENSION RR12(22,22),RO12(22,22),RI12(22,22),RT12(22,22),
     1OO12(22,22),OI12(22,22),OT12(22,22),
     2II12(22,22),IT12(22,22),TT12(22,22),
     3RR21(22,22),RO21(22,22),RI21(22,22),RT21(22,22),
     4OO21(22,22),OI21(22,22),OT21(22,22),
     5II21(22,22),IT21(22,22),TT21(22,22)
      DIMENSION GCOV(16,16), CCOV(16,16), GC12(16,16), GC21(16,16)
      DATA NSIZ/22*1/
      DATA ALFA/22*0.50/,BETA/22*0.50/,GAMA/22*0.50/,DETA/22*0.50/
      DATA CORMOD/0.9,0.85,0.9,0.3,0.85,0.8,0.2,0.3,0.9,0.2,0.75,
     C0.7,0.3,0.3,0.7,0.6/
C      NUMBER OF E-V PONITS ON GRAPH -M
      READ(9,101) M
101   FORMAT (I2)
C NUMBER OF POSSIBLE PROCESS PER PORTFOLIO -NPA(J)
      READ(9,1031) (NPA(J),J=1,M)
C     NUMBER OF POSSIBLE PROCESSES
      MT=22
      NSIZE=1
C     READ PROCESS NAMES
      DO 131 JJ=1,MT
131   READ(11,1104) NAME1(JJ),NAME2(JJ),NAME3(JJ),NAME4(JJ),NAME5(JJ)
1104  FORMAT(20A4)
C     READ IN ALL B/C (EB), VARIANCES (VB), COVARIANCES AND DEMO CAPITA
      DO 11 J=1,MT
      DO 11 K=1,NSIZE
11    READ(4,1101)(EB(J,K,L),L=1,5)
1101  FORMAT(4F10.2,F15.2)
      DO 111 J=1,MT
111   READ(7,1102)(VB(J,K),K=1,4)
1102  FORMAT(4F10.4)
       DO 12 K=1,4
       DO 12 L=1,4
       READ(8,1221) KDUM,LDUM
1221      FORMAT(//////////2A4)
       DO 12 J1=1,MT
12     READ(8,1211)(B(J1,J3,K,L),J3=1,MT)
1211  FORMAT(22F6.4)
C     NUMBER OF E-V POINTS ON GRAPH = M
C     EXECUTE THE PROGRAM N TIMES 55 C      EXECUTE THE PROGRAM M TIMES
       DO 1 JM=1,M
C      INPUT NP - NUMBER OF PROCESSES IN A PORTFOLIO
      NP=NPA(JM)
C      PROCESS INDEX NPT(J); SIZE NSIZ(J)
      READ (9,1031)(NPT(J),J=1,NP)
1031  FORMAT(22I3)
```

```
C     * * * * * * * * * * * * * * * * * *
C     SELECT PORTFOLIO DATA FROM PLANT DATA
C     REINDEXING
      DO 13 JR=1,NP
      J1=NPT(JR)
      DO 13 JC=1,NP
      J3=NPT(JC)
      DO 13 K=1,4
      DO 13 L=1,4
      A(JR,JC,K,L)=B(J1,J3,K,L)
C     CALCULATE MODIFIED CORR COEF MATRIX
       IF( JR .EQ. JC ) GO TO 13
       A(JR,JC,K,L)=A(JR,JC,K,L)*CORMOD(K,L)/1.25
 13       CONTINUE
      DO 14 J=1,NP
      J1=NPT(J)
      J2=NSIZ(J)
      DO 14 K=1,5
 14   E(J,K)=EB(J1,J2,K)
      DO 15 J=1,NP
      J1=NPT(J)
      DO 15 K=1,4
 15   V(J,K)=VB(J1,K)
C     V(J,K) IS SIGMA WITH NO UNIT
      TINV = TOT(NP,E,3)
      DEMINV=TOT(NP,E,5)
      DO 21 JR=1,NP
      DO 21 JC=1,NP
      DO 21 K=1,4
      DO 21 L=1,4
21    X (JR,JC,K,L)=A(JR,JC,K,L)*V(JR,K)*V(JC,L)*E(JR,K)*E(JC,L)
C     GOVERNMENTAL RISK
      DO 31 JR=1,NP
      DO 31 JC=1,NP
      CRR1(JR,JC)=X(JR,JC,1,1)*ALFA(JR)*ALFA(JC)
      COO1(JR,JC)=X(JR,JC,2,2)*BETA(JR)*BETA(JC)
      CII1(JR,JC)=X(JR,JC,3,3)*GAMA(JR)*GAMA(JC)
      CTT1(JR,JC)=X(JR,JC,4,4)*DETA(JR)*DETA(JC)
      CRO1(JR,JC)=X(JR,JC,1,2)*ALFA(JR)*BETA(JC)
      CRI1(JR,JC)=X(JR,JC,1,3)*ALFA(JR)*GAMA(JC)
      CRT1(JR,JC)=X(JR,JC,1,4)*ALFA(JR)*DETA(JC)
      COI1(JR,JC)=X(JR,JC,2,3)*BETA(JR)*GAMA(JC)
      COT1(JR,JC)=X(JR,JC,2,4)*BETA(JR)*DETA(JC)
31    CIT1(JR,JC)=X(JR,JC,3,4)*GAMA(JR)*DETA(JC)
C    CONTRACTOR RISK
      DO 32 JR=1,NP
      DO 32 JC=1,NP
      CRR2(JR,JC)=X(JR,JC,1,1)*(1.-ALFA(JR))*(1.-ALFA(JC))
      COO2(JR,JC)=X(JR,JC,2,2)*(1.-BETA(JR))*(1.-BETA(JC))
      CII2(JR,JC)=X(JR,JC,3,3)*(1.-GAMA(JR))*(1.-GAMA(JC))
      CTT2(JR,JC)=X(JR,JC,4,4)*(1.-DETA(JR))*(1.-DETA(JC))
      CRO2(JR,JC)=X(JR,JC,1,2)*(1.-ALFA(JR))*(1.-BETA(JC))
      CRI2(JR,JC)=X(JR,JC,1,3)*(1.-ALFA(JR))*(1.-GAMA(JC))
      CRT2(JR,JC)=X(JR,JC,1,4)*(1.-ALFA(JR))*(1.-DETA(JC))
      COI2(JR,JC)=X(JR,JC,2,3)*(1.-BETA(JR))*(1.-GAMA(JC))
      COT2(JR,JC)=X(JR,JC,2,4)*(1.-BETA(JR))*(1.-DETA(JC))
32    CIT2(JR,JC)=X(JR,JC,3,4)*(1.-GAMA(JR))*(1.-DETA(JC))
C     JOINT RISK
      DO 33 JR=1,NP
      DO 33 JC=1,NP
```

```
      RR12(JR,JC)=X(JR,JC,1,1)*ALFA(JR)*(1.-ALFA(JC))
      OO12(JR,JC)=X(JR,JC,2,2)*BETA(JR)*(1.-BETA(JC))
      II12(JR,JC)=X(JR,JC,3,3)*GAMA(JR)*(1.-GAMA(JC))
      TT12(JR,JC)=X(JR,JC,4,4)*DETA(JR)*(1.-DETA(JC))
      RO12(JR,JC)=X(JR,JC,1,2)*ALFA(JR)*(1.-BETA(JC))
      RI12(JR,JC)=X(JR,JC,1,3)*ALFA(JR)*(1.-GAMA(JC))
      RT12(JR,JC)=X(JR,JC,1,4)*ALFA(JR)*(1.-DETA(JC))
      OI12(JR,JC)=X(JR,JC,2,3)*BETA(JR)*(1.-GAMA(JC))
      OT12(JR,JC)=X(JR,JC,2,4)*BETA(JR)*(1.-DETA(JC))
      IT12(JR,JC)=X(JR,JC,3,4)*GAMA(JR)*(1.-DETA(JC))
      RR21(JR,JC)=X(JR,JC,1,1)*(1.-ALFA(JR))*ALFA(JC)
      OO21(JR,JC)=X(JR,JC,2,2)*(1.-BETA(JR))*BETA(JC)
      II21(JR,JC)=X(JR,JC,3,3)*(1.-GAMA(JR))*GAMA(JC)
      TT21(JR,JC)=X(JR,JC,4,4)*(1.-DETA(JR))*DETA(JC)
      RO21(JR,JC)=X(JR,JC,1,2)*(1.-ALFA(JR))*BETA(JC)
      RI21(JR,JC)=X(JR,JC,1,3)*(1.-ALFA(JR))*GAMA(JC)
      RT21(JR,JC)=X(JR,JC,1,4)*(1.-ALFA(JR))*DETA(JC)
      OI21(JR,JC)=X(JR,JC,2,3)*(1.-BETA(JR))*GAMA(JC)
      OT21(JR,JC)=X(JR,JC,2,4)*(1.-BETA(JR))*DETA(JC)
33    IT21(JR,JC)=X(JR,JC,3,4)*(1.-GAMA(JR))*DETA(JC)
C     SUM OF GOV RISKS - ABSOLUTE DOLLARS
      COV1=SUM(NP,CRR1)+SUM(NP,COO1)+SUM(NP,CII1)+SUM(NP,CTT1)
     $      -2.*(SUM(NP,CRO1)+SUM(NP,CRI1)+SUM(NP,CRT1))
     $      +2.*(SUM(NP,COI1)+SUM(NP,COT1)+SUM(NP,CIT1))
      GRISK = COV1
C     SUM OF GOV RISKS - NORMALIZED BY PORTFOLIO INVESTMENT
      GNORM = GRISK/(TINV**2)
C     SUM OF CONTRACTOR RISKS - ABSOLUTE DOLLARS
      COV2=SUM(NP,CRR2)+SUM(NP,COO2)+SUM(NP,CII2)+SUM(NP,CTT2)
     $      -2.*(SUM(NP,CRO2)+SUM(NP,CRI2)+SUM(NP,CRT2))
     $      +2.*(SUM(NP,COI2)+SUM(NP,COT2)+SUM(NP,CIT2))
      CRISK = COV2
C     SUM OF CONTRACTOR RISKS - NORMALIZED BY PORTFOLIO INVESTMENT
      CNORM = CRISK/(TINV**2)
C     JOINT RISKS - ABSOLUTE DOLLARS
      GCRISK=SUM(NP,RR12)+SUM(NP,OO12)+SUM(NP,II12)+SUM(NP,TT12)
     $        +SUM(NP,RR21)+SUM(NP,OO21)+SUM(NP,II21)+SUM(NP,TT21)
     $       -2.*(SUM(NP,RO12)+SUM(NP,RI12)+SUM(NP,RT12))
     $       +2.*(SUM(NP,OI12)+SUM(NP,OT12)+SUM(NP,IT12))
     $       -2.*(SUM(NP,RO21)+SUM(NP,RI21)+SUM(NP,RT21))
     $       +2.*(SUM(NP,OI21)+SUM(NP,OT21)+SUM(NP,IT21))
C     SUM OF JOINT RISKS - NORMALIZED BY PORTFOLIO INVESTMENT
      GCNORM = GCRISK/(TINV**2)
C     COMPUTE GOVERNMENT COVARIANCE MATRIX
      GCOV(1,1) = SUM(NP,CRR1)
      GCOV(2,2) = SUM(NP,COO1)
      GCOV(3,3) = SUM(NP,CII1)
      GCOV(4,4) = SUM(NP,CTT1)
      GCOV(1,2) = -SUM(NP,CRO1)
      GCOV(2,1) = GCOV(1,2)
      GCOV(1,3) = -SUM(NP,CRI1)
      GCOV(3,1) = GCOV(1,3)
      GCOV(1,4) = -SUM(NP,CRT1)
      GCOV(4,1) = GCOV(1,4)
      GCOV(2,3) = SUM(NP,COI1)
      GCOV(3,2) = GCOV(2,3)
      GCOV(2,4) = SUM(NP,COT1)
      GCOV(4,2) = GCOV(2,4)
      GCOV(3,4) = SUM(NP,CIT1)
      GCOV(4,3) = GCOV(3,4)
```

```
C     COMPUTE CONTRACTOR COVARIANCE MATRIX
      CCOV(1,1) = SUM(NP,CRR2)
      CCOV(2,2) = SUM(NP,COO2)
      CCOV(3,3) = SUM(NP,CII2)
      CCOV(4,4) = SUM(NP,CTT2)
      CCOV(1,2) = -SUM(NP,CRO2)
      CCOV(2,1) = CCOV(1,2)
      CCOV(1,3) = -SUM(NP,CRI2)
      CCOV(3,1) = CCOV(1,3)
      CCOV(1,4) = -SUM(NP,CRT2)
      CCOV(4,1) = CCOV(1,4)
      CCOV(2,3) = SUM(NP,COI2)
      CCOV(3,2) = CCOV(2,3)
      CCOV(2,4) = SUM(NP,COT2)
      CCOV(4,2) = CCOV(2,4)
      CCOV(3,4) = SUM(NP,CIT2)
      CCOV(4,3) = CCOV(3,4)
C     COMPUTE JOINT 12 COVARIANCE MATRIX
      GC12(1,1) = SUM(NP,RR12)
      GC12(2,2) = SUM(NP,OO12)
      GC12(3,3) = SUM(NP,II12)
      GC12(4,4) = SUM(NP,TT12)
      GC12(1,2) = -SUM(NP,RO12)
      GC12(2,1) = GC12(1,2)
      GC12(1,3) = -SUM(NP,RI12)
      GC12(3,1) = GC12(1,3)
      GC12(1,4) = -SUM(NP,RT12)
      GC12(4,1) = GC12(1,4)
      GC12(2,3) = SUM(NP,OI12)
      GC12(3,2) = GC12(2,3)
      GC12(2,4) = SUM(NP,OT12)
      GC12(4,2) = GC12(2,4)
      GC12(3,4) = SUM(NP,IT12)
      GC12(4,3) = GC12(3,4)
C     COMPUTE JOINT 21 COVARIANCE MATRIX
      GC21(1,1) = SUM(NP,RR21)
      GC21(2,2) = SUM(NP,OO21)
      GC21(3,3) = SUM(NP,II21)
      GC21(4,4) = SUM(NP,TT21)
      GC21(1,2) = -SUM(NP,RO21)
      GC21(2,1) = GC21(1,2)
      GC21(1,3) = -SUM(NP,RI21)
      GC21(3,1) = GC21(1,3)
      GC21(1,4) = -SUM(NP,RT21)
      GC21(4,1) = GC21(1,4)
      GC21(2,3) = SUM(NP,OI21)
      GC21(3,2) = GC21(2,3)
      GC21(2,4) = SUM(NP,OT21)
      GC21(4,2) = GC21(2,4)
      GC21(3,4) = SUM(NP,IT21)
      GC21(4,3) = GC21(3,4)
C     PORTFOLIO NET BENEFIT, BNET - ABSOLUTE DOLLARS
C     PORTFOLIO RISK, PRISK - ABSOLUTE DOLLARS
      BNET=TOT(NP,E,1)-TOT(NP,E,2)-TOT(NP,E,3)-TOT(NP,E,4)
      PRISK=SQRT(GRISK+CRISK+GCRISK)
C     SCLRSK   SCALES THE RISK AXIS FROM 0 TO 100 (APPROXIMATELY)
      SCLRSK = 1.
      PRISK = PRISK/SCLRSK
      GRISK=SQRT(ABS(GRISK))
      CRISK=SQRT(ABS(CRISK))
```

```
      GCRISK=SQRT(ABS(GCRISK))
C     PORTFOLIO NET BENEFIT, BNORM - NORMALIZED BY PORTFOLIO INVESTMENT
      BNORM = BNET/TINV
      PNORM = SQRT(GNORM + CNORM + GCNORM)
C.    SCLN SCALES THE NORMALIZED RISK AXIS
      SCLN = 1.
      PNORM = PNORM/SCLN
C     WRITE(10,5111) JM
 5111 FORMAT('-',12X,'PORTFOLIO',5X,I2)
C     WRITE(10,96)GRISK,CRISK,GCRISK
 96   FORMAT('0','GRISK=',F11.0,5X,'CRISK=',F12.0,5X,'JRISK=',F12.0)
C     WRITE(10,5112) BNET,PRISK
 5112 FORMAT('0','BNET=',F12.2,5X,'PRISK=',F12.2)
      WRITE(6,514)
 514  FORMAT('1')
      WRITE(6,5111) JM
C     PRINT PROCESS NAMES
      WRITE(6,992)
      DO 55 J=1,NP
      JPROC=NPT(J)
 55   WRITE(6,998) NAME1(JPROC),NAME2(JPROC),NAME3(JPROC),
     *NAME4(JPROC),NAME5(JPROC)
 998  FORMAT('0',20A4)
      WRITE(6,992)
C     WRITE(6,96)  GRISK,CRISK,GCRISK
      WRITE(6,5112) BNET,PRISK
      WRITE(6,97) BNORM, PNORM
 97   FORMAT('0','BNORM=',F11.2,5X,'PNORM=',F12.2)
      WRITE(6,98) TINV
 98   FORMAT('0','COMM SCALE CAPITAL REQMTS =',F9.2)
      WRITE(6,980) DEMINV
 980  FORMAT('0','DEMO SCALE CAPITAL REQMTS =',F9.2)
      WRITE(6,5113)
 5113 FORMAT('0','________________________________')
      WRITE(6,992)
C     SUM OF FOUR SUBMATRICES
      DO 666 K=1,4
      DO 666 L=1,4
 666  SMTRIX(K,L)=GCOV(K,L)+GC12(K,L)+GC21(K,L)+CCOV(K,L)
      DO 668 K=1,4
      DO 668 L=1,4
      STDMTX(K,L)=SQRT(ABS(SMTRIX(K,L)))
      NCOV(K,L)=SMTRIX(K,L)/TINV**2
 668  NSTD(K,L)=STDMTX(K,L)/TINV
 991  FORMAT('0',4F12.0, 12X, 4F12.0)
 992  FORMAT('0')
      WRITE(6,994)
      DO 667 K=1,4
```

```
667  WRITE(6,991) (SMTRIX(K,L),L=1,4)
994  FORMAT('0','COVARIANCE MATRIX')
     WRITE(6,992)
     WRITE(6,995)
995  FORMAT('0','STD DEV MATRIX')
     DO 113 K=1,4
113  WRITE(6,991) (STDMTX(K,L),L=1,4)
     WRITE(6,992)
     WRITE(6,996)
996  FORMAT('0','NORMALIZED COVARIANCE MATRIX')
     DO 114 K=1,4
114  WRITE(6,981)(NCOV(K,L),L=1,4)
     WRITE(6,992)
     WRITE(6,997)
997  FORMAT('0','NORMALIZED STD DEV MATRIX')
     DO 115 K=1,4
115  WRITE(6,981) (NSTD(K,L),L=1,4)
981  FORMAT('0',4F12.4)
1    CONTINUE
     STOP
     END
```

```
        FUNCTION SMAX(N,K,SD)
      DIMENSION SD(22,4)
      SMAX=SD(1,K)
      IF(N .EQ. 1) GO TO 2
      DO 1 I=1,N
      IF( SD(I,K) .LT. SMAX ) GO TO 1
      SMAX=SD(I,K)
    1 CONTINUE
    2 RETURN
      END
```

^
SRU'S:.4
!
^

```
        FUNCTION SMIN(N,K,SD)
      DIMENSION SD(22,4)
      SMIN=SD(1,K)
      IF (N .EQ. 1) GO TO 2
      DO 1 I=1,N
      IF (SD(I,K) .GT. SMIN)  GO TO 1
      SMIN=SD(I,K)
    1 CONTINUE
    2 RETURN
      END
```

```
C       FUNCTION SUBROUTINE SQRSUM
      FUNCTION SQRSUM(N,X,E,Y,J)
      DIMENSION X(20,4),E(20,4),Y(4)
      SQRSUM=0.
      DO 1 I=1,N
    1 SQRSUM=SQRSUM+(X(I,J)*E(I,J)*Y(I))**2
      RETURN
      END
```

^
SRU'S:.3
!
GPS108 E FILE NAME > 6 CHARS
!
^

```
C       FUNCTION SUBROUTINE SQSUMY
      FUNCTION SQSUMY(N,X,E,Y,J)
      DIMENSION X(20,4),E(20,4),Y(4)
      TINV = 0.
      DO 5 II = 1,N
    5 TINV = TINV + E(II,3)
      SQSUMY=0.
      DO 1 I=1,N
    1 SQSUMY=SQSUMY+(X(I,J)*E(I,J)*Y(I)*E(I,3)/TINV)**2
      RETURN
      END
```

```
^
 SRU'S:.3
!
 ^
C     FUNCTION SUBROUTINE SUM
      FUNCTION SUM(N,X)
      DIMENSION X(22,22)
      SUM=0.
      DO 1 I=1,N
      DO 1 J=1,N
1     SUM=SUM+X(I,J)
      RETURN
      END
```

```
^
 SRU'S:.3
!
 ^
        FUNCTION SUM2(I,N,X)
      DIMENSION X(22,15)
      SUM2=0.
      DO 1 J=1,N
1     SUM2=SUM2+X(I,J)
      RETURN
      END
```

```
^
 SRU'S:.3
!
 ^
        FUNCTION SUMXY(NJ,I,J,K,L,X,XB)
      DIMENSION X(4,22,15),XB(22,4)
      SUMXY=0.
      DO  1 JR=1,NJ
1     SUMXY=SUMXY+(X(K,I,JR)-XB(I,K))*(X(L,J,JR)-XB(J,L))
      RETURN
      END
```

```
^
 SRU'S:.3
!
 ^
C     FUNCTION SUBROUTINE TOT
      FUNCTION TOT(N,X,J)
      DIMENSION X(22,4)
      TOT=0.
      DO 1 I=1,N
1     TOT=TOT+X(I,J)
      RETURN
      END
```

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1 | 1.00 | 1.00 | 1.00 | 1.00 | 313.8 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | * | 1.00 | 1.00 | 1.00 | 1.00 | 114.6 |
| 0.06 | 0.17 | 0.37 | 0.29 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | * | 0.00 | 0.00 | 0.00 | 0.00 | 1144.5 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 2 | 1.00 | 1.00 | 1.00 | 1.00 | 315.5 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | * | 1.00 | 1.00 | 1.00 | 1.00 | 102.6 |
| 0.08 | 0.11 | 0.17 | 0.39 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | * | 0.00 | 0.00 | 0.00 | 0.00 | 920.5 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 3 | 1.00 | 1.00 | 1.00 | 1.0 | 329.9 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | * | 1.00 | 1.00 | 1.00 | 1.0 | 117.3 |
| 0.04 | 0.13 | 0.37 | 0.30 | 0.13 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | * | 0.00 | 0.00 | 0.00 | 0.00 | 825.3 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 4 | 1.00 | 1.00 | 1.00 | 1.0 | 312.4 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | * | 1.00 | 1.00 | 1.00 | 1.0 | 85.1 |
| 0.06 | 0.06 | 0.10 | 0.44 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | * | 0.00 | 0.00 | 0.00 | 0.00 | 1201.5 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 5 | 1.00 | 1.00 | 1.00 | 1.0 | 335.1 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | * | 1.00 | 1.00 | 1.00 | 1.0 | 190.5 |
| 0.04 | 0.13 | 0.31 | 0.36 | 0.12 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | * | 0.00 | 0.00 | 0.00 | 0.0 | 1086.7 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 6 | 1.00 | 1.00 | 1.00 | 1.0 | 105.6 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | * | 1.00 | 1.00 | 1.00 | 1.0 | 62.8 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 263.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 7 | 1.00 | 1.00 | 1.00 | 1.0 | 65.6 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | * | 1.00 | 1.00 | 1.00 | 1.0 | 32.4 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 102.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 8 | 1.00 | 1.00 | 1.00 | 1.0 | 127.3 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | * | 1.00 | 1.00 | 1.00 | 1.0 | 99.1 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 343.0 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 9 | 1.00 | 1.00 | 1.00 | 1.0 | 26.4 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | * | 1.00 | 1.00 | 1.00 | 1.0 | 14.9 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 47.2 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1 | 1.00 | 1.00 | 1.00 | 1.0 | 8.8 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 0 | 1.00 | 1.00 | 1.00 | 1.0 | 6.8 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 21.9 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1 | 1.00 | 1.00 | 1.00 | 1.0 | 11.3 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1 | 1.00 | 1.00 | 1.00 | 1.0 | 5.7 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 21.3 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1 | 1.00 | 1.00 | 1.00 | 1.0 | 7.9 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 2 | 1.00 | 1.00 | 1.00 | 1.0 | 4.3 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 9.64 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1 | 1.00 | 1.00 | 1.00 | 1.0 | 88.3 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 3 | 1.00 | 1.00 | 1.00 | 1.0 | 29.0 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 72.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1 | 1.00 | 1.00 | 1.00 | 1.0 | 63.1 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 4 | 1.00 | 1.00 | 1.00 | 1.0 | 52.0 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 367.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1 | 1.00 | 1.00 | 1.00 | 1.0 | 29.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 5 | 1.00 | 1.00 | 1.00 | 1.0 | 15.1 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 23.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1 | 1.00 | 1.00 | 1.00 | 1.0 | 176.6 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 6 | 1.00 | 1.00 | 1.00 | 1.0 | 125.0 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 448.0 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1 | 1.00 | 1.00 | 1.00 | 1.0 | 141.3 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 7 | 1.00 | 1.00 | 1.00 | 1.0 | 50.0 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 117.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1 | 1.00 | 1.00 | 1.00 | 1.0 | 151.4 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 8 | 1.00 | 1.00 | 1.00 | 1.0 | 126.1 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 250.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1 | 1.00 | 1.00 | 1.00 | 1.0 | 329.5 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 9 | 1.00 | 1.00 | 1.00 | 1.0 | 130.1 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 450.3 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 2 | 1.00 | 1.00 | 1.00 | 1.0 | 329.5 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 0 | 1.00 | 1.00 | 1.00 | 1.0 | 151.8 |
| 0.08 | 0.22 | 0.33 | 0.24 | 0.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | * | 0.0 | 0.0 | 0.0 | 0.0 | 525.2 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 2 | 1.00 | 1.00 | 1.00 | 1.0 | 750.3 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1 | 1.00 | 1.00 | 1.00 | 1.0 | 192.9 |
| 0.02 | 0.09 | 0.28 | 0.44 | 0.14 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | * | 0.00 | 0.00 | 0.00 | 0.00 | 1414.5 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 2 | 1.00 | 1.00 | 1.00 | 1.0 | 549.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 2 | 1.00 | 1.00 | 1.00 | 1.0 | 190.6 |
| 0.02 | 0.06 | 0.16 | 0.50 | 0.22 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | * | 0.00 | 0.00 | 0.00 | 0.00 | 1769.0 |

| | | | | |
|---|---|---|---|---|
| 1526.27 | 557.39 | 833.98 | 298.92 | 229.00 |
| 1534.54 | 499.03 | 645.68 | 296.79 | 249.00 |
| 1604.58 | 570.53 | 588.55 | 291.18 | 457.00 |
| 1519.46 | 413.91 | 822.69 | 329.18 | 210.80 |
| 1629.87 | 926.56 | 769.75 | 232.17 | 209.50 |
| 513.62 | 305.45 | 193.75 | 65.57 | 112.00 |
| 319.07 | 157.59 | 75.14 | 43.92 | 102.00 |
| 619.17 | 482.01 | 252.69 | 54.75 | 194.00 |
| 128.41 | 72.47 | 34.77 | 16.02 | 47.20 |
| 42.80 | 33.07 | 16.13 | 3.72 | 21.90 |
| 54.96 | 27.72 | 15.69 | 7.69 | 21.30 |
| 38.42 | 20.91 | 7.10 | 4.67 | 9.60 |
| 429.48 | 141.05 | 53.04 | 70.96 | 36.00 |
| 306.91 | 252.92 | 270.37 | 37.33 | 130.00 |
| 141.05 | 73.44 | 16.94 | 17.05 | 23.00 |
| 858.95 | 607.98 | 330.04 | 87.96 | 196.00 |
| 687.26 | 243.19 | 86.19 | 109.67 | 41.00 |
| 736.38 | 613.33 | 184.18 | 45.19 | 90.00 |
| 1602.63 | 632.78 | 331.74 | 252.76 | 164.00 |
| 1602.63 | 738.33 | 386.92 | 233.68 | 254.00 |
| 3649.33 | 938.23 | 983.83 | 711.78 | 260.43 |
| 2670.24 | 927.05 | 1196.38 | 509.73 | 325.80 |

^
SRU'S:.4
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| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10. | 0. | 0. | 2. | 8. | 10. | 3. | 4. | 2. | 4. | 10. | 10. | 0. |
| 2 | 7. | 7. | 4. | 5. | 8. | 9. | 5. | 8. | 8. | 10. | 10. | 7. | 5. |
| 3 | 8. | 10. | 2. | 4. | 10. | 9. | 4. | 6. | 8. | 10. | 5. | 8. | 8. |
| 4 | 8. | 10. | 2. | 6. | 8. | 10. | 1. | 4. | 6. | 10. | 3. | 5. | 10. |
| 5 | * * * * * * * * * * * * * * * * * * * * * * * * | | | | | | | | | | | | |
| 6 | 9. | 4. | 0. | 1. | 7. | 4. | 4. | 1. | 4. | 7. | 5. | 5. | 3. |
| 7 | 9. | 1. | 0. | 4. | 2. | 0. | 5. | 2. | 4. | 4. | 2. | 1. | 0. |
| 8 | 9. | 3. | 1. | 7. | 7. | 0. | 5. | 5. | 10. | 6. | 6. | 5. | 4. |
| 9 | 9. | 3. | 8. | 10. | 7. | 0. | 4. | 3. | 4. | 6. | 4. | 4. | 3. |
| 10 | 9. | 1. | 0. | 7. | 4. | 0. | 6. | 4. | 4. | 4. | 4. | 5. | 1. |
| 11 | 5. | 2. | 0. | 2. | 4. | 0. | 7. | 1. | 1. | 4. | 4. | 4. | 1. |
| 12 | 5. | 5. | 2. | 1. | 7. | 0. | 5. | 0. | 1. | 4. | 6. | 8. | 2. |
| 13 | 5. | 4. | 0. | 10. | 4. | 0. | 8. | 8. | 1. | 7. | 6. | 6. | 2. |
| 14 | 5. | 0. | 0. | 1. | 2. | 0. | 3. | 0. | 6. | 3. | 4. | 2. | 0. |
| 15 | 5. | 0. | 0. | 1. | 2. | 0. | 3. | 0. | 6. | 3. | 4. | 2. | 0. |
| 16 | 5. | 0. | 0. | 1. | 2. | 0. | 3. | 0. | 6. | 4. | 4. | 2. | 0. |
| 17 | 5. | 0. | 0. | 1. | 2. | 0. | 3. | 0. | 4. | 3. | 4. | 4. | 0. |
| 18 | 5. | 5. | 0. | 1. | 7. | 0. | 4. | 0. | 6. | 2. | 4. | 8. | 2. |
| 19 | 5. | 6. | 0. | 2. | 4. | 0. | 8. | 1. | 4. | 5. | 6. | 6. | 1. |
| 20 | 5. | 5. | 0. | 4. | 4. | 0. | 7. | 2. | 6. | 6. | 6. | 4. | 2. |
| 21 | 5. | 5. | 0. | 6. | 4. | 0. | 7. | 4. | 6. | 10. | 8. | 6. | 3. |
| 22 | 5. | 8. | 0. | 1. | 4. | 0. | 8. | 0. | 6. | 5. | 4. | 4. | 2. |
| 23 | 2. | 5. | 0. | 1. | 0. | 0. | 3. | 0. | 2. | 2. | 4. | 4. | 3. |
| 24 | 10. | 3. | 0. | 5. | 7. | 4. | 3. | 3. | 4. | 8. | 6. | 2. | 4. |
| 25 | 10. | 3. | 0. | 5. | 7. | 4. | 3. | 3. | 4. | 8. | 6. | 2. | 4. |
| 26 | 10. | 1. | 0. | 7. | 4. | 6. | 7. | 6. | 4. | 6. | 5. | 3. | 4. |
| 27 | 10. | 3. | 0. | 4. | 4. | 8. | 8. | 2. | 4. | 6. | 5. | 2. | 4. |

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SRU'S:.5
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| | | | |
|---|---|---|---|
| .2712 | .3958 | .8253 | .8581 |
| .0850 | .1746 | .2480 | .2903 |
| .2825 | .5000 | 1.0000 | 1.0000 |
| .2238 | .4254 | .8105 | .8903 |
| .2013 | .3096 | .5382 | .5452 |
| .1075 | .1862 | .2776 | .2677 |
| .1975 | .2929 | .5618 | .5323 |
| .2313 | .4228 | .7572 | .7613 |
| .0475 | .1193 | .1000 | .1065 |
| .0475 | .1193 | .1000 | .1065 |
| .0525 | .1322 | .1296 | .1387 |
| .0675 | .1167 | .1000 | .1000 |
| .1713 | .2762 | .5678 | .5290 |
| .1738 | .3161 | .5855 | .5419 |
| .1650 | .3457 | .6388 | .6290 |
| .2500 | .4807 | .9171 | .9065 |
| .1212 | .3006 | .6092 | .5935 |
| 0. | .1000 | .1118 | .1581 |
| .2800 | .4408 | .8875 | .9774 |
| .2800 | .4408 | .8875 | .9774 |
| .3000 | .4550 | .8668 | .9323 |
| .2888 | .4331 | .8609 | .9387 |

^
SRU'S:.4

1 L=1

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.00 | .76 | .89 | .89 | .87 | .87 | .79 | .70 | .85 | .85 | .85 | .85 | .78 | .79 | .81 | .71 | .86 | .58 | .94 | .94 | .89 | .85 |
| .76 | 1.00 | .82 | .87 | .89 | .72 | .46 | .55 | .83 | .83 | .83 | .74 | .47 | .57 | .65 | .51 | .72 | .36 | .83 | .83 | .81 | .72 |
| .89 | .82 | 1.00 | .97 | .95 | .94 | .84 | .85 | .93 | .93 | .93 | .92 | .83 | .88 | .92 | .84 | .93 | .66 | .86 | .86 | .75 | .61 |
| .89 | .87 | .97 | 1.00 | .95 | .90 | .78 | .77 | .88 | .88 | .87 | .86 | .78 | .79 | .84 | .73 | .88 | .53 | .88 | .88 | .76 | .64 |
| .87 | .89 | .95 | .95 | 1.00 | .92 | .79 | .83 | .91 | .91 | .90 | .93 | .79 | .84 | .85 | .77 | .90 | .67 | .82 | .82 | .79 | .65 |
| .87 | .72 | .94 | .90 | .92 | 1.00 | .93 | .90 | .90 | .90 | .90 | .95 | .89 | .96 | .96 | .89 | .98 | .78 | .78 | .78 | .69 | .58 |
| .79 | .46 | .84 | .78 | .79 | .93 | 1.00 | .87 | .76 | .76 | .76 | .89 | .97 | .96 | .89 | .88 | .91 | .82 | .62 | .62 | .51 | .41 |
| .70 | .55 | .85 | .77 | .83 | .90 | .87 | 1.00 | .77 | .77 | .78 | .87 | .80 | .92 | .91 | .94 | .85 | .84 | .62 | .62 | .57 | .41 |
| .85 | .83 | .93 | .88 | .91 | .90 | .76 | .77 | 1.00 | 1.00 | 1.00 | .95 | .71 | .87 | .93 | .84 | .92 | .74 | .85 | .85 | .76 | .67 |
| .85 | .83 | .93 | .88 | .91 | .90 | .76 | .77 | 1.00 | 1.00 | 1.00 | .95 | .71 | .87 | .93 | .84 | .92 | .74 | .85 | .85 | .76 | .67 |
| .85 | .83 | .93 | .87 | .90 | .90 | .76 | .78 | 1.00 | 1.00 | 1.00 | .94 | .70 | .87 | .93 | .85 | .92 | .73 | .85 | .85 | .76 | .67 |
| .85 | .74 | .92 | .86 | .93 | .95 | .89 | .87 | .95 | .95 | .94 | 1.00 | .85 | .95 | .94 | .90 | .95 | .87 | .76 | .76 | .71 | .60 |
| .78 | .47 | .83 | .78 | .79 | .89 | .97 | .80 | .71 | .71 | .70 | .85 | 1.00 | .90 | .81 | .78 | .88 | .75 | .58 | .58 | .49 | .38 |
| .79 | .57 | .88 | .79 | .84 | .96 | .96 | .92 | .87 | .87 | .87 | .95 | .90 | 1.00 | .97 | .95 | .96 | .91 | .67 | .67 | .59 | .48 |
| .81 | .65 | .92 | .84 | .85 | .96 | .89 | .91 | .93 | .93 | .93 | .94 | .81 | .97 | 1.00 | .97 | .96 | .84 | .76 | .76 | .65 | .54 |
| .71 | .51 | .84 | .73 | .77 | .89 | .88 | .94 | .84 | .84 | .85 | .90 | .78 | .95 | .97 | 1.00 | .89 | .90 | .64 | .64 | .55 | .43 |
| .86 | .72 | .93 | .88 | .90 | .98 | .91 | .85 | .92 | .92 | .92 | .95 | .88 | .96 | .96 | .89 | 1.00 | .78 | .76 | .76 | .66 | .57 |
| .58 | .36 | .66 | .53 | .67 | .78 | .82 | .84 | .74 | .74 | .73 | .87 | .75 | .91 | .84 | .90 | .78 | 1.00 | .43 | .43 | .44 | .34 |
| .94 | .83 | .86 | .88 | .82 | .78 | .62 | .62 | .85 | .85 | .85 | .76 | .58 | .67 | .76 | .64 | .76 | .43 | 1.00 | 1.00 | .93 | .89 |
| .94 | .83 | .86 | .88 | .82 | .78 | .62 | .62 | .85 | .85 | .85 | .76 | .58 | .67 | .76 | .64 | .76 | .43 | 1.00 | 1.00 | .93 | .89 |
| .89 | .81 | .75 | .76 | .79 | .69 | .51 | .57 | .76 | .76 | .76 | .71 | .49 | .59 | .65 | .55 | .66 | .44 | .93 | .93 | 1.00 | .97 |
| .85 | .72 | .61 | .64 | .65 | .58 | .41 | .41 | .67 | .67 | .67 | .60 | .38 | .48 | .54 | .43 | .57 | .34 | .89 | .89 | .97 | 1.00 |

K=1 L=2

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .78 | .52 | .40 | .46 | .61 | .62 | .61 | .17 | .48 | .48 | .46 | .64 | .51 | .42 | .30 | .23 | .23 | .13 | .66 | .66 | .60 | .64 |
| .55 | .84 | .49 | .61 | .76 | .54 | .31 | .23 | .51 | .51 | .49 | .57 | .28 | .32 | .31 | .20 | .26 | .08 | .59 | .59 | .62 | .54 |
| .67 | .66 | .66 | .67 | .84 | .72 | .68 | .40 | .62 | .62 | .59 | .77 | .63 | .55 | .49 | .40 | .33 | .24 | .63 | .63 | .53 | .40 |
| .67 | .69 | .58 | .73 | .82 | .69 | .62 | .36 | .51 | .51 | .49 | .66 | .55 | .45 | .39 | .31 | .27 | .11 | .64 | .64 | .53 | .41 |
| .57 | .68 | .51 | .59 | .83 | .66 | .57 | .36 | .51 | .51 | .47 | .69 | .51 | .46 | .36 | .28 | .25 | .22 | .51 | .51 | .52 | .39 |
| .66 | .54 | .49 | .55 | .76 | .83 | .80 | .42 | .54 | .54 | .51 | .76 | .64 | .65 | .49 | .41 | .37 | .36 | .53 | .53 | .44 | .38 |
| .58 | .25 | .41 | .43 | .58 | .72 | .86 | .34 | .43 | .43 | .40 | .69 | .74 | .61 | .41 | .36 | .31 | .39 | .38 | .38 | .22 | .18 |
| .49 | .43 | .49 | .50 | .78 | .76 | .71 | .69 | .44 | .44 | .43 | .69 | .49 | .60 | .48 | .52 | .22 | .37 | .44 | .44 | .47 | .22 |
| .68 | .69 | .62 | .58 | .78 | .72 | .64 | .32 | .73 | .73 | .70 | .85 | .57 | .62 | .57 | .46 | .42 | .42 | .64 | .64 | .55 | .51 |
| .68 | .69 | .62 | .58 | .78 | .72 | .64 | .32 | .73 | .73 | .70 | .85 | .57 | .62 | .57 | .46 | .42 | .42 | .64 | .64 | .55 | .51 |
| .72 | .71 | .64 | .61 | .79 | .75 | .65 | .35 | .75 | .75 | .72 | .86 | .56 | .65 | .60 | .50 | .45 | .43 | .67 | .67 | .57 | .54 |
| .63 | .55 | .52 | .50 | .74 | .72 | .72 | .34 | .62 | .62 | .58 | .82 | .63 | .63 | .49 | .42 | .37 | .47 | .50 | .50 | .43 | .38 |
| .53 | .26 | .42 | .41 | .57 | .62 | .79 | .23 | .41 | .41 | .37 | .65 | .79 | .53 | .33 | .25 | .29 | .30 | .30 | .30 | .16 | .12 |
| .60 | .42 | .49 | .45 | .70 | .80 | .83 | .44 | .58 | .58 | .55 | .81 | .68 | .71 | .54 | .49 | .39 | .50 | .45 | .45 | .36 | .30 |
| .67 | .55 | .62 | .57 | .79 | .85 | .80 | .51 | .68 | .68 | .66 | .86 | .64 | .73 | .64 | .58 | .43 | .47 | .60 | .60 | .49 | .41 |
| .63 | .45 | .58 | .52 | .74 | .82 | .80 | .61 | .64 | .64 | .63 | .84 | .59 | .75 | .66 | .68 | .40 | .54 | .56 | .56 | .46 | .34 |
| .71 | .59 | .58 | .56 | .77 | .85 | .80 | .37 | .66 | .66 | .64 | .84 | .71 | .71 | .58 | .47 | .48 | .40 | .55 | .55 | .44 | .42 |
| .40 | .23 | .33 | .21 | .52 | .62 | .69 | .40 | .50 | .50 | .47 | .74 | .53 | .65 | .48 | .48 | .31 | .66 | .24 | .24 | .23 | .18 |
| .77 | .63 | .46 | .55 | .65 | .59 | .49 | .23 | .51 | .51 | .49 | .60 | .36 | .36 | .33 | .26 | .19 | .06 | .78 | .78 | .73 | .73 |
| .77 | .63 | .46 | .55 | .65 | .59 | .49 | .23 | .51 | .51 | .49 | .60 | .36 | .36 | .33 | .26 | .19 | .06 | .78 | .78 | .73 | .73 |
| .62 | .57 | .27 | .31 | .58 | .44 | .28 | .16 | .38 | .38 | .36 | .49 | .17 | .21 | .15 | .10 | .04 | -.00 | .62 | .62 | .79 | .77 |
| .62 | .49 | .16 | .20 | .41 | .36 | .22 | .00 | .35 | .35 | .32 | .42 | .12 | .16 | .10 | .03 | .04 | -.03 | .60 | .60 | .75 | .85 |

... ATION COEFFICIENTS - OUTPUT FROM CORR PROGRAM

1 L=3

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .71 | .56 | .42 | .53 | .69 | .65 | .55 | .23 | .52 | .52 | .49 | .69 | .44 | .36 | .26 | .20 | .14 | -.04 | .64 | .64 | .66 | .62 |
| .54 | .87 | .51 | .63 | .82 | .58 | .28 | .28 | .59 | .59 | .56 | .65 | .23 | .30 | .31 | .20 | .19 | -.01 | .60 | .60 | .70 | .58 |
| .58 | .66 | .60 | .65 | .84 | .70 | .56 | .40 | .63 | .63 | .59 | .78 | .51 | .44 | .39 | .31 | .20 | .01 | .55 | .55 | .52 | .34 |
| .64 | .72 | .60 | .76 | .87 | .74 | .58 | .43 | .58 | .58 | .55 | .73 | .49 | .42 | .37 | .29 | .20 | -.03 | .63 | .63 | .59 | .42 |
| .52 | .69 | .50 | .59 | .85 | .68 | .50 | .40 | .55 | .55 | .51 | .74 | .42 | .40 | .31 | .24 | .16 | .07 | .47 | .47 | .55 | .37 |
| .54 | .52 | .44 | .53 | .74 | .78 | .65 | .42 | .51 | .51 | .48 | .74 | .50 | .50 | .36 | .32 | .21 | .12 | .44 | .44 | .41 | .29 |
| .49 | .26 | .37 | .44 | .59 | .69 | .75 | .37 | .40 | .40 | .36 | .67 | .62 | .50 | .31 | .29 | .19 | .17 | .30 | .30 | .20 | .11 |
| .31 | .36 | .31 | .38 | .66 | .63 | .51 | .58 | .36 | .36 | .35 | .61 | .32 | .38 | .26 | .34 | .03 | .07 | .25 | .25 | .30 | .06 |
| .52 | .66 | .51 | .51 | .73 | .61 | .44 | .25 | .67 | .67 | .63 | .77 | .39 | .43 | .39 | .31 | .23 | .13 | .50 | .50 | .49 | .40 |
| .52 | .66 | .51 | .51 | .73 | .61 | .44 | .25 | .67 | .67 | .63 | .77 | .39 | .43 | .39 | .31 | .23 | .13 | .50 | .50 | .49 | .40 |
| .55 | .68 | .53 | .53 | .74 | .64 | .45 | .29 | .69 | .69 | .66 | .79 | .38 | .45 | .43 | .36 | .25 | .14 | .53 | .53 | .51 | .43 |
| .49 | .54 | .44 | .45 | .72 | .65 | .55 | .32 | .58 | .58 | .54 | .79 | .47 | .48 | .35 | .31 | .21 | .23 | .38 | .38 | .40 | .29 |
| .51 | .30 | .46 | .48 | .64 | .68 | .76 | .32 | .44 | .44 | .40 | .71 | .72 | .51 | .32 | .26 | .22 | .16 | .30 | .30 | .21 | .11 |
| .44 | .38 | .37 | .38 | .63 | .69 | .63 | .39 | .49 | .49 | .46 | .73 | .50 | .51 | .35 | .34 | .19 | .20 | .29 | .29 | .27 | .16 |
| .47 | .50 | .45 | .46 | .68 | .69 | .56 | .41 | .58 | .58 | .56 | .75 | .43 | .48 | .41 | .39 | .19 | .12 | .41 | .41 | .36 | .24 |
| .40 | .37 | .37 | .37 | .60 | .64 | .53 | .49 | .50 | .50 | .50 | .71 | .36 | .47 | .39 | .46 | .15 | .17 | .33 | .33 | .28 | .13 |
| .59 | .58 | .52 | .55 | .77 | .79 | .65 | .39 | .64 | .64 | .61 | .83 | .56 | .56 | .46 | .39 | .29 | .15 | .47 | .47 | .42 | .33 |
| .17 | .15 | .13 | .07 | .39 | .42 | .42 | .27 | .34 | .34 | .32 | .59 | .31 | .39 | .21 | .27 | .08 | .34 | .01 | .01 | .06 | -.01 |
| .67 | .65 | .42 | .56 | .66 | .57 | .38 | .21 | .52 | .52 | .49 | .60 | .26 | .25 | .23 | .17 | .08 | -.15 | .71 | .71 | .73 | .68 |
| .67 | .65 | .42 | .56 | .66 | .57 | .38 | .21 | .52 | .52 | .49 | .60 | .26 | .25 | .23 | .17 | .08 | -.15 | .71 | .71 | .73 | .68 |
| .51 | .59 | .22 | .32 | .58 | .41 | .18 | .12 | .40 | .40 | .37 | .50 | .08 | .10 | .04 | -.00 | -.07 | -.18 | .54 | .54 | .77 | .71 |
| .52 | .51 | .14 | .23 | .44 | .33 | .12 | -.03 | .35 | .35 | .33 | .42 | .03 | .06 | .00 | -.06 | -.06 | -.20 | .54 | .54 | .76 | .80 |



K=1 L=4

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .63 | .55 | .35 | .36 | .58 | .62 | .48 | .11 | .55 | .55 | .51 | .69 | .40 | .30 | .18 | .10 | .10 | -.13 | .53 | .53 | .52 | .51 |
| .53 | .86 | .54 | .56 | .80 | .63 | .32 | .25 | .68 | .68 | .63 | .74 | .29 | .32 | .31 | .19 | .20 | -.02 | .56 | .56 | .58 | .48 |
| .45 | .62 | .50 | .46 | .71 | .65 | .49 | .24 | .64 | .64 | .58 | .76 | .46 | .35 | .28 | .18 | .13 | -.10 | .41 | .41 | .34 | .21 |
| .54 | .71 | .57 | .61 | .80 | .74 | .55 | .35 | .63 | .63 | .58 | .77 | .48 | .38 | .33 | .23 | .17 | -.10 | .53 | .53 | .46 | .32 |
| .42 | .67 | .44 | .45 | .74 | .62 | .43 | .25 | .58 | .58 | .53 | .74 | .38 | .32 | .22 | .14 | .11 | -.05 | .38 | .38 | .39 | .25 |
| .38 | .46 | .31 | .32 | .55 | .61 | .51 | .18 | .49 | .49 | .45 | .66 | .40 | .33 | .19 | .13 | .09 | -.06 | .29 | .29 | .20 | .12 |
| .29 | .21 | .21 | .20 | .39 | .52 | .56 | .13 | .34 | .34 | .30 | .54 | .48 | .30 | .13 | .09 | .07 | -.03 | .14 | .14 | .03 | -.02 |
| .15 | .32 | .18 | .21 | .48 | .47 | .34 | .31 | .33 | .33 | .31 | .53 | .19 | .21 | .10 | .15 | -.07 | -.13 | .11 | .11 | .10 | -.08 |
| .41 | .62 | .42 | .35 | .61 | .56 | .38 | .12 | .66 | .66 | .61 | .75 | .35 | .33 | .27 | .17 | .16 | .00 | .37 | .37 | .32 | .26 |
| .41 | .62 | .42 | .35 | .61 | .56 | .38 | .12 | .66 | .66 | .61 | .75 | .35 | .33 | .27 | .17 | .16 | .00 | .37 | .37 | .32 | .26 |
| .45 | .64 | .44 | .38 | .63 | .59 | .39 | .16 | .69 | .69 | .64 | .78 | .35 | .36 | .31 | .23 | .18 | .01 | .41 | .41 | .35 | .28 |
| .36 | .50 | .33 | .28 | .56 | .55 | .44 | .14 | .56 | .56 | .51 | .72 | .39 | .34 | .21 | .15 | .12 | .05 | .26 | .26 | .23 | .17 |
| .31 | .25 | .28 | .24 | .43 | .51 | .57 | .09 | .39 | .39 | .33 | .58 | .58 | .31 | .14 | .06 | .09 | -.03 | .14 | .14 | .04 | -.01 |
| .25 | .31 | .20 | .17 | .42 | .49 | .44 | .12 | .43 | .43 | .39 | .61 | .35 | .29 | .14 | .12 | .05 | -.02 | .13 | .13 | .06 | -.01 |
| .31 | .43 | .30 | .26 | .50 | .55 | .41 | .18 | .53 | .53 | .50 | .66 | .32 | .30 | .22 | .19 | .07 | -.07 | .24 | .24 | .15 | .06 |
| .23 | .33 | .23 | .19 | .42 | .50 | .38 | .25 | .45 | .45 | .44 | .61 | .24 | .29 | .21 | .25 | .04 | -.03 | .17 | .17 | .09 | -.01 |
| .41 | .49 | .37 | .32 | .56 | .62 | .50 | .14 | .59 | .59 | .55 | .74 | .45 | .37 | .25 | .19 | .15 | -.05 | .30 | .30 | .20 | .13 |
| .02 | .11 | -.01 | -.07 | .21 | .24 | .23 | .03 | .25 | .25 | .23 | .43 | .15 | .17 | .02 | .05 | -.04 | .10 | -.10 | -.10 | -.08 | -.13 |
| .63 | .65 | .41 | .44 | .63 | .60 | .38 | .17 | .58 | .58 | .55 | .66 | .29 | .26 | .22 | .13 | .10 | -.18 | .62 | .62 | .62 | .59 |
| .63 | .65 | .41 | .44 | .63 | .60 | .38 | .17 | .58 | .58 | .55 | .66 | .29 | .26 | .22 | .13 | .10 | -.18 | .62 | .62 | .62 | .59 |
| .50 | .58 | .21 | .24 | .54 | .41 | .16 | .05 | .46 | .46 | .42 | .56 | .09 | .09 | .02 | -.04 | -.06 | -.24 | .50 | .50 | .65 | .63 |
| .53 | .50 | .13 | .17 | .42 | .34 | .12 | -.06 | .41 | .41 | .37 | .48 | .05 | .05 | -.01 | -.08 | -.06 | -.23 | .51 | .51 | .67 | .72 |

L=1

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .78 | .55 | .67 | .67 | .57 | .66 | .58 | .49 | .68 | .68 | .72 | .63 | .53 | .60 | .67 | .63 | .71 | .40 | .77 | .77 | .62 | .62 |
| .52 | .84 | .66 | .69 | .68 | .54 | .25 | .43 | .69 | .69 | .71 | .55 | .26 | .42 | .55 | .45 | .59 | .23 | .63 | .63 | .57 | .49 |
| .40 | .49 | .66 | .58 | .51 | .49 | .41 | .49 | .62 | .62 | .64 | .52 | .42 | .49 | .62 | .58 | .58 | .33 | .46 | .46 | .27 | .16 |
| .46 | .61 | .67 | .73 | .59 | .55 | .43 | .50 | .58 | .58 | .61 | .50 | .41 | .45 | .57 | .52 | .56 | .21 | .55 | .55 | .31 | .20 |
| .61 | .76 | .84 | .82 | .83 | .76 | .58 | .78 | .78 | .78 | .79 | .74 | .57 | .70 | .79 | .74 | .77 | .52 | .65 | .65 | .58 | .41 |
| .62 | .54 | .72 | .69 | .66 | .83 | .72 | .76 | .72 | .72 | .75 | .72 | .62 | .80 | .85 | .82 | .85 | .62 | .59 | .59 | .44 | .36 |
| .61 | .31 | .68 | .62 | .57 | .80 | .86 | .71 | .64 | .64 | .65 | .72 | .79 | .83 | .80 | .80 | .80 | .69 | .49 | .49 | .28 | .22 |
| .17 | .23 | .40 | .36 | .36 | .42 | .34 | .69 | .32 | .32 | .35 | .34 | .23 | .44 | .51 | .61 | .37 | .40 | .23 | .23 | .16 | .00 |
| .48 | .51 | .62 | .51 | .51 | .54 | .43 | .44 | .73 | .73 | .75 | .62 | .41 | .58 | .68 | .64 | .66 | .50 | .51 | .51 | .38 | .35 |
| .48 | .51 | .62 | .51 | .51 | .54 | .43 | .44 | .73 | .73 | .75 | .62 | .41 | .58 | .68 | .64 | .66 | .50 | .51 | .51 | .38 | .35 |
| .46 | .49 | .59 | .49 | .47 | .51 | .40 | .43 | .70 | .70 | .72 | .58 | .37 | .55 | .66 | .63 | .64 | .47 | .49 | .49 | .36 | .32 |
| .64 | .57 | .77 | .66 | .69 | .76 | .69 | .69 | .85 | .85 | .86 | .82 | .65 | .81 | .86 | .84 | .84 | .74 | .60 | .60 | .49 | .42 |
| .51 | .28 | .63 | .55 | .51 | .64 | .74 | .49 | .57 | .57 | .56 | .63 | .79 | .68 | .64 | .59 | .71 | .53 | .36 | .36 | .17 | .12 |
| .42 | .32 | .55 | .45 | .46 | .65 | .61 | .60 | .62 | .62 | .65 | .63 | .53 | .71 | .73 | .75 | .71 | .65 | .36 | .36 | .21 | .16 |
| .30 | .31 | .49 | .39 | .36 | .49 | .41 | .48 | .57 | .57 | .60 | .49 | .33 | .54 | .64 | .66 | .58 | .48 | .33 | .33 | .15 | .10 |
| .23 | .20 | .40 | .31 | .28 | .41 | .36 | .52 | .46 | .46 | .50 | .42 | .25 | .49 | .58 | .68 | .47 | .48 | .26 | .26 | .10 | .03 |
| .23 | .26 | .33 | .27 | .25 | .37 | .31 | .22 | .42 | .42 | .45 | .37 | .29 | .39 | .43 | .40 | .48 | .31 | .19 | .19 | .04 | .04 |
| .13 | .08 | .24 | .11 | .22 | .36 | .39 | .37 | .42 | .42 | .43 | .47 | .30 | .50 | .47 | .54 | .40 | .66 | .06 | .06 | -.00 | -.03 |
| .66 | .59 | .63 | .64 | .51 | .53 | .38 | .44 | .64 | .64 | .67 | .50 | .30 | .45 | .60 | .56 | .55 | .24 | .78 | .78 | .62 | .60 |
| .66 | .59 | .63 | .64 | .51 | .53 | .38 | .44 | .64 | .64 | .67 | .50 | .30 | .45 | .60 | .56 | .55 | .24 | .78 | .78 | .62 | .60 |
| .60 | .62 | .53 | .53 | .52 | .44 | .22 | .47 | .55 | .55 | .57 | .43 | .16 | .36 | .49 | .46 | .44 | .23 | .73 | .73 | .79 | .75 |
| .64 | .54 | .40 | .41 | .39 | .38 | .18 | .22 | .51 | .51 | .54 | .38 | .12 | .30 | .41 | .34 | .42 | .18 | .73 | .73 | .77 | .85 |

K=2 L=2

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.00 | .60 | .60 | .54 | .56 | .74 | .68 | .31 | .65 | .65 | .69 | .72 | .58 | .68 | .67 | .63 | .62 | .34 | .90 | .90 | .62 | .74 |
| .60 | 1.00 | .74 | .72 | .86 | .60 | .23 | .42 | .73 | .73 | .74 | .69 | .29 | .48 | .61 | .53 | .49 | .12 | .69 | .69 | .69 | .56 |
| .60 | .74 | 1.00 | .69 | .80 | .57 | .42 | .45 | .87 | .87 | .87 | .81 | .63 | .61 | .80 | .71 | .59 | .28 | .66 | .66 | .48 | .28 |
| .54 | .72 | .69 | 1.00 | .75 | .61 | .47 | .50 | .53 | .53 | .57 | .57 | .36 | .43 | .54 | .54 | .34 | .04 | .66 | .66 | .37 | .19 |
| .56 | .86 | .80 | .75 | 1.00 | .73 | .46 | .66 | .70 | .70 | .69 | .78 | .46 | .58 | .65 | .61 | .40 | .21 | .63 | .63 | .66 | .38 |
| .74 | .60 | .57 | .61 | .73 | 1.00 | .83 | .66 | .59 | .59 | .62 | .76 | .58 | .86 | .78 | .74 | .66 | .49 | .66 | .66 | .46 | .44 |
| .68 | .23 | .42 | .47 | .46 | .83 | 1.00 | .43 | .43 | .43 | .44 | .65 | .78 | .83 | .64 | .58 | .63 | .62 | .47 | .47 | .09 | .18 |
| .31 | .42 | .45 | .50 | .66 | .66 | .43 | 1.00 | .24 | .24 | .30 | .39 | .12 | .55 | .59 | .74 | .27 | .31 | .46 | .46 | .47 | .13 |
| .65 | .73 | .87 | .53 | .70 | .59 | .43 | .24 | 1.00 | 1.00 | .99 | .93 | .60 | .68 | .82 | .69 | .65 | .41 | .63 | .63 | .48 | .47 |
| .65 | .73 | .87 | .53 | .70 | .59 | .43 | .24 | 1.00 | 1.00 | .99 | .93 | .60 | .68 | .82 | .69 | .65 | .41 | .63 | .63 | .48 | .47 |
| .69 | .74 | .87 | .57 | .69 | .62 | .44 | .30 | .99 | .99 | 1.00 | .93 | .56 | .70 | .85 | .76 | .67 | .41 | .68 | .68 | .51 | .50 |
| .72 | .69 | .81 | .57 | .78 | .76 | .65 | .39 | .93 | .93 | .93 | 1.00 | .68 | .78 | .81 | .74 | .63 | .52 | .64 | .64 | .49 | .46 |
| .58 | .29 | .63 | .36 | .46 | .58 | .78 | .12 | .60 | .60 | .56 | .68 | 1.00 | .73 | .62 | .42 | .71 | .53 | .31 | .31 | -.02 | .07 |
| .68 | .48 | .61 | .43 | .58 | .86 | .83 | .55 | .68 | .68 | .70 | .78 | .73 | 1.00 | .92 | .83 | .89 | .79 | .52 | .52 | .24 | .32 |
| .67 | .61 | .80 | .54 | .65 | .78 | .64 | .59 | .82 | .82 | .85 | .81 | .62 | .92 | 1.00 | .93 | .86 | .67 | .65 | .65 | .37 | .36 |
| .63 | .53 | .71 | .54 | .61 | .74 | .58 | .74 | .69 | .69 | .76 | .74 | .42 | .83 | .93 | 1.00 | .69 | .61 | .67 | .67 | .43 | .33 |
| .62 | .49 | .59 | .34 | .40 | .66 | .63 | .27 | .65 | .65 | .67 | .63 | .71 | .89 | .86 | .69 | 1.00 | .71 | .44 | .44 | .10 | .29 |
| .34 | .12 | .28 | .04 | .21 | .49 | .62 | .31 | .41 | .41 | .41 | .52 | .53 | .79 | .67 | .61 | .71 | 1.00 | .18 | .18 | -.06 | .10 |
| .90 | .69 | .66 | .66 | .63 | .66 | .47 | .46 | .63 | .63 | .68 | .64 | .31 | .52 | .65 | .67 | .44 | .18 | 1.00 | 1.00 | .79 | .77 |
| .90 | .69 | .66 | .66 | .63 | .66 | .47 | .46 | .63 | .63 | .68 | .64 | .31 | .52 | .65 | .67 | .44 | .18 | 1.00 | 1.00 | .79 | .77 |
| .62 | .69 | .48 | .37 | .66 | .46 | .09 | .47 | .48 | .48 | .51 | .49 | -.02 | .24 | .37 | .43 | .10 | -.06 | .79 | .79 | 1.00 | .84 |
| .74 | .56 | .28 | .19 | .38 | .44 | .18 | .13 | .47 | .47 | .50 | .46 | .07 | .32 | .36 | .33 | .29 | .10 | .77 | .77 | .84 | 1.00 |

K=2 L=3

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .92 | .63 | .63 | .64 | .62 | .78 | .63 | .44 | .67 | .67 | .71 | .74 | .51 | .65 | .69 | .67 | .52 | .20 | .87 | .87 | .68 | .73 |
| .53 | .98 | .70 | .68 | .85 | .60 | .17 | .45 | .80 | .80 | .81 | .75 | .20 | .42 | .59 | .53 | .36 | .00 | .65 | .65 | .70 | .54 |
| .48 | .69 | .89 | .64 | .74 | .52 | .32 | .42 | .87 | .87 | .87 | .79 | .48 | .49 | .71 | .65 | .42 | .08 | .55 | .55 | .41 | .21 |
| .51 | .71 | .67 | .89 | .76 | .65 | .43 | .57 | .59 | .59 | .63 | .63 | .31 | .40 | .53 | .55 | .27 | -.09 | .64 | .64 | .39 | .19 |
| .44 | .80 | .60 | .67 | .92 | .67 | .34 | .62 | .71 | .71 | .71 | .79 | .32 | .44 | .52 | .52 | .22 | -.01 | .51 | .51 | .57 | .29 |
| .59 | .54 | .47 | .56 | .66 | .89 | .67 | .66 | .52 | .52 | .56 | .68 | .42 | .69 | .64 | .65 | .45 | .24 | .53 | .53 | .37 | .31 |
| .60 | .23 | .39 | .49 | .46 | .80 | .89 | .51 | .36 | .36 | .37 | .58 | .68 | .76 | .60 | .56 | .52 | .44 | .40 | .40 | .07 | .11 |
| .14 | .29 | .23 | .33 | .45 | .50 | .27 | .88 | .14 | .14 | .20 | .28 | -.01 | .36 | .39 | .58 | .11 | .09 | .24 | .24 | .22 | -.06 |
| .45 | .66 | .71 | .43 | .60 | .45 | .22 | .15 | .94 | .94 | .92 | .85 | .38 | .46 | .63 | .55 | .39 | .11 | .46 | .46 | .39 | .32 |
| .45 | .66 | .71 | .43 | .60 | .45 | .22 | .15 | .94 | .94 | .92 | .85 | .38 | .46 | .63 | .55 | .39 | .11 | .46 | .46 | .39 | .32 |
| .49 | .67 | .72 | .46 | .61 | .49 | .24 | .23 | .93 | .93 | .94 | .85 | .35 | .48 | .68 | .64 | .41 | .12 | .52 | .52 | .42 | .36 |
| .52 | .63 | .65 | .47 | .69 | .62 | .42 | .32 | .86 | .86 | .86 | .92 | .46 | .56 | .62 | .60 | .37 | .20 | .46 | .46 | .40 | .31 |
| .58 | .32 | .69 | .50 | .54 | .65 | .80 | .27 | .63 | .63 | .58 | .72 | .94 | .78 | .70 | .50 | .66 | .45 | .34 | .34 | .05 | .10 |
| .51 | .41 | .48 | .39 | .48 | .74 | .66 | .56 | .57 | .57 | .59 | .66 | .56 | .86 | .81 | .75 | .70 | .56 | .37 | .37 | .12 | .17 |
| .47 | .52 | .63 | .46 | .51 | .63 | .45 | .54 | .71 | .71 | .74 | .68 | .43 | .74 | .85 | .83 | .64 | .41 | .46 | .46 | .22 | .20 |
| .41 | .42 | .51 | .40 | .45 | .57 | .37 | .67 | .56 | .56 | .64 | .59 | .23 | .61 | .74 | .88 | .46 | .34 | .44 | .44 | .25 | .15 |
| .57 | .48 | .59 | .43 | .41 | .65 | .60 | .41 | .62 | .62 | .64 | .60 | .64 | .91 | .93 | .77 | .92 | .65 | .43 | .43 | .10 | .27 |
| .19 | .06 | .15 | .01 | .10 | .34 | .45 | .30 | .23 | .23 | .24 | .33 | .38 | .67 | .56 | .53 | .59 | .85 | .02 | .02 | -.18 | -.02 |
| .77 | .67 | .60 | .66 | .61 | .62 | .36 | .47 | .62 | .62 | .67 | .60 | .21 | .41 | .57 | .62 | .31 | -.02 | .90 | .90 | .76 | .71 |
| .77 | .67 | .60 | .66 | .61 | .62 | .36 | .47 | .62 | .62 | .67 | .60 | .21 | .41 | .57 | .62 | .31 | -.02 | .90 | .90 | .76 | .71 |
| .45 | .63 | .34 | .32 | .56 | .35 | -.05 | .35 | .47 | .47 | .50 | .46 | -.15 | .05 | .19 | .29 | -.08 | -.28 | .63 | .63 | .89 | .71 |
| .60 | .55 | .23 | .23 | .36 | .37 | .07 | .10 | .45 | .45 | .48 | .42 | -.03 | .19 | .27 | .26 | .15 | -.07 | .68 | .68 | .82 | .91 |



K=2 L=4

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .85 | .59 | .56 | .46 | .54 | .80 | .65 | .35 | .71 | .71 | .74 | .77 | .53 | .64 | .62 | .59 | .50 | .15 | .75 | .75 | .54 | .60 |
| .51 | .93 | .69 | .61 | .83 | .65 | .23 | .43 | .86 | .86 | .85 | .84 | .25 | .44 | .55 | .49 | .33 | -.03 | .59 | .59 | .55 | .40 |
| .37 | .62 | .76 | .49 | .64 | .54 | .31 | .36 | .84 | .84 | .82 | .78 | .46 | .45 | .60 | .53 | .35 | .01 | .41 | .41 | .24 | .08 |
| .46 | .76 | .73 | .85 | .83 | .77 | .49 | .65 | .69 | .69 | .71 | .74 | .37 | .49 | .60 | .59 | .30 | -.07 | .58 | .58 | .36 | .15 |
| .33 | .76 | .61 | .55 | .82 | .63 | .29 | .50 | .73 | .73 | .71 | .80 | .28 | .36 | .42 | .41 | .15 | -.12 | .40 | .40 | .38 | .14 |
| .43 | .44 | .35 | .36 | .47 | .71 | .56 | .40 | .49 | .49 | .52 | .62 | .35 | .51 | .45 | .46 | .30 | .07 | .37 | .37 | .14 | .09 |
| .41 | .18 | .25 | .26 | .28 | .65 | .77 | .28 | .30 | .30 | .31 | .47 | .60 | .60 | .42 | .37 | .42 | .27 | .23 | .23 | -.09 | -.04 |
| .06 | .29 | .21 | .29 | .39 | .44 | .22 | .70 | .17 | .17 | .23 | .28 | -.04 | .31 | .33 | .50 | .08 | .01 | .16 | .16 | .08 | -.14 |
| .33 | .56 | .55 | .27 | .47 | .40 | .17 | .07 | .86 | .86 | .84 | .79 | .32 | .35 | .45 | .38 | .27 | -.02 | .31 | .31 | .20 | .15 |
| .33 | .56 | .55 | .27 | .47 | .40 | .17 | .07 | .86 | .86 | .84 | .79 | .32 | .35 | .45 | .38 | .27 | -.02 | .31 | .31 | .20 | .15 |
| .39 | .58 | .57 | .31 | .49 | .46 | .20 | .15 | .88 | .88 | .88 | .81 | .30 | .40 | .52 | .49 | .30 | .00 | .38 | .38 | .25 | .19 |
| .37 | .54 | .49 | .28 | .53 | .52 | .32 | .17 | .80 | .80 | .78 | .83 | .35 | .41 | .43 | .40 | .24 | .02 | .31 | .31 | .20 | .13 |
| .37 | .23 | .47 | .24 | .33 | .51 | .68 | .08 | .52 | .52 | .47 | .57 | .84 | .60 | .48 | .29 | .51 | .28 | .16 | .16 | -.12 | -.06 |
| .34 | .31 | .31 | .18 | .29 | .57 | .56 | .31 | .48 | .48 | .50 | .55 | .48 | .68 | .58 | .53 | .55 | .36 | .20 | .20 | -.10 | -.04 |
| .35 | .43 | .49 | .30 | .38 | .55 | .42 | .39 | .64 | .64 | .67 | .62 | .39 | .63 | .68 | .65 | .53 | .28 | .31 | .31 | .03 | .02 |
| .32 | .37 | .42 | .30 | .36 | .54 | .35 | .54 | .54 | .54 | .61 | .56 | .20 | .55 | .64 | .75 | .40 | .23 | .33 | .33 | .10 | .02 |
| .45 | .37 | .45 | .25 | .26 | .56 | .59 | .26 | .55 | .55 | .57 | .52 | .63 | .80 | .75 | .60 | .79 | .53 | .29 | .29 | -.06 | .08 |
| .11 | .02 | .08 | -.06 | -.00 | .25 | .40 | .16 | .15 | .15 | .16 | .22 | .35 | .56 | .44 | .38 | .52 | .70 | -.04 | -.04 | -.24 | -.11 |
| .77 | .69 | .63 | .58 | .63 | .75 | .46 | .49 | .70 | .70 | .75 | .72 | .29 | .50 | .60 | .62 | .36 | .01 | .83 | .83 | .68 | .63 |
| .77 | .69 | .63 | .58 | .63 | .75 | .46 | .49 | .70 | .70 | .75 | .72 | .29 | .50 | .60 | .62 | .36 | .01 | .83 | .83 | .68 | .63 |
| .47 | .61 | .35 | .29 | .55 | .40 | -.02 | .30 | .54 | .54 | .56 | .55 | .13 | .07 | .19 | .27 | -.07 | -.29 | .60 | .60 | .75 | .63 |
| .64 | .52 | .25 | .19 | .36 | .40 | .11 | .10 | .50 | .50 | .52 | .50 | .01 | .21 | .25 | .24 | .14 | -.08 | .65 | .65 | .73 | .81 |

K=3 L=1

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .71 | .54 | .58 | .64 | .52 | .54 | .49 | .31 | .52 | .52 | .55 | .49 | .51 | .44 | .47 | .40 | .59 | .17 | .67 | .67 | .51 | .52 |
| .56 | .87 | .66 | .72 | .69 | .52 | .26 | .36 | .66 | .66 | .68 | .54 | .30 | .38 | .50 | .37 | .58 | .15 | .65 | .65 | .59 | .51 |
| .42 | .51 | .60 | .60 | .50 | .44 | .37 | .31 | .51 | .51 | .53 | .44 | .46 | .37 | .45 | .37 | .52 | .13 | .42 | .42 | .22 | .14 |
| .53 | .63 | .65 | .76 | .59 | .53 | .44 | .38 | .51 | .51 | .53 | .45 | .48 | .38 | .46 | .37 | .55 | .07 | .56 | .56 | .32 | .23 |
| .69 | .82 | .84 | .87 | .85 | .74 | .59 | .66 | .73 | .73 | .74 | .72 | .64 | .63 | .68 | .60 | .77 | .39 | .66 | .66 | .58 | .44 |
| .65 | .58 | .70 | .74 | .68 | .78 | .69 | .63 | .61 | .61 | .64 | .65 | .68 | .69 | .69 | .64 | .79 | .42 | .57 | .57 | .41 | .33 |
| .55 | .28 | .56 | .58 | .50 | .65 | .75 | .51 | .44 | .44 | .45 | .55 | .76 | .63 | .56 | .53 | .65 | .42 | .38 | .38 | .18 | .12 |
| .23 | .28 | .40 | .43 | .40 | .42 | .37 | .58 | .25 | .25 | .29 | .32 | .32 | .39 | .41 | .49 | .39 | .27 | .21 | .21 | .12 | -.03 |
| .52 | .59 | .63 | .58 | .55 | .51 | .40 | .36 | .67 | .67 | .69 | .58 | .44 | .49 | .58 | .50 | .64 | .34 | .52 | .52 | .40 | .35 |
| .52 | .59 | .63 | .58 | .55 | .51 | .40 | .36 | .67 | .67 | .69 | .58 | .44 | .49 | .58 | .50 | .64 | .34 | .52 | .52 | .40 | .35 |
| .49 | .56 | .59 | .55 | .51 | .48 | .36 | .35 | .63 | .63 | .66 | .54 | .40 | .46 | .56 | .50 | .61 | .32 | .49 | .49 | .37 | .33 |
| .69 | .65 | .78 | .73 | .74 | .74 | .67 | .61 | .77 | .77 | .79 | .79 | .71 | .73 | .75 | .71 | .83 | .59 | .60 | .60 | .50 | .42 |
| .44 | .23 | .51 | .49 | .42 | .50 | .62 | .32 | .39 | .39 | .38 | .47 | .72 | .50 | .43 | .36 | .56 | .31 | .26 | .26 | .08 | .03 |
| .36 | .30 | .44 | .42 | .40 | .50 | .50 | .38 | .43 | .43 | .45 | .48 | .51 | .51 | .48 | .47 | .56 | .39 | .25 | .25 | .10 | .06 |
| .26 | .31 | .39 | .37 | .31 | .36 | .31 | .26 | .39 | .39 | .43 | .35 | .32 | .35 | .41 | .39 | .46 | .21 | .23 | .23 | .04 | .00 |
| .20 | .20 | .31 | .29 | .24 | .32 | .29 | .34 | .31 | .31 | .36 | .31 | .26 | .34 | .39 | .46 | .39 | .27 | .17 | .17 | -.00 | -.06 |
| .14 | .19 | .20 | .20 | .16 | .21 | .19 | .03 | .23 | .23 | .25 | .21 | .22 | .19 | .19 | .15 | .29 | .08 | .08 | .08 | -.07 | -.06 |
| -.04 | -.01 | .01 | -.03 | .07 | .12 | .17 | .07 | .13 | .13 | .14 | .23 | .16 | .20 | .12 | .17 | .15 | .34 | -.15 | -.15 | -.18 | -.20 |
| .64 | .60 | .55 | .63 | .47 | .44 | .30 | .25 | .50 | .50 | .53 | .38 | .30 | .29 | .41 | .33 | .47 | .01 | .71 | .71 | .54 | .54 |
| .64 | .60 | -.55 | .63 | .47 | .44 | .30 | .25 | .50 | .50 | .53 | .38 | .30 | .29 | .41 | .33 | .47 | .01 | .71 | .71 | .54 | .54 |
| .66 | .70 | .52 | .59 | .55 | .41 | .20 | .30 | .49 | .49 | .51 | .40 | .21 | .27 | .36 | .28 | .42 | .06 | .73 | .73 | .77 | .76 |
| .62 | .58 | .34 | .42 | .37 | .29 | .11 | .06 | .40 | .40 | .43 | .29 | .11 | .16 | .24 | .13 | .33 | -.01 | .68 | .68 | .71 | .80 |

K=3 L=2

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .92 | .53 | .48 | .51 | .44 | .59 | .60 | .14 | .45 | .45 | .49 | .52 | .58 | .51 | .47 | .41 | .57 | .19 | .77 | .77 | .45 | .60 |
| .63 | .98 | .69 | .71 | .80 | .54 | .23 | .29 | .66 | .66 | .67 | .63 | .32 | .41 | .52 | .42 | .48 | .06 | .67 | .67 | .63 | .55 |
| .63 | .70 | .89 | .67 | .68 | .47 | .39 | .23 | .71 | .71 | .72 | .65 | .69 | .48 | .63 | .51 | .59 | .15 | .60 | .60 | .34 | .23 |
| .64 | .68 | .64 | .89 | .67 | .56 | .49 | .33 | .43 | .43 | .46 | .47 | .50 | .39 | .46 | .40 | .43 | .01 | .66 | .66 | .32 | .23 |
| .62 | .85 | .74 | .76 | .92 | .66 | .46 | .45 | .60 | .60 | .61 | .69 | .54 | .48 | .51 | .45 | .41 | .10 | .61 | .61 | .56 | .36 |
| .78 | .60 | .52 | .65 | .67 | .89 | .80 | .50 | .45 | .45 | .49 | .62 | .65 | .74 | .63 | .57 | .65 | .34 | .62 | .62 | .35 | .37 |
| .63 | .17 | .32 | .43 | .34 | .67 | .89 | .27 | .22 | .22 | .24 | .42 | .80 | .66 | .45 | .37 | .60 | .45 | .36 | .36 | -.05 | .07 |
| .44 | .45 | .42 | .57 | .62 | .66 | .51 | .88 | .15 | .15 | .23 | .32 | .27 | .56 | .54 | .67 | .41 | .30 | .47 | .47 | .35 | .10 |
| .67 | .80 | .87 | .59 | .71 | .52 | .36 | .14 | .94 | .94 | .93 | .86 | .63 | .57 | .71 | .56 | .62 | .23 | .62 | .62 | .47 | .45 |
| .67 | .80 | .87 | .59 | .71 | .52 | .36 | .14 | .94 | .94 | .93 | .86 | .63 | .57 | .71 | .56 | .62 | .23 | .62 | .62 | .47 | .45 |
| .71 | .81 | .87 | .63 | .71 | .56 | .37 | .20 | .92 | .92 | .94 | .86 | .58 | .59 | .74 | .64 | .64 | .24 | .67 | .67 | .50 | .48 |
| .74 | .75 | .79 | .63 | .79 | .68 | .58 | .28 | .85 | .85 | .85 | .92 | .72 | .66 | .68 | .59 | .60 | .33 | .60 | .60 | .46 | .42 |
| .51 | .20 | .48 | .31 | .32 | .42 | .68 | -.01 | .38 | .38 | .35 | .46 | .94 | .56 | .43 | .23 | .64 | .38 | .21 | .21 | -.15 | -.03 |
| .65 | .42 | .49 | .40 | .44 | .69 | .76 | .36 | .46 | .46 | .48 | .56 | .78 | .86 | .74 | .61 | .91 | .67 | .41 | .41 | .05 | .19 |
| .69 | .59 | .71 | .53 | .52 | .64 | .60 | .39 | .63 | .63 | .68 | .62 | .70 | .81 | .85 | .74 | .93 | .56 | .57 | .57 | .19 | .27 |
| .67 | .53 | .65 | .55 | .52 | .65 | .56 | .58 | .55 | .55 | .64 | .60 | .50 | .75 | .83 | .88 | .77 | .53 | .62 | .62 | .29 | .26 |
| .52 | .36 | .42 | .27 | .22 | .45 | .52 | .11 | .39 | .39 | .41 | .37 | .66 | .70 | .64 | .46 | .92 | .59 | .31 | .31 | -.08 | .15 |
| .20 | .00 | .08 | -.09 | -.01 | .24 | .44 | .09 | .11 | .11 | .12 | .20 | .45 | .56 | .41 | .34 | .65 | .85 | -.02 | -.02 | -.28 | -.07 |
| .87 | .65 | .55 | .64 | .51 | .53 | .40 | .24 | .46 | .46 | .52 | .46 | .34 | .37 | .46 | .44 | .43 | .02 | .90 | .90 | .63 | .68 |
| .87 | .65 | .55 | .64 | .51 | .53 | .40 | .24 | .46 | .46 | .52 | .46 | .34 | .37 | .46 | .44 | .43 | .02 | .90 | .90 | .63 | .68 |
| .68 | .70 | .41 | .39 | .57 | .37 | .07 | .22 | .39 | .39 | .42 | .40 | .05 | .12 | .22 | .25 | .10 | -.18 | .76 | .76 | .89 | .82 |
| .73 | .54 | .21 | .19 | .29 | .31 | .11 | -.06 | .32 | .32 | .36 | .31 | .10 | .17 | .20 | .15 | .27 | -.02 | .71 | .71 | .71 | .91 |

K=3 L=3

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.00 | .63 | .69 | .76 | .65 | .80 | .72 | .43 | .59 | .59 | .63 | .67 | .64 | .68 | .70 | .63 | .62 | .25 | .92 | .92 | .68 | .75 |
| .63 | 1.00 | .74 | .75 | .88 | .63 | .26 | .42 | .79 | .79 | .80 | .76 | .30 | .46 | .60 | .51 | .43 | .04 | .72 | .72 | .73 | .61 |
| .69 | .74 | 1.00 | .81 | .80 | .62 | .49 | .41 | .85 | .85 | .85 | .79 | .68 | .59 | .78 | .66 | .58 | .17 | .70 | .70 | .49 | .35 |
| .76 | .75 | .81 | 1.00 | .83 | .78 | .63 | .59 | .60 | .60 | .62 | .65 | .57 | .56 | .66 | .60 | .49 | .08 | .81 | .81 | .52 | .39 |
| .65 | .88 | .80 | .83 | 1.00 | .77 | .50 | .59 | .75 | .75 | .74 | .85 | .52 | .54 | .59 | .54 | .36 | .05 | .65 | .65 | .65 | .42 |
| .80 | .63 | .62 | .78 | .77 | 1.00 | .84 | .71 | .53 | .53 | .57 | .72 | .64 | .80 | .73 | .70 | .61 | .30 | .69 | .69 | .46 | .42 |
| .72 | .26 | .49 | .63 | .50 | .84 | 1.00 | .55 | .29 | .29 | .30 | .52 | .85 | .83 | .65 | .56 | .66 | .50 | .49 | .49 | .11 | .18 |
| .43 | .42 | .41 | .59 | .59 | .71 | .55 | 1.00 | .19 | .19 | .27 | .38 | .29 | .61 | .60 | .75 | .40 | .29 | .44 | .44 | .31 | .10 |
| .59 | .79 | .85 | .60 | .75 | .53 | .29 | .19 | 1.00 | 1.00 | .99 | .92 | .50 | .50 | .69 | .58 | .47 | .08 | .58 | .58 | .51 | .43 |
| .59 | .79 | .85 | .60 | .75 | .53 | .29 | .19 | 1.00 | 1.00 | .99 | .92 | .50 | .50 | .69 | .58 | .47 | .08 | .58 | .58 | .51 | .43 |
| .63 | .80 | .85 | .62 | .74 | .57 | .30 | .27 | .99 | .99 | 1.00 | .91 | .46 | .53 | .73 | .67 | .48 | .09 | .63 | .63 | .54 | .46 |
| .67 | .76 | .79 | .65 | .85 | .72 | .52 | .38 | .92 | .92 | .91 | 1.00 | .60 | .62 | .68 | .63 | .45 | .19 | .58 | .58 | .52 | .41 |
| .64 | .30 | .68 | .57 | .52 | .64 | .85 | .29 | .50 | .50 | .46 | .60 | 1.00 | .78 | .68 | .47 | .73 | .48 | .38 | .38 | .05 | .13 |
| .68 | .46 | .59 | .56 | .54 | .80 | .83 | .61 | .50 | .50 | .53 | .62 | .78 | 1.00 | .91 | .79 | .92 | .71 | .47 | .47 | .13 | .25 |
| .70 | .60 | .78 | .66 | .59 | .73 | .65 | .60 | .69 | .69 | .73 | .68 | .68 | .91 | 1.00 | .91 | .90 | .58 | .61 | .61 | .27 | .32 |
| .63 | .51 | .66 | .60 | .54 | .70 | .56 | .75 | .58 | .58 | .67 | .63 | .47 | .79 | .91 | 1.00 | .71 | .51 | .60 | .60 | .31 | .27 |
| .62 | .43 | .58 | .49 | .36 | .61 | .66 | .40 | .47 | .47 | .48 | .45 | .73 | .92 | .90 | .71 | 1.00 | .74 | .44 | .44 | .07 | .28 |
| .25 | .04 | .17 | .08 | .05 | .30 | .50 | .29 | .08 | .08 | .09 | .19 | .48 | .71 | .58 | .51 | .74 | 1.00 | .04 | .04 | -.19 | .01 |
| .92 | .72 | .70 | .81 | .65 | .69 | .49 | .44 | .58 | .58 | .63 | .58 | .38 | .47 | .61 | .60 | .44 | .04 | 1.00 | 1.00 | .81 | .79 |
| .92 | .72 | .70 | .81 | .65 | .69 | .49 | .44 | .58 | .58 | .63 | .58 | .38 | .47 | .61 | .60 | .44 | .04 | 1.00 | 1.00 | .81 | .79 |
| .68 | .73 | .49 | .52 | .65 | .46 | .11 | .31 | .51 | .51 | .54 | .52 | .05 | .13 | .27 | .31 | .07 | -.19 | .81 | .81 | 1.00 | .88 |
| .75 | .61 | .35 | .39 | .42 | .42 | .18 | .10 | .43 | .43 | .46 | .41 | .13 | .25 | .32 | .27 | .28 | .01 | .79 | .79 | .88 | 1.00 |

K=3 L=4

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .96 | .62 | .67 | .59 | .59 | .87 | .80 | .40 | .67 | .67 | .69 | .74 | .71 | .73 | .70 | .61 | .64 | .27 | .84 | .84 | .59 | .66 |
| .62 | .97 | .76 | .68 | .87 | .72 | .35 | .43 | .88 | .88 | .87 | .87 | .37 | .51 | .60 | .51 | .42 | .04 | .67 | .67 | .60 | .49 |
| .60 | .69 | .92 | .65 | .72 | .69 | .54 | .40 | .86 | .86 | .84 | .82 | .71 | .60 | .73 | .60 | .55 | .16 | .58 | .58 | .36 | .25 |
| .72 | .79 | .88 | .92 | .87 | .92 | .73 | .67 | .71 | .71 | .72 | .77 | .67 | .67 | .74 | .66 | .53 | .14 | .76 | .76 | .49 | .35 |
| .55 | .85 | .75 | .70 | .92 | .78 | .49 | .51 | .80 | .80 | .77 | .89 | .51 | .50 | .53 | .47 | .31 | -.01 | .57 | .57 | .49 | .30 |
| .66 | .56 | .54 | .57 | .62 | .89 | .79 | .51 | .55 | .55 | .58 | .70 | .62 | .70 | .61 | .57 | .51 | .20 | .56 | .56 | .27 | .24 |
| .57 | .23 | .40 | .41 | .36 | .75 | .94 | .37 | .29 | .29 | .29 | .46 | .83 | .74 | .55 | .44 | .60 | .40 | .36 | .36 | .00 | .07 |
| .37 | .43 | .43 | .52 | .55 | .72 | .56 | .86 | .27 | .27 | .34 | .42 | .30 | .61 | .60 | .71 | .40 | .25 | .39 | .39 | .20 | .03 |
| .49 | .70 | .71 | .43 | .63 | .53 | .28 | .14 | .97 | .97 | .94 | .90 | .46 | .44 | .55 | .45 | .36 | -.01 | .46 | .46 | .34 | .27 |
| .49 | .70 | .71 | .43 | .63 | .53 | .28 | .14 | .97 | .97 | .94 | .90 | .46 | .44 | .55 | .45 | .36 | -.01 | .46 | .46 | .34 | .27 |
| .54 | .72 | .73 | .46 | .63 | .58 | .31 | .22 | .97 | .97 | .97 | .91 | .43 | .48 | .61 | .55 | .40 | .01 | .52 | .52 | .38 | .31 |
| .54 | .68 | .65 | .45 | .69 | .66 | .45 | .25 | .89 | .89 | .88 | .95 | .52 | .50 | .52 | .47 | .34 | .04 | .45 | .45 | .34 | .25 |
| .47 | .24 | .52 | .33 | .35 | .56 | .79 | .15 | .44 | .44 | .39 | .50 | .95 | .68 | .54 | .32 | .62 | .38 | .24 | .24 | -.07 | .01 |
| .55 | .39 | .47 | .37 | .38 | .72 | .81 | .44 | .48 | .48 | .50 | .56 | .77 | .91 | .77 | .65 | .83 | .59 | .34 | .34 | -.02 | .09 |
| .61 | .54 | .70 | .50 | .49 | .74 | .70 | .52 | .68 | .68 | .71 | .67 | .72 | .89 | .91 | .81 | .84 | .52 | .50 | .50 | .14 | .18 |
| .57 | .49 | .63 | .49 | .47 | .74 | .61 | .67 | .60 | .60 | .69 | .65 | .49 | .80 | .87 | .93 | .69 | .46 | .52 | .52 | .21 | .18 |
| .55 | .36 | .51 | .34 | .27 | .60 | .73 | .33 | .45 | .45 | .46 | .43 | .79 | .91 | .82 | .63 | .95 | .70 | .36 | .36 | -.02 | .15 |
| .24 | .04 | .17 | .05 | .01 | .30 | .54 | .25 | .06 | .06 | .07 | .13 | .54 | .70 | .56 | .46 | .74 | .94 | .05 | .05 | -.17 | .00 |
| .94 | .74 | .77 | .73 | .70 | .86 | .63 | .51 | .71 | .71 | .74 | .73 | .51 | .61 | .70 | .66 | .53 | .14 | .96 | .96 | .76 | .75 |
| .94 | .74 | .77 | .73 | .70 | .86 | .63 | .51 | .71 | .71 | .74 | .73 | .51 | .61 | .70 | .66 | .53 | .14 | .96 | .96 | .76 | .75 |
| .74 | .74 | .55 | .50 | .68 | .58 | .20 | .34 | .63 | .63 | .65 | .66 | .13 | .23 | .34 | .36 | .13 | -.13 | .82 | .82 | .92 | .83 |
| .83 | .61 | .42 | .37 | .46 | .53 | .30 | .16 | .53 | .53 | .55 | .53 | .23 | .35 | .38 | .32 | .33 | .08 | .81 | .81 | .84 | .94 |

K=4 L=1

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .63 | .53 | .45 | .54 | .42 | .38 | .29 | .15 | .41 | .41 | .45 | .36 | .31 | .25 | .31 | .23 | .41 | .02 | .63 | .63 | .50 | .53 |
| .55 | .86 | .62 | .71 | .67 | .46 | .21 | .32 | .62 | .62 | .64 | .50 | .25 | .31 | .43 | .33 | .49 | .11 | .65 | .65 | .58 | .50 |
| .35 | .54 | .50 | .57 | .44 | .31 | .21 | .18 | .42 | .42 | .44 | .33 | .28 | .20 | .30 | .23 | .37 | -.01 | .41 | .41 | .21 | .13 |
| .36 | .56 | .46 | .61 | .45 | .32 | .20 | .21 | .35 | .35 | .38 | .28 | .24 | .17 | .26 | .19 | .32 | -.07 | .44 | .44 | .24 | .17 |
| .58 | .80 | .71 | .80 | .74 | .55 | .39 | .48 | .61 | .61 | .63 | .56 | .43 | .42 | .50 | .42 | .56 | .21 | .63 | .63 | .54 | .42 |
| .62 | .63 | .65 | .74 | .62 | .61 | .52 | .47 | .56 | .56 | .59 | .55 | .51 | .49 | .55 | .50 | .62 | .24 | .60 | .60 | .41 | .34 |
| .48 | .32 | .49 | .55 | .43 | .51 | .56 | .34 | .38 | .38 | .39 | .44 | .57 | .44 | .41 | .38 | .50 | .23 | .38 | .38 | .16 | .12 |
| .11 | .25 | .24 | .35 | .25 | .18 | .13 | .31 | .12 | .12 | .16 | .14 | .09 | .12 | .18 | .25 | .14 | .03 | .17 | .17 | .05 | -.06 |
| .55 | .68 | .64 | .63 | .58 | .49 | .34 | .33 | .66 | .66 | .69 | .56 | .39 | .43 | .53 | .45 | .59 | .25 | .58 | .58 | .46 | .41 |
| .55 | .68 | .64 | .63 | .58 | .49 | .34 | .33 | .66 | .66 | .69 | .56 | .39 | .43 | .53 | .45 | .59 | .25 | .58 | .58 | .46 | .41 |
| .51 | .63 | .58 | .58 | .53 | .45 | .30 | .31 | .61 | .61 | .64 | .51 | .33 | .39 | .50 | .44 | .55 | .23 | .55 | .55 | .42 | .37 |
| .69 | .74 | .76 | .77 | .74 | .66 | .54 | .53 | .75 | .75 | .78 | .72 | .58 | .61 | .66 | .61 | .74 | .43 | .66 | .66 | .56 | .48 |
| .40 | .29 | .46 | .48 | .38 | .40 | .48 | .19 | .35 | .35 | .35 | .39 | .58 | .35 | .32 | .24 | .45 | .15 | .29 | .29 | .09 | .05 |
| .30 | .32 | .35 | .38 | .32 | .33 | .30 | .21 | .33 | .33 | .36 | .34 | .31 | .29 | .30 | .29 | .37 | .17 | .26 | .26 | .09 | .05 |
| .18 | .31 | .28 | .33 | .22 | .19 | .13 | .10 | .27 | .27 | .31 | .21 | .14 | .14 | .22 | .21 | .25 | .02 | .22 | .22 | .02 | -.01 |
| .10 | .19 | .18 | .23 | .14 | .13 | .09 | .15 | .17 | .17 | .23 | .15 | .06 | .12 | .19 | .25 | .19 | .05 | .13 | .13 | -.04 | -.08 |
| .10 | .20 | .13 | .17 | .11 | .09 | .07 | -.07 | .16 | .16 | .18 | .12 | .09 | .05 | .07 | .04 | .15 | -.04 | .10 | .10 | -.06 | -.06 |
| -.13 | -.02 | -.10 | -.10 | .05 | .06 | -.03 | .13 | .00 | .00 | .01 | .05 | -.03 | -.02 | -.07 | -.03 | -.05 | .10 | -.18 | -.18 | -.24 | -.23 |
| .53 | .56 | .41 | .53 | .38 | .29 | .14 | .11 | .37 | .37 | .41 | .26 | .14 | .13 | .24 | .17 | .30 | -.10 | .62 | .62 | .50 | .51 |
| .53 | .56 | .41 | .53 | .38 | .29 | .14 | .11 | .37 | .37 | .41 | .26 | .14 | .13 | .24 | .17 | .30 | -.10 | .62 | .62 | .50 | .51 |
| .52 | .58 | .34 | .46 | .39 | .20 | .03 | .10 | .32 | .32 | .35 | .23 | .04 | .06 | .15 | .09 | .20 | -.08 | .62 | .62 | .65 | .67 |
| .51 | .48 | .21 | .32 | .25 | .12 | -.02 | -.08 | .26 | .26 | .28 | .17 | -.01 | -.01 | .06 | -.01 | .13 | -.13 | .59 | .59 | .63 | .72 |



K=4 L=2

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .85 | .51 | .37 | .46 | .33 | .43 | .41 | .06 | .33 | .33 | .39 | .37 | .37 | .34 | .35 | .32 | .45 | .11 | .77 | .77 | .47 | .64 |
| .59 | .93 | .62 | .76 | .76 | .44 | .18 | .29 | .56 | 56 | .58 | .54 | .23 | .31 | .43 | .37 | .37 | .02 | .69 | .69 | .61 | .52 |
| .56 | .69 | .76 | .73 | .61 | .35 | .25 | .21 | .55 | .55 | .57 | .49 | .47 | .31 | .49 | .42 | .45 | .08 | .63 | .63 | .35 | .25 |
| .46 | .61 | .49 | .85 | .55 | .36 | .26 | .29 | .27 | .27 | .31 | .28 | .24 | .18 | .30 | .30 | .25 | -.06 | .58 | .58 | .29 | .19 |
| .54 | .83 | .64 | .83 | .82 | .47 | .28 | .39 | .47 | .47 | .49 | .53 | .33 | .29 | .38 | .36 | .26 | -.00 | .63 | .63 | .55 | .36 |
| .80 | .65 | .54 | .77 | .63 | .71 | .65 | .44 | .40 | .40 | .46 | .52 | .51 | .57 | .55 | .54 | .56 | .25 | .75 | .75 | .40 | .40 |
| .65 | .23 | .31 | .49 | .29 | .56 | .77 | .22 | .17 | .17 | .20 | .32 | .68 | .56 | .42 | .35 | .59 | .40 | .46 | .46 | -.02 | .11 |
| .35 | .43 | .36 | .65 | .50 | .40 | .28 | .70 | .07 | .07 | .15 | .17 | .08 | .31 | .39 | .54 | .26 | .16 | .49 | .49 | .30 | .10 |
| .71 | .86 | .84 | .69 | .73 | .49 | .30 | .17 | .86 | .86 | .88 | .80 | .52 | .48 | .64 | .54 | .55 | .15 | .70 | .70 | .54 | .50 |
| .71 | .86 | .84 | .69 | .73 | .49 | .30 | .17 | .86 | .86 | .88 | .80 | .52 | .48 | .64 | .54 | .55 | .15 | .70 | .70 | .54 | .50 |
| .74 | .85 | .82 | .71 | .71 | .52 | .31 | .23 | .84 | .84 | .88 | .78 | .47 | .50 | .67 | .61 | .57 | .16 | .75 | .75 | .56 | .52 |
| .77 | .84 | .78 | .74 | .80 | .62 | .47 | .28 | .79 | .79 | .81 | .83 | .57 | .55 | .62 | .56 | .52 | .22 | .72 | .72 | .55 | .50 |
| .53 | .25 | .46 | .37 | .28 | .35 | .60 | -.04 | .32 | .32 | .30 | .35 | .84 | .48 | .39 | .20 | .63 | .35 | .29 | .29 | -.13 | .01 |
| .64 | .44 | .45 | .49 | .36 | .51 | .60 | .31 | .35 | .35 | .40 | .41 | .60 | .68 | .63 | .55 | .80 | .56 | .50 | .50 | .07 | .21 |
| .62 | .55 | .60 | .60 | .42 | .45 | .42 | .33 | .45 | .45 | .52 | .43 | .48 | .58 | .68 | .64 | .75 | .44 | .60 | .60 | .19 | .25 |
| .59 | .49 | .53 | .59 | .41 | .46 | .37 | .50 | .38 | .38 | .49 | .40 | .29 | .53 | .65 | .75 | .60 | .38 | .62 | .62 | .27 | .24 |
| .50 | .33 | .35 | .30 | .15 | .30 | .42 | .08 | .27 | .27 | .30 | .24 | .51 | .55 | .53 | .40 | .79 | .52 | .36 | .36 | -.07 | .14 |
| .15 | -.03 | .01 | -.07 | -.12 | .07 | .27 | .01 | -.02 | .02 | .00 | .02 | .28 | .36 | .28 | .23 | .53 | .70 | .01 | .01 | -.29 | -.08 |
| .75 | .59 | .41 | .58 | .40 | .37 | .23 | .16 | .31 | .31 | .38 | .31 | .16 | .20 | .31 | .33 | .29 | -.04 | .83 | .83 | .60 | .65 |
| .75 | .59 | .41 | .58 | .40 | .37 | .23 | .16 | .31 | .31 | .38 | .31 | .16 | .20 | .31 | .33 | .29 | -.04 | .83 | .83 | .60 | .65 |
| .54 | .55 | .24 | .36 | .38 | .14 | -.09 | .08 | .20 | .20 | .25 | .20 | -.12 | -.10 | .03 | .10 | -.06 | -.24 | .68 | .68 | .75 | .73 |
| .60 | .40 | .08 | .15 | .14 | .09 | -.04 | -.14 | .15 | .15 | .19 | .13 | -.06 | -.04 | .02 | .02 | .08 | -.11 | .63 | .63 | .63 | .81 |

K=4 L=3

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .96 | .62 | .60 | .72 | .55 | .66 | .57 | .37 | .49 | .49 | .54 | .54 | .47 | .55 | .61 | .57 | .55 | .24 | .94 | .94 | .74 | .83 |
| .62 | .97 | .69 | .79 | .85 | .56 | .23 | .43 | .70 | .70 | .72 | .68 | .24 | .39 | .54 | .49 | .36 | .04 | .74 | .74 | .74 | .61 |
| .67 | .76 | .92 | .88 | .75 | .54 | .40 | .43 | .71 | .71 | .73 | .65 | .52 | .47 | .70 | .63 | .51 | .17 | .77 | .77 | .55 | .42 |
| .59 | .68 | .65 | .92 | .70 | .57 | .41 | .52 | .43 | .43 | .46 | .45 | .33 | .37 | .50 | .49 | .34 | .05 | .73 | .73 | .50 | .37 |
| .59 | .87 | .72 | .87 | .92 | .62 | .36 | .55 | .63 | .63 | .63 | .69 | .35 | .38 | .49 | .47 | .27 | .01 | .70 | .70 | .68 | .46 |
| .87 | .72 | .69 | .92 | .78 | .89 | .75 | .72 | .53 | .53 | .58 | .66 | .56 | .72 | .74 | .74 | .60 | .30 | .86 | .86 | .58 | .53 |
| .80 | .35 | .54 | .73 | .49 | .79 | .94 | .56 | .28 | .28 | .31 | .45 | .79 | .81 | .70 | .61 | .73 | .54 | .63 | .63 | .20 | .30 |
| .40 | .43 | .40 | .67 | .51 | .51 | .37 | .86 | .14 | .14 | .22 | .25 | .15 | .44 | .52 | .67 | .33 | .25 | .51 | .51 | .34 | .16 |
| .67 | .86 | .86 | .71 | .80 | .55 | .29 | .27 | .97 | .97 | .97 | .89 | .44 | .48 | .68 | .60 | .45 | .06 | .71 | .71 | .63 | .53 |
| .67 | .88 | .86 | .71 | .80 | .55 | .29 | .27 | .97 | .97 | .97 | .89 | .44 | .48 | .68 | .60 | .45 | .06 | .71 | .71 | .63 | .53 |
| .69 | .87 | .84 | .72 | .77 | .58 | .29 | .34 | .94 | .94 | .97 | .88 | .39 | .50 | .71 | .69 | .46 | .07 | .74 | .74 | .65 | .55 |
| .74 | .87 | .82 | .77 | .89 | .70 | .46 | .42 | .90 | .90 | .91 | .95 | .50 | .56 | .67 | .65 | .43 | .13 | .73 | .73 | .66 | .53 |
| .71 | .37 | .71 | .67 | .51 | .62 | .83 | .30 | .46 | .46 | .43 | .52 | .95 | .77 | .72 | .49 | .79 | .54 | .51 | .51 | .13 | .23 |
| .73 | .51 | .60 | .67 | .50 | .70 | .74 | .61 | .44 | .44 | .48 | .50 | .68 | .91 | .89 | .80 | .91 | .70 | .61 | .61 | .23 | .35 |
| .70 | .60 | .73 | .74 | .53 | .61 | .55 | .60 | .55 | .55 | .61 | .52 | .54 | .77 | .91 | .87 | .82 | .56 | .70 | .70 | .34 | .38 |
| .61 | .51 | .60 | .66 | .47 | .57 | .44 | .71 | .45 | .45 | .55 | .47 | .32 | .65 | .81 | .93 | .63 | .46 | .66 | .66 | .36 | .32 |
| .64 | .42 | .55 | .53 | .31 | .51 | .60 | .40 | .36 | .36 | .40 | .34 | .62 | .83 | .84 | .69 | .95 | .74 | .53 | .53 | .13 | .33 |
| .27 | .04 | .16 | .14 | -.01 | .20 | .40 | .25 | -.01 | -.01 | .01 | .04 | .38 | .59 | .52 | .46 | .70 | .94 | .14 | .14 | -.13 | .08 |
| .84 | .67 | .58 | .76 | .57 | .56 | .36 | .39 | .46 | .46 | .52 | .45 | .24 | .34 | .50 | .52 | .36 | .05 | .96 | .96 | .82 | .81 |
| .84 | .67 | .58 | .76 | .57 | .56 | .36 | .39 | .46 | .46 | .52 | .45 | .24 | .34 | .50 | .52 | .36 | .05 | .96 | .96 | .82 | .81 |
| .59 | .60 | .36 | .49 | .49 | .27 | .00 | .20 | .34 | .34 | .38 | .34 | -.07 | -.02 | .14 | .21 | -.02 | -.17 | .76 | .76 | .92 | .84 |
| .66 | .49 | .25 | .35 | .30 | .24 | .07 | .03 | .27 | .27 | .31 | .25 | .01 | .09 | .18 | .18 | .15 | .00 | .75 | .75 | .83 | .94 |



K=4 L=4

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.00 | .66 | .68 | .64 | .60 | .84 | .73 | .44 | .62 | .62 | .66 | .68 | .61 | .70 | .71 | .64 | .65 | .33 | .93 | .93 | .73 | .81 |
| .66 | 1.00 | .79 | .80 | .93 | .75 | .38 | .55 | .84 | .84 | .83 | .85 | .36 | .53 | .64 | .57 | .43 | .09 | .75 | .75 | .70 | .57 |
| .68 | .79 | 1.00 | .86 | .84 | .76 | .55 | .59 | .81 | .81 | .81 | .77 | .65 | .63 | .80 | .71 | .58 | .27 | .75 | .75 | .56 | .42 |
| .64 | .80 | .86 | 1.00 | .88 | .82 | .59 | .77 | .60 | .60 | .62 | .64 | .49 | .58 | .72 | .68 | .47 | .19 | .78 | .78 | .60 | .43 |
| .60 | .93 | .84 | .88 | 1.00 | .79 | .46 | .67 | .76 | .76 | .75 | .83 | .43 | .50 | .60 | .55 | .34 | .05 | .71 | .71 | .67 | .45 |
| .84 | .75 | .76 | .82 | .79 | 1.00 | .85 | .72 | .65 | .65 | .69 | .77 | .65 | .80 | .80 | .76 | .64 | .33 | .81 | .81 | .53 | .47 |
| .73 | .38 | .55 | .59 | .46 | .85 | 1.00 | .51 | .34 | .34 | .36 | .48 | .86 | .86 | .72 | .60 | .76 | .55 | .56 | .56 | .17 | .26 |
| .44 | .55 | .59 | .77 | .67 | .72 | .51 | 1.00 | .30 | .30 | .38 | .40 | .27 | .62 | .71 | .81 | .46 | .33 | .58 | .58 | .42 | .24 |
| .62 | .84 | .81 | .60 | .76 | .65 | .34 | .30 | 1.00 | 1.00 | .99 | .95 | .46 | .50 | .64 | .56 | .42 | .03 | .63 | .63 | .52 | .43 |
| .62 | .84 | .81 | .60 | .76 | .65 | .34 | .30 | 1.00 | 1.00 | .99 | .95 | .46 | .50 | .64 | .56 | .42 | .03 | .63 | .63 | .52 | .43 |
| .66 | .83 | .81 | .62 | .75 | .69 | .36 | .38 | .99 | .99 | 1.00 | .95 | .42 | .54 | .69 | .65 | .44 | .05 | .67 | .67 | .54 | .45 |
| .68 | .85 | .77 | .64 | .83 | .77 | .48 | .40 | .95 | .95 | .95 | 1.00 | .51 | .56 | .63 | .59 | .40 | .06 | .65 | .65 | .54 | .43 |
| .61 | .36 | .65 | .49 | .43 | .65 | .86 | .27 | .46 | .46 | .42 | .51 | 1.00 | .79 | .68 | .44 | .77 | .52 | .42 | .42 | .08 | .17 |
| .70 | .53 | .63 | .58 | .50 | .80 | .86 | .62 | .50 | .50 | .54 | .56 | .79 | 1.00 | .93 | .80 | .95 | .70 | .57 | .57 | .20 | .30 |
| .71 | .64 | .80 | .72 | .60 | .80 | .72 | .71 | .64 | .64 | .69 | .63 | .68 | .93 | 1.00 | .93 | .90 | .62 | .69 | .69 | .35 | .37 |
| .64 | .57 | .71 | .68 | .55 | .76 | .60 | .81 | .56 | .56 | .65 | .59 | .44 | .80 | .93 | 1.00 | .72 | .52 | .68 | .68 | .39 | .34 |
| .65 | .43 | .58 | .47 | .34 | .64 | .76 | .46 | .42 | .42 | .44 | .40 | .77 | .95 | .90 | .72 | 1.00 | .79 | .50 | .50 | .13 | .30 |
| .33 | .09 | .27 | .19 | .05 | .33 | .55 | .33 | .03 | .03 | .05 | .06 | .52 | .70 | .62 | .52 | .79 | 1.00 | .21 | .21 | -.02 | .14 |
| .93 | .75 | .75 | .78 | .71 | .81 | .56 | .58 | .63 | .63 | .67 | .65 | .42 | .57 | .69 | .68 | .50 | .21 | 1.00 | 1.00 | .87 | .84 |
| .93 | .75 | .75 | .78 | .71 | .81 | .56 | .58 | .63 | .63 | .67 | .65 | .42 | .57 | .69 | .68 | .50 | .21 | 1.00 | 1.00 | .87 | .84 |
| .73 | .70 | .56 | .60 | .67 | .53 | .17 | .42 | .52 | .52 | .54 | .54 | .08 | .20 | .35 | .39 | .13 | -.02 | .87 | .87 | 1.00 | .91 |
| .81 | .57 | .42 | .43 | .45 | .47 | .26 | .24 | .43 | .43 | .45 | .43 | .17 | .30 | .37 | .34 | .30 | .14 | .84 | .84 | .91 | 1.00 |

```
^               2
 SRU'S:.4
!
 ^
     1          9
   2           3   6   9  12   6   9   1   1   1
   3           5  10  11
   4           4   5   9  10  11  15
   5           4   5   6   7   9  10  11  13  15
   6           4   5   6   7   8   9  10  11  12  13  14  15
   7           5   9  10  11  13  15
   8           4   5   7   9  10  11  13  15
   9           5
  10          10
  11          11
^
 SRU'S:.3          3

!
 ^
     1         12
   2           4   3   3   2   4   5   3   4   4   3   4   5
   3           1   2   3  17
   4           1   2  17
   5           1   2   3
   6           1   2
   7           1   2  16  17
   8           1   2   3  16  17
   9           1   2  16
  10           1   2   3  16
  11           1   2   3  18
  12           1   2  18
  13           1   2  16  18
  14           1   2   3  16  18
^
 SRU'S:.4            4


!
 ^
     1         15
   2           5   5   5   6   8   7   9   5   7   6   8   8   7   9   8
   3           1   2   5  16  18
   4           1   2  10  16  18
   5           1   2  11  16  18
   6           1   2   5  10  11  18
   7           1   2   5   9  10  11  15  18
   8           1   2   5  10  11  16  18
   9           1   2   5   9  10  11  15  16  18
  10           1   2   5  10  11
  11           1   2   5   9  10  11  15
  12           1   2   5  10  11  16
  13           1   2   5   9  10  11  15  16
  14           1   2   3   5  10  11  16  18
  15           1   2   3   5  10  11  16
  16           1   2   3   5   9  10  11  15  18
  17           1   2   3   5   9  10  11  15
```

```
^
 SRU'S:.4

!
 ^
      1       10
      2       8  7  7  7  7  7  7  7  7  9
      3       1  2  5  9 10 11 16 18
      4       2  5  9 10 11 16 18
      5       1  5  9 10 11 16 18
      6       1  2  9 10 11 16 18
      7       1  2  5 10 11 16 18
      8       1  2  5  9 11 16 18
      9       1  2  5  9 10 16 18
     10       1  2  5  9 10 11 18
     11       1  2  5  9 10 11 16
     12       1  2  3  5  9 10 11 16 18

^
 SRU'S:.3
!
 ^
  EDT073 E UNDEFINED DIRECTIVE OR OPERATOR
^
     1        7
     2        1  1  1  2  2  2  3
     3       01
     4       02
     5       03
     6       01 02
     7       01 03
     8       02 03
     9       01 02 03
^
 SRU'S:.5

!
 ^
      1       10
     2        8  6  6  4  7  9  6 10  6  4
     3        2  3  7 11 12 17 18 20
     4        2 11 12 17 18 20
     5        7 11 12 17 18 20
     6        2  3 18 20
     7        2  7 11 12 17 18 21
     8        2  3  7 11 12 17 18 20 21
     9        2  7 11 12 18 21
    10        2  3  6  7 11 12 17 18 20 21
    11        2  3  7 11 12 18 20 21
    12        2  7 18 21
```

```
^
    1       22
  2       1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
  3       01
  4       02
  5       03
  6       04
  7       05
  8       06
  9       07
 10       08
 11       09
 12       10
 13       11
 14       12
 15       13
 16       14
 17       15
 18       16
 19       17
 20       18
 21       19
 22       20
 23       21
 24       22
```

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