
Staff Handbook on Natural Gas.

Office of Energy Programs (DOC), Washington, D.C.

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Conservation (Environment); Economics; Energy; Government Role; Manuals; Natural Resources; Planning; Problem Solving; Reference Materials Natural Gas; Resource Management

The Department of Commerce created a Natural Gas Action Group early in the fall of 1975 to assist industrial firms and the communities they serve to cope with the effects of potentially severe and crippling curtailment situations. This action group was trained to assess a specific local situation, review the potential for remedial action and alternate energy sources, and to assist in the implementation of remedial action plans. This handbook was developed for use by this team in the field and has been updated for the 1976-77 season. The first four sections provide building blocks essential to the understanding of the problems encountered in the development of a strategy. They are: (1) Technical and Physical Data; (2) Governmental Organizations and Procedures; (3) Governmental and Industrial Organizations; and (4) The Gas Industry, Alternate Resources, and Industrial Resources. The last section provides a framework for assembling data and assessing and managing a curtailment. A glossary is also included. (RH)
ACKNOWLEDGMENTS

This book is the result of the initiative of H.F. Gustafurre, the director of the Natural Gas Action Group for the winter 1975-76. He planned and organized the first training course of its kind, in which speakers from industry and government presented an overall view of the complexity of the natural gas industry and its role in the country's economy.

The substance of this volume is the quintessence of this course. Many people were consulted during the preparation of the book, far too many to mention them individually. The editors, H.A. Gorges and L.P. Faine, gratefully acknowledge their contributions and recognize that without their assistance they could not have succeeded.

Particular thanks are due to Linda Scholl of the FEA and Joe Solters of the FPC, who provided the editors with guidance and comment throughout the preparation of the manuscript.

Although care was taken to eliminate errors and inconsistencies, undoubtedly some oversights may remain in this first edition. The editors, therefore, welcome corrections and suggestions for improvements.
Staff Handbook on

NATURAL GAS

Prepared by
Natural Gas Action Group
Office of Energy Programs
Domestic & International Business Administration
U.S. DEPARTMENT OF COMMERCE
August 1976
FOREWORD

When natural gas curtailment proceeds to a point where an industrial firm, or firms, must sharply reduce operations or actually shut down, the impact on the local community—and in some cases on other firms and areas—can be severe: unemployment, direct economic loss to the firm or firms curtailed and, in some instances at least, adverse indirect or ripple effects on other firms and localities.

In some cases, there is little that can be done to mitigate these impacts. But in other cases, speedy, coordinated action can provide alternatives which avoid plant shutdowns and the adverse effects which accompany them.

To sort out the situation and to take positive remedial action calls for effective coordination of talents from many disciplines and interests. To assess the effects of a curtailment, to establish priorities of needs and to implement workable relief measures in a situation of an immediate crisis puts heavy demands on the affected community and its industry.

The Department of Commerce created a Natural Gas Action Group early in the fall of 1975 to assist industrial firms and the communities they serve to cope with the effects of potentially severe and crippling curtailment situations. This action group, designed to provide a quick reaction capability in a crisis situation, has been trained to assess quickly a specific local situation, review the potential for remedial action and alternate energy sources, and to assist in the implementation of remedial action plans which would be feasible within the provisions of government regulations and options.

The Handbook was developed for the use by this team in the field. Updated for the 1976-77 season, it is designed to contain, in concise and concentrated form, data and information for immediate use in the field. Limited copies are available for others who would find this particular approach helpful in assessing, evaluating or initiating efforts to reduce the impact of gas curtailment on a particular firm or within a given community.

Robert E. Shepherd
Director
Office of Energy Programs
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Introduction

The Role of the Department of Commerce in Energy

The Department of Commerce has charted responsibilities to foster trade and commerce. Recognizing the necessity of maintaining a viable industrial and commercial base to sustain the Nation’s growing economy—in the face of increasing costs and diminishing energy sources—the Department is working closely with industry and business in a variety of ways to assist in the mobilization of the total capability of business and industry to:

- Generate and expand sources of energy supply, and in particular assure rational development of coastal energy resources.
- Use energy efficiently in the production process, improving productivity by reducing energy consumption per unit of output.
- Design and produce goods that will use energy more efficiently.*

The Office of Energy Programs (OEP), located in the Domestic and International Business Administration (DIBA), a primary operating unit of the Department,** provides the central vehicle through which many of these activities are being accomplished. Among the responsibilities assigned to OEP are the following:

- Maintaining a current overview of the main elements of energy supply and demand.
- Working with business and industry to increase their awareness of and to promote energy conservation and efficiency.
- Developing and evaluating approaches, methods, and programs to foster energy efficiency.
- Maintaining intimate liaison with key energy intensive industries and trade associations to implement energy management programs to ensure efficient use of energy resources by the business community.
- Providing technical liaison on energy matters with other Department elements, other U.S. Government agencies, and business and industry.

The Office of Energy Programs’ Natural Gas Action Group (NGAG) was set up in November 1975 in anticipation of impending natural gas shortages. There were two reasons for creating the group:

- To serve as an effective communication link for the exchange of experiences in solving alternate fuel and conversion problems, disseminating fuel and policy data, evaluating and promoting conservation efforts, exploring policy options, and providing State and local input to Federal policy. The effectiveness of the operation is dependent on the team’s ability to move freely and expeditiously between front-line trenches and Washington.

The NGAG is to serve as an effective communication link for the exchange of experiences in solving alternate fuel and conversion problems, disseminating fuel and policy data, evaluating and promoting conservation efforts, exploring policy options, and providing State and local input to Federal policy. The effectiveness of the operation is dependent on the team’s ability to move freely and expeditiously between front-line trenches and Washington.

The team, based in Washington, D.C., is made up of energy, Government, and industrial specialists, conversant with national fuel problems. Government fuel policies, relevant legislation, and industrial operations. It is backed up by the OEP staff, itself, as well as some 100 Department industry and commodity specialists, experienced in working directly with business firms and through industrial, trade, and technical associations, and can draw on any of the Commerce field representatives located throughout the United States.

The NGAG provides assistance and/or counselling by letter or telephone, in the case of simple inquiries, or by going into the field, as the need arises.

The group’s operational requirements are supported by a data base, which is noncomputerized and centrally located and consists of systematically filed collections of natural gas-related materials. These main files and this handbook, to which the files are keyed, will assist NGAG members on location to: (1) understand the local situation; (2) develop insights to the specific locale’s sensitivities in allocating energy resources in the face of curtailment; (3) discuss with well-informed local managers the planning and implementation of action strategies; and (4) perform on-the-spot, quick-look assessments in an objective manner.

*"Department of Commerce Role in National Energy Policy and Programs," n.d.

**Department of Commerce Order 10-3, "Assistant Secretary for Domestic and International Business," issued May 19, 1976.
The Role of the Handbook

Whenever a shortfall in energy occurs and endangers the economic viability of an industry or community, three tasks have to be resolved:

1. Assess the effect of the shortfall in economic terms.
2. Develop an energy management strategy for the duration of the crisis, which minimizes the adverse economic effects.
3. Implement a relief action plan which will restore "business as usual."

In many instances, a prudent management will have anticipated a crisis and will have prepared a contingency plan for the eventuality.

In any event, the nature of the problem is complex: beyond the purely technical and economic issues, it requires an up-to-date knowledge of the management, control, and regulation of resources at national and local level. No general problem-solving techniques can exist; conditions vary widely from city to city, from industry to industry, and even within an industry itself.

Wherever a gas shortage develops, a considerable amount of information will exist on the availability and distribution of resources and their economic output. This Handbook is intended to provide the necessary tools to use this information in the conduct of the three tasks described above: crisis assessment, crisis management, and relief planning.

Naturally the management of this set of tasks cannot be undertaken in a purely quantitative fashion; it requires judgment, and the assignment of priorities is going to be difficult—under the best of circumstances.

The last section of the Handbook provides a framework which will accommodate information and data available on the demand-supply situation in the state of equilibrium. A strategy can then be developed after agreement has been reached on the priorities and the progress can be continuously observed as the relief actions become effective.

It is preceded by four sections which will provide some of the building blocks essential to the understanding of the problems encountered in the development of a strategy. They are:

Section 1: Technical and physical data
Section 2: Governmental organizations and procedures
Section 3: Governmental and industrial organizations.
Section 4: The gas industry, alternate resources and industrial users.

A glossary of the terms most frequently encountered follows the main text.
Section 1

Purpose
This section presents some of the technical issues which are incurred in the management of energy. It addresses itself to questions such as, for example,

- Physical properties of fuels, conversion to alternate sources of energy.
- Aspects of combustion and process engineering.
- Heating requirements as a function of weather and end-use.

Contents
The data will provide inputs to the quantitative handling of the following tasks:

- Convert physical units from one system to another.
- Convert temperature, pressure and energy from the English system to the metric system.
- Convert energy from one energy form to another.
- Establish physical properties of various hydrocarbons.
- Outline processes like the usage of methane as a feedstock and coal gasification.
- A brief description of an LNG terminal.
- Determine the availability and quality of alternate fuels:
  - propane
  - oil
  - coal
- Assess the cost involved in transporting energy in various forms.
- Explain the combustion mechanisms for gaseous and liquid fuels.
- Show normal seasonal heating degree day patterns across the United States.
- Establish heating requirements as a function of degree days, location and design temperature.
- A short review of environmental considerations.

### Units

<table>
<thead>
<tr>
<th>Multiples of Ten</th>
<th>Technical Usage &amp; Prefix</th>
<th>U.S. Usage</th>
<th>European Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TERA</td>
<td>T</td>
<td>10^{15}</td>
<td>Quadrillion</td>
</tr>
<tr>
<td>GIGA</td>
<td>G</td>
<td>10^{12}</td>
<td>Trillion</td>
</tr>
<tr>
<td>MEGA</td>
<td>M</td>
<td>10^{9}</td>
<td>Billion</td>
</tr>
<tr>
<td>KILO</td>
<td>K</td>
<td>10^{6}</td>
<td>Million</td>
</tr>
<tr>
<td>DECI</td>
<td>d</td>
<td>10^{-1}</td>
<td>Thousand</td>
</tr>
<tr>
<td>CENTI</td>
<td>c</td>
<td>10^{-2}</td>
<td>-</td>
</tr>
<tr>
<td>MILLI</td>
<td>m</td>
<td>10^{-3}</td>
<td>-</td>
</tr>
<tr>
<td>MICRO</td>
<td>µ</td>
<td>10^{-6}</td>
<td>-</td>
</tr>
</tbody>
</table>

Thus A: \( 1 \text{ mg} = 1/1000 \text{ grams (g)} \)
\( 1 \text{ kg} = 1000 \text{ grams (g)} \)
\( 1 \mu \text{ g} = 1/1000 \mu \text{ g} = 10^{-6} \text{ g} \)

Exception: Natural gas
\( 1 \text{ Mcf} = 1000 \text{ cu. ft.} \)
\( 1 \text{ MMcft} = 1 \text{ million cu. ft.} \)
\( 1 \text{ Mcf} = 1 \text{ million Btu} \)

Also 1 quad = 1 quadrillion Btu
For example: U.S. Energy Demand for 1975 = 71.1 quads

### Units of Measure

<table>
<thead>
<tr>
<th></th>
<th>U.S. System</th>
<th>International System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>In. (inch) Ft. (foot)</td>
<td>m</td>
</tr>
<tr>
<td>Area</td>
<td>Sq. in. Sq. Ft.</td>
<td>m²</td>
</tr>
<tr>
<td>Volume</td>
<td>Cu. in. Cu. Ft.</td>
<td>m³</td>
</tr>
<tr>
<td>Weight</td>
<td>lb. 1 (short) ton = 2000 lb.</td>
<td>Kg = 1,000 g</td>
</tr>
<tr>
<td>Temperature</td>
<td>°F (°R)</td>
<td>°C (°K)</td>
</tr>
<tr>
<td>Pressure</td>
<td>lb./sq. in.</td>
<td>Kg/cm²</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>lb./cu. ft.</td>
<td>Kg/m³</td>
</tr>
<tr>
<td>Specific Volume</td>
<td>cu. ft./lb.</td>
<td>m³/Kg</td>
</tr>
<tr>
<td>Unit of Heat (Energy)</td>
<td>Btu</td>
<td>Kcal</td>
</tr>
<tr>
<td>Unit of Power</td>
<td>HP, KW, Btu/hr.</td>
<td>KW</td>
</tr>
<tr>
<td>Heat Content</td>
<td>Solid — Btu/lb.</td>
<td>Solid Kcal/Kg</td>
</tr>
<tr>
<td></td>
<td>Liquid — Btu/gal.</td>
<td>Liquid Kcal/dm³</td>
</tr>
<tr>
<td></td>
<td>Gas — Btu/cu. ft.</td>
<td>Gas Kcal/m³</td>
</tr>
</tbody>
</table>

Heat (Energy): 1 Btu heats 1 lb. of water by 1°F.
1 Kcal heats 1 Kg of water by 1°C.
Power = Energy per unit of time, e.g., Btu/hr.
A standard cu. ft. (scf) refers to a gas at atmospheric pressure and 60°F.

1.1
### Conversion Tables

#### Conversion of Thermometer Readings

<table>
<thead>
<tr>
<th>C</th>
<th>F</th>
<th>C</th>
<th>F</th>
<th>C</th>
<th>F</th>
<th>C</th>
<th>F</th>
<th>C</th>
<th>F</th>
<th>C</th>
<th>F</th>
</tr>
</thead>
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<tr>
<td>-32</td>
<td>-0.4</td>
<td>-20</td>
<td>-6.8</td>
<td>-10</td>
<td>-12.2</td>
<td>-2</td>
<td>-6.7</td>
<td>-1</td>
<td>-12.2</td>
<td>-3</td>
<td>-11.1</td>
</tr>
<tr>
<td>32</td>
<td>90.2</td>
<td>20</td>
<td>68.0</td>
<td>10</td>
<td>54.5</td>
<td>2</td>
<td>14.4</td>
<td>1</td>
<td>54.5</td>
<td>3</td>
<td>11.5</td>
</tr>
<tr>
<td>-20</td>
<td>6.8</td>
<td>-10</td>
<td>54.5</td>
<td>-1</td>
<td>14.4</td>
<td>1</td>
<td>54.5</td>
<td>3</td>
<td>11.5</td>
<td>4</td>
<td>9.0</td>
</tr>
<tr>
<td>0</td>
<td>32.0</td>
<td>4</td>
<td>61.0</td>
<td>8</td>
<td>77.8</td>
<td>12</td>
<td>221.6</td>
<td>22</td>
<td>527.2</td>
<td>44</td>
<td>1228.0</td>
</tr>
</tbody>
</table>

#### Conversion of Pressures *

<table>
<thead>
<tr>
<th>Pounds per sq. in. to kilograms per sq. cm</th>
<th>Kilograms per sq. cm to pounds per sq. in.</th>
<th>Pounds per in. to inches mercury</th>
<th>Pounds per sq. in. to inches water</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0703</td>
<td>14.22</td>
<td>2.036</td>
</tr>
<tr>
<td>2</td>
<td>0.1406</td>
<td>28.45</td>
<td>4.072</td>
</tr>
<tr>
<td>3</td>
<td>0.2109</td>
<td>42.67</td>
<td>6.108</td>
</tr>
<tr>
<td>4</td>
<td>0.2812</td>
<td>56.89</td>
<td>8.144</td>
</tr>
<tr>
<td>5</td>
<td>0.3515</td>
<td>71.12</td>
<td>10.180</td>
</tr>
<tr>
<td>6</td>
<td>0.4218</td>
<td>85.34</td>
<td>12.216</td>
</tr>
<tr>
<td>7</td>
<td>0.4921</td>
<td>99.56</td>
<td>14.252</td>
</tr>
<tr>
<td>8</td>
<td>0.5625</td>
<td>113.8</td>
<td>16.288</td>
</tr>
<tr>
<td>9</td>
<td>0.6328</td>
<td>128.0</td>
<td>18.324</td>
</tr>
</tbody>
</table>

* Example: 1 lb. per sq. in. = 0.0703 kg per sq. cm

#### Energy Equivalents:

- 1 Btu = 0.252 kcal = 1.415 HP sec = 1.055 KW sec
- 1 Kcal = 3.968 Btu = 5.616 HP sec = 4.187 KW sec
- 1 KWh = 3,412 Btu = 859.9 Kcal = 1.341 HP sec
- 1 HPh = 2,544 Btu = 641.2 Kcal = 0.7457 KW sec

#### Power Equivalents:

- 1 Btu/sec = 1.055 KW = 1.415 HP
- 1 Kcal/sec = 5.616 HP = 4.187 KW
- 1 HP = 0.7068 Btu/sec
- 1 KW = 0.3478 Btu/sec

#### Density Equivalents:

- 1 g/cm³ = 0.036 lb./cu. in. = 62.43 lb./cu. ft. = 8.345 lb./gal (USA)
- 1 lb./cu. in. = 27.68 g/cm² = 1728 lb./cu. ft. = 231 lb./gal
- 1 lb./cu. ft. = 0.016 g/cm² = 0.1337 lb./gal
- 1 lb./gal = 7.481 lb./cu. ft. = 0.0043 lb./cu. in. = 1198 g/cm³
## Heat Value Equivalents Derived From The Use Of British Thermal Unit Heat Values

<table>
<thead>
<tr>
<th>Alternate Fuel</th>
<th>Approximate BTU Content</th>
<th>Heat Value Equivalent of 1 Mcf of natural gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2 Oil</td>
<td>39,000 per gal.</td>
<td>7.5 gals.</td>
</tr>
<tr>
<td>4 Oil</td>
<td>150,000 per gal.</td>
<td>6.9 gals.</td>
</tr>
<tr>
<td>5, 6 Bunk</td>
<td>150,000 per gal.</td>
<td>6.9 gal.</td>
</tr>
<tr>
<td>Propane</td>
<td>51,000 per gal.</td>
<td>11.4 gals.</td>
</tr>
<tr>
<td>LNG</td>
<td>54,000 per gal.</td>
<td>19.2 gals.</td>
</tr>
<tr>
<td>Coal: Anthracite</td>
<td>25,400,000 per short ton</td>
<td>0.041 short ton.</td>
</tr>
<tr>
<td>Coal: Bituminous</td>
<td>26,200,000 per short ton</td>
<td>0.040 short ton.</td>
</tr>
<tr>
<td>Lignite</td>
<td>11,000,000 per short ton</td>
<td>0.094 short ton.</td>
</tr>
<tr>
<td>Electricity</td>
<td>10,500 per KWH</td>
<td>99 KWH.</td>
</tr>
</tbody>
</table>

### Energy Unit Conversion Chart

<table>
<thead>
<tr>
<th>Cubic feet of natural gas (CF)</th>
<th>Barrels of crude petroleum (42 Gal. Bbl.)</th>
<th>Short tons of bituminous coal (T)</th>
<th>British thermal units (Btu)</th>
<th>Kilowatt hours of electricity (KWH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.000018</td>
<td>0.000004</td>
<td>1000</td>
<td>0.000293</td>
</tr>
<tr>
<td>3.41</td>
<td>0.00061</td>
<td>0.00014</td>
<td>3413</td>
<td>1</td>
</tr>
<tr>
<td>3413</td>
<td>0.61</td>
<td>0.14</td>
<td>3.41 million (1 MWhr)</td>
<td>1 million</td>
</tr>
<tr>
<td>5000</td>
<td>1</td>
<td>0.22</td>
<td>5.6 million</td>
<td>1640</td>
</tr>
<tr>
<td>25,000</td>
<td>4.46</td>
<td>1</td>
<td>25 million</td>
<td>7265</td>
</tr>
<tr>
<td>1 million (1 MMcf)</td>
<td>180</td>
<td>40</td>
<td>1 billion (1 GWhr)</td>
<td>293,000</td>
</tr>
<tr>
<td>1 billion (1 bcf)</td>
<td>180,000</td>
<td>40,000</td>
<td>1 trillion (1 TWhr)</td>
<td>293 million</td>
</tr>
<tr>
<td>1 trillion (1 fcf)</td>
<td>180 million</td>
<td>40 million</td>
<td>1 quadrillion (1 QWhr)</td>
<td>293 billion</td>
</tr>
</tbody>
</table>

### Conversion Tables

- **Crude Petroleum (42 Gal. Bbl.)**
- **Anthracite Coal (Short Ton)**
- **Bituminous Coal (Short Ton)**
- **Natural Gas - Dry (1000 cu. ft)**
- **Distillate Fuel Oil (42 Gal. Bbl.)**
- **Residual Fuel Oil (42 Gal. Bbl.)**
- **Liquefied Petroleum Gas (42 Gal. Bbl.)**
- **B.T.U. Heat Values As Used By Bureau of Mines**

### COST EQUIVALENTS

- If natural gas costs $1/Mcf then the same amount of energy is delivered at the same price if propane costs 8.84/gal, oil costs 12.14/gal, or 5.88$/bbl. electricity costs 1.0 mil/kwh.

Other Refined Products' B.T.U. Values (1000s): Gasoline 5,248; Kerosene 5,670; Lubricants 6,064.8; Wax 5,537.3; Asphalt 6,636; Natural Gasoline 4,620 Per 42 Gallon Barrel.
Properties of Light Hydrocarbons

Composition of Typical Natural Gases*

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Methane</th>
<th>Ethane</th>
<th>Propane</th>
<th>Normal Butane</th>
<th>Iso Butane</th>
<th>Normal Pentane</th>
<th>Isopentane</th>
<th>Hexane</th>
<th>Normal Heptane</th>
<th>Iso-Heptane</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>94.3</td>
<td>0.5</td>
<td>0.9</td>
<td>0.6</td>
<td>0.4</td>
<td>0.5</td>
<td>0.3</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>2</td>
<td>92.1</td>
<td>0.8</td>
<td>0.7</td>
<td>0.9</td>
<td>0.6</td>
<td>0.9</td>
<td>0.2</td>
<td>0.1</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>3</td>
<td>89.9</td>
<td>0.6</td>
<td>0.8</td>
<td>0.7</td>
<td>0.4</td>
<td>0.7</td>
<td>0.3</td>
<td>0.2</td>
<td>0.5</td>
<td>0.2</td>
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<td>4</td>
<td>88.7</td>
<td>0.7</td>
<td>0.9</td>
<td>0.8</td>
<td>0.6</td>
<td>0.8</td>
<td>0.4</td>
<td>0.3</td>
<td>0.7</td>
<td>0.3</td>
</tr>
<tr>
<td>5</td>
<td>87.5</td>
<td>0.8</td>
<td>0.8</td>
<td>0.7</td>
<td>0.5</td>
<td>0.9</td>
<td>0.3</td>
<td>0.2</td>
<td>0.6</td>
<td>0.4</td>
</tr>
<tr>
<td>6</td>
<td>86.3</td>
<td>0.9</td>
<td>0.7</td>
<td>0.9</td>
<td>0.4</td>
<td>0.6</td>
<td>0.2</td>
<td>0.1</td>
<td>0.5</td>
<td>0.3</td>
</tr>
</tbody>
</table>

* Analysis by Ref. 1, 2, 3, 4, 5, 6. For more details, see Ref. 7 and 8.

Physical Properties of Light Hydrocarbons

<table>
<thead>
<tr>
<th>Hydrocarbon</th>
<th>Boiling Point (°C)</th>
<th>Melting Point (°C)</th>
<th>Critical Temperature (°C)</th>
<th>Critical Pressure (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>187.3</td>
<td>90.7</td>
<td>27.9</td>
<td>4.65</td>
</tr>
<tr>
<td>Ethane</td>
<td>185.7</td>
<td>80.7</td>
<td>37.6</td>
<td>5.34</td>
</tr>
<tr>
<td>Propane</td>
<td>138.5</td>
<td>77.9</td>
<td>41.6</td>
<td>5.11</td>
</tr>
<tr>
<td>Normal Butane</td>
<td>124.6</td>
<td>67.4</td>
<td>46.9</td>
<td>5.02</td>
</tr>
<tr>
<td>Iso Butane</td>
<td>136.1</td>
<td>60.9</td>
<td>47.8</td>
<td>5.03</td>
</tr>
<tr>
<td>Normal Pentane</td>
<td>112.3</td>
<td>52.6</td>
<td>50.9</td>
<td>5.06</td>
</tr>
<tr>
<td>Iso-Pentane</td>
<td>124.4</td>
<td>46.9</td>
<td>52.5</td>
<td>5.04</td>
</tr>
<tr>
<td>Hexane</td>
<td>99.2</td>
<td>39.2</td>
<td>55.8</td>
<td>5.08</td>
</tr>
<tr>
<td>Normal Heptane</td>
<td>91.1</td>
<td>31.1</td>
<td>58.5</td>
<td>5.10</td>
</tr>
<tr>
<td>Iso-Heptane</td>
<td>103.2</td>
<td>26.4</td>
<td>61.3</td>
<td>5.09</td>
</tr>
</tbody>
</table>

Examples:
(1) Natural gas (methane) at atmospheric pressure liquefies at 2.58°F. (-161°C).
(2) Propane at 60 °F can exist in the liquid phase at a pressure of about 115 psi absolute or 100 psi gauge.

Methane Processes

1. Methane as Feedstock

2. Methane From Coal

Coal Gasification


LNG—Technology

Typical capability of an LNG terminal (Cove Point, Maryland).

- 170 gpm gas flow rate ship to storage:
- 7,000,000 cft. storage capacity: four tanks, 1,750,000 cft. each
- Vaporization rate (combustion and waste heat: 1,000 MMcf/d

LNG Properties:

- Boiling point at 1 atmosphere (storage temperature) –259°F.
- Liquid density at boiling point: 24.47 lb./cft.
- Heat of vaporization at boiling point: 5,800 Btu/cft.
- Heating value: 1,020 Btu/cft.
- Gas to liquid ratio: 625 to 1

Conversion Factors for LNG (rounded for 1 MMBtu/cft.)

<table>
<thead>
<tr>
<th></th>
<th>MMBtu Btu</th>
<th>Bbl Liquid</th>
<th>Gal Liquid</th>
<th>Cu. Ft Gas</th>
<th>Cu. Ft Liquid</th>
<th>Million Btu</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cu. ft. liquid</td>
<td>0.00131</td>
<td>0.1281</td>
<td>0.7436</td>
<td>0.6254</td>
<td>1.00</td>
<td>0.00254</td>
</tr>
<tr>
<td>1 bbl. liquid</td>
<td>0.001585</td>
<td>1.0281</td>
<td>6.1465</td>
<td>5.0125</td>
<td>8.3325</td>
<td>0.00362</td>
</tr>
<tr>
<td>1 gal. liquid</td>
<td>0.001585</td>
<td>0.0281</td>
<td>0.1832</td>
<td>0.1377</td>
<td>0.2225</td>
<td>0.000836</td>
</tr>
<tr>
<td>1 cu. ft. gas</td>
<td>14.91</td>
<td>264.8</td>
<td>1139.7</td>
<td>10.90</td>
<td>18.19</td>
<td>1.0000</td>
</tr>
<tr>
<td>1 million Btu</td>
<td>0.001585</td>
<td>0.1585</td>
<td>1.0000</td>
<td>0.001585</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
</tbody>
</table>
Alternate Fuels 1
(Propane)

A Generalized LPG System

Pure LPG must be vaporized before mixing with air or natural gas.

Options of introducing LPG to the End User.

Vaporized LPG added to natural gas.

Alternate Fuels 2
(Liquid Fuels)

Analyses and High Heat Values of Crude Petroleum,
Typical Distillates, and Fuel Oils

<table>
<thead>
<tr>
<th>Product</th>
<th>Gravity</th>
<th>Spec. gravity at 60°F</th>
<th>Heat value per lb.</th>
<th>Ultimate analyses percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>API</td>
<td></td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>California crude</td>
<td>22.8</td>
<td>7.630</td>
<td>84.00</td>
<td>12.70</td>
</tr>
<tr>
<td>Nasca crude</td>
<td>22.1</td>
<td>7.570</td>
<td>19.150</td>
<td>84.15</td>
</tr>
<tr>
<td>Oklahoma crude</td>
<td>31.3</td>
<td>7.216</td>
<td>19.502</td>
<td>85.70</td>
</tr>
<tr>
<td>Oklahoma crude</td>
<td>31.0</td>
<td>7.250</td>
<td>19.486</td>
<td>85.00</td>
</tr>
<tr>
<td>Pennsylvanian crude</td>
<td>42.6</td>
<td>6.769</td>
<td>19.505</td>
<td>86.06</td>
</tr>
<tr>
<td>Texas crude</td>
<td>30.2</td>
<td>7.286</td>
<td>19.460</td>
<td>85.05</td>
</tr>
<tr>
<td>Wyoming crude</td>
<td>31.5</td>
<td>7.228</td>
<td>19.510</td>
<td></td>
</tr>
<tr>
<td>Mexican crude</td>
<td>31.6</td>
<td>8.120</td>
<td>18.755</td>
<td>83.70</td>
</tr>
<tr>
<td>Gasoline</td>
<td>67.0</td>
<td>5.955</td>
<td>84.3</td>
<td>15.3</td>
</tr>
<tr>
<td>Gasoline</td>
<td>60.0</td>
<td>6.152</td>
<td>84.90</td>
<td>14.20</td>
</tr>
<tr>
<td>Gasoline-bitumen blend</td>
<td>46.3</td>
<td>6.927</td>
<td>88.3</td>
<td>11.7</td>
</tr>
<tr>
<td>Kerosene</td>
<td>41.3</td>
<td>6.819</td>
<td>89.8</td>
<td>10.10</td>
</tr>
<tr>
<td>Aviation</td>
<td>32.5</td>
<td>7.166</td>
<td>92.00</td>
<td></td>
</tr>
<tr>
<td>Fuel oil, Mess</td>
<td>31.9</td>
<td>8.220</td>
<td>18.510</td>
<td>84.02</td>
</tr>
<tr>
<td>Fuel oil, mid-combustion</td>
<td>27.1</td>
<td>7.428</td>
<td>19.326</td>
<td>85.92</td>
</tr>
<tr>
<td>Fuel oil, light</td>
<td>16.7</td>
<td>7.954</td>
<td>18.835</td>
<td>84.87</td>
</tr>
</tbody>
</table>

From Chemical Engineering Handbook, P. H. Perry
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Transportation Costs

In the assessment of alternate fuels, be it on a contingency basis or in an emergency situation, transportation costs may add substantially to the costs of energy available to the end-user. Other restrictions, such as lack of trucks or rolling stock can further add to the costs of energy at the point of entry.

The following graph (excerpted from Hottel and Howard: "New Energy Technology," MIT Press, 1974) is intended to assist in the assessment of the relative costs to transport energy. The values shown here apply to large flow rates, but will serve as a useful guide, particularly in rural areas.

Combustion Technology

Gaseous Fuels

Gaseous fuels are easily dispersed or mixed with the combustion air.

Gas and air can be mixed prior to ignition; such premix burners are suitable for natural draft or forced draft application. Premix burners very often depend on a carburetor, which maintains or controls a ratio of gas to air as a function of the load. (Proportioning.)

In nozzle-mix burners air and gas are combined in the combustion zone. The following figures show a few examples of nozzle-mix burners.
Liquid Fuels

Liquid fuels are vaporized or atomized in the combustion air. Provision can be made for preheating the fuel, either in the burner or some separate equipment. The following figures show a few configurations for various oil pressures, air (or steam) pressures, and fuel flow rates.

(a) Pressure type vaporizing burner (small applications only).
(b) High pressure steam or air atomizing burner.
(c) Horizontal rotary-cup atomizing oil burner.
(d) Low pressure air-atomizing burner, variable pressure type.
(e) Mechanical or oil-pressure atomizing burner (return flow type).
(f) Complete mechanical or oil-pressure atomizing burner unit.

---

Fuel consumption per degree days for 1000 BTU/h design heat loss

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Degree days, May 31</th>
<th>Design outside temp, °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>Juneau</td>
<td>8.088</td>
<td>5</td>
</tr>
<tr>
<td>Ala.</td>
<td>Birmingham</td>
<td>2.780</td>
<td>12</td>
</tr>
<tr>
<td>Ariz.</td>
<td>Phoenix</td>
<td>1.698</td>
<td>36</td>
</tr>
<tr>
<td>Ark.</td>
<td>Little Rock</td>
<td>2.982</td>
<td>8</td>
</tr>
<tr>
<td>Calif.</td>
<td>San Francisco</td>
<td>3.421*</td>
<td>12</td>
</tr>
<tr>
<td>Colo.</td>
<td>Denver</td>
<td>8.132*</td>
<td>12</td>
</tr>
<tr>
<td>Conn.</td>
<td>Hartford</td>
<td>6.139</td>
<td>2</td>
</tr>
<tr>
<td>D.C.</td>
<td>Washington</td>
<td>4.331</td>
<td>10</td>
</tr>
<tr>
<td>Fla.</td>
<td>Jacksonville</td>
<td>1.241</td>
<td>28</td>
</tr>
<tr>
<td>Ga.</td>
<td>Atlanta</td>
<td>2.826</td>
<td>11</td>
</tr>
<tr>
<td>Hawaii</td>
<td>Honolulu</td>
<td>5.800*</td>
<td>10</td>
</tr>
<tr>
<td>Idaho</td>
<td>Boise</td>
<td>8.090*</td>
<td>10</td>
</tr>
<tr>
<td>Ill.</td>
<td>Chicago</td>
<td>6.310</td>
<td>11</td>
</tr>
<tr>
<td>Ind.</td>
<td>Indianapolis</td>
<td>6.611</td>
<td>8</td>
</tr>
<tr>
<td>Iowa</td>
<td>Des Moines</td>
<td>6.446*</td>
<td>11</td>
</tr>
<tr>
<td>Ky.</td>
<td>Frankfort</td>
<td>2.209</td>
<td>12</td>
</tr>
<tr>
<td>La.</td>
<td>Los Angeles</td>
<td>4.434</td>
<td>12</td>
</tr>
<tr>
<td>Me.</td>
<td>Newport</td>
<td>1.317</td>
<td>20</td>
</tr>
<tr>
<td>Mass.</td>
<td>Boston</td>
<td>4.782</td>
<td>5</td>
</tr>
<tr>
<td>Me.</td>
<td>Detroit</td>
<td>6.408*</td>
<td>4</td>
</tr>
<tr>
<td>Minn.</td>
<td>Minneapolis</td>
<td>2.836*</td>
<td>13</td>
</tr>
<tr>
<td>Mo.</td>
<td>Kansas City</td>
<td>2.000</td>
<td>15</td>
</tr>
<tr>
<td>N. Dak.</td>
<td></td>
<td>4.699</td>
<td>5</td>
</tr>
<tr>
<td>Mont.</td>
<td>Helena</td>
<td>8.250*</td>
<td>39</td>
</tr>
<tr>
<td>Nebr.</td>
<td>Omaha</td>
<td>6.160</td>
<td>17</td>
</tr>
<tr>
<td>N. H.</td>
<td>Concord</td>
<td>7.612*</td>
<td>11</td>
</tr>
<tr>
<td>N. J.</td>
<td>Trenton</td>
<td>5.068</td>
<td>2</td>
</tr>
<tr>
<td>N. Mex.</td>
<td>Albuquerque</td>
<td>4.109</td>
<td>8</td>
</tr>
<tr>
<td>N. Y.</td>
<td>New York</td>
<td>5.010</td>
<td>5</td>
</tr>
<tr>
<td>N. C.</td>
<td>Raleigh</td>
<td>3.360</td>
<td>14</td>
</tr>
<tr>
<td>N. Dak.</td>
<td></td>
<td>9.011*</td>
<td>11</td>
</tr>
<tr>
<td>N. Mex.</td>
<td></td>
<td>3.916</td>
<td>0</td>
</tr>
</tbody>
</table>

Normal Degree Days and Design Outside Temperatures

(Note—all readings are at the airport except those marked * which are in the city)

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Degree days, May 31</th>
<th>Design outside temp, °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conn.</td>
<td>Hartford</td>
<td>6.139</td>
<td>2</td>
</tr>
<tr>
<td>D.C.</td>
<td>Washington</td>
<td>4.331</td>
<td>10</td>
</tr>
<tr>
<td>Fla.</td>
<td>Jacksonville</td>
<td>1.241</td>
<td>28</td>
</tr>
<tr>
<td>Ga.</td>
<td>Atlanta</td>
<td>2.826</td>
<td>11</td>
</tr>
<tr>
<td>Hawaii</td>
<td>Honolulu</td>
<td>5.800*</td>
<td>10</td>
</tr>
<tr>
<td>Ill.</td>
<td>Chicago</td>
<td>6.310</td>
<td>11</td>
</tr>
<tr>
<td>Ind.</td>
<td>Indianapolis</td>
<td>6.611</td>
<td>8</td>
</tr>
<tr>
<td>Iowa</td>
<td>Des Moines</td>
<td>6.446*</td>
<td>11</td>
</tr>
<tr>
<td>Ky.</td>
<td>Frankfort</td>
<td>2.209</td>
<td>12</td>
</tr>
<tr>
<td>La.</td>
<td>Los Angeles</td>
<td>4.434</td>
<td>12</td>
</tr>
<tr>
<td>Me.</td>
<td>Newport</td>
<td>1.317</td>
<td>20</td>
</tr>
<tr>
<td>Mass.</td>
<td>Boston</td>
<td>4.782</td>
<td>5</td>
</tr>
<tr>
<td>Me.</td>
<td>Detroit</td>
<td>6.408*</td>
<td>4</td>
</tr>
<tr>
<td>Minn.</td>
<td>Minneapolis</td>
<td>2.836*</td>
<td>13</td>
</tr>
<tr>
<td>Mo.</td>
<td>Kansas City</td>
<td>2.000</td>
<td>15</td>
</tr>
<tr>
<td>N. Dak.</td>
<td></td>
<td>4.699</td>
<td>5</td>
</tr>
</tbody>
</table>

Relative heating requirements per degree day per unit space

<table>
<thead>
<tr>
<th>Apartments (as reference)</th>
<th>Banks</th>
<th>Retail Stores</th>
<th>Hotels</th>
<th>Office Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.10 to .60</td>
<td>15 to .35</td>
<td>.05 to .90</td>
<td>.15 to .60</td>
</tr>
</tbody>
</table>

---

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**Definition of Degree Days**

Each Degree of declination
terms 18 F in outdoor temperature

Each Degree = 15 hour per

Example: A day with an average temperature of 50 F equals 5 Degree Days.

Systems rated for open air/conditioner
temperatures and consumption closely proportional
to the number of Degree Days.
Environmental Protection

The major environmental concern of the handbook user will be in the area of air quality control. As an example, emission standards may limit the utilization of specific alternate fuels available. Only a basic outline is given here. For other issues such as effluent standards, refer to the appropriate sections of CFR 40.

### National Air Quality Standards:
Primary standards provide an adequate safety margin to protect public health; secondary standards protect public welfare from unknown or anticipated effects from a pollutant.

### Fossil-fueled Steam Generators:
Since this particular emission source is the most likely one to be encountered, the emission standards are cited here as a very important example. For other industries such as Portland Cement. See CFR 40.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Air Quality Standards</th>
<th>Emission Standards for Fossil- Fueled Fired Steam Generators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary</td>
<td>Secondary</td>
</tr>
<tr>
<td>Sulfur Oxides (SO₂)</td>
<td>60 micrograms/cubic meter (.03 ppm) annual arithm. mean</td>
<td>1300 micrograms/cubic meter (.5 ppm) maximum 3 hrs.</td>
</tr>
<tr>
<td></td>
<td>365 micrograms/cubic meter (.14 ppm) maximum 24 hrs.</td>
<td>once a year</td>
</tr>
<tr>
<td></td>
<td>Maximum 1300 micrograms/cubic meter (.5 ppm) once a year.</td>
<td>Max. 0.10 lb. per million Btu derived from fossil fuel.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20% opacity, 40% permissible for 2 min./hour.</td>
</tr>
<tr>
<td>Particulates</td>
<td>75 micrograms/cubic meter annual geom. mean.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>260 micrograms/cubic meter maximum 24 hrs. once a year.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max. 0.10 lb. per million Btu derived from fossil fuel.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20% opacity, 40% permissible for 2 min./hour.</td>
</tr>
<tr>
<td>C O</td>
<td>10 milligrams/cubic meter (9 ppm) maximum 8 hrs. once a year</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 milligrams/cubic meter (35 ppm) maximum 1 hr. once a year</td>
<td></td>
</tr>
<tr>
<td>Petrochemical Oxidants</td>
<td>160 micrograms/cubic meter (0.08 ppm) maximum 1 hr. once a yr.</td>
<td></td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>160 micrograms/cubic meter (.24 ppm) maximum 3 hrs. once a yr.</td>
<td></td>
</tr>
<tr>
<td>Nitric Oxides (NO₂)</td>
<td>100 micrograms/cubic meter (.05 ppm) annual arithm. mean</td>
<td>0.20 lb./million Btu derived from gaseous fossil fuel.</td>
</tr>
</tbody>
</table>

CFR 40; §50.1 -- 11

CFR 40; §60.40 -- 44

2.4

1.12
Section 2

Government Organizations and Procedures

Purpose

This section outlines the roles of the Federal Government (particularly the FPC and the FEA) and State and local governments in supplying natural gas or alternate fuels to end-users suffering from the effects of natural gas shortages. It provides the reader with an overview of those Federal agencies potentially useful in securing energy-related information and guidance, describes available FPC relief avenues for securing natural gas supplies, addresses the various procedures for acquiring alternate fuels via the FEA, and briefly discusses and displays various informal local measures for alleviating natural gas shortages.

Contents

2.1 Federal Agencies Involved in Natural Gas-Related Activity
2.2 FPC Relief Options to Ameliorate Natural Gas Shortages
2.3 FEA Relief Options to Ameliorate Natural Gas Shortages
2.4 Local Relief Options

Section 2.1

Federal Agencies Involved in Natural Gas-Related Activity

There are a number of Federal agencies involved in one facet of natural gas-related activity or another to which one can go for information (see the chart “Federal Agencies Engaged in Natural Gas-Related Activity” on page 2.3). For the purpose of aiding end-users suffering curtailment difficulties, however, only three of these, the Federal Power Commission (FPC), the Federal Energy Administration (FEA), and the Department of Commerce (DOC), are of primary importance. Among the rest there are some that are more useful than others. The more relevant are listed below, along with appropriate addresses, telephone numbers, and brief descriptions (as needed).

Primary Agencies

FEDERAL POWER COMMISSION (FPC)
825 North Capital St., N.E.
Washington, D.C. 20426
(202) 386-6102

Develops and implements regulations governing the interstate functions of the natural gas and electric power industries, including licensing, economic, and other types of research, and data compilation on jurisdictional companies.

Bureau of Natural Gas
825 North Capital St., N.E.
Washington, D.C. 20426

Regulates natural gas companies, including producers and pipeline companies engaged in interstate transportation and sale of natural gas for resale; certifies construction of interstate pipeline facilities; investigates and regulates rates and other charges as established in interstate transactions; certifies liquefied natural gas importation; and maintains in summaries of data filed by natural gas companies.

For FPC publications and reports, consult main file.

FEDERAL ENERGY ADMINISTRATION (FEA)
U.S. Post Office Bldg.
Benjamin Franklin Station
Washington, D.C. 20461
(202) 393-6400

Develops and coordinates domestic and foreign policies as they relate to the management of energy resources; develops and implements programs to meet energy shortages, including fuel allocation, rationing, and surcharges; plans and promotes energy conservation programs; develops energy price regulations; prepares guidelines for the import/export of energy resources; develops policies and programs directed toward attaining national self-sufficiency; assembles, evaluates, and analyzes information on energy reserves, supply and demand, and related economic data; coordinates with State and local governments, industry, and the public on energy resources management.

Office of Conservation & Environment
U.S. Post Office Bldg.
Benjamin Franklin Station
Washington, D.C. 20461

Prepares and implements energy conservation programs; conducts research on methods of conservation.

Office of Intergovernmental & Regional Relations
2000 M St., N.W.
Washington, D.C. 20506

Functions as liaison between the 10 regional offices and Washington and between the FEA and other energy-related Federal, State, and local agencies.

Office of Policy & Analysis
U.S. Post Office Bldg.
Benjamin Franklin Station
Washington, D.C. 20461

Develops, coordinates, and evaluates agency policies and programs; operates the agency’s energy data systems; coordinates quantitative and economic impact analysis and energy forecasting; incorporates Office of Oil & Gas and Office of Energy Data & Analysis.

Office of Resource Development
U.S. Post Office Bldg.
Benjamin Franklin Station
Washington, D.C. 20461

Develops and implements programs and policies to achieve national energy self-sufficiency through increased production and utilization of domestic energy sources (coal, petroleum, natural gas, and nuclear fuels); develops policies and programs to facilitate siting, licensing, and construction of domestic energy facilities.

National Energy Information Center
U.S. Post Office Bldg.
Benjamin Franklin Station
Washington, D.C. 20461

Serves as national central clearinghouse for energy information (production, imports, and supplies of petroleum, gasoline, and other petroleum products).

(For FEA publications and reports, consult main file.)

DEPARTMENT OF COMMERCE (DOC)
14th & Constitution Ave., N.W.
Washington, D.C. 20230
(202) 783-9200

Reviews impact of specific energy-related actions on business and industrial community; assists commercial/industrial enterprises to develop and implement energy conservation programs; participates in formulation of energy policies.

Bureau of the Census
14th & Constitution Ave., N.W.
Washington, D.C. 20230

Collects and disseminates statistical information pertaining to population, housing, agriculture, irrigation, drainage, construction, foreign trade, manufacturers, mineral industries, transportation and activities of oil and gas field operators, petroleum re-
operators information service

Domestic & International Business Administration
14th & Constitution Ave., N.W.
Washington, D.C. 20230
Manages DOC's domestic/international industrial, trade, investment, and related economic activities; prepares industrial mobilization readiness plans (energy conservation, supply demand, energy efficiency).

Bureau of Domestic Commerce
14th & Constitution Ave., N.W.
Washington, D.C. 20230
Collects, analyzes, maintains data on U.S. industries (production, pricing, inventories, marketing, labor, financing, taxation, and location and size of companies); disseminates information on crude petroleum and natural gas, natural gas liquids, petroleum refining, lubricating oils and greases, and coal mining.

Bureau of Economic Analysis
14th & Constitution Ave., N.W.
Washington, D.C. 20230
Studies alternative energy technologies, their current and capital account structures; compiles data on production/quantity value by type of fuel, expenditures by end use, expenditures by type of fuel and by industry for domestic and international trade.

Office of Energy Programs
14th & Constitution Ave., N.W.
Washington, D.C. 20230
Encourages and assists the business and industrial community to achieve immediate and significant energy savings and to develop a more permanent conservation ethic; serves as a department authority on energy sources and supplies, primarily oil, gas, and coal; participates in developing plans and programs to implement Project Independence; reviews the impact of specific Federal energy-related actions, including allocation, on business and industry.

Office of Industrial Mobilization
14th & Constitution Ave., N.W.
Washington, D.C. 20230
Assures adequate supply of strategic and critical materials for war-supporting activities and in case of national emergency.

National Bureau of Standards
Washington, D.C. 20230
Develops measurement methods/standards on energy, advanced conversion, fossil and synthetic fuels.

Center for Building Technology
Washington, D.C. 20234
Collects data on petroleum, petroleum products, coal, natural gas, hydropower, and nuclear energy; assists the public and other Federal agencies in obtaining documents; disseminates energy conservation information in building construction community.

Cryogenic Data Center
Boulder, Colorado 80302
Operates information service for cryogenics.

Other Agencies

DEPARTMENT OF AGRICULTURE (USDA)
14th & Independence Ave., S.W.
Washington, D.C. 20250
(202) 655-4000
Conducts programs in research, conservation, rural development, and land management to meet U.S. energy needs; monitors food and agriculture fuels; compiles monthly estimates of gasoline and diesel fuel demand by State.

DEPARTMENT OF DEFENSE (DOD)
The Pentagon
Washington, D.C. 20301
(202) 454-6700
Advises on energy policy formulation and implementation; maintains programs for determining energy/fuel requirements, planning and implementing a conservation program, and evaluating fuel needs.

Defense Advanced Research Projects Agency
1400 Wilson Blvd.
Arlington, Virginia 22204
Conducts research in energy technology (including mission requirements, plans and operations, supply and demand, allocations, R&D, conservation and the conceptual design of a system to meet these needs).

Defense Supply Agency
Cameron Station
Alexandria, Virginia 22314

Procures bulk and packaged petroleum products and coal for military services and Federal agencies; collects data on availability of minerals for defense purposes.

Office of Installation & Logistics
The Pentagon
Washington, D.C. 20301
Provides guidance on availability of petroleum products from industry under peacetime and wartime conditions; conducts statistical studies on consumption of all forms of energy at Defense Supply Agency field activities (electric power natural gas, propane, oil, coal, gasoline, and diesel fuel).

Army Corps of Engineers
Forrestal Bldg.
1000 Independence Ave., S.W.
Washington, D.C. 20314
Designs constructs and administers Army petroleum and natural and liquefied petroleum gas storage and distribution systems. (For DOD and relevant service-generated publications and reports, see main files.)

ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION (ERDA)
Washington, D.C.
(202) 376-4000
Exercises central responsibility for policy planning, coordination, support, and management of R&D for all energy sources and utilization technologies; encourages and conducts research, development, and demonstration for the extraction, conversion, storage, transmission, and utilization phases; engages in supporting environmental, biomedical, physical, and safety research; conducts conservation R&D programs, including automotive power systems, end-use consumption technologies, and improving energy efficiency. (For ERDA reports and publications, consult main files.)

ENVIRONMENTAL PROTECTION AGENCY (EPA)
401 M St., S.W.
Washington, D.C. 20460
(202) 755-2673
Seeks to minimize environmental impact of energy production and consumption by integration of a variety of research, monitoring, standard-setting, and enforcement activities (allowable air and water pollution from energy production).

FEDERAL TRADE COMMISSION (FTC)
The Pentagon
Washington, D.C. 20580
(202) 963-1110
Conducts investigations into the competitive availability of alternative energy sources, acquisitions of coal reserves by oil companies, and petroleum marketing practices (service station lease limitations, dealer coercion, vertical price fixing, and reciprocity); conducts studies relating to energy industry structure.

GENERAL SERVICES ADMINISTRATION (GSA)
18th & F Sts., N.W.
Washington, D.C. 20405
(202) 343-1100
Manages public utility services; develops efficient and economical methods of transporting fuels and supplies needed in operation of energy producing facilities; conducts energy studies to determine type and source of energy for heating and cooling new buildings.

Federal Preparedness Agency
18th & F Sts., N.W.
Washington, D.C. 20405

Develops policies and plans for civil defense preparedness; monitors the emergency availability of such resources as materials, industrial capacity, transportation, and communications.

(For GSA reports and publications, consult main files.)

DEPARTMENT OF THE INTERIOR (USDI)
18th & C Sts., N.W.
Washington, D.C. 20240

Seeks optimal development of fuel and nonfuel mineral resources; manages federally-owned energy and mineral resources in the public interest; collects, analyzes, and disseminates scientific, technical, economic data for continuing appraisal of resource availability and demand; administers programs dealing with oil shale development, geothermal energy, Northern Great Plains coal resources, and coal-fired electrical generating plants in the Four Corners area.

Office of Energy & Minerals
18th & C Sts., N.W.
Washington, D.C. 20240

Administers plans and programs for the maintenance of an adequate supply of solid fuels to meet essential civilian and military requirements under partial or full mobilization (assembles and evaluates data on materials, equipment, manpower, transportation, electric power, and other requirements).

Geological Survey
National Center
Reston, Virginia 22092

Provides continuing appraisal of mineral fuel resources, maintains program objectives for individual energy sources (coal, oil, gas, and geothermal).

Conservation Division
National Center
Reston, Virginia 22092

Supervises industry operations for exploration, development, production of oil, gas, and coal on federal land, Indian leases, outer continental shelf; obtains data submitted by lessees and permittees under operating regulations for coal, uranium, and oil shale.

Bureau of Land Management
18th & C Sts., N.W.
Washington, D.C. 20240

Issues and administers oil, gas, and oil shale mineral leases on the public domain, acquired lands, and submerged lands; processes requests for rights-of-way of petroleum and gas pipelines over the public domain and outer continental shelf; conducts supply and demand analyses to determine location, size, and timing of offshore oil and gas sales.

Office of Land Use & Water Planning
18th & C Sts., N.W.
Washington, D.C. 20240

Focuses on energy extraction, conversion, and transport issues relating to resource allocation in land use and water planning.

Bureau of Mines
18th & C Sts., N.W.
Washington, D.C. 20240

Conducts research on mining, processing and utilization of minerals and energy resources, and energy economics.

Office of Energy
18th & C Sts., N.W.
Washington, D.C. 20240

Conducts research processing and utilization of petroleum, natural gas, coal, shale oil, and helium; coordinates activities of series of national research centers and laboratories.

National Petroleum Council
1625 K St., N.W.
Washington, D.C. 20006

Performs resource analyses and projections (marine petroleum resources, petroleum storage capacity, short-term energy conservation potential, emergency preparedness for interruption of petroleum imports, and factors affecting U.S. petroleum exploration, development, and production).

(For USDI reports and publications, consult main files.)

SECURITIES & EXCHANGE COMMISSION (SEC)
500 North Capital St.
Washington, D.C. 20549
(202) 755-1200

Regulates public utility holding company systems.

SMALL BUSINESS ADMINISTRATION (SBA)
1441 L St., S.W.
Washington, D.C. 20416
(202) 382-1891

Grants loans to firms affected by the energy crisis; receives Federal funds for energy research and development; studies the impact of the energy crisis on small businesses.

DEPARTMENT OF TRANSPORTATION (DOT)
400 7th St., S.W.
Washington, D.C. 20590
(202) 426-4000

Ensures adequacy of facilities and services for fuel movement, particularly when changes occur in rate of movement or in sources of supply due to transportation strikes, seasonal energy fluctuations in demand, or disruptions in fuel supply; promotes development, collection, and dissemination of technological, economic, and other information relevant to domestic/international transportation.

National Transportation Safety Board
800 Independence Ave., S.W.
Washington, D.C. 20591

Undertakes studies on pipeline safety and petroleum or natural gas transport.

Office of Pipeline Safety
400 7th St., S.W.
Washington, D.C. 20590
Promulgates/enforces safety regulations for gas distribution systems.

(For DOT reports and publications, consult main files.)
FEDERAL AGENCIES ENGAGED IN NATURAL GAS—RELATED ACTIVITIES

Energy Resources Council
Established to insure communication and coordination among federal agencies involved in energy matters and to set and implement national energy policy, the Energy Resources Council is a cabinet-level body charged with overall control of the national energy effort. Although the Federal Energy Administration (FEA), which runs the petroleum allocation and price control programs, and the Energy Research and Development Administration (ERDA), which is the heart of the federal government's effort to develop alternatives to foreign oil, are sister organizations both technically immediately under the President, ERC is apparently an interim strata between the two in the federal hierarchy.

* DOC (Chairman)  * ERDA Asst. to the Pres., Nat.
* FEA (Exec. Dir.)  * EPA Sec. Affairs
* State  * NRC Asst. to the Pres.
* Treasury  * NSF Econ. Affairs
DOD  * GSA Asst. to the Pres., Domestic
DOJ  * FPC Affairs
* USDI  * OMB Sp. Asst. to the Pres.
USDA  * CEA Consumer Affairs
HEW  * GCIQ
HUD
DOT

* Member, Executive Committee

INTERNATIONAL ENERGY AGENCY

DOMESTIC COUNCIL ENERGY SUBCOMMITTEE

OMB NATURAL RESOURCES PROGRAM

OFFICE OF SCIENCE & TECHNOLOGY, JOINT BOARD FOR FUEL SUPPLY & TRANSPORT

FEDERAL COUNCIL FOR SCIENCE & TECHNOLOGY

FEDERAL MARITIME COMMISSION

SECRETARY

FEDERAL AGENCIES ENGAGED IN NATURAL GAS—RELATED ACTIVITIES

DOMESTIC COUNCIL ENERGY SUBCOMMITTEE

OMB NATURAL RESOURCES PROGRAM

OFFICE OF SCIENCE & TECHNOLOGY, JOINT BOARD FOR FUEL SUPPLY & TRANSPORT

FEDERAL COUNCIL FOR SCIENCE & TECHNOLOGY

FEDERAL MARITIME COMMISSION

SECRETARY
Section 2.2
FPC Relief Options to Ameliorate Natural Gas Shortages

Curtailment Priorities

The Federal Power Commission in its General Policy Order 65 issued January 8, 1973, and FPC Order 66 issued March 1, 1973, set up nine "priorities-of-service" categories for policy during periods of curtailed deliveries to pipeline companies under FPC jurisdiction. (For the complete text, see 18 CFR 2.78(c).) These categories are listed in descending order of priority, as follows:

1. Residential, small commercial (less than 50 Mcf on a peak day).
2. Large commercial requirements (50 Mcf or more on a peak day), firm industrial requirements for plant protection, feedstock and process needs, and pipeline customer storage injection requirements.
3. All industrial requirements not specified in other categories listed here.
4. Firm industrial requirements for boiler use at less than 3,000 Mcf per day, but more than 1,500 Mcf per day, where alternate fuel capabilities can meet such requirements.
5. Firm industrial requirements for large volume (3,000 Mcf or more per day) boiler fuel use, where alternate fuel capabilities can meet such requirements.
6. Interruptible requirements of more than 300 Mcf per day, but less than 1,500 Mcf per day, where alternate fuel capabilities can meet such requirements.
7. Interruptible requirements of intermediate volumes (from 1,500 Mcf per day through 3,000 Mcf per day), where alternate fuel capabilities can meet such requirements.
8. Interruptible requirements of more than 3,000 Mcf per day, but less than 10,000 Mcf per day, where alternate fuel capabilities can meet such requirements.
9. Interruptible requirements of more than 10,000 Mcf per day, where alternate fuel capabilities can meet such requirements.*

The FPC has modified this policy statement with respect to the application of curtailment programs on each particular pipeline. Certain pipelines recently have received orders from the Commission containing modifications of 467 (Panhandle Eastern in RP 71-119, El Paso in RP 72-6, and Arkansas-Louisiana in RP 72-121). In these recent decisions the Commission has eliminated the firm/interruptible distinction with respect to contracts held by end-users; this, in turn, eliminates categories 6 through 9, as well as any references to the firm/interruptible distinctions in categories 1 through 5. Among the reasons for these modifications is the growing awareness that in certain high priority interruptible contract holders simply need natural gas as badly as parties that have negotiated firm contracts; (2) certain companies anticipating the application of the policy statement, switched before interruptible to firm contracts; (3) the concept, itself, of adjudicating the firm versus interruptible contract distinction is difficult to administer because there are so many different variations of those contracts. It is important to remember, however, that these modifications apply only to wholesale deliveries between an interstate pipeline and a distributor or direct industrial consumers, those arrangements falling within FPC jurisdiction. It does not apply for resale gas to the end-user behind a distribution company, which is within the jurisdiction of the state PUC's, who for the next few years probably will continue to maintain a firm/interruptible distinction.

If state PUC's require subordination of interruptible markets as an absolute fact before curtailing firm markets, NGAG team members should advise industrial consumers on interruptible contracts on the status of the state PUC regulation at that point in time. The fact that the FPC may not make a firm/interruptible distinction in a particular pipeline case would not absolve an interruptible consumer from seeking all available self-help measures or to try to develop an alternate fuel capability.

Definitions

Each of the significant terms used in the nine "priorities-of-service" categories is defined by the FPC in 18 CFR 2.78(c).

Residential—"service to customers which consists of direct natural gas usage in a residential dwelling for space heating, air conditioning, cooking, water heating, and other residential uses."

Commercial—"service to customers engaged primarily in the sale of goods or services including institutions and local, state, and Federal Government agencies for uses other than those involving manufacturing or electric power generation."

Industrial—"service to customers engaged primarily in a process which creates or changes raw or unfinished materials into another form or product including the generation of electric power."

Firm service—"service from schedules or contracts under which seller is expressly obligated to deliver specific volumes within a given time period and which anticipates no interruptions, but which may permit unexpected interruption in case the supply to higher priority customers is threatened."

Interruptible service—"service from schedules or contracts under which seller is expressly obligated to deliver specific volumes within a given time period and which anticipates and permits interruption on short notice, or service under schedules or contracts which expressly or impliedly (sic) require installation of alternate fuel capability."

Plant protection gas—"minimum volumes required to prevent physical harm to the plant facilities or danger to plant personnel when such protection cannot be afforded through the use of an alternate fuel. This includes the protection of such material in process as would otherwise be destroyed, but shall not include deliveries required to maintain plant production. For the purposes of this definition, propane and other gaseous fuels shall not be considered alternate fuels."

Feedstock gas—"natural gas used as raw material for its chemical properties in creating an end product."

Process gas—"gas use for which alternate fuels are not technically feasible such as in applications requiring precise temperature controls and precise flame characteristics. For the purposes of this definition, propane and other gaseous fuels shall not be considered alternate fuels."

Boiler fuel—"considered to be natural gas used as a fuel for the generation of steam or electricity, including the utilization of gas turbines for the generation of electricity."

Alternate fuel capabilities—"a situation where an alternate fuel could have been utilized whether or not the facilities for such use have actually been installed; provided however, where the use of natural gas is for plant protection, feedstock, or process uses and the only alternate fuel is propane or other gaseous fuel, then the consumer will be treated as if he had no alternate fuel capability."

Pipeline Operational Flexibility

In order to provide additional natural gas to an end-user who utilizes the emergency and extraordinary relief options available under CFR 2.78 (FPC Orders 467-A and 467-C), it is necessary that pipeline companies retain operational flexibility. There are a variety of ways that a pipeline can maintain flexibility in its operational system and increase its volume of natural gas in order to be prepared to deal with these emerg-
Pipe lines can make emergency purchases of natural gas. 18 CFR 2.68 states that it will be the general policy of the FPC to encourage intrastate and distribution companies, if requested, to aid natural gas distribution companies and pipeline companies in need of temporary emergency supplies, by making short-term or deliveries of natural gas intrastate commerce for periods up to 90 days, including 60 consecutive days without any express authorization by the Federal Power Commission. There are certain procedures that are foreclosed after 60 days, which are described later in the section on relief mechanisms.

Paragraph 2.72 contains two sections 157.22 and 157.29, which are used complementary to emergency natural gas purchases by an intra-state pipeline from a producer. 18 CFR 2.72, Exemption of temporary emergency operation, stipulates that the public interest "does not require the issuance of a certificate for the sale of natural gas necessary to assure the maintenance of adequate natural gas service where interruption or serious curtailment of service exists or is threatened because of failure of facilities, a curtailment of supply or unscheduled unexpected demand on such facilities or supply, and where such interruptions and operations are limited to a single period of not more than 60 days."

In the sum, the producer does not need a certificate to sell gas to an interstate pipeline. There are, however, considerations from the public interest perspective that influence his capacity to sell on an emergency gas basis. Some of these considerations are: future financial exposure because of the FPC approval of emergency pipeline sales; contract limitations on future interstate sales of gas from the source of intrastate production used for the emergency gas; whether or not the production source for the emergency gas sale has been developed under an advance payment agreement; and if an intrastate producer's "fear" of becoming subject at a future date to Federal regulation by participating in an emergency sale.

18 CFR 157.29, Exemption of Emergency Sales or Transportation, states the public interest "does not require the issuance of a certificate authorizing the sale or transportation of natural gas by an independent producer when imminent danger to life and property can be eliminated by such sale or transportation or where the sale or transportation of natural gas is necessary to assure maintenance of adequate natural gas service on the purchaser's pipeline system or in the case of serious curtailment of service or is threatened on purchaser's system because of failure of facilities, a curtailment of supply or an unusual and unexpected demand on such facilities or supply, and where such sale or transportation is limited to a single period of not more than 60 days."

These operations terminate after 60 days unless a filing for a permanent or temporary certificate has been started within 15 days of the start of delivery. This section relaxes for short-term gas sales only the normal transportation certification procedures. However, pipelines may be reluctant to use this device because of other considerations such as possible exposure to future price refunds and payback provisions.

A pipeline can develop and efficiently utilize underground storage to modify gas deliveries to consumers on a seasonal basis. Warm weather gas supplies can be stored for winter periods, and stored gas can be made available quickly for emergency uses.

- A pipeline can curtail all of its customers and curtailment more deeply "rob Peter to pay Paul." This provides instant diversion from one customer to another.
- A pipeline can request a voluntary relinquishment from one or a number of customers. These customers can be on another's pipeline system, or a distributor, or even an end-user.
- A pipeline can request voluntary conservation. If an emergency occurs, the distributor should go to regular radio and television stations and to the newspapers and make pleas for all to lower their thermostats, etc. School hours can be cut back as well.
- A pipeline can purchase or borrow natural gas from another pipeline. Usually gas pipelines' supply situations and operational flexibilities will vary considerably. These variations may even change at different periods of the year depending upon underground storage capacities and load seasonality. In emergency situations, pipelines have frequently shared gas with each other through sales or a promise to repay in kind at a later date. One potential problem which exists in sales of this type is that the FPC may, upon consideration of the transaction, disallow the full sales price charged, thereby causing the seller to lose both the gas and the full agreed upon price.
- Similar emergency exchanges of gas can be made between distribution companies and between distribution companies and pipeline companies.

A pipeline company can raise the price in large sections of pipeline, thereby increasing the volume of gas transported in the line. This is called "line packing." Although this procedure would not be enough to run a big power plant for one day, for instance, pulling the line pressure down might provide enough gas to save the residences in a small town for a couple of days. A large amount of natural gas sits in a long distance pipeline system. At different points in time, a pipeline will "draw down surplusies" in the line to meet hourly shifts in demand or smaller type emergency deliveries where needed. Line packing can be used only by the pipeline itself. Each section of the system has its own line pack characteristics, pressure and volume. Although the pressure can be manipulated for a short period, the section has to be repressurized before it gets extended.

Relief Mechanisms

Four relief mechanisms for obtaining natural gas are available to an end-user, suffering from curtailed supplies, vis-a-vis the FPC. The response time for the mechanisms described is likely to vary widely.

- Emergency relief. "Life and property" standards, 18 CFR 2.78(a)(4) (FPC Order No. 467-A, issued January 15, 1973). Under this order, a pipeline company can respond immediately, and without FPC permission, to meet an emergency situation (including environmental emergencies) during curtailment periods, where supplemental deliveries of natural gas are required to forestall irreparable damage to life or property.
This supplemental gas, which is being taken from other customers, is provided only until the immediate emergency is over. The pipeline company reports to the FPC simply that it has made use of this provision. (This emergency relief provision is included in the tariffs filed by the pipeline with the FPC.)

Emergency Situations
Likelihood of loss of service to residential users, such as
- explosions due to delivery pressure drop or flame extinguishment
- health hazards and damage to the home (such as frozen or ruptured water pipes) due to temperature drop
Likelihood of loss of service to commercial users, such as
- health hazards and property damage (frozen lines) due to temperature drop and its effect on space heating
Likelihood of loss of service to essential commercial users (e.g., hospitals, nursing homes, apartment buildings—operating off a large central heating plant), such as
- explosions due to delivery pressure drop or flame extinguishment
- health hazards and property and equipment damage due to temperature drop.
Likelihood of loss of service to industrial users, such as
- health hazards and equipment damage resulting from loss of space heating (here dealing with humans and capital equipment not a process product)
- damage to equipment due to a shutdown
- damage to perishable agricultural products, crops, due to lack of natural gas (a crop such as alfalfa, for example, may require a dryer; the farmer, since he is often an interruptible customer needing natural gas only during a very specific phase, may be unable to procure gas)
an electric generating power plant, which has an existing natural gas purchase contract, may need emergency natural gas because it has lost its coal-crushing machine or some other capability that may force it to have “shut its electrical load.” (Normally there are a number of contingencies available, such as buying power from another facility, but they may not be working—for whatever reason. This would have to be explained in the initial telephone conversation with the pipeline.)
an air pollution emergency declared by a local authority because of an inversion. (If it can be shown that the introduction of additional natural gas above the curtailed volume of natural gas would produce a measurable benefit to alleviate an emergency, then the pipeline may use whatever flexibility it may have to effect additional deliveries. The only, however, that additional natural gas could make any difference. These invasions normally take place in a large metropolitaan area in the amount of pollution emission (of oxyn sulfur) eliminated by natural gas. Emissions would be so small compared to the total emissions as to be negligible. In addition, the affected area would have to be one already operating a natural gas contact, who, because of entitlement, is on a dual system and temporarily using coal.)

Procedures
A direct customer, a pipeline, i.e., a distribution company or a direct end-user, a large direct industrial buyer, calls the pipeline saying that there is an emergency. (A party, a customer behind a distributor company, cannot make the call to the pipeline.)
In the case of a third party, the distributor would have to demonstrate to the pipeline that it, the direct customer, had exhausted all of its internal flexibility or capability, including curtailing other customers. (If, for example, the distribution company had a needy interruptible hospital, the distributor would have to exhaust his own resources, before the pipeline would okay the relief.)
The pipeline may demand a payback either from the distributor or the direct end-user (a large industrial buyer), as soon as the emergency has passed.

It should be noted that this is a fairly new measure and has not been well-tested. There may be problems if pipeline is experiencing heavy curtailment into generally high priority markets.

- Extraordinary relief. “Exemptions.” 18 CFR 2.78(a)(2) (FPC Order No. 467-C, issued April 4, 1974. Under this order “extraordinary” relief can be applied for in those situations where the customer, the end-user, needs relief for economic reasons—other than damage to health and property situations: if he does not get help, he will have to shut down. The customer may need for feedstock purposes and the less, or he may be an interruptible customer behind a distributor, who has been off completely and does not have an alternate fuel capability. 18 CFR 2.78(a)(1) states that, although the “priorities of deliveries . . . may be applied to the deliveries of all jurisdictional pipeline companies during periods of curtailment on each company’s system . . . upon a finding of extraordinary circumstances after hearing initiated by a petition . . . exceptions to those priorities may be permitted.”

Extraordinary relief situations
Most of those who will need a need to file for an exemption to the curtailment priorities-of-deliveries schedule are industrial consumers who claim: significant production losses, unemployment; a lack of an existing alternate fuel capability; a lack of an adequate alternate fuel supply; or a non-convertible potential because of the necessity for processing a feedstock (you can refer the end-user to the definition of “process gas”): uneconomical operations due to high cost of alternate fuel compared to natural gas.
A person does have the right to file for extraordinary relief and have the petition heard on whatever basis he chooses. No regulation precludes him from filing on whatever economic grounds he chooses. Whether or not the FPC approves the petition is another matter. The application can be rejected if the petitioner does not qualify as an applicant or if the petition does not conform to certain procedural criteria, which will be laid out below. (See 2.78. (b)(1)-(11).)

Who can file?
- Any pipeline customer can file.
- A state commission (PUC) can file on behalf of a particular end-user served by a particular distributor, subject to PUC authority.
- An end-user behind a distributor, if joined by a distributor. (The FPC may take 10 days to begin processing an application from an end-user; if the end-user’s distributor has not joined in the filing within that 10-day period, the FPC may reject the application. After one has gone through the information required to secure this type of relief, which is listed below, it becomes clear why this is so. The FPC has no jurisdiction over what the distributor does with the natural gas once it is in hand, nor can the FPC compel the end-user to use the gas in a particular way. Without the information required in the filing [2.78, (b)(11)] the FPC cannot determine whether or not the local distributor could use internal flexibility or whether or not the natural gas should be taken from other customers of the pipeline.)

Procedures for obtaining extraordinary relief
Requests for relief must contain the following information
- “The specific amount of natural gas deliveries requested on a peak day and monthly basis, and the type of contract under which the deliveries would be made.”
- “The estimated duration of the relief requested.”
Directions for preparing petitions for extraordinary relief seeking an exemption to the priorities of deliveries schedule, are laid out for the applicant in 18 CFR, sections 17.51, 15, and 1.16.

Filing Time The applicant should file as soon as the actual demand can be reasonably anticipated. At all times, when you can determine that the actual supply will be from a supplier with reasonable certainty, the estimated peak day and monthly volumes of natural gas available with respect to the relief requested, as well as the estimated duration of time relief would be necessary.

For certain types of relief, the duration of relief may go on indefinitely. It may continue as long as it can be demonstrated that there is a problem within the system, and the FPC finds that the relief can continue to be given without jeopardizing other customers. Relief is generally given for a sufficient period of time to allow the development of an alternate fuel capability.

Lead-time An applicant petitioner, can ask for relief pendente lite (pending litigation). Whether or not the applicant will get this immediate relief, while formal FPC hearings are still pending will depend upon the discretion of the FPC. Generally, the granting of immediate relief pendente lite is a function of, among other things, two elements: the applicant’s (ultimately, the user’s) need (this is, in turn, a function of perceived public interest at a given point in time); and the flexibility of the pipeline (how many other customers might be hurt depends on the amount the applicant wants and his priority).

If the application does not require formal hearing, the process can take as little time as one day or as long as four or five weeks. Although the latter is unlikely if the end-user is threatened with an imminent shutdown.

In the relief process and the FPC has required applicants to provide in detail in these sections how these relate to any conceivable alternate fuel, including propane and including other sources of natural gas. (If you come in for help because even though you are in category number two you have been curtailed, then you have to demonstrate that you have looked for alternate fuels, including propane. Simply because you are a “process user” does not automatically qualify you. The justification is much more rigorous when you are asking that gas be diverted from another customer.)

Reporting requirements: Although the FPC plays a minimal role initially in this transaction area, in fact,
procures its jurisdiction over those sales between the intrastate sellers and the interstate buyers, there are certain requirements that must be met. The purchaser (an interstate pipeline company or a distributor company) must file with the FPC, within 10 days after the emergency commences, a statement in writing and undertakes, within four (4) calendar days thereafter, briefly outlining the nature of the emergency. Within 10 days after the termination of the emergency, a full sworn statement, and four (4) sworn copies thereof, shall be filed setting forth the volume of gas delivered exceeding (1) the marshaled requirements received by the seller, and (2) the applicable rate schedule, if any. Alternatively, the basis on which the per MCF reimbursement was determined (the transporter shall, in any case, receive adequate compensation for any additional transportation services rendered in connection with its participation in the delivery of the emergency volumes of gas and, upon termination of the emergency, shall inform the FPC in writing of, the total amount of compensation received, if any, and the means by which the per MCF compensation was derived. See 2.6(b).

Requirements if emergency exceeds 60-day period

If the emergency being responded to is expected to have a duration of more than 60 consecutive days, the purchaser must obtain an advance statement from the FPC prior to the end of the initial 60-day period, that the seller, if it is not the end-user-producer, will inform the FPC of the requirement for the certificate. The FPC will notify the pipeline company if it is approved, the arrangement is not in the public interest. The Commission will deny the application, if the product is the same type of natural gas, where alternate fuels or adequate natural gas supplies are available;

- if the price of the gas is above the going field rate for intrastate contract purchases;
- if the intrastate gas would otherwise be available for sale to an interstate pipeline under an interstate contract between a pipeline and a producer, the request for a certificate would be denied. (The producer may show that the gas would be sold to other intrastate buyers. The proximity to an intrastate buyer is a factor, since the producer would likely choose to sell his gas at the higher intrastate price, rather than at today's much lower regulated interstate prices).

If the request for the certificate is approved, the arrangement goes forward. There are reporting requirements; these will be discussed in the following section.

Application for a transportation certificate must include the following information:

- The pipeline transporting the gas must:
  - indicate volumes to be transported, on a peak day, average day, and annual basis;
  - indicate the pipeline capacity available to perform the transport service;

*Although the FPC can and will apply a standard on the end-user-purchaser contract, this will be done by vetoing the whole arrangement. The FPC would tell the transporting pipeline that the arrangement is not in the public interest because the production price, for example, is too high.*
In addition to the four options discussed above, long-range relief from FPC rulings can be attempted through intervention in FPC curtailment proceedings. An example is General Motors' continuing arguments for end-use priorities that reflect the economic value of gas to various consumers. Also, companies and communities should consider intervening in FPC cases that more directly affect their gas supplies, such as curtailment orders for their interstate pipeline supplier and cases involving other customers of this pipeline.

**Case A**
State A PUC approves: sales price set by seller (SALES POINT = 1).
State B PUC approves: sales price set by middleman-distributor in front of needy end-user (SALES POINT = 2); actual need of end-user.
FPC approves: transport rate between seller and buyer.

**Case B**
State A PUC approves: sales price set by seller (SALES POINT = 1).
State B PUC approves: sales price set by middleman-distributor in front of needy end-user (SALES POINT = 3); actual need of end-user.
FPC approves: transport rate between seller and buyer.

Usually located near an interstate pipeline (the case of the connecting pipeline to the end-user and, as such, the connecting the connecting pipeline, if necessary, between the independent seller and the interstate pipeline).
Section 2.3

FEA Relief Options to Ameliorate Natural Gas Shortages

Alternate Fuels

The FEA has jurisdiction over the following fuels, which might be used as alternates if an end user is being deprived of natural gas:

Middle distillates, "any derivatives of petroleum including kerosene, home heating oil, range oil, stove oil, and diesel fuel, which have a fifteen percent boiling point in the ASTM D-86 standard distillation test falling between 371° and 700° F. Products specifically excluded from this definition are kerosene base and naphtha base jet fuel, heavy fuel oils, ... grades #4, #5, and #6, intermediate fuel oils (which are blends containing #6 oil), and all specialty items such as solvents, lubricants, waxes, and process oil."

Residual fuel oil, "...fuel oil commonly known as: (a) #4, #5, and #6 fuel oils; (b) Bunker C; (c) Naval Special Fuel Oil; (d) crude oil when burned directly as a fuel; and all other fuels oils which have a fifty percent boiling point over 700° F. in the ASTM D 56 standard distillation test.

Propane, "the chemical C3H8 in its commercial forms, including propane-butane mixes" (LPG) "in which propane constitutes greater than ten (10) percent by weight. Included within the definition of propane is the propane content of natural gas liquids and refinery gas when used for refinery fuel use."

Butane, "the chemical C4H10 in its commercial forms, including both normal butane and iso-butane, their mixtures and mixtures of butane and propane containing ten (10) percent by weight of propane. Included within the definition of butane is the butane content of natural gas liquids and refinery gas when used for refinery fuel use."

Relief Vehicles

Depending on his situation, the end-user seeking an alternate fuel can avail himself of one of the vehicles provided by the FEA: adjustments, assignments, state set-aside supplies, waivers, or exceptions. The end-user can apply for an adjustment of his base period volume in order to meet increased requirements for that fuel, which has been necessitated by the deprivation of natural gas. This is a particularly useful device for an "interruptible" end-user. (See 10 CFR 211.12 (h)) The applicant must be prepared to establish his historical requirements and justify his increased requirements. Applications for an adjustment to a base period volume should be made according to the steps laid out in 10 CFR 205, C. A Form No. 17 * should be filed with the regional FEA office. (An end-user filing for an adjustment is requesting a modification of his original allocation entitlement, which specifies the amount of a particular fuel he has the right to purchase from his supplier.)

The end-user, who chooses to acquire an alternate fuel, can apply for an assignment. An end-user is entitled to receive a volume of an allocated product equal to the sum of the volumes allocated to him from each of his suppliers. This is called an entitlement. The assignment of a base period volume provides the end-user with the right to purchase a specific amount of fuel from a supplier. He will file a Form No. 17 with his regional FEA office. (See 211.11, "Basis for Purchaser's Allocation Entitlement," 211.12, "Purchaser's Allocation Entitlement," and 205, C. which explains the steps to be taken in order to acquire an assignment.)

An end-user experiencing difficulties in meeting his fuel requirements sufficiently severe that the situation could be reaching "hardship" or "emergency" proportions can apply to the State Petroleum Allocation Office in order to secure a temporary assignment of fuel (propane, middle distillate, motor gasoline, and residual fuel oil) from State set-aside supplies. The applicant must be located within the State and be able to demonstrate his hardship or emergency requirements. In addition, an end-user, who previously had no supply of that particular fuel and who is experiencing severe problems in acquiring an alternate fuel to natural gas, can apply for a new assignment from the State set-aside supply. (211.17 explains the scope and purpose of this mechanism. 205.210, Q, explains the procedures for acquiring fuel via this mechanism.) In the case of a set-aside applicant, the request may either be contained in a form (Form 20) or be conveyed verbally via the telephone. Applicants for a new assignment are required to file with the State Office the same form as used in applications for an assignment of a base period volume to regional FEA offices. In Pennsylvania, for example, the Fuel User's Emergency Line is essentially the first line of defense for curtailed gas users. Curtailed gas customers file a FUEL office application form and an FEO-17. The FEO-17 is forwarded to the regional FEA allocation officer and the FUEL office form is checked against any previous requests that may have been filed by the same consumer and verified. Fuel officials can approve or disapprove the application. If approved, a supplier is assigned and is supplied with sufficient fuels from the State set-aside to meet the consumer's requirements. If disapproved, the consumer is informed as to why such decision was made and provided with an appeal form. Appeals must be filed within 15 days of the FUEL office decision.

FUEL office allocations are for short-term emergency situations and usually have a duration of six months. This allows time for the consumer to obtain supplies through regular FEA channels.

If an end-user wishes to make up for his natural gas deficiency by using additional amounts of propane (or butane, which is highly unlikely), he can apply to the National FEA office in Washington, D.C. for a waiver of the limitation placed on the amount of propane or butane he is allowed to acquire. (An explanation of this special restriction on propane and butane is set out in 211.10 (g).) As opposed to an entitlement, which provides the purchaser with the right to acquire FEA-allocated fuels, this waiver simply puts aside a flat ceiling restriction on the amount of propane or butane a purchaser is allowed to acquire. This regulation prohibits the end-user from using propane or butane in excess of the pre-determined base period amount. Again, the applicant uses FEA Form No. 17 in filing his request.

A final avenue for acquiring or increasing his alternate fuel capability, and one which ought not be pursued unless all other options are closed, is for the end-user to file for an exception to the regulations. (The FEA defines "exception" as a "waiver or modification of the requirements of a regulation, ruling or generally applicable requirement under a specific set of facts." If an end-user, who has applied under some other mechanism for relief, has been denied that relief, for whatever reason, and can claim a severe hardship or gross inequity, he can file an "Application for Exception" with the Office of Exceptions and Appeals, FEA, Washington, D.C. (See 205. D.) The criteria or standards established for satisfying the contention of serious hardship or gross inequity are very rigorous, so potential applicants are encouraged to exhaust other options first. Normally, if an end-user is in desperate straits, either the FEA or the FPC will be able to help him, without his having to use this court-of-last-resort.

* A sample FEA Form No. 17 follows on page 3.6, accompanied by some explanation provided by the FEA.
End-Use Categories

Which options are most appropriate in certain situations depend on the nature of end-use, e.g., industrial, commercial, residential, utilities, and emergency and medical services. The FEA defines these categories in the following manner:

- Industrial use, "usage by those firms primarily engaged in a process which creates or changes raw or unfinished materials into another form or product."

- Commercial use, "usage by those purchasers engaged primarily in the sale of goods or services and for uses other than those involving industrial activities and electrical generation."

- Residential use, "direct usage in a residential dwelling or church or other place of worship for space heating, refrigeration, cooking, water heating, and other residential uses."

- Utility, "a facility that generates electricity by any means, and sells it to the public."

- Medical and nursing buildings, "buildings that house medical, dental or nursing activities, including, but not limited to... the use of clinics, hospitals, nursing homes, and other facilities."

FEA Relief Options

The following options are available for acquiring particular FEA-controlled alternate fuels for a variety of specific end-uses to replace losses in natural gas. (In each case, the end-user is the applicant, not the supplier/distributor.)

- If the choice is a middle distillate and the end-user intends to use it for purely industrial purposes (i.e., he won't use it for space heating or as a boiler fuel), he can go directly to his distributor without filing an application with the FEA. (See 10 CFR 211.12(h).) If, however, he intends to use it for commercial purposes (which generally means space heating), then he must file a Form No. 17 with the FEA Regional Office, requesting an assignment of a supplier to provide a "base period volume." If the commercial end-user already has this alternate fuel capability and now needs to use it exclusively because he can no longer obtain natural gas, he will file a Form No. 17 with his FEA Regional Office in order to secure an adjustment of his "base period use." (See 10 CFR 211.51.)

- If the choice is residual fuel oil for either industrial or commercial (i.e., space heating) use, the end-user has to file a Form No. 17 with his FEA Regional Office in order to get an assignment of a supplier or an adjustment in his base period supplier. (See 10 CFR 211.12(h).)

- If there is a surplus of middle distillates or residual fuel oils, commercial and industrial end-users can acquire quantities of these from their suppliers in excess of their base period volume. (See 10 CFR 211.10(g)(6).)

- If the choice is propane, the end-user intends to use it for industrial purposes, and there is already on-site a propane capability, the end-user files an FEA Form No. 17 with the FEA Regional Office requesting an adjustment in his base period use. (It should be noted that in the case of industrial users, the regional FEA offices will only approve an energy equivalent amount of propane to compensate for below base period of natural gas. Amounts in excess of that can only be secured by applying to the national office for a waiver.)

Such end-users already have this capability in situ, either to handle an overload on the system, "peak shaving," or because they are interruptible natural gas customers, utilizing natural gas during various production phases. (See 211.12(h).) Apparently quite a number of industrial customers have this dual capability.

As opposed to securing informally supplies of either middle distillates or residual fuels in excess of base period volumes, when the supplier happens to have surplus fuel on hand, without being restricted by FEA regulations, an end-user cannot at any time procure additional supplies of propane (or butane) without applying to the FEA national office requesting a waiver of such ceiling limitations. (See 10 CFR 211.10(g)(8).)

- If an end-user wishes to substitute propane for natural gas for industrial purposes, but lacks the facilities to utilize propane, he should submit an FEA Form No. 17, requesting an assignment of a supplier, to the appropriate FEA Regional Office. (See 211, D and 211.12(h).) If the end-user's gas utility has a propane utilization capability, arrangements can be made to have the propane delivered to the utility, where it will be introduced into the distribution system. Excluded from this are synthetic natural gas manufacturing, electrical generation whose power source is petroleum based, gasoline blending and manufacturing and refinery fuel use. (See 10 CFR 211.51.)

Propane, however, "shall not be used for peak shaving as long as the gas utility continues services during such peak shaving usage to interruptible industrial customers (other than for process fuel, plant protection fuel, or raw material) or to any non-residential customer who can use a fuel other than natural gas, propane, or butane." (See 211.84.)

Energy production is defined by FEA as the "exploration, drilling, mining, refining, processing, production and distribution of coal, natural gas, geothermal, nuclear fuels and electrical energy, petroleum or petroleum products, shale oil, nuclear fuels and electrical energy. It also includes the construction of facilities and equipment used in energy production, such as pipelines, mining equipment and similar capital goods. Excluded from this are synthetic natural gas manufacturing, electrical generation whose power source is petroleum based, gasoline blending and manufacturing and refinery fuel use."

The regulation further states that each user must file separately, but that a utility can take the initiative in locating a supplier.

On November 21, 1975, the FEA issued its "Guidelines for Adjustments and Assignments for Alternate Fuels," which appeared in the Federal Register, Vol. 40, No. 229, November 26, 1975. These are helpful in trying to understand the regulations, not only as they apply to propane, but to other FEA-controlled fuel allocations as well. These "Guidelines" are provided on page 2.3.18 of this handbook.

The FEA has set up the following allocation schedule for propane users:

- 100 percent of current requirements for agricultural production and Department of Defense use;
- 100 percent of current requirements (as reduced by the application of an allocation fraction) for emergency services, energy production, sanitation services, telecommunications services, passenger transportation services, medical and nursing buildings, aviation ground support vehicles and equipment, startup, testing and flame stability of electrical and utility plants; 100 percent of base period volumes for petrochemical feedstock use, synthetic natural gas plant feedstock use, industrial use as a process or plant protection fuel if no substitute for propane is available, Government use, peak shaving for gas utilities**, and refinery use.

**Propane, however, "shall not be used for peak shaving as long as the gas utility continues services during such peak shaving usage to interruptible industrial customers (other than for process fuel, plant protection fuel, or raw material) or to any non-residential customer who can use a fuel other than natural gas, propane, or butane." (See 211.84.)"
fuel use; 95 percent of base period use for all residential use; and *90 percent of base period use for commercial use (maximum of 210,000 gallons per year), standby volumes or any other industrial use, transportation services other than passenger transportation service or aviation ground vehicles, for vehicles equipped to use propane as of December 17, 1973, and schools.

If a gas utility wishes to acquire propane that does not exceed its base period uses (see preceding immediately above 100 percent of base period volume), it can file an FEA Form No. 17 with the FEA Regional Office requesting an adjustment of its base period volume (211.83 (c)(2)). If the utility needs propane in excess of 100 percent base period use, it must apply to the FEA National Office in order to obtain a waiver of ceiling limitations on propane (211.10 (g)(8)).

(The above only applies if the utility already has a propane capability.)

Definitive FEA policies on utility use of propane as of this date aren’t yet worked out. This should be worked through shortly.

Propane can be imported by an industrial end-user without securing permission from the FEA.

For alternate fuel capability purposes, butane is neither as readily available nor easy to utilize. In the U.S., butane is used primarily for gasoline blending. Because it is heavier than propane and has a higher boiling point, it does not gasify as readily. Consequently, butane is not readily adaptable to dilution with air for Btu content reduction to obtain a natural gas substitute similar to propane/air mixtures. There are almost no local butane suppliers. If the end-user is situated near a refinery, he might be able to secure butane. If an industrial end-user is able to acquire butane, he files an FEA Form No. 17 with the FEA Regional Office requesting an adjustment in volume not to exceed 100 percent of his base period volume (211.93 (b)). If, however, he is seeking a new supply of butane or desires an amount beyond his current base use, as with propane, he must file with the FEA National Office to secure a waiver of ceiling limitations (211.1 (g)(8)).

* Ibid.
Dear Mr. 

Transcontinental Gas Pipeline Co., our Supplier, currently projects a system-wide curtailment for the winter period (Nov. 16, 1975, to April 15, 1976) of 43.5%. At this rate of curtailment, it will be necessary for Power Company to curtail the supply of gas to its firm industrial customers. This curtailment will be instituted in accordance with the Curtailment Plan (enclosed), which is on file with the Public Service Commission.

will be curtailed 25% of the volume used during the period which was the twelve (12) months ending April 1973. Usage during the base period and allocated volumes are indicated on the enclosure.

Allocations are on a monthly basis and may use the allocated volumes at your convenience provided that your daily consumption does not exceed the limitations in the existing contract. will be responsible for monitoring the monthly consumption. By prior arrangements with Power Company, some allocated volumes may be transferred between the months.

Power Company will adjust the demand charges of the "WP" Tariff to reflect monthly allocations. It must be remembered that these projections reflect only our best present knowledge and are subject to change as the supply position changes.

I re, again, urge you to contact both Federal and State Officials to make them aware of the situation and its effect upon your operation.

Very truly yours,

John Doe
Supervisor
Industrial Services Div.

Enclosures
## BASE PERIOD CONSUMPTION

<table>
<thead>
<tr>
<th>Month</th>
<th>Base Period Use of Natural Gas In Mcf</th>
<th>Natural Gas To Be Available In Mcf</th>
<th>Natural Gas To Be Curtailed In Mcf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 1975</td>
<td>81,420</td>
<td>71,243</td>
<td>10,177</td>
</tr>
<tr>
<td>Dec.</td>
<td>72,500</td>
<td>54,375</td>
<td>18,125</td>
</tr>
<tr>
<td>Jan. 1976</td>
<td>83,520</td>
<td>62,640</td>
<td>20,880</td>
</tr>
<tr>
<td>Feb.</td>
<td>88,480</td>
<td>66,360</td>
<td>22,120</td>
</tr>
<tr>
<td>Mar.</td>
<td>64,600</td>
<td>48,450</td>
<td>16,150</td>
</tr>
<tr>
<td>April</td>
<td>55,330</td>
<td>48,414</td>
<td>7,316</td>
</tr>
<tr>
<td>TOTAL</td>
<td>446,250</td>
<td>351,482</td>
<td>94,768</td>
</tr>
</tbody>
</table>
## BASE PERIOD USE OF NATURAL GAS

<table>
<thead>
<tr>
<th>Month of Base Period</th>
<th>Natural Gas In Mcf</th>
</tr>
</thead>
<tbody>
<tr>
<td>April, 1972</td>
<td>55,730</td>
</tr>
<tr>
<td>May</td>
<td>45,570</td>
</tr>
<tr>
<td>June</td>
<td>35,840</td>
</tr>
<tr>
<td>July</td>
<td>20,900</td>
</tr>
<tr>
<td>Aug.</td>
<td>21,720</td>
</tr>
<tr>
<td>Sept.</td>
<td>40,270</td>
</tr>
<tr>
<td>Oct.</td>
<td>66,160</td>
</tr>
<tr>
<td>Nov.</td>
<td>81,420</td>
</tr>
<tr>
<td>Dec.</td>
<td>72,500</td>
</tr>
<tr>
<td>Jan., 1973</td>
<td>83,520</td>
</tr>
<tr>
<td>Feb.</td>
<td>88,480</td>
</tr>
<tr>
<td>Mar.</td>
<td>64,600</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>676,710</strong></td>
</tr>
</tbody>
</table>

Average monthly use of natural gas: 56,392.5 Mcf
FEDERAL ENERGY OFFICE

Request for Assignment of a Supplier
or Adjustments of Base Period Supply Volume
(FEO-17 (1-74))

Instructions

General Instructions

1. Who Submits and Where to Submit.
   a. The following should submit this form to their current or prospective supplier:
      (1) Wholesale purchasers who do not have a supplier.
      (2) Wholesale purchasers who need to establish a base period supply volume.
      (3) Wholesale purchasers who have had unusual growth (more than 10% per year for motor gasoline and more than 5% per year for all other products) since the base period and wish to adjust their base period supply volume.
      (4) Wholesale purchasers who wish to adjust their base period supply volume to cover certified increases in volume from end users allocated on the basis of 100% of current requirements.
   b. The following should submit this form to the appropriate Regional Office of FEO:
      (1) Wholesale purchasers who wish to adjust their base period supply volume to cover certified increases in volume from end users allocated on the basis of a percentage of base period supply.
      (2) Suppliers who question the validity of this application.
      (3) Suppliers who have approved an adjustment of the base period supply volume in excess of 20%.
      (4) Wholesale purchasers who request an adjustment in the base period supply volume due to curtailment or abandonment of service of an energy source other than residual fuel oil or refined petroleum products.
   c. The following should submit this form to the FEO National Office:
      (1) International air carriers requesting allocations of non-bonded fuels.
      (2) Civil Air Carriers and Public Aviation requesting redistribution of aviation fuels.

2. FueIs Covered

<table>
<thead>
<tr>
<th>Type of Product</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 Motor Gasoline</td>
<td>310</td>
</tr>
<tr>
<td>310 Kerosene</td>
<td>320</td>
</tr>
<tr>
<td>330 Diesel Fuel</td>
<td>340</td>
</tr>
<tr>
<td>410 Aviation Gasoline</td>
<td>420</td>
</tr>
<tr>
<td>430 Naphtha Jet Fuel</td>
<td>510</td>
</tr>
</tbody>
</table>

3. Specific Instructions

   a. Name of Company - Enter the corporate name, or the name of the entity making the request.
   b. Date - Enter the year, month, and day of this request.
   c. Street Address - Enter the street address of the company or individual making the request.
   d. City - Enter the name of the city location of the company making the request.
   e. State - Enter the name of the state location of the company making the request.
   f. Zip Code - Enter the zip code of the company making the request.
   g. Employer Identification Number - Enter the nine digit number that is used in all filings with the Internal Revenue Service.
   h. Person to Contact - Enter the name of the person to contact from the requesting company.
   i. Telephone - Enter the telephone number (including area code) of the person to contact from the requesting company.
   j. Street Address, City, State, Zip Code - Delivery Location - Enter the street address, city name, state name, and zip code of the location to which the product is to be delivered. This information should only be completed if the delivery location is different from the corporate address entered in blocks 2, 3, & 4, above. If the delivery is to be more than one location enter the address of each location, other than that in blocks 2, 3, & 4, on separate sheet(s) and attach to this form.
   k. Storage Capacity of Delivery Location - Enter the storage capacity in gallons for each location to which the product is to be delivered.
   l. Current Inventory of Delivery Location - Enter the inventory level in gallons as of the date of this request for each location to which the product is to be delivered.
   m. Type of Product - Check only one box for the type of product for which supply or supplier is being requested.
   n. Specify Grade of Product - Enter the grade of the product under request, such as Diesel #2, etc.
   o. Type of Request - Check the appropriate box for the request being made.
   p. Name of Supplier - Enter the name of the supplier who is presently supplying you the product. There are four lines provided and the principal supplier should be entered on the first line. If there are more than four suppliers list on an additional sheet.
   q. % of Base Period Supplier - Enter the percentage of the annual base period volume that has been supplied by the appropriate supplier.
   r. Person to Contact & Telephone - Enter the name of the person to contact for each supplier and his telephone number including the area code.
   s. Wiling to Supply? - For each supplier you have entered, indicate his willingness to supply by checking the appropriate box.
   t. Supplier's Decision on this Request - This section should be completed by the supplier. The supplier's name is entered and the appropriate box checked for approving or disapproving this request. If the request is disapproved, indicate in detail the reasons for disapproval.

2.36
13. Product Purchased For - Check the appropriate box for the type of use. If the product is for end-use rather than for resale, briefly describe how the product is used.

14. Credit or Legal Problem - If there is a credit or legal problem involving your request for supply, describe the nature of the problem.

15. Base Period Supply Volume by Month - Enter for each month the gallons of product purchased during the base year.

16. Actual Purchases in the Last Twelve Months - Enter the gallons purchased for each month for the latest twelve complete months prior to date of this application. Enter the appropriate year, for example, may begin with March 1973 and end with February 1974. Enter the percentage of the comparable month in the base period, for example, 117.90.

17. Requested Adjusted Base Period Supply Volume - Enter for each month the gallons requested for the adjusted base period supply volume. This information should be included for all requests such as establishment of a base period supply, adjustment of a base period supply due to growth, allocation for non-bonded fuels or establishment of base period supply due to curtailment of other energy source. Also enter the appropriate year, for example, 1974. Enter the percentage of the comparable month in the base period, for example, 125% if the request is an adjustment to base period supply volume.

18. Justification For Volumes Requested - Describe in detail the reasons justifying the requested volumes. Indicate the names and telephone numbers of major customers whose requirements have substantially increased or major new customers who will be supplied. Also indicate the end-use for each of these customers and the impact on customers' operations if the request is denied. If the requested volumes are for your own end-use, give a description including facilities or equipment, major changes since the base period, usage rates and how the rates are determined. For the addition of new equipment attach certified statement concerning usage rates and operational capacity.

If requested volumes are as a consequence of curtailed access to other sources of energy, or pursuant to a plan filed in compliance with a rule or order of a Federal or State Agency, indicate the energy source denied and its BTU equivalent.

19. Applied to State for Exceptional Hardship - If you have applied to the state for an exceptional hardship for the type of product under request, check the appropriate box. If "yes", indicate the state to which application was made, date of application, reason for hardship, quantity of product requested and the resolution of the hardship.

20. Application to the Federal Government - Indicate whether you have ever requested an assignment of a supplier or an adjustment of a base period supply for the type of product under request. Check the appropriate box and enter the case number if the answer is "yes".

21. Other Significant Factors - Enter any other significant factors or remarks that are important to this request.

22. List Titles of Attached Sheets - Enter the titles of the attached sheets in this section of the form.

23. Certification - The form must be certified both by the person completing it, and also by the person or a senior representative of the firm on whose behalf the request is submitted.

24. International Air Carriers Certification - For such requests, this additional certification is required by a senior company official.
FEDERAL ENERGY OFFICE
MANDATORY PETROLEUM PRODUCTS ALLOCATION PROGRAM
REQUEST FOR ASSIGNMENT OF A SUPPLIER
OR ADJUSTMENT OF BASE PERIOD SUPPLY VOLUME

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Street Address</td>
<td>917 Wilton Ave.</td>
</tr>
<tr>
<td>3. City</td>
<td>Orgone</td>
</tr>
<tr>
<td>7a. Person to Contact</td>
<td>A. Jones</td>
</tr>
<tr>
<td>8a. Street Address - Delivery Location</td>
<td>Same</td>
</tr>
</tbody>
</table>

| 4. State | RS |
| 5. Zip Code | 41960 |
| 6. Employer Identification Number (Internal Revenue Service Number) | |

| 10. Type of Product: Complete separate form for each type of fuel. |
|---|---|
| 10a. [ ] 110 Propane | 10o. [ ] 540 #5 & #6 for Non-Utilities |
| 10b. [ ] 120 Butane | 10p. [ ] 550 Bunker C |
| 10c. [ ] 130 Propane/Butane Mix | 10q. [ ] 560 Navy Special |
| 10d. [ ] 200 Motor Gasoline | 10r. [ ] 570 Other Residuals |
| 10e. [ ] 310 Kerosene | 10s. [ ] 710 Lubricants |
| 10f. [ ] 320 #2 Heating Oil | 10t. [ ] 720 Special Naphthas |
| 10g. [ ] 330 Diesel Fuel | 10u. [ ] 730 Solvents |
| 10h. [ ] 340 Other Middle Distillates | 10v. [ ] 740 Miscellaneous |
| 10i. [ ] 410 Aviation gasoline | |
| 10j. [ ] 420 Kerosene Jet Fuel | |
| 10k. [ ] 430 Naphtha Jet Fuel | |
| 10l. [ ] 510 #4 for Utilities | |
| 10m. [ ] 520 #5 & #6 for Utilities | |
| 10n. [ ] 530 #4 for Non-Utilities | |

10w. Specify Grade of Product (Please Check) | Commercial |

| 11. Type of Request (Please Check) |
|---|---|
| [ ] 11a. [ ] Request for Assignment of Supplier | |
| [ ] 11b. [ ] Request for Assignment of Base Period Supply Volume | |
| [ ] 11c. [ ] Request for Adjustment of Base Period Supply Volume - Adjustment less than 20% | |
| [ ] 11d. [ ] Request for Adjustment of Base Period Supply Volume - Adjustment Equal To or Greater Than 20%* | |
| [ ] 11e. [ ] Request for Assignment of Non Bonded Fuels (See Instructions) *All adjustments must be greater than 10% for motor gasoline and 5% for all other products. | |

*Due to curtailment of natural gas

| 12. Name and Address of Suppliers (or Potential Suppliers if Requesting Assignment of a Supplier) - Complete 12a. through 12f. List principal supplier on the first line and others below. If more than four, provide additional sheets. |
|---|---|
| 12a. Name of Supplier | Independent LPG |
| 12b. Supplier Address | P.O. Box 344 Butyl, RS 42911 |
| 12c. Brand Name of Supplier | Lynn |
| 12d. % of Base Period Supplied | 0 |
| 12e. Person to Contact & Telephone | E. Smith (202) 254-330 |
| 12f. Willing to Supply? | Yes - X No |

12g. Supplier's Decision on this request - Completed by Supplier.

| Supplier Name | Independent LPG |

Please check appropriate box.

[ ] Approved  [ ] Disapproved  If disapproved, indicate reasons for disapproval.

2.3.8
13. Product Purchased For:  
   Resale

   YY. End Use - describe briefly:  Assembly plant -- See documents attached

14. If there is a credit or legal problem involving your supply, briefly describe (Attach additional information if necessary).

   --NONE--

15. Base Period Supply Volume by Month (Gallons)

<table>
<thead>
<tr>
<th>Month</th>
<th>Year</th>
<th>Gallons</th>
<th>% of Base Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1974</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>1974</td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>1974</td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>1974</td>
<td></td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>1974</td>
<td></td>
<td></td>
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<tr>
<td>June</td>
<td>1974</td>
<td></td>
<td></td>
</tr>
<tr>
<td>July</td>
<td>1974</td>
<td></td>
<td></td>
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<tr>
<td>August</td>
<td>1974</td>
<td></td>
<td></td>
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<tr>
<td>September</td>
<td>1974</td>
<td></td>
<td></td>
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<tr>
<td>October</td>
<td>1974</td>
<td></td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>1974</td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>1974</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15a. Base Period Year 4-72 thru 3-73

<table>
<thead>
<tr>
<th>Month</th>
<th>Year</th>
<th>Gallons</th>
<th>% of Base Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1973</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>1973</td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>1973</td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>1973</td>
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<td></td>
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<tr>
<td>May</td>
<td>1973</td>
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<td></td>
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<tr>
<td>June</td>
<td>1973</td>
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<td>July</td>
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<td>September</td>
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<tr>
<td>October</td>
<td>1973</td>
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<td></td>
</tr>
<tr>
<td>November</td>
<td>1973</td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>1973</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total

15b. Does this base period supply volume agree with your supplier?

   Check ☐ Yes ☐ No  
   If "No" attach copy of Base Period Supply Volume Report briefly describe disagreement.

16. Actual purchases in the last twelve months and the percentage of the comparable base period month. (Total for all use categories in 16b.)

<table>
<thead>
<tr>
<th>Month</th>
<th>Year</th>
<th>Gallons</th>
<th>% of Base Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1975</td>
<td>43,999</td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>1975</td>
<td></td>
<td></td>
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<tr>
<td>July</td>
<td>1975</td>
<td></td>
<td></td>
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<tr>
<td>August</td>
<td>1975</td>
<td></td>
<td></td>
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<tr>
<td>September</td>
<td>1975</td>
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<td></td>
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<tr>
<td>October</td>
<td>1975</td>
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<td></td>
</tr>
<tr>
<td>November</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16a. Actual Purchases in the last twelve months.

Total

16b. Actual purchases in the last twelve months and the percentage of the comparable base period month by use category. (Space for three use categories is provided. If more than three exist, attach additional sheets using the following format.)

(1) Use Category  Industrial & manufacturing

<table>
<thead>
<tr>
<th>Month</th>
<th>Year</th>
<th>Gallons</th>
<th>% of Base Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1975</td>
<td>43,999</td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>1975</td>
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<td></td>
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<tr>
<td>April</td>
<td>1975</td>
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<tr>
<td>May</td>
<td>1975</td>
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<td></td>
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<tr>
<td>June</td>
<td>1975</td>
<td></td>
<td></td>
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<tr>
<td>July</td>
<td>1975</td>
<td></td>
<td></td>
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<tr>
<td>August</td>
<td>1975</td>
<td></td>
<td></td>
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<tr>
<td>September</td>
<td>1975</td>
<td></td>
<td></td>
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<tr>
<td>October</td>
<td>1975</td>
<td></td>
<td></td>
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<tr>
<td>November</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total

(2) Use Category  Testing Safety of New Pro-

<table>
<thead>
<tr>
<th>Month</th>
<th>Year</th>
<th>Gallons</th>
<th>% of Base Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1975</td>
<td>43,999</td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>1975</td>
<td></td>
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</tr>
<tr>
<td>March</td>
<td>1975</td>
<td></td>
<td></td>
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<tr>
<td>April</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>1975</td>
<td></td>
<td></td>
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<tr>
<td>July</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>1975</td>
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<td></td>
</tr>
<tr>
<td>September</td>
<td>1975</td>
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<td></td>
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<tr>
<td>October</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total

23.9
17. Requested adjusted base period supply volume and the percentage of the comparable base period month.

<table>
<thead>
<tr>
<th>Month</th>
<th>Year</th>
<th>Gallons</th>
<th>% of Base Period</th>
<th>Month</th>
<th>Year</th>
<th>Gallons</th>
<th>% of Base Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1976</td>
<td>238,032</td>
<td></td>
<td>July</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>1976</td>
<td>252,168</td>
<td></td>
<td>August</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>1976</td>
<td>184,110</td>
<td></td>
<td>September</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>1976</td>
<td>83,402</td>
<td></td>
<td>October</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>19</td>
<td></td>
<td></td>
<td>November</td>
<td>1975</td>
<td>116,018</td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>19</td>
<td></td>
<td></td>
<td>December</td>
<td>1975</td>
<td>206,625</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,080,355</td>
<td></td>
</tr>
</tbody>
</table>

18. Justification for volumes requested in item 17 above. Describe in detail the reasons justifying this request. (See Instructions)

SEE ATTACHED
19. Have you applied to the State for exceptional hardship?  
Check □ Yes □ No  If "yes", briefly describe.

20. Have you ever filed this form with the Federal Government for the type of fuel you are presently requesting action?  
Check □ Yes (If yes give case #) □ No

21. Other significant factors, special requirements, or remarks (Provide additional sheets if required).

All fuel to be used as process fuel.
No conversions made since March 31, 1973, to any other fuel other than propane.

22. List titles of attached sheets.

23. Certification - I hereby certify that the above statements are true, accurate, and complete to the best of my knowledge and that any quantity requested for priority use will be used only for that use.

F. Young
Signature of person completing form

A. Jones, Plant Manager
Signature and title of certifying company official

24. International Air Carriers:  
Additional Certification for Assignment of Non-Bonded Fuels - I hereby certify that bonded fuel supplies are not available at any price to provide a level of fuel comparable to the average percentage of base period fuel currently supplied to other international air carriers operating into the U.S.

Signature and title of certifying company official

Title 18 USC Sec. 1001 makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

FEO-17(1-74)5OM  
(Supersedes OOG-PAP-17-11-73)
INFORMATION REQUIRED FROM COMPANIES BEING CURTAILED FROM
NATURAL GAS WHERE A MIDDLE DISTILLATE IS REQUESTED AS AN
ALTERNATE FUEL UNDER SECTION 211.12(h).

1. Completed Form FEA-17.

2. Description of business including a brochure, if available.

3. Estimate of effect that denial of the request would have on the business.

4. Notice of curtailment. (Should show beginning month curtailment will be in effect, and ending month if not on a 12-month basis).

5. Expected availability of natural gas in MCF by month for the period for which approval is requested as furnished by the natural gas supplier.

6. The company should identify the end uses it considers to be entitled to the 100 percent of current requirements allocation level. Also furnish the last twelve months' usage and the proposed usage for the next twelve months in TUs based on expected natural gas availability of:
   a. Natural gas
   b. Middle distillate

7. Where the applicant is using natural gas for space heating, the natural gas and middle distillate base period use by month during the base period (1972) may be requested. Separately identify space heating and non-space heating. (May be documented on Form FEA-17).

8. Description of efforts and contacts made to find a supplier if unable to do so (where applicable).

9. Documentation of suppliers willingness to supply (where applicable).
INFORMATION REQUIRED FROM COMPANIES BEING CURTAILED FROM
NATURAL GAS WHERE RESIDUAL FUEL OIL IS REQUESTED AS AN
ALTERNATE FUEL UNDER SECTION 211.(h).

1. Completed Form FEA-17.

2. Description of business including a brochure, if available.

3. Estimate of effect that denial of the request would have
   on the business.

4. Notice of curtailment. (Should show beginning month
   curtailment will be in effect, and ending month if not
   on a 12-month basis).

5. Expected availability of natural gas in MCF by month
   for the period for which approval is requested as
   furnished by the natural gas supplier.

6. Total purchases by month during the base period (1973)
   in BTU and MCF of natural gas.

7. Natural gas, and residual fuel oil uses since the base
   period that have been changed to an alternate energy source.
   Show separately for each end use or process the base period
   use by month in BTUs of:
   a. Natural gas
   b. Residual fuel oil

8. The company should identify the end uses it considers to be
   entitled to the 100 percent of current requirements allo-
   cation level. Information sufficient to document that such
   identified uses do, in fact, qualify for "current require-
   ments" shall also be furnished. Also furnish for each such
   end use or process by month the last twelve months' usage
   and the proposed usage for the next twelve months in BTUs
   based on expected natural gas availability of:
   a. Natural gas
   b. Residual fuel oil

9. Description of efforts and contacts made to find a supplier
   if unable to do so (if applicable).

10. Statement from current supplier(s) as to willingness to
    supply increased volumes (if applicable).
11. Status of appeal to State Public Utility Commission or Federal Power Commission for relief from natural gas curtailment. Where applicable, the following:
   a. Copy of decision
   b. When filed
   c. Current status

12. Status of state set-aside request (if applicable).

13. Statement as to availability and efforts made to purchase surplus residual fuel oil.

14. Update on ongoing basis of natural gas availability. Advise the company to notify FEA of any change in natural gas availability for the period covered by any approval. Before approval is granted for a subsequent period, a statement of actual volumes received during the approval period should be furnished.

**EXAMPLE CASE RESOLUTION**

(Alternate fuel allocation level 100 percent of base period use)

\[
\begin{align*}
236,600 & \times \quad 177,450 \\
\text{Base period consumption of natural gas (MCF)} & \text{Natural gas to be available (MCF)} \\
0 & \times \quad 1,035,000 \\
\text{Conversions to alternate energy source (equivalent MCF)} & \text{BTU/MCF} \\
91,500 & = \quad 669,074 \\
\text{BTU/gal. alternate fuel} & \text{Gal. alternate fuel}
\end{align*}
\]
INFORMATION REQUIRED FROM COMPANIES BEING CURTAILED FROM
NATURAL GAS WHERE PROPANE OR BUTANE IS REQUESTED AS AN
ALTERNATE FUEL UNDER SECTION 211.12(h).

1. Description of business including a brochure, if available.

2. Estimate of effect that denial of the request would have
after taking into consideration the availability of non-
Canadian imports.

3. Notice of curtailment. (Should show beginning month
curtailment will be in effect, and ending month if not
on a 12 month basis).

4. Volume of propane or butane requested on a monthly basis.

5. Expected availability of natural gas in MCF by month for
the period for which approval is requested as furnished
by the natural gas supplier.

6. Total monthly purchases during propane base period in BTU
and MCF (or gallons as appropriate) of:
   a. Propane
   b. Butane
   c. Natural gas

7. Natural gas, propane and butane uses since the base period
that have been changed to an alternate energy source. Show
the following:
   a. Each end use or process
   b. For each end use or process the propane base period
      use by month in BTUs of:
         -- Natural gas
         -- Propane
         -- Butane

8. The company should identify the end uses it considers to be
entitled to the 100 percent of current requirements allocation
level. Information sufficient to document that such identified
uses are, in fact, qualify for "current requirements" shall
also be furnished. Also furnish for each such end use or
process by month the last twelve months' usage and the pro-
posed usage for the next twelve months in BTUs based on
expected natural gas availability of:
   a. Natural gas
   b. Propane
   c. Butane

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2.3.15
9. Where the applicant is using natural gas for boiler fuel or space heating, the natural gas, propane and butane base period use by month during propane base period is needed. Separately identify space heating and boiler fuel usage. Show separately for each end use or process by month the propane base period use in BTUs of:
   a. Natural gas
   b. Propane
   c. Butane

10. The company is required to identify processes (end uses) that can be converted to alternate energy sources (other than propane, butane or natural gas). Request the company to furnish supporting documentation to justify its continued use of natural gas, propane or butane. Documentation may include but is not limited to statements by or studies conducted by recognized consultants such as engineering firms attesting to the technical feasibility of using an alternate energy source. If conversion is technically practical, the company should furnish schedule for conversion. Where conversion to an alternate source of energy is not under active consideration, the company should furnish a detailed explanation including estimated costs, engineering practicability, environmental considerations, competitive factors, etc.

11. Proposal by the applicant to use its own stored product if applicable.

12. Status of appeal to State Public Utility Commission or Federal Power Commission for relief from natural gas curtailment. Where applicable, the following:
   a. Copy of decision
   b. When filed
   c. Current status
   d. If not filed -- Why not? Filing plans?

13. Status of state set-aside request (if applicable).

14. Statement as to why non-Canadian imports are not being purchased and used to offset expected curtailment.

15. Update on ongoing basis of natural gas availability. Advise the company to notify FEA of any change in natural gas availability for the period covered by any approval. Before approval is granted for a subsequent period, a statement of actual volumes received during the approval period should be furnished.
16. Industrial users requesting assignments of propane or butane which will be processed by a gas utility for industrial uses should furnish FEA with the following in addition to the above information as applicable:
   a. A statement that delivery of product through a utility is necessary;
   b. A written verification that the applicant has no facilities to use a fuel other than pipeline gas;
   c. A copy of the applicants agreement with the utility company concerning the financial and logistical arrangements for the product requested;
   d. Complete information on the extent of curtailment being experienced or projected;
   e. A statement from the utility that furnishing propane or butane to the applicant in this manner is consistent with all applicable Federal and State laws, regulations, and orders.
FEDERAL ENERGY ADMINISTRATION
CURTAILED ENERGY USERS
Guidelines for Adjustments and Assignments of Alternate Fuels

On January 25, 1975, the Federal Energy Administration issued "Guidelines for Adjustments and Assignments of Propane and Butane to Purchasers Whose Supplies Have Been or May Be Curtailed." These guidelines were based on the experience of the years 1975-1976 and the results of several studies. The guidelines were issued to provide a consistent basis for applications of FEA regulations with respect to adjustments of base period uses of and assignments of suppliers of propane and butane to wholesale purchasers and end-users of alternate fuels.

The guidelines were designed to provide a framework for the allocation of available supplies among potential users in a fair and equitable manner. They established a process for determining the allocation of supplies to end-users and wholesale purchasers, and provided a mechanism for resolving disputes that arose during the allocation process.

The guidelines were based on the principle that all users who were eligible to receive supplies under the allocation system should be treated fairly and equitably. They provided a procedure for determining the allocation of supplies to end-users and wholesale purchasers, and established a process for resolving disputes that arose during the allocation process. The guidelines also outlined the responsibilities of the FEA and the users, and provided for the resolution of disputes through a formal and informal process.

The guidelines were intended to provide a fair and equitable framework for the allocation of available supplies among potential users. They established a process for determining the allocation of supplies to end-users and wholesale purchasers, and provided a mechanism for resolving disputes that arose during the allocation process. The guidelines were a significant step towards ensuring that all eligible users received their fair share of available supplies.

The guidelines were widely implemented and became a blueprint for the allocation of supplies to all users who were eligible to receive them. They were particularly important for the allocation of propane and butane, which are used in a wide range of applications, including heating, cooking, and industrial uses.

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(1) A statement that delivery of product through a utility is necessary;
(2) A written verification that the applicant has no facilities to use a fuel other than pipeline gas;
(3) A copy of the applicant’s agreement with the utility company concerning the financial and logistical arrangements for the product requested;
(4) Information on the extent of curtailment being experienced or projected;
(5) Volume of propane or butane requested as alternate fuel; and
(6) A statement from the utility that furnishing propane or butane to the applicant in this manner is consistent with all applicable Federal and State laws, regulations and orders.

(4) FEA evaluation and treatment of applications.—(1) FEA may contact the utility involved to verify that the cost of purchase, storage, and transmission of a gaseous fuel of an equal BTU content is to be borne solely by the applicant.

Section 3(b)(2) of these guidelines.

(3) Applications for butane should be submitted to the National FEA at the address given in 2(d) above. Applications for propane should be submitted to the appropriate FEA regional office.

(1) Applicants seeking assignment and adjustments of a supplier and base period should be strongly urged to seek immediate assistance in obtaining supplies of natural gas from the Federal and State agencies which have regulatory authority over suppliers or supplies of natural gas and to take adequate steps to protect themselves from future curtailments by installing an energy system which is capable of being fueled by an energy source other than natural gas, propane or butane.

(4) In evaluating an application for assignment or adjustment of propane and butane, FEA should consider the extent to which the energy system which is capable of being fueled by an energy source other than natural gas, propane or butane is technically feasible for meeting the applicant’s energy requirements. FEA should also consider what steps have been taken by the applicant to obtain an alternate fuel capability. FEA should also consider the extent to which an applicant has exhausted all of its administrative remedies through the Federal and State agencies which have regulatory authority over suppliers or suppliers of natural gas.

3. Allocation levels. As noted, care should be taken to ascertain the proper allocation level for the end-user or wholesale purchaser-consumer.

(a) Allocation levels not subject to an allocation fraction.—(i) Agricultural Production.

(1) Assignments of a supplier and a base period use for which an adjustment is made in accordance with the provisions of 10 CFR, Part 205, Subpart C.

(2) Percent of base period use subject to a fraction.—(i) Assignments of a supplier and a base period use may be made if the applicant does not have a base period supplier and base period use. The assigned base period use should be calculated in the following manner:

Determine in BTU’s the amount of energy consumed by the petitioner in each base period. Base periods shall be the same as that for the particular allocable product being requested as an alternate fuel.

Convert the BTU value into volume of allocable product being requested. This volume is the maximum base period use which should be generally assigned for the period corresponding to the base period.

(ii) If the applicant has an established base period use for an allocable product as an alternate fuel, an adjustment may be made if circumstances permit. An adjustment to base period use should be calculated in the following manner:

Determine in BTU’s the total amount of energy (energy sources subject to curtailment plus all allocable products used) consumed by the petitioner in the base period. Base periods shall be the same as that for the particular allocable product being requested as an alternate fuel.

Where any process or end-use which utilized volumes of the curtailed energy source during the base period has since been discontinued or converted to use another source of energy other than the alternate fuel being sought, the BTU value of the product used for such discontinued or converted process or end-use should be subtracted from the total amount of energy consumed during the base period.

Subtract the BTU value of the volume of the curtailed source of energy which is or will be available after curtailment during the period corresponding to the base period for the allocable product which is being sought as an alternate fuel.

Convert the BTU difference into volume of allocable product being requested. This volume is the maximum base period use which should generally be assigned for the period corresponding to the base period.

(b) Allocation levels subject to an allocation fraction.—(1) One hundred percent of current requirements subject to an allocation fraction.—(A) A decision to assign a base period supplier to an applicant which does not have a base period supplier of an alternate fuel and which is entitled to an allocation level of one hundred percent of current requirements subject to an allocation fraction shall be made in accordance with the provisions of 10 CFR, Part 205, Subpart C.

(ii) Since this allocation level is expressed in terms of current requirements, an adjustment of base period use pursuant to 10 CFR 211.13(h) cannot be made. Ordinarily the applicant will not apply for increased current requirements since his supplier will have certified those requirements pursuant to 10 CFR 211.13(d). Thus, FEA will generally be involved only to the extent that a dispute as to the extent to which the adjustment to base period use is valid is submitted to FEA National Office in accordance with

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Section 2.4
Local Relief Options

Before applying to the FPC for additional supplies of natural gas (or to the FEA for an assignment of or an adjustment in his alternate fuel allocation), there are a number of options that the end-user should explore.

The first step and the easiest is to go to his natural gas company, the distributor, and tell him that for whatever reason he needs more gas. This request can sometimes be met if the distributor has some operational flexibility. The distributor will be cooperative, when possible, because the gas utilities have an interest in maintaining healthy customer relationships. Distributors also want the cooperation and active participation of their customers in curtailments, so they try to maintain as good a relationship as possible. For example, the situation might arise when the distribution company must call the end-user and tell him that they are being forced to cut back deliveries because they do not have enough gas. The user may be asked to reduce his production in order to consume less gas. If the distribution company wants this type of cooperation, it should be willing to help out the end-user at other times.

There may be times, too, when the end-user cannot acquire any natural gas. For a variety of reasons the distribution company cannot come up with additional supplies or operational flexibility, at least on its own initiative. In this situation there are two steps that are available to the end-user: "pooling" and appealing to the State public utility commission. The second step is normally not initiated until all attempts at the first have proven fruitless.

Sometimes, when supplies of natural gas are inadequate to provide for all needs in a given local distribution system, the industrial users supplied by a single distribution company will try to settle the problem among themselves.

If, for some reason, pooling does not work, then the end-user can file for relief before the State public utility commission and the commission will decide whether or not to hold a hearing on his behalf. This usually is done when the end-user feels that he has been treated unfairly. Generally, this is not a particularly attractive option. First, because the curtailment plans, which are based on end-use, are generally in the tariff provisions of the utility company approved by the commission, the commission may refuse to accept a hearing, or the end-user may lose the case. Second, hearings usually require substantial time and can be rather complicated. In most cases, it appears that neither the plaintiffs (the end-users) nor the defendants (the utilities) are anxious to become involved in commission hearings. So each party tries to do its best to settle the problem between themselves. It is important, however, to alert the end-user that this option is open to him if, indeed, he feels that he is being given unfair treatment.

If a variety of natural gas-dependent companies or industries located in a single community are suffering from curtailment, the community can undertake a strong conservation campaign to try to minimize the demands being made on available supplies. For example, when Danville, Virginia was suffering from curtailments in 1974-75, a number of conservation efforts were launched, including radio broadcasts by locals advocating conserving gas to preserve jobs, merchants setting their thermostats at 65° and placing posters in their windows, taking out full-page ads in the local newspapers, and banners hanging across main streets.

Very occasionally, a heavy natural gas user may be located sufficiently near a natural gas producer to make it feasible to buy gas directly from him. Undertaking such arrangements, however, will probably be rather costly if any long-distance pipelines must be constructed. This should be checked out.

Because of the disparate situations existing among the states, it is impossible to outline a firm local option guide. The above are suggested merely as starting points. Once the local situation has been carefully and completely assessed, a number of other specific avenues will probably arise. In any event, it is important to make sure that every attempt is made to work with the distribution companies, which often have sufficient flexibility to solve the end-user's problem. Each of the above avenues should be explored before turning to the FPC for help; in most cases, the FPC will ask if these have been explored first anyway.

Options at Local (Regional) Level

- **Curtailed Party**
- **Resource or Fuel Option**
- **Who Responds?**

- **State fuel office**
- **FEA**
- **distributor**

- **end-user(s)**
- **natural gas**
- **conservation action**

- **distributor**
- **pipeline**
- **purchase from intrastate producer**

- **industrial pooling**
- **P U C**

- **agreement with other distributors**
- **storage and other technical engineers**

2.4
Section 3
Governmental and Industrial Organizations

Purpose
This section will serve primarily as an address book to be used by staff on location. It will permit them to contact Government and industrial organizations to familiarize them with the specifics of their local problem.

Contents
- Federal Regions.
- Department of Commerce Field Offices.
- Federal Energy Administration Regional Offices.
- State government energy offices.
- Public utility commissions.
- Major trade associations in fuels.
- Major trade associations by SIC code.

Federal Regional Council Offices
(Areas included within each region are indicated on the map on the following page.)

<table>
<thead>
<tr>
<th>Region</th>
<th>Regional Chairman</th>
<th>Address</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>David W. Hays</td>
<td>c/o Federal Regional Council Secretariat, 100 F. Kennedy Bldg., Boston, Mass. 02203</td>
<td>617-223-3420</td>
</tr>
<tr>
<td>IV</td>
<td>Jack E. Ravan</td>
<td>c/o Federal Regional Council, 1371 Peachtree St. NW, Atlanta, Ga. 30309</td>
<td>404-526-2287</td>
</tr>
<tr>
<td>V</td>
<td>Norman Erbe</td>
<td>300 E. Wacker Dr., Chicago, Ill. 60606</td>
<td>312-353-4000</td>
</tr>
<tr>
<td>VI</td>
<td>Ed Foreman</td>
<td>c/o Southwest Federal Regional Council, 1100 Commerce St., Dallas, Tex. 75202</td>
<td>214-748-1010</td>
</tr>
<tr>
<td>VII</td>
<td>Limer E. Smith</td>
<td>Federal Office Bldg., 911 Walnut St., Kansas City, Mo. 64106</td>
<td>816-374-7061</td>
</tr>
<tr>
<td>VIII</td>
<td>Samuel Martinez</td>
<td>c/o Federal Regional Council, Federal Bldg., 1961 Stout St., Denver, Colo. 80202</td>
<td>303-837-2741</td>
</tr>
<tr>
<td>IX</td>
<td>Webster Otis</td>
<td>450 Golden Gate Ave., P. O. Box 36098, San Francisco, Calif. 94102</td>
<td>415-556-6200</td>
</tr>
</tbody>
</table>

Federal Executive Boards

Federal Executive Boards (FEBs) were established for the purpose of improving internal Federal management practices in major metropolitan centers of Federal activity.

Federal Executive Boards serve as alternative lines of communication, in addition to the primary department and agency channels, for disseminating information within the Federal Government, for training, and for discussing Federal policies and activities of special interest to the President and Federal executives in the field.

The Boards assist in mobilizing Federal field personnel in emergency situations, organize program or administrative specialists to work on management problems, and prepare special publications. The Boards also act as a focal point in concentrating Federal resources in response to community-metropolitan needs.

Federal Executive Boards are composed of heads of Federal field offices in the metropolitan area. A Chairman is elected annually by Board members, and other officers are appointed or elected from among the membership. Committees and task forces undertake the annual projects of the Boards. The Boards receive overall policy direction from the Office of Management and Budget.

Currently, Federal Executive Boards are located in 25 cities which are important centers of Federal activity. These cities are: Albuquerque-Santa Fe, Atlanta, Baltimore, Boston,Buffalo, Chicago, Cincinnati, Cleveland, Dallas-Ft. Worth, Denver, Detroit, Honolulu, Kansas City, Los Angeles, Miami, New Orleans, New York, Newark, Philadelphia, Pittsburgh, Portland, St. Louis, San Francisco, Seattle, and the Twin Cities (Minneapolis-St. Paul).
U.S. Department of Commerce Field Offices

ALABAMA

Birmingham
DIB 9:30am - 6:00pm
Gayle C Shelton Jr Director, Suite 200, 908 S 20th St, 35205 (Area Code 205) Tel 325-3327 FTS325-3327

Montgomery
EDA 9:30am - 6:00pm
John T Bagwell, James A Geesey, Economic Development Representatives, 732 Aronov Bldg., 474 S Court St, 36104 (Area Code 205) Tel 832-7125 FTS325-3327

ALASKA

Anchorage
DIB 1:30pm - 10:00pm
Everett W Buness, Director, Room 412 Hill Bldg., 632 Sixth Ave., 99501 (Area Code 907) Tel 265-5597
EDA 11:30am - 8:00pm
Clyde S Courtinage. Economic Development Representative Suite 455, 632 Sixth Ave, 99501 (Area Code 907) Tel 265-5317

Juneau
NOA 1:30pm - 9:30PM
Harry L Rietze, Director, Alaska Region, National Marine Fisheries Service PO Box 1668, 99802 (Area Code 907) Tel 586-7221 FTS 5206 442-0150 ask for 586-7221

ARIZONA

Phoenix
DIB 10:30am - 7:00pm
Donald W Fry Director, 508 Greater Arizona Savings Bldg., 112 N Central Ave, 85004 (Area Code 602) Tel 261-3285 FTS261-3285
EDA 10:30am - 7:00pm

ARKANSAS

Little Rock
EDA 9:30am - 6:00pm
Willeen M Hough, Economic Development Representative, PO and Court Bldg, Rm 151, 72201 (Area Code 501) Tel 378-5637 FTS378-5637

CALIFORNIA

Fresno
EDA 11:30am - 8:00pm

LaJolla
NOA 11:00am - 7:30pm Dr. Brian J Rothschild, Director, Southwest Fisheries Center, National Marine Fisheries Service, 8604 LaJolla Shores Dr., P.O.Box 271, 92037 (Area Code 714) Tel 453-2820 FTS453-2820

Los Angeles
CEN 11:30am - 8:00pm
C Michael Long, Regional Director, Regional Office, 11209 Federal Office Bldg., 1100 Wilshire Blvd., 90024 (Area Code 213) Tel 824-7291 FTS 824-7291
DIB 11:30am - 8:00pm
Eric C Silverstein Director, 11201 Federal Office Bldg., 1100 Wilshire Blvd., 90024 (Area Code 213) Tel 824-7591 FTS 824-7591
EDA 11:30am - 8:00pm
Wilfred Marshall Economic Development Representative, 1100 Wilshire Blvd., Room 11204, 90024 (Area Code 213) Tel 824-7521

Sacramento
EDA 11:30am - 8:00pm

San Francisco
DIB 11:30am - 8:00pm
Philip M Creighton, Acting Director, Federal Bldg., Box 36013, 450 Golden Gate Ave, 94102 (Area Code 415) Tel 556-5868 FTS 556-5868
MA 11:15am - 7:45pm
Thomas J Patterson Jr, Western Region Director, 450 Golden Gate Ave, Box 36073, 94102 (Area Code 415) Tel 556-3816 FTS 556-3816
MBE 8:30am - 5:00pm
Ramon Romero, Director, Federal Bldg., Room 15043, Box 36114, 450 Golden Gate Ave, 94102 (Area Code 415) FTS 556-7234
NTIS 11:30am - 8:00pm
Kyuma Mano, Chief, US Joint Publications Research Service, Room 53, 100 McAllister St., 94102 (Area Code 415) Tel 556-3382 FTS 556-3382
SEC 11:30am - 8:00pm
Miguel P Barrios, Jr, Regional Manager Audits, Federal Bldg., Box 31134, 450 Golden Gate Ave, 94102 (Area Code 415) Tel 556-7223 FTS 556-7223

San Pedro
MA 11:15am - 7:45pm
CALIFORNIA—Continued
Peter Muntz, Area Representative, 825 S Beacon St, Room5, 90731 (Area Code 213) Tel 831-9281, Ext 9508 FTS 831-9508

Terminal Island
NOA 11:00am - 7:30pm
Gerald V Howard, Director, Southwest Region, National Marine Fisheries Service, 300 S Ferry St 90731 (Area Code 213) Tel 548-2575 FTS 548-2575

COLORADO
Boulder
NBS 10:00am - 7:00pm
B W Birmingham, Deputy Director, IBS/Boulder, 80302 (Area Code 303) Tel 499-1000 Ext 3237 FTS 499-6357

Denver
CEN 9:30am - 6:00pm
Walter A Freeman Jr, Regional Director, Regional Office, 10111 WestSixth Avenue 80255 PO Box 25207 (Area Code 303) Tel FTS 234-3924

EDA 8:30am - 5:00pm
David S Williamson, Director, Rm 523, 1401 Peachtree St, N.E. 30309 (Area Code 404) Tel 526-6000 FTS 526-6000

Georgia
Atlanta
Cen 8:30am - 5:00pm
Thomas W McWhirter, Regional Director, Regional Office, 1401 Peachtree St, N.E. Room 569,30309 (Area Code 404) Tel 526-5318 FTS 526-5318

CPC 8:30am - 5:00pm
Field Director (Vacant) Room 801 Fulton Federal Bldg 11 Pryor St, S.W. 30303 (Area Code 404) FTS 526-4482

CHARLESTON
DIB 8:30am - 5:00pm
Charles F McMillan, Director, Suite 505, 1371 Peachtree St, N.E. 30309 (Area Code 404) FTS 526-5091

SEC 8:00am - 4:30pm
Natalie Micka, Regional Manager Audits, 1365 Peachtree St, N.E. Room 430, 30309 (Area Code 404) Tel 526-5578 FTS 526-5578

Savannah
DIB 8:30am - 5:00pm
James W McIntire, Director, 235 US Court House & Post Office Bldg, 125-29 Bull St, 31402 (Area Code 912) Tel 232-4204 FTS 232-4321 Ext 204

CONNECTICUT
 Hartford
DIB 8:30am - 5:00pm
Richard C Kilbourn, Director, Room 610B Federal Office Bldg, 450 Main St, 06103 (Area Code 203) Tel 244-3530 FTS 244-3530
EDA 8:30am - 5:00pm
Charles N Hammarland, Economic Development Representative, 60 Washington St, 06106 (Area Code 203) Tel 244-2336 FTS 244-2336
HAWAII

Honolulu
DIB 10:30pm - 10:00pm
John S Davies, Director. 286 Alexander Young Bldg, 1015 Bishop Street, 96813 (Area Code 808) Tel 546-8694
NOA 1:30pm - 10:00pm
Director, Charles M Woffinden, National Weather Service, Box 3650, Bethel-Pauahi Bldg, Room 516, 96811 Tel 808 546-5680
Kekaha, Kauai
NBS Open 24 Hrs
Engineer in Charge, Radio Station WWVH, Box 417, 96572 (Area Code 808) Tel Kauai 335-4361

IDAHO

Boise
EDA 11:30am - 8:00pm
Aldred F Ames, Economic Development Representative, Room 473 New Federal Bldg, 6th & Fort St, 83702 (Area Code 208) Tel 342-2711 Ext 2521 FTS 342-2521

ILLINOIS

Carbondale
EDA 8:30am - 5:00pm
Arnold E Ramsey, Economic Development Representative, Suite D 606 East Main St, 62901 (Area Code 618) Tel 549-0765 FTS 525-4200
Chicago
CEN 9:30am - 6:00pm
Forrest P Cawley Jr, Regional Director, Regional Office, 536 S Clark St, Room 1085, 60605 (Area Code 312) Tel 353-6251 FTS 353-6251
DIB 9:30am - 6:00pm
Gerald M Marks, Director, 1406 Mid Continental Plaza Bldg, 505 East Monroe St, 60603 (Area Code 312) Tel 353-6957 FTS 353-6957
ECA 8:30am - 5:00pm
James E Peterson, Regional Director, 1025 Civic Towers Bldg, 32 West Randolph St, 60601 (Area Code 312) Tel 353-7706 FTS 353-7706
MA 9:30am - 6:00pm
Market Development Specialist, (Vacant) 1486 New Federal Bldg, 219 South Dearborn St, 60604 (Area Code 312) Tel 353-7514 FTS 353-7514
OMBE 8:30am - 5:00pm
John Smith, Director, Suite 1438, 55 E Monroe St, 60603 (Area Code 312) Tel 353-8375 FTS 353-8375
SEC 9:30am - 6:00pm
William L Tibbs, Regional Manager Audits, Mid-Continental Plaza Bldg, Room 1411, 55 East Monroe St, 60603 (Area Code 312) Tel 353-7188 FTS 353-7188
Clearing
NBS 9:30am - 6:00pm
B F Banks, in Charge, Master Railway Track Scale Depot, 5800 West 69th St, (Area Code 312) Tel 252-0855

INDIANA

Indianapolis
DIB 9:30am - 6:00pm
Milton R Sherar, Trade Specialist-in-Charge, Room 357 Federal Bldg & U S Courthouse, 46 R. Ohio St, 46204 (Area Code 317) Tel 269-6214 FTS 269-6214
EDA 9:30am - 6:00pm
William E Wilson, Economic Development Representative, Room 414 Federal Courts Bldg, 46 E Ohio Street, 46204 (Area Code 317) Tel 269-6214 FTS 269-6214

IOWA

Des Moines
CEN 9:30am - 6:00pm
Jessie N Durden, Director, 609 Federal Bldg, 210 Walnut St, 50309 (Area Code 515) Tel 285-3511 Ext 344 FTS 283-1344

KANSAS

Kansas City
CEN 9:30am - 6:00pm
Rex Pullen, Regional Director, Regional Office, Gateway Center, 4th & State Sts, 66101 (Area Code 816) Tel 374-4601
Pittsburg
CEN 9:30am - 6:00pm
Francis N Allai, Acting Chief, Personal Census Service Branch, Walnut and Pine Sts, 66762 (Area Code 316) Tel 231-7100

KENTUCKY

Hopkinsville
EDA 9:30am - 6:00pm
William G Glasscock, Economic Development Representative, P O Box 241, 210 East 9th St, 42240 (Area Code 270) Tel 885-5311
Lexington
EDA 9:30am - 6:00pm
Economic Development Representative (Vacant) 190 N Upper St, Room 112, 40507 (Area Code 606) Tel 252-2512 Ext 2596 FTS 252-2596

LOYSIANIA

Baton Rouge
EDA 9:30am - 6:00pm
Charles R Pate, Economic Development Representative, Room 301-302 Federal Bldg & Courthouse, 707 Florida Blvd, 70801 (Area Code 504) Tel 348-0181 Ext 227 FTS 348-4227

New Orleans
DIB 9:30am - 6:00pm
Edwin A Leand Jr, Director, 432 International Trade Bldg, No 2 Canal Street, 70130 (Area Code 504) Tel 589-6546 FTS 589-6546
LOUISIANA—Continued
MA 8:30am - 5:00pm
Frank X McNerney, Central Region Director, 701 Loyola Ave, (Area Code 504) Tel 589-6556 FTS 589-6568

MAINE
Augusta
EDA 8:30am - 5:00pm
Philip H Bartram, Economic Development Representative, Room 101C Federal Office Bldg, 40 Western Ave, 04330 (Area Code 207) Tel 622-6171 Ext 272 FTS 622-6271

MARYLAND
Annapolis
OT 8 30am - 5:00pm
Stanley I Cohn, Director, ECAC Liaison Office, 1923-4 West St, 21401 I, Area Code 301) Tel 261-2688

Baltimore
DIB 8:30am - 5:00pm
Carrol F Hopkins, Director, 415 Customhouse, Gay and Lombard Sts, 21202 (Area Code 301) Tel 962-3560 FTS 962-3560

Frostburg
OT 8 30am - 5:00pm
Elmer C Rexrode, Supervisor, IRAC Computer Support Section, 2nd Floor American Legion Bldg, 21532 (Area Code 301) Tel 689-8873 FTS 800-540-1170

MASSACHUSETTS
Boston
DIB 8 30am - 5:00pm
Richard F Treadway, Director, 441 Stuart St, 10th FL 02116 (Area Code 617) Tel 223-2312 FTS 223-2312

CEN 8:30am 5:00pm
Arthur G Dukakis, Regional Director, Regional Office, 441 Stuart St, 10th FL 02116 (Area Code 617) Tel 223-2327

EDA 8:30am - 5:00pm
William A Fitzhenry. Economic Development Representative, 441 Stuart St, 02116 (Area Code 617) Tel 223-6468 FTS 223-6468

Gloucester
NOA 8 00am - 4 30pm
Russell T Norris, Director, Northeast Region, National Marine Fisheries Service, Federal Bldg, 14 Elm Street, 01930 (Area Code 617) Tel 281-0640 FTS 281-0640

Louis J Ronisvalli, Director, Northeast Utilization Research Center, National Marine Fisheries Service, Emerson Avenue, 01930 (Area Code 617) Tel 283-5600

Woods Hole
NOA 9 00am - 4 10pm
Dr Robert L Edwards, Director, Northeast Fisheries Center, National Marine Fisheries Service. 02543 (Area Code 617) Tel 548-5123

MICHIGAN
Detroit
CEN 8:30am - 5:00pm
Robert G McWilliam Regional Director, Regional Office, 2100 Washington Blvd Bldg, 234 State St, 48226 (Area Code 313) Tel 226-7742 FTS 226-7742

DIB 8:30am - 5:00pm
William Welch Director, 445 Federal Bldg, 230 W Fort St, 48226 (Area Code 313) Tel 226-3650 FTS 226-3650

NOA 8:00am - 4:30pm
Cdr. Darrell W Crawford, Director, Lake Survey Center, National Ocean Survey, 630 Federal Bldg and U S Court House, 48226 (Area Code 313) FTS 226-6161

Lansing
EDA 8:30am - 5:00pm
James L Collison, Economic Development Representative, 112 E Allegan St., Room 306,48933 (Area Code 517) Tel 372-1621

MINNESOTA
Bemidji
EDA 9:30am - 6:00pm
Stanley J Pechaver, Economic Development Representative, 415 Federal Bldg 56601 (Area Code 218) Tel 751-4415 FTS 725-4242

Duluth
EDA 9:30am - 6:00pm
John B Arnold III, Economic Development Representative, 407 Federal Bldg, 515 W. First St, 55802 (Area Code 218) Tel 727-6326 FTS 727-6326

Minneapolis
DIB 9:30am - 6:00pm
Glenn A Matson, Director, 306 Federal Bldg, 110 S Fourth St, 55401 (Area Code 612) Tel 725-2133 FTS 725-2133

MISSISSIPPI
Jackson
EDA 9:30am - 6:00pm
Bobby D Ainsworth, Economic Development Representative, 630 Milner Bldg, 210 S Lamar St, 39201 (Area Code 601) Tel 969-4342 FTS 969-4342

MISSOURI
Crestwood
EDA 9:30am - 6:00pm
Forrest E Koch, Economic Development Representative, Crestwood Bank Bldg, Room 201,9705 US Highway 66, 63126 (Area Code 314) FTS 425-3309

Kansas City
DIB 9:30am - 6:00pm
George H Payne, Director, Room 1840, 601 E 12th St,64106 (Area Code 816) Tel 374-3142 FTS 374-3142

NOA 7:00am - 4:00pm
Charles G Knudsen, Director, Central Region, National Weather Service, Room 1836, 601 E 12th St, 64106 (Area Code 816) Tel 374-5464 FTS 374-5464
MISSOURI—Continued
St Louis
DIB 9:30am - 6:00pm
Donald R Loso, Director, 120 South Central Avenue
63105 (Area Code 314) Tel 622-4243 FTS 425-3302

MONTANA

Butte
EDA 10:30am - 8:00pm
Mary A Rowling, Economic Development Representative, Federal Office Bldg, 59701 (Area Code 406) Tel 723-3382 FTS 425-3302

NEVADA

Reno
DIB 10:30am - 7:00pm
Joseph J Jeremy, Director, 2028 Federal Bldg, 300 Boyd St 89502 (Area Code 702) Tel 784-5203 FTS 784-5203

NEW JERSEY

Highlands
NOA 8:00am - 4:30pm
Dr C J Sindermann, Director, Middle Atlantic Coastal Fisheries Center, National Marine Fisheries Service Box 428, 07732 (Area Code 201) Tel 872-0200 FTS 872-0200

Newark
DIB 8:30am - 5:00pm
Clifford R Lincoln, Director, Gateway Bldg, 4th Floor 07102 (Area Code 201) Tel 645-6214 FTS 645-6214

Trenton
EDA 8:30am - 5:00pm
Clifford J Rossignol, Economic Development Representative, Federal Bldg, 402 E State St 08608 (Area Code 609) Tel 599-3511 Ext 244 FTS 599-3244

NEW MEXICO

Albuquerque
DIB 9:30am - 5:00pm
William E Dwyer, Director, U. S. Courthouse, Room 316, 87101 (Area Code 505) Tel 766-2386 FTS 766-2386

Santa Fe
EDA 10:30am - 7:00pm
James S Swearingen, Economic Development Representative, Room 209 Federal Bldg, Cathedral Place, 87501 (Area Code 505) Tel 988-6557 FTS 988-6557

NEW YORK

Albany
EDA 8:30am - 5:00pm
Michael Daley, Economic Development Representative, 100 State St, Room 939, 12207 (Area Code 518) Tel 472-3688 FTS 472-3688

Buffalo
DIB 8:30am - 5:30pm
Robert F Magee, Director, 1312 Federal Bldg, 111 West Huron St, 14202 (Area Code 716) Tel 842-3208 FTS 842-3208

Garden City
NOA 8:00am - 4:30pm
Silvio G Simplicio, Director, Eastern Region National Weather Service, 585 Stewart Avenue, 11530 (Area Code 516) Tel 248-2101 FTS 212-995-8633

Kings Point
MA 8:00am - 4:30pm
Arthur B Engel, Superintendent, US Merchant Marine Academy, 11024 (Area Code 516) Tel 482-8200 Ext 349 FTS 482-8200

New York City
CEN 8:30am - 5:00pm
John C Cullinane, Regional Director, Regional Office, 41st Floor Federal Office Building, 26 Federal Plaza 10007 (Area Code 212) Tel 264-3860 FTS 264-3860

DIB 8:45am - 5:15pm
Arthur C Rutzen, Director, 41st Floor Federal Bldg, 26 Federal Plaza 10007 (Area Code 212) Tel 264-0634 FTS 264-0600

Joseph Lucciola, Agent-in-Charge, Compliance Division, 3721 Federal Office Bldg, 26 Federal Plaza 10007 (Area Code 212) Tel 264-1365 FTS 264-1366

Alton B Ashendorf, Manager, Exhibits Transportation Section, 3719 Federal Office Bldg, 26 Federal Plaza 10007 (Area Code 212) Tel 264-8990 FTS 264-8990

MA 8:30am - 5:00pm
Thomas A King, Eastern Region Director, 26 Federal Plaza, 10007 (Area Code 212) Tel 264-1300 FTS 264-1300

MBE 8:30am - 5:00pm
Newton Downing, Director, 26 Federal Plaza, Rm3714, 10007 (Area Code 212) FTS 264-3262

SEC 8:30am - 5:00pm
Wilbur Weisel, Regional Manager Audits, 26 Federal Plaza, Federal Bldg, Room 4146,10007 (Area Code 212) Tel 264-1252 FTS 264-1252

NORTH CAROLINA

Asheville
NOA 8:00am - 4:30pm
William H Haggard, Director, National Climatic Center, Fed. Bldg, 28801 (Area Code 704) Tel 258-2650 FTS 254-0236

Beaufort
NOA 7:45am - 4:30pm
Dr Theodore R Rice, Director, Atlantic Estuarine Fisheries Center, National Marine Fisheries Service, PO Box 570 28516 (Area Code 919) Tel 728-4595

Charlotte
CEN 8:30am - 5:00pm
Joseph R Norwood, Regional Director, Regional Office 510 Addison Bldg, 222 S Church St., 28202 (Area Code 704) Tel FTS 372-7471
NORTH CAROLINA—Continued
Greensboro
DIB 8:30am - 5:00pm
Joel B New, Director, 203 Federal Bldg, West Market
St., PO Box 1950, 27402 (Area Code 919) Tel 275-
9111 Ext. 345 FTS 275-5345
Raleigh
CPC 8:30am - 5:00pm
Dr. Leigh Hammond, North Carolina Field Director, B-
41 Administration Bldg, PO Box 1351,27605 (Area
Code 919) FTS 828-9111
EDA 8:30am - 5:00pm
Dale R Jones, Economic Development Representa-
tive, 310 New Bern Ave, Room 314 Federal Bldg,
27611 (Area Code 919) Tel 755-4570 FTS 755-4570

NORTH DAKOTA
Bismark
EDA 10:30am - 7:00pm
Cornelius Grant, Economic Development Represen-
tative, PO Bldg, Box 1911,58501 (Area Code 701) Tel
255-4321 FTS 701-255-4321

OHIO
Athens
EDA 8.30am - 5:00pm
Philip F Lavelle, Economic Development Representa-
tive, Security Bank Bldg, Room 405, 45701 (Area
Code 614) Tel 593-8146 FTS 216 522-3131
Cincinnati
DIB 8:30am - 5:00pm
Gordon B Thomas, Director, 8028 Federal Office
Bldg, 550 Main St, 45202 (Area Code 513) Tel 684-
2944 FTS 684-2944
Cleveland
DIB 8:30am - 5:00pm
Charles B Stebbins, Director, Room 600, 666 Euclid
Ave 44114 (Area Code 216) Tel 522-4750 FTS 522-
4750

OKLAHOMA
Oklahoma City
EDA 8.30am - 5:00pm
Hunter Kemmet, Economic Development Representa-
tive, 815 Old Post Office Bldg, Third and Harvey Sts.
73102 (Area Code 405) Tel 231-4197 FTS 231-4197

OREGON
Portland
DIB 11 30am - 8:00pm
J Don Chapman, Director, 521 Pittock Bldg 921 S W
Washington St 97205 (Area Code 503) Tel 221-3001
FTS 221-3001
EDA 11 30am - 8:00pm
Thomas G Current, Economic Development Represen-
tative, 521 Pittock Bldg 921 S W Washington
St 97205 (Area Code 503) Tel 221-3078 FTS 221-
3078

PHILADELPHIA
CEN 8:30am - 5:00pm
Porter Rickley, Regional Director, Regional Office,
600 Arch Street 19106 (Area Code 215) Tel 597-4920
FTS 597-4920
DIB 8:30am - 5:00pm
Patrick P. McCabe, Director, 9448 Federal Building,
600 Arch St 19106 (Area Code 215) Tel 597-2850 FTS
597-2850
EDA 8:30am - 5:00pm
Anthony M Pecone, Economic Development Represen-
tative, 10424 Federal Bldg, 600 Arch St (Area Code 215) Tel 597-2811 FTS 597-2811
John E Corrigan, Regional Director, Federal Bldg,
600 Arch St (Area Code 215) Tel 597-4603 FTS 597-
4603

PUERTO RICO
Hato Rey
EDA 8:30am - 5:00pm
(Vacant), Economic Development Representative,
Pan Am Bldg. 255 Ponce de Leon Ave, 00917 (Area
Code 202) Tel 967-1221 Ext 436
San Juan
DIB 7:30am - 4:00pm
Enrique Vilella, Director, Room 100 Post Office Bldg.
00902, Tel 723-4640

SOUTH CAROLINA
Columbia
CPC 8:30am - 5:00pm
Dr A C Flora, South Carolina Field Director, 681 Bar-
ringer Bldg, 1338 Main St, 29201 (Area Code 803) Tel
253-3461 FTS 253-3461
DIB 8:30am - 5:00pm
Philip L Ouzts, Director, 2611 Forest Drive, Forest
Center 29204 (Area Code 803) Tel 765-5345 FTS 765-
5345
EDA 8:30am - 5:00pm
S Townes Holland, Economic Development Represen-
tative, Suite 114 Forest Center, Rt. 3, Box 31,
29204 (Area Code 803) Tel 765-5676 FTS 765-5676

SOUTH DAKOTA
Pierre
EDA 10 30am - 7:00pm
Floyd E Taylor, Economic Development Representa-
tive, Room 321, Federal Bldg 57501 (Area Code 605)
Tel 224-8238 FTS 224-8238

TENNESSEE
Memphis
DIB 9:30am - 6:30pm
TENNESSEE—Continued
Bradford H. Rice, Director, Room 710, 147 Jefferson Ave., 38103 (Area Code 901) Tel 534-3213 FTS 534-3213

Nashville
EDA 9:30am - 6:00pm
Mitchell S. Parks, Economic Development Representative, Suite 903 Federal Bldg., 801 Broadway, 37203 (Area Code 615) Tel 749-5911 FTS 749-5911

TEXAS
Austin
EDA 9:30am - 6:00pm
Jerry M. Graybill, Henry N. Troell, Economic Development Representatives, Suite 600, American Bank Tower, 221 West Sixth Street, 78701 (Area Code 512) Tel 749-1515 FTS 749-1515

Dallas
DIB 9:30am - 6:30pm
H. Phillips Hubbard, Acting Director, Room 3E7, 1100 Commerce St., 75202 (Area Code 214) Tel 749-1515 FTS 749-1515
CEN 9:00am - 5:30pm
Percy R. Millard, Regional Director, Regional Office, 1100 Commerce St., Room 3C54, 75202 (Area Code 214) Tel 749-2814
OMBE 9:30am - 6:30pm
Robert J. Hamsher, Regional Manager, Audits, Room 3E7, 1100 Commerce St., 75202 (Area Code 214) Tel 749-7241 FTS 749-7241

Fort Worth
NOA 8:30am - 5:30pm
Lawrence R. Mahar, Director, Southern Region, National Weather Service, Room 10E09, 819 Taylor St., 76102 (Area Code 817) 334-2668 FTS 334-2668

Galveston
NOA 8:00am - 4:30pm
Dr. Joseph W. Angelovic, Director, Gulf Coastal Fisheries Center, National Marine Fisheries Service, 4700 Avenue "U", 77550 (Area Code 713) Tel 763-1211 FTS 763-1501

Houston
DIB 9:30am - 6:00pm
Felicito C. Guerrero, Acting Director, 1017 Old Federal Bldg., 201 Fannin St., 77002 (Area Code 713) Tel 226-4231 FTS 226-4231
MA 9:30am - 6:00pm
George Krohn, Old Federal Bldg., 201 Fannin St., 77002 (Area Code 713) Tel 226-4209 FTS 226-4231

Lubbock
EDA 9:30am - 6:00pm
Leonard W. Cuffman, Economic Development Representative, Federal Bldg., 1205 Texas Avenue, Rm 416, 79408 (Area Code 806) Tel 762-7661 FTS 762-7661

UTAH
Salt Lake City
DIB 10:30am - 7:00pm
Sherman P. Lloyd, Trade Specialist-in-Charge, 1205 Federal Bldg., 125 South State St., 84138 (Area Code 801) Tel 524-5116 FTS 524-5116
EDA 10:30am - 7:00pm
David H. Allred, Economic Development Representative, 1205 Federal Office Bldg., 125 S State St., 84111 (Area Code 801) Tel 524-5119 FTS 524-5119
NOA 10:00am - 6:30pm
Hazen H. Bedke, Director, Western Region, National Weather Service, P.O. Box 1188, Federal Bldg., 125 S State St., 84111 (Area Code 801) Tel 524-5135

VIRGINIA
Norfolk
NOA 8:00am - 4:30pm
RADM Alfred C Holmes, Director, Atlantic Marine Center, National Ocean Survey, 439 W York St., 23510 (Area Code 804) Tel 441-6201

Richmond
DIB 8:30am - 5:00pm
Weldon W. Tuck, Director, 8010 Federal Bldg., 400 N 8th St., 23240 (Area Code 804) Tel 782-2246 FTS 782-2246
EDA 8:30am - 5:00pm
Robert C. Roberts, Economic Development Representative, 8002 Federal Office Bldg., 400 N 8th St., 23240 (Area Code 804) Tel 782-2567 FTS 782-2567

Wallops Island
NOA 8:00am - 4:30pm
Robert S. Gray, Engineer-in-Charge, Ionosphere Research Station, Bldg. E-144, NASA, 23337 (Area Code 804) Tel 824-3411 Ext. 638 FTS 824-2638

WASHINGTON
Everett
EDA 11:30am - 8:00pm
Valmer W. Cameron, Economic Development Representative, 4327 Rucker Ave., 98203 (Area Code 206) Tel 258-2677 FTS 259-0332

Seattle
CEN 11:00am - 7:30pm
John E. Thoraldson, Regional Director, Regional Office, Lake Union Bldg., 1700 Westlake Ave. N., 98101 (Area Code 206) Tel 442-7800 FTS 442-7800
DIB 11:30am - 8:00pm
Judson S. Wonderly, Director, 706 Lake Union Bldg., 1700 Westlake Ave. N., 98109 (Area Code 206) Tel 442-5615 FTS 442-5615
EDA 11:30am - 8:00pm
WASHINGTON—Continued  
C Mark Smith, Regional Director, 1700 Westlake Ave., N. 98109 (Area Code 206) Tel 442-0596 FTS 442-0596  
Frank McChesney, Economic Development Representative, 1700 Westlake Ave., N. 98109 (Area Code 206) Tel 442-7556 FTS 442-7556  
MA 11:15am - 7:45pm  
F I Huxtable, Area Representative, 311 Alaska Bldg. 618 Second Ave, 98104 (Area Code 206) Tel 583-5348 FTS 583-5348  
NOA 11:00am - 7:30pm  
RAdm Herbert R Lippold, Jr, Director, Pacific Marine Center, National Ocean Survey, 1801 Fairview Ave. E. 98102 (Area Code 206) Tel 442-7656 FTS 442-7656  
NOA 11:00 - 7:30pm  
Donald R Johnson, Director, Northwest Region, National Marine Fisheries Service, Westlake Ave., N. 98109 (Area Code 206) Tel 442-7575 FTS 442-7575  
NOA 11:00am - 7:30pm  
Dr Dayton L Alverson, Director, Northwest Fisheries Center, National Marine Fisheries Service, 2725 Montlake Blvd. E. 98112 (Area Code 206) Tel 442-4760 FTS 442-4760  
NOA 11:00am - 7:30pm  
Dr Maynard A Steinberg, Director, Pacific Utilization Research Center, National Marine Fisheries Service, 2725 Montlake Blvd. E. 98112 (Area Code 206) Tel 442-7746 FTS 442-7746  

WEST VIRGINIA  
Charleston  
DIB 8:30am - 5:00pm  
J Raymond DePaulo, Director, 3000 New Federal Office Bldg. 500 Quarrier St. 25301 (Area Code 304) Tel 343-6181 Ext 375 FTS 343-1375  
Clarksburg  
EDA 8:30am - 5:00pm  
Rene V Zabeau, Economic Development Representative, 304 New Post Office Bldg, W. Pike St. 26301 (Area Code 304) Tel 623-3461 Ext 272 FTS 624-1272  
Huntington  
EDA 8:30am - 5:00pm  
James M. Donohoe, Economic Development Representative, 601 9th St, Suite 319, Pritchard Bldg. 25701 (Area Code 304) Tel 529-2311 Ext 591 FTS 529-2591  
Beckley  
EDA 8:30am - 5:00pm  
Carlton P White, Economic Development Representative, B-020 Federal Bldg, 25801 (Area Code 304) Tel 253-2723 FTS 252-7313  

WISCONSIN  
Eau Claire  
EDA 8:30am - 6:00pm  
Hanford Olson, Economic Development Representative, 510 S Barstow, 54701 (Area Code 715) Tel 834-2226 FTS 834-2226  
Milwaukee  
DIB 9:30am - 6:00pm  
Russell H Leitch, Director, Straus Bldg, 238 W Wisconsin Ave. 52303 (Area Code 414) Tel 224-3473 FTS 224-3473  

WYOMING  
Cheyenne  
DIB 10:30am - 7:00pm  
Director (Vacant) 6022 O’Mahoney Federal Center, 2120 Capitol Ave. 82001 (Area Code 307) Tel 778-2220 Ext 2151 FTS 778-2151
Federal Energy Administration

REGION I
150 Causeway St. Room 700
Boston, MA 02114
(617) 223-3701

REGION II
26 Federal Plaza, Room 3206
New York, NY
(212) 264-1023

REGION III
1421 Cherry Street
Philadelphia, PA 19102
(215) 597-3890

REGION IV
1655 Peachtree Street
Atlanta, GA 30309
(404) 526-2837

REGION V
P.O. Box 35228
Seattle, WA 98174
915 Second Avenue

REGION VI
P.O. Box 991
Montgomery, Alabama 36102
Kenneth Hammond
President
(205) 832-3353
Wallace Tidmore
Secretary
(205) 832-3421

REGION VII
112 East 12th Street
P.O. Box 2208
Kansas City, MO 64142
(816) 374-2061

REGION VIII
P.O. Box 26247, Belmar Branch
1075 South Yukon Street
Lakewood, CO 80226
(303) 234-2420

REGION IX
P.O. Box 2610
Phoenix, Arizona 85010
(602) 271-4241

REGION X
P.O. Box 2610
Chicago, IL 60604
(312) 749-7345

State Government Energy Agencies

Alabama Energy Management Board
(205) 832-6784

Alaska State Energy Office
(907) 272-0527

Arizona Fuel Allocations Section of the Office of Economic Planning and Development
(602) 271-3303

Arkansas State Energy Office
(501) 371-1379

California Energy Resources Conservation and Development Commission
(916) 322-3690

Colorado Office of the Governor—Fuel Allocations Office
(303) 892-2471

Connecticut Department of Planning and Energy Policy
(203) 566-2800

Delaware Division of Emergency Planning and Operations
(302) 834-4531

Florida State Energy Office
(904) 488-6764

Georgia State Energy Office
(404) 666-5176

Hawaii Department of Planning and Economic Development
(808) 548-3033

Idaho State Office of Energy
(208) 384-2885

Illinois Division of Energy
(219) 782-5784

Indiana Energy Office
(317) 633-6753

Iowa Energy Policy Council
(515) 281-3428

Kansas Department of Energy
(913) 296-2496

Kentucky Department of Energy
(502) 564-7416

Louisiana Division of Natural Resources and Energy
(504) 389-5161

Maine State Fuel Allocation and Conservation Office
(207) 622-6201

Maryland Energy Policy Office
(301) 383-6810

Massachusetts Energy Policy Office
(617) 727-3482

Michigan Energy Office, Public Service Commission
(517) 373-0777

Minnesota Energy Agency
(612) 296-5120

Mississippi Energy Policy Office
(601) 354-7406

Missouri Energy Agency
(314) 751-4000

Montana State Fuel Allocation Office
(406) 449-2860

Nebraska State Office of Petroleum Allocation
(402) 471-2867

New Jersey State Energy Office
(609) 829-2300

New Mexico Energy Resources Board
(505) 827-2146

New York State Emergency Fuel Office
(518) 474-7928

North Carolina Energy Division
(919) 829-2230

North Dakota Office of Energy Management
(701) 224-3301

Ohio Energy Emergency Commission
(614) 466-6797

Oklahoma Department of Energy
(405) 521-3941

Oregon Department of Energy
(503) 378-4128

Pennsylvania Governor's Energy Council
(717) 787-9749

Rhode Island State Energy Office
(401) 421-7333

South Carolina Energy Management Office
(803) 758-2050

South Dakota Office of Energy Policy
(605) 224-3603

Tennessee Energy Office
(615) 741-2994

Texas Governor's Energy Advisory Council
(512) 475-4591

Utah Intergovernmental Coordinating Council for Energy Affairs
(801) 533-5356

Vermont State Energy Office
(802) 826-2768

Virginia Energy Office
(804) 770-8451

Washington State Department of Emergency Services
(206) 753-5420

West Virginia Fuel and Energy Office
(304) 348-8860

Wisconsin Office of Energy Emergency Assistance
(608) 266-8234

Wyoming Mineral Development Division
(307) 777-7284

State Public Utility Commissions

Public Service Commission
P.O. Box 991
Montgomery, Alabama 36102
Kenneth Hammond
President
(205) 832-3353
Wallace Tidmore
Secretary
(205) 832-3421

Public Utilities Commission
1100 McKay Building
338 Denali Street
Anchorage, Alaska 99501
Gordon J. Zerbetz
Chairman
(907) 272-1487
J. Lowell Jensen
Executive Director
(907) 272-1487

Arizona Corporation Commission
1888 West Adams
Phoenix, Arizona 85007
Albert D. Faro
Chairman
(602) 271-4241
George M. Dempsey
Executive Secretary
(602) 271-4241

Public Service Commission
Justice Building
Little Rock, Arkansas 72201
Robert C. Downie
Chairman
(501) 371-1453
Major Trade Associations in Fuels and Processing of Fuels

Gas
American Gas Association
1515 Wilson Boulevard
Arlington, Virginia 22209
Telephone: (703) 524-2000

Independent Natural Gas Association
1660 L Street, N.W.
Washington, D.C. 20036
Telephone: (202) 293-5770

Natural Gas Processors Association
803 Home Federal Building
Tulsa, Oklahoma 74103
Telephone: (918) 582-5112

National LP-Gas Association
79 West Monroe Street
Chicago, Illinois 60603
Telephone: (312) 372-5484

Public Utilities Commission
26 Pleasant Street
Concord, New Hampshire 03301

Alexander Kalinski
Chairman
(603) 271-2442

Board of Public Utility Commissioners
101 Commerce Street
Newark, New Jersey 07102

Anthony J. Grossi
Chairman
(201) 648-2013

Secretary
(201) 648-2350

Ralph Caprio

Utilities and Transportation Commission
Highway Licenses Building
Olympia, Washington 98504

Donald H. Brazier
Chairman
(206) 753-6430

Edward T. Shaw
Executive Officer
(206) 753-6402

Board of Public Utility Commissioners
101 Commerce Street
Newark, New Jersey 07102

Anthony J. Grossi
Chairman
(201) 648-2013

Secretary
(201) 648-2350

Ralph Caprio

American Gas Association
1515 Wilson Boulevard
Arlington, Virginia 22209
Telephone: (703) 524-2000

Independent Natural Gas Association
1660 L Street, N.W.
Washington, D.C. 20036
Telephone: (202) 293-5770

Natural Gas Processors Association
803 Home Federal Building
Tulsa, Oklahoma 74103
Telephone: (918) 582-5112

National LP-Gas Association
79 West Monroe Street
Chicago, Illinois 60603
Telephone: (312) 372-5484

Public Utilities Commission
26 Pleasant Street
Concord, New Hampshire 03301

Alexander Kalinski
Chairman
(603) 271-2442

Board of Public Utility Commissioners
101 Commerce Street
Newark, New Jersey 07102

Anthony J. Grossi
Chairman
(201) 648-2013

Secretary
(201) 648-2350

Ralph Caprio

Utilities and Transportation Commission
Highway Licenses Building
Olympia, Washington 98504

Donald H. Brazier
Chairman
(206) 753-6430

Edward T. Shaw
Executive Officer
(206) 753-6402

Board of Public Utility Commissioners
101 Commerce Street
Newark, New Jersey 07102

Anthony J. Grossi
Chairman
(201) 648-2013

Secretary
(201) 648-2350

Ralph Caprio
## Major Trade Associations

### (Gas Intensive Industries)

<table>
<thead>
<tr>
<th>SIC Code</th>
<th>Description</th>
</tr>
</thead>
</table>
| 201      | American Petroleum Institute  
1801 K Street, N.W.  
Washington, D.C. 20006  
Telephone: (202) 627.4322 |
| 205      | American Paper Institute  
201          1 K Street, N.W.  
Washington, D.C. 20006  
Telephone: (202) 833.5600 |
| 205      | National Independent Meat Packers Association  
734 Fifteenth Street, N.W.  
Washington, D.C. 20005  
Telephone: (202) 289.2100 |
| 205      | American Meat Institute  
1600 Wilson Boulevard  
Arlington, Virginia 22209  
Telephone: (202) 466.3400 |
| 205      | Biscuit and Cracker Manufacturing Association  
1500 Pennsylvania Avenue, N.W.  
Washington, D.C. 20005  
Telephone: (202) 466.3400 |
| 205      | Battelle Institute (Pressed & Blown Glass)  
Columbus Laboratories  
505 King Avenue  
Columbus, Ohio 43201  
Telephone: (614) 465.5820 |
| 205      | Stewart & Ikenson (Flat Glass)  
Attorneys at Law  
1000 Connecticut Avenue, N.W.  
Washington, D.C. 20006  
Telephone: (202) 467.5820 |
Section 4
The Gas Industry, Alternate Resources and Industrial Users

Purpose:
The information contained in this section shall provide some guidance to staff members moving into location to enable them to:
- Assess rapidly the potential supply situation for natural gas and/or alternate energy sources within a State.
- Help develop an understanding of the socioeconomic effects of a shortfall, particularly in the industrial sector.

It is realized that the data presented here can at best provide some very general background and that in many cases even referral back to the more complete main files may not be adequate to assess a local situation.

In the present form, information at State level is restricted to the 10 most critical States which would be most seriously affected in the event of curtailments.

Contents
This section will provide, in concise form, data which will permit answering questions of the following nature:
- United States fuel consumption data.
- United States natural gas distribution system.
- United States natural gas production and consumption.
- The main elements of a natural gas pipeline system.
- Gas utility industry miles of pipeline and main.
- Gas utility industry sales by class of service and firm and interruptible customers.
- Main line natural gas sales to industrial end-users.
- Industrial consumers of natural gas by SIC code.
- Main line sales directly to industrial end-users for some critical States.
- Overall fuel consumption for some critical States.

Overview of U.S. Natural Gas System in BCF and % (1971)

<table>
<thead>
<tr>
<th>ENERGY SOURCE</th>
<th>USER SECTOR</th>
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</thead>
<tbody>
<tr>
<td>Coal</td>
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<td>Petroleum</td>
<td>Industry</td>
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<tr>
<td>Nuclear</td>
<td>Transportation</td>
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<tr>
<td>Gas</td>
<td>Elec Util.</td>
</tr>
<tr>
<td>Other</td>
<td>Total</td>
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</table>

(Estimate for 1975)

Consumption by end-user in quads.
Natural Gas Production and Consumption—1974

Based on U.S. Gross Withdrawal 100% (22849 TCF)
Typical Gas Pipe Line System

- **GATHERING SYSTEMS**
  - FIELD BOOSTER STATION
  - COMPRESSOR STATION
  - TRANSMISSION LINE
  - CHECK METER STATION
  - LNG STORAGE
  - UNDERGROUND STORAGE
  - CITY GATE

- **PRODUCTION**
  - PURCHASE METER
  - FIELD SEPARATOR

- **PROCESSING**
  - REFINERY
  - INTERCHANGE METER

- **UTILIZATION PRESSURE DISTRIBUTION SYSTEM**
  - UTILIZATION PRESSURE DISTRIBUTION SYSTEM
  - DISTRICT REGULATOR STATION
  - INDUSTRIAL UTILIZATION (PLANTS)

- **COMMERCIAL UTILIZATION**
  - HIGH PRESSURE DISTRIBUTION SYSTEM
  - METERING

- **CUSTOMERS METER SERVICE**
  - TELECONTROL METERING

- **INDUSTRIAL CUSTOMER**
  - COMPRESSOR PLANT
  - LNG STORAGE
  - UNDERGROUND STORAGE

- **GAS UTILITY**
  - SMALL COMPRESSOR PLANT
  - DEHYDRATION SCRUBBERS
  - INJECTION WITHDRAWAL WELLS

- **TRANSPORTATION**
  - MIXING STATION
  - LPG STORAGE TANKS

- **MIXING STATICS**
  - PRESSURE REGULATION
  - SCRUBBERS

- **TELEMETERING**
  - HEADQUARTERS:
  - DISPATCHING CONTROL COMMUNICATIONS TELEMETEING

- **FEEDER MAIN OR LOOP**
  - DISTRIBUTE MAIN OR LOOP
GAS UTILITY INDUSTRY MILES OF PIPELINE AND MAIN

Thousands of Miles

MN  Field & Gathering
1500  Transmission
1200  Distribution
1000  Field & Gathering
1800  Transmission
1600  Distribution
1400  Field & Gathering
1200  Transmission
1000  Distribution
800  Field & Gathering
600  Transmission
400  Distribution
200  Field & Gathering
0  Transmission

Source—Gas Facts 1974

Gas Utility Industry Miles of Pipeline and Main, by Type and by State, 1974

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<tr>
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<th>Field and Gathering</th>
<th>Transmission</th>
<th>Distribution Main</th>
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a) Source—Gas Facts 1974

b) Includes 1,140 miles of underground storage pipe.
## Selected Operating Statistics of Major Transmission Systems

<table>
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<tr>
<th>Compressor Stations</th>
<th>Miles of Transmission Pipeline</th>
<th>1974</th>
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<tr>
<td>Name of Transmission System</td>
<td>No. of Transmission Statn.</td>
<td>Installed Horsepower</td>
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<td>Alaskan Gas Transmission Co</td>
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<td>Cities Service Gas Co</td>
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<td>203,510</td>
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<td>Colorado Interstate Gas Co</td>
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<td>130,780</td>
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<td>Columbia Gas Transmission Co</td>
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<td>Columbia Gulf Transmission Co</td>
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<td>Consolidated Gas Supply Corp</td>
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<td>117,247</td>
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<td>East Tennessee Natural Gas Co</td>
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<td>20,520</td>
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<td>El Paso Natural Gas Co</td>
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<td>735,000</td>
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<td>84,960</td>
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<td>Missouri River Transmission Co</td>
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<td>104,125</td>
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<td>924,145</td>
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<td>Transwestern Co</td>
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<tr>
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Note: Including all operating revenues with more than 500 miles of transmission pipeline and $5,000,000 operating revenues.

### Gas Utility Industry Sales by State and Class of Service, 1974 *

<table>
<thead>
<tr>
<th>Division and State</th>
<th>Total</th>
<th>Residential</th>
<th>Commercial</th>
<th>Industrial</th>
<th>Other</th>
<th>Average</th>
<th>High</th>
<th>Low</th>
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<tr>
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<td>23.9</td>
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### Gas Utility Industry Firm and Interruptible Gas Sales by State, 1974 *

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<tr>
<th>Division and State</th>
<th>Total</th>
<th>Firm</th>
<th>Interruptible</th>
<th>Total</th>
<th>Firm</th>
<th>Interruptible</th>
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### Source—Gas Facts 1974
### Summary of Main Line Natural Gas Sales to Industrial Users, by Type of Sale—1974, MMcf

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<th>State</th>
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<td>0</td>
<td>14,920</td>
<td>0</td>
<td>18,458</td>
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<tr>
<td>Illinois</td>
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<td>Indiana</td>
<td>0</td>
<td>0</td>
<td>1,967</td>
<td>0</td>
<td>1,967</td>
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<td>Kansas</td>
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<tr>
<td>Kentucky</td>
<td>10,760</td>
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<tr>
<td>Louisiana</td>
<td>137,851</td>
<td>0</td>
<td>131</td>
<td>479</td>
<td>136,461</td>
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<tr>
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<td>10,603</td>
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<td>12,820</td>
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<tr>
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<td>73,280</td>
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<td>22,331</td>
<td>259</td>
<td>30,847</td>
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<td>0</td>
<td>2,858</td>
<td>1,687</td>
<td>4,545</td>
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<tr>
<td>Nebraska</td>
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<td>24,594</td>
<td>0</td>
<td>48,202</td>
</tr>
<tr>
<td>Nevada</td>
<td>40,506</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>40,506</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>121</td>
<td>0</td>
<td>261</td>
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<td>382</td>
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<tr>
<td>New Jersey</td>
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<td>0</td>
<td>0</td>
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<tr>
<td>New Mexico</td>
<td>13,836</td>
<td>0</td>
<td>476</td>
<td>0</td>
<td>14,312</td>
</tr>
<tr>
<td>North Carolina</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>North Dakota</td>
<td>0</td>
<td>0</td>
<td>1,042</td>
<td>0</td>
<td>1,042</td>
</tr>
<tr>
<td>Ohio</td>
<td>8,398</td>
<td>3,616</td>
<td>3,505</td>
<td>0</td>
<td>15,519</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>5,551</td>
<td>0</td>
<td>15,832</td>
<td>191</td>
<td>21,574</td>
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<td>Pennsylvania</td>
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<td>967</td>
<td>0</td>
<td>6,715</td>
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<tr>
<td>South Carolina</td>
<td>3,250</td>
<td>0</td>
<td>1,896</td>
<td>0</td>
<td>5,146</td>
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<tr>
<td>South Dakota</td>
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<td>0</td>
<td>4,615</td>
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<td>4,620</td>
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<tr>
<td>Tennessee</td>
<td>24,182</td>
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<td>14,200</td>
<td>341</td>
<td>38,723</td>
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<tr>
<td>Texas</td>
<td>33,929</td>
<td>0</td>
<td>135,835</td>
<td>0</td>
<td>169,764</td>
</tr>
<tr>
<td>Virginia</td>
<td>218</td>
<td>0</td>
<td>309</td>
<td>0</td>
<td>527</td>
</tr>
<tr>
<td>Washington</td>
<td>404</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>404</td>
</tr>
<tr>
<td>West Virginia</td>
<td>1,231</td>
<td>0</td>
<td>863</td>
<td>0</td>
<td>2,094</td>
</tr>
<tr>
<td>Wyoming</td>
<td>44</td>
<td>0</td>
<td>13,842</td>
<td>0</td>
<td>13,886</td>
</tr>
</tbody>
</table>

**Total** | **770,350** | **3,616** | **480,089** | **91,246** | **1,345,301**

*Source: Data compiled from table 4.*

*Source: Mineral Industry Surveys, Bureau of Mines, Dept. of Interior Dated March 2, 1976*
Main Line Sales Directly to Industrial End Users for Some Critical States 1974 *

Source: Mineral Industry Surveys, Bureau of Mines, Dept. of Interior
Dated March 2, 1976
### Salient Fuel Statistics—1972 Kentucky

#### Production

<table>
<thead>
<tr>
<th>Product</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>21.1 T</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>1.1 T</td>
</tr>
<tr>
<td>Petroleum</td>
<td>0.1 T</td>
</tr>
</tbody>
</table>

#### Average number of active operations: 419

#### Labor Force: Total: 111,800

<table>
<thead>
<tr>
<th>Type</th>
<th>Fuel Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>72,200</td>
</tr>
<tr>
<td>Residential</td>
<td>28,800</td>
</tr>
<tr>
<td>Electric Power</td>
<td>11,000</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>1,800</td>
</tr>
<tr>
<td>Total</td>
<td>111,800</td>
</tr>
</tbody>
</table>

### Salient Energy Statistics—1972

#### Energy Consumption (TJ)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Energy Consumption</th>
<th>Natural Gas</th>
<th>Electricity Distributed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>85.7</td>
<td>33.5</td>
<td>123.4</td>
</tr>
<tr>
<td>Transportation</td>
<td>20.5</td>
<td>10.9</td>
<td>48.4</td>
</tr>
<tr>
<td>Electric Power</td>
<td>11.6</td>
<td>6.0</td>
<td>31.4</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>1.5</td>
<td>1.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Total</td>
<td>120.3</td>
<td>45.5</td>
<td>167.8</td>
</tr>
</tbody>
</table>

#### Installed Capacity (MW)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Installed Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>100.0</td>
</tr>
<tr>
<td>Transportation</td>
<td>30.0</td>
</tr>
<tr>
<td>Electric Power</td>
<td>20.0</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>5.0</td>
</tr>
<tr>
<td>Total</td>
<td>155.0</td>
</tr>
</tbody>
</table>

#### Total Net Energy Input (TJ)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Total Net Energy Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>1,200</td>
</tr>
<tr>
<td>Transportation</td>
<td>300</td>
</tr>
<tr>
<td>Electric Power</td>
<td>200</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>1,750</td>
</tr>
</tbody>
</table>

#### Total Net Energy Input per Capita (TJ)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Total Net Energy Input per Capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>10.0</td>
</tr>
<tr>
<td>Transportation</td>
<td>3.0</td>
</tr>
<tr>
<td>Electric Power</td>
<td>2.0</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>0.5</td>
</tr>
<tr>
<td>Total</td>
<td>16.0</td>
</tr>
</tbody>
</table>
### Salient Fuel Statistics—1972 Maryland and District of Columbia

<table>
<thead>
<tr>
<th>Natural Gas</th>
<th>Uranium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovered (thousand bbl)</td>
<td>Recoverable (tons)</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Nuclear Energy Statistics—1972

<table>
<thead>
<tr>
<th>Nuclear Energy</th>
<th>Hydroelectric</th>
<th>Total Gross Electrical Inputs Distributed (Three Sectors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fossil Fuel</td>
<td>2,785</td>
<td>3,788</td>
</tr>
<tr>
<td>Hydropower</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>2,785</td>
<td>3,788</td>
</tr>
</tbody>
</table>

### Energy Consumed, 1972

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Total</th>
<th>Utility</th>
<th>Total Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fossil Fuel</td>
<td>2,785</td>
<td>3,788</td>
<td>10,081</td>
</tr>
<tr>
<td>Hydropower</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>2,785</td>
<td>3,788</td>
<td>10,081</td>
</tr>
</tbody>
</table>

### Production of Energy, 1972

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Total</th>
<th>Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fossil Fuel</td>
<td>2,785</td>
<td>3,788</td>
</tr>
<tr>
<td>Hydropower</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>2,785</td>
<td>3,788</td>
</tr>
</tbody>
</table>

### Natural Gas Wells

<table>
<thead>
<tr>
<th>State</th>
<th>Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryland</td>
<td>0</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>0</td>
</tr>
</tbody>
</table>

### Uranium Mines

<table>
<thead>
<tr>
<th>State</th>
<th>Mines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryland</td>
<td>0</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>0</td>
</tr>
</tbody>
</table>

### Natural Gas Proved Reserves

<table>
<thead>
<tr>
<th>State</th>
<th>Reserves (thousand bbl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryland</td>
<td>0</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>0</td>
</tr>
</tbody>
</table>

### Coal Proved Reserves

<table>
<thead>
<tr>
<th>State</th>
<th>Reserves (thousand tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryland</td>
<td>0</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>0</td>
</tr>
</tbody>
</table>

### Uranium Recoverable

<table>
<thead>
<tr>
<th>State</th>
<th>Recoverable (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryland</td>
<td>0</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>0</td>
</tr>
</tbody>
</table>

### Uranium Total Production

<table>
<thead>
<tr>
<th>State</th>
<th>Total Production (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryland</td>
<td>0</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>0</td>
</tr>
</tbody>
</table>

### Uranium Natural Gas

<table>
<thead>
<tr>
<th>State</th>
<th>Natural Gas (MMcf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryland</td>
<td>0</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>0</td>
</tr>
</tbody>
</table>

### Uranium Nuclear Energy

<table>
<thead>
<tr>
<th>State</th>
<th>Nuclear Energy (million kW-hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryland</td>
<td>0</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>0</td>
</tr>
</tbody>
</table>

### Uranium Total Energy

<table>
<thead>
<tr>
<th>State</th>
<th>Total Energy (million Btu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryland</td>
<td>0</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>0</td>
</tr>
</tbody>
</table>
Salient Fuel Statistics—1972 New Jersey

<table>
<thead>
<tr>
<th>Natural gas</th>
<th>Natural gas liquids</th>
<th>Petroleum products</th>
<th>Lignite</th>
<th>Bituminous coal</th>
<th>Anthracite</th>
<th>Total coal and lignite</th>
<th>Total gross inputs</th>
<th>Gross energy inputs per capita</th>
<th>Gross energy inputs per capita</th>
<th>Total net energy input</th>
<th>Total net energy input per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3</td>
<td>1.2</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Generating Plants:

<table>
<thead>
<tr>
<th>Installed Capacity (thousand kw)</th>
<th>Production (million kWh)</th>
<th>20.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>11.4</td>
<td>4.99</td>
</tr>
</tbody>
</table>

Total gross energy input: 1.616 trillion Btu
Total net energy input: 1.248 trillion Btu
Total net energy input per capita: 242 million Btu
### Salient Fuel Statistics—1972 New York

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Quantity (thousand tons)</th>
<th>Value, thousands (thousand pounds)</th>
<th>Production, millions (MMcf)</th>
<th>Value, thousands (thousand tons)</th>
<th>Production, millions (MMcf)</th>
<th>Recoverable U3O8 (thousand tons)</th>
<th>Value, thousands (thousand bbl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthracite</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bituminous coal</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lignite</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Natural gas</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Natural gas liquids</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Uranium</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hydropower and nuclear</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Production:**
- Total: 1,521.7 trillion Btu
- Total net energy input per capita: 192 million Btu

**Consumption:**
- Total: 1,521.7 trillion Btu
- Total net energy input per capita: 192 million Btu

**Generating Plants:**
- Installed capacity (thousand kw): 1,046,311
- Production (million Btu): 27,562

**Total Gross Energy Input:** 1,521.7 trillion Btu

**Total Net Energy Input:** 1,521.7 trillion Btu

**Total Net Energy Input per Capita:** 192 million Btu
### Salient Fuel Statistics—1972 North Carolina

#### Production

<table>
<thead>
<tr>
<th>Anthropitic</th>
<th>Bituminous Coal and Lignite</th>
<th>Crude Oil</th>
<th>Natural Gas Liquid (MMcf)</th>
<th>Natural Gas</th>
<th>Uranium (thousand pounds recoverable U)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonnes</td>
<td>(thousand bbl)</td>
<td>(thousand bbl)</td>
<td>(thousand bbl)</td>
<td>(thousand bbl)</td>
<td>(thousand bbl)</td>
</tr>
<tr>
<td>Not available</td>
<td>Not available</td>
<td>Not available</td>
<td>Not available</td>
<td>Not available</td>
<td>Not available</td>
</tr>
</tbody>
</table>

#### Average number of active operations:

- Coal mines: 0
- Crude oil wells: 0
- Natural gas wells: 0
- Uranium mines: 0

#### Labor force: Total, by fuel sector (excluding processing):

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number</th>
<th>Daily capacity</th>
<th>Processing plants</th>
<th>Natural gas processing plants</th>
<th>Uranium mills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum refineries</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Natural gas plants</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Uranium mills</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Consumption

<table>
<thead>
<tr>
<th>Activity</th>
<th>Petroleum Refineries</th>
<th>Natural Gas Processing Plants</th>
<th>Uranium Mills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption (thousand tons)</td>
<td>(thousand bbl)</td>
<td>(thousand bbl)</td>
<td>(thousand bbl)</td>
</tr>
<tr>
<td>Anthracite</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bituminous coal and lignite</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Crude Oil</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Natural Gas Liquid</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Uranium</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</table>

#### Energy Consumption (trillion BTU)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Petroleum Refineries</th>
<th>Natural Gas Processing Plants</th>
<th>Uranium Mills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Consumption</td>
<td>(thousand bbl)</td>
<td>(thousand bbl)</td>
<td>(thousand bbl)</td>
</tr>
<tr>
<td>Anthracite</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>Bituminous coal and lignite</td>
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<tr>
<td>Crude Oil</td>
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<tr>
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<tr>
<td>Natural Gas</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Uranium</td>
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</table>

#### Energy Production (thousand kW)

<table>
<thead>
<tr>
<th>Activity</th>
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<th>Natural Gas Processing Plants</th>
<th>Uranium Mills</th>
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</thead>
<tbody>
<tr>
<td>Installed capacity</td>
<td>(thousand kW)</td>
<td>(thousand kW)</td>
<td>(thousand kW)</td>
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</tr>
<tr>
<td>Natural Gas Processing Plants</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Uranium Mills</td>
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#### Total gross energy input (trillion BTU)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Petroleum Refineries</th>
<th>Natural Gas Processing Plants</th>
<th>Uranium Mills</th>
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</thead>
<tbody>
<tr>
<td>Total gross energy input</td>
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<td>0</td>
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</table>

#### Total net energy input per capita (million Btu)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Petroleum Refineries</th>
<th>Natural Gas Processing Plants</th>
<th>Uranium Mills</th>
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<tbody>
<tr>
<td>Total net energy input</td>
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4.13
### Salient Fuel Statistics—1972 Ohio

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<thead>
<tr>
<th>Category</th>
<th>Gas (10^6 cu ft)</th>
<th>Propane (10^3 lb)</th>
<th>Oil (10^6 bbl)</th>
<th>Coal (10^6 lb)</th>
<th>Uranium (thousand pounds recoverable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated recoverable reserves</td>
<td>3.072</td>
<td>3.430</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Produced quantity</td>
<td>2.871</td>
<td>1.145</td>
<td>0.090</td>
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<td>0</td>
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<td>0</td>
<td>0</td>
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<td>Other term (all others)</td>
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<td>Other generating plants</td>
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<tr>
<td>Total</td>
<td>2.871</td>
<td>1.145</td>
<td>0.090</td>
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### Salient Energy Statistics—1972

<table>
<thead>
<tr>
<th>Sector</th>
<th>Utility Electricity Inputs</th>
<th>Total Net Energy Inputs</th>
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<tbody>
<tr>
<td>Generation Plant</td>
<td>Hydroelectric</td>
<td>Nuclear</td>
</tr>
<tr>
<td>Installed capacity (thousands)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Production (million Btu)</td>
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<tr>
<td>Total gross energy input</td>
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<tr>
<td>Total net energy input</td>
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4.14
### Salient Fuel Statistics—1972 Pennsylvania

#### Production

<table>
<thead>
<tr>
<th>Source</th>
<th>Anthracite</th>
<th>Bituminous Coal</th>
<th>Petroleum Products</th>
<th>Natural Gas</th>
<th>Uranium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>(thousand tons)</td>
<td>(thousand tons)</td>
<td>(million bbl)</td>
<td>(trillion cubic feet)</td>
<td>(thousand pounds)</td>
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<td>Source</td>
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</table>

#### Average Net Output of a Typical Operation

<table>
<thead>
<tr>
<th>Source</th>
<th>Bituminous Coal</th>
<th>Petroleum Products</th>
<th>Natural Gas</th>
<th>Uranium</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

#### Processing Plants

<table>
<thead>
<tr>
<th>Source</th>
<th>Bituminous Coal</th>
<th>Petroleum Products</th>
<th>Natural Gas</th>
<th>Uranium</th>
</tr>
</thead>
<tbody>
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### Salient Energy Statistics—1972

#### Fuel Consumption, Million Btu

<table>
<thead>
<tr>
<th>Source</th>
<th>Anthracite</th>
<th>Bituminous Coal</th>
<th>Petroleum Products</th>
<th>Natural Gas</th>
<th>Hydroelectric Nuclear</th>
<th>Total Gross Inputs</th>
<th>Utility Inputs</th>
<th>Total Net Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
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#### Generating Plants

<table>
<thead>
<tr>
<th>Source</th>
<th>Natural Gas</th>
<th>Petroleum Products</th>
<th>Hydroelectric Nuclear</th>
<th>Total Gross</th>
<th>Utility Distribution</th>
<th>Total Net</th>
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</thead>
<tbody>
<tr>
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</table>

#### Total Gross Energy Input: 4,152 Billion Btu

<table>
<thead>
<tr>
<th>Source</th>
<th>Natural Gas</th>
<th>Petroleum Products</th>
<th>Hydroelectric Nuclear</th>
<th>Total Gross</th>
<th>Utility Distribution</th>
<th>Total Net</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Source</td>
<td>Source</td>
<td>Source</td>
</tr>
</tbody>
</table>
Salient Fuel Statistics—1972 Virginia

### Anthracite
- **Production (thousand tons):** 6.5
- **Quantity used (thousand tons):** 5.8

### Bituminous coal and lignite
- **Production (thousand tons):** 11.3
- **Quantity used (thousand tons):** 11.1

### Petroleum products
- **Production (thousand bbl):** 21,223

### Natural gas
- **Production (MMcf):** 62.4
- **Recoverable ** (thousand pounds):** 0

### Uranium mines
- **Quantity (tons of ore):** 0

### Uranium mills
- **Quantity (tons):** 0

### Natural gas processing plants
- **Quantity (tons):** 0

### Energy Consumption, Trillion Btu

<table>
<thead>
<tr>
<th>Category</th>
<th>Anthracite</th>
<th>Bituminous coal and lignite</th>
<th>Petroleum products</th>
<th>Natural gas</th>
<th>Hydroelectricity and nuclear</th>
<th>Total gross energy inputs</th>
<th>Total net energy inputs (million kWh)</th>
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</thead>
<tbody>
<tr>
<td>Household, commer.</td>
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<td>0</td>
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### Generation Plants

<table>
<thead>
<tr>
<th>Category</th>
<th>Generation plants</th>
<th>Nuclear</th>
<th>Hydroelectricity and nuclear</th>
<th>Total net energy inputs (million Btu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
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<td>0</td>
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<tr>
<td>Installed capacity (thousand kW)</td>
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<td>852</td>
<td>25,510</td>
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<tr>
<td>Production (million kWh)</td>
<td>3,730</td>
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<td>7,466</td>
<td>60,000</td>
</tr>
</tbody>
</table>

### Total gross energy input: 1.036.7 trillion Btu
### Total net energy input per capita: 218 million Btu
### Salient Fuel Statistics—1972 West Virginia

#### Production

<table>
<thead>
<tr>
<th>Category</th>
<th>Aggregate (thousand tons)</th>
<th>Bituminous (thousand tons)</th>
<th>Lignite (thousand tons)</th>
<th>Coal (thousand tons)</th>
<th>Petroleum products (thousand bbl)</th>
<th>Natural gas (MMcf)</th>
<th>Hydropower (million kwh)</th>
<th>Total (million bbl)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>527</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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#### Energy Consumption—1972

<table>
<thead>
<tr>
<th>Sector</th>
<th>Aggregate (thousand tons)</th>
<th>Bituminous (thousand tons)</th>
<th>Lignite (thousand tons)</th>
<th>Coal (thousand tons)</th>
<th>Petroleum products (thousand bbl)</th>
<th>Natural gas (MMcf)</th>
<th>Hydropower (million kwh)</th>
<th>Total (million bbl)</th>
<th>Utility electricity distributed (three sectors)</th>
<th>Total net inputs (three sectors)</th>
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<tr>
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<td><strong>Total</strong></td>
<td>807.1</td>
<td>372.3</td>
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#### Generation Plants

<table>
<thead>
<tr>
<th>Sector</th>
<th>Aggregate (thousand tons)</th>
<th>Bituminous (thousand tons)</th>
<th>Lignite (thousand tons)</th>
<th>Coal (thousand tons)</th>
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<td>Household-commercial</td>
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<tr>
<td><strong>Total</strong></td>
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<td>372.3</td>
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</table>

Total gross energy input: 807.1 million Btu
Total gross energy input per capita: 442.8 million Btu
Total net energy input: 779.2 trillion Btu
Total net energy input per capita: 43.4 million Btu

89
<table>
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<th>3-Digit</th>
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*Source: Department of Commerce*
Section 5
A Format To Assess and Manage a Curtailment

Purpose

This section is, in essence, an arrangement of forms which provides the team member on location with a framework which will:

- Lead to a rapid understanding and assessment of the effects of a curtailment or shortfall and the potential chances of obtaining an effective relief and its potential benefits.

- Provide a uniform reporting format in which all pertinent facts can be recorded and become part of the main files.

The method presented here assumes that data are obtained on an historical basis, primarily from the utility company; in general, this can be achieved with a reasonable degree of objectivity. By inserting them into the proper spaces on the forms and by some simple computations, the team can obtain a "working knowledge" of the situation and ready itself for more detailed discussions with those who are concerned with the economic and social effects of the curtailment.

Content

A data-gathering and assessment scheme is presented which consists of two parts:

A. Deals with the data pertaining to energy demand and supply, the potential penalties to be expected from a curtailment or shortfall and some guidelines on how to prioritize end-use in a manner which reduces the economic impact on the community.

B. Provides a record of the remedial actions which have been taken or are contemplated. This part will determine the inevitable "residual shortfall" which can then be introduced into Part A and give a measure of the economic consequences of the natural gas shortage in the particular situation.

Part A consists of a sequence of six forms which are arranged as follows:

1. Presents numerical evidence on the supply capability and its upper performance limits.
2. Provides basic descriptive data on the demography of the locality.
3. Gives the basic meteorological data for the design and energy demand of the heating equipment as it is revealed by past and present records.
4. Gives a broad survey of end-uses and determines the effective curtailment rate in percent.
5. Lists the critical gas-dependent industries.
6. First assessment of the economic effects. By assigning priorities, the form can be used over and over again to establish the configurations which will minimize the economic impact, be it in terms of value added or unemployment.

Part B consists of a sequence of three forms which combine the relief actions possible under FPC, FEA, and related efforts. The last form gives a measure of the ultimate residual shortfall, which can then be reintroduced into Part A to compute the inevitable economic impact.
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</tbody>
</table>

### Gas Supply Capabilities

- **Main throughput**
  - Winter rate: MMCF/year
  - Summer rate: MMCF/day
  - Peak (average over years): MMCF/day

- **Maximum Flow Rate**: MMCF
  - Gas Storage capab.: MMCF
  - LNG Capacity: MMCF
  - Max. delivery rate from these: MMCF/day
  - Propane availability: MMCF/day
  - Maximum Rate of addition: MMCF/day

- **Amount available after curtailment**: MMCF/day
  - Maximum available: MMCF/day
  - Time limit: days

- **Curtailment percentage**: % (enter in sheet A6)

### Alternate Energy Sources (descriptive estimates)

- **Oil as a group**: BBL/day
- **Electricity**: KW
- **Coal**: t/day

### Transportation capability for alternates:

State: Set aside for alternate Fuels:
- Rate available for release on location: MMCF/day
- For how long? days

Maximum available energy flow rate in gas equivalents: 5.3 MMCF/day
## Demographic Data

<table>
<thead>
<tr>
<th>General data</th>
<th>Work force</th>
<th>Financial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>Total number of production workers</td>
<td>City budget</td>
</tr>
<tr>
<td>Number of households</td>
<td>% full time</td>
<td>$ p.a.</td>
</tr>
<tr>
<td>Cost of Living Index</td>
<td>% part time</td>
<td>Mean family income</td>
</tr>
<tr>
<td>Commuters into town</td>
<td>Unemployment, current</td>
<td>$ p.a.</td>
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<tr>
<td></td>
<td>seasonal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>non seasonal</td>
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</table>

## Weather, Heating Demand and Conservation

- Mean local degree days
- Design temperature
- Average summer demand (baseload)
- Historical winter demands
- Difference = heating demand
- Historical slope

### Records of recent months

<table>
<thead>
<tr>
<th>Year:</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Total</th>
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</tbody>
</table>

- Compute conservation effects
  - Room temperature 68 F
  - % reduction → MMCF/day
  - Room temperature 65 F
  - % reduction → MMCF/day
### General Demand Survey (Effect of Conservation Measures)

<table>
<thead>
<tr>
<th>end user category</th>
<th>absolute demand</th>
<th>% of total demand</th>
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<tbody>
<tr>
<td></td>
<td>without MMCF/day conservation</td>
<td>with MMCF/day conservation</td>
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<td>residential</td>
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<tr>
<td>commercial</td>
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<tr>
<td>power generation</td>
<td></td>
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<tr>
<td>industrial</td>
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<tr>
<td>if separately recorded public services (hospitals, schools, etc.)</td>
<td></td>
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<tr>
<td>Total</td>
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</tbody>
</table>

Effective Reduction due to conservation

<table>
<thead>
<tr>
<th>absolute demand</th>
<th>MMCF/day</th>
<th>%</th>
</tr>
</thead>
</table>

From Form A1 Bottom Line $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$

Deduct $\bullet$ $\bullet$ gives NG supply available for power generation + industrial use

Deduct $\bullet$ $\bullet$ gives residual available for industrial use

Divide by $\bullet$ gives effective curtailment rate

Enter this figure into Form A6.
<table>
<thead>
<tr>
<th>No.</th>
<th>Name of firm</th>
<th>SIC Code</th>
<th>gas usage</th>
<th>number of produc. workers</th>
<th>sales $ p.a.</th>
<th>value added $ p.a.</th>
<th>payroll $ p.a.</th>
<th>production hours per week</th>
<th>type of contract</th>
<th>FPC priority</th>
<th>continuous operation mandatory</th>
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</table>

Total of the above

Total industrial complex

Percentage
### Curtailment Effect Assessment (Industrial Users Only)

<table>
<thead>
<tr>
<th>No.</th>
<th>employees per MMCF</th>
<th>payroll per MMCF</th>
<th>sales per MMCF</th>
<th>added value per MMCF</th>
<th>Substitute Fuel cap.</th>
<th>Present gas usage</th>
<th>Substitute cap.</th>
<th>Residual Demand</th>
<th>Allocation of gas</th>
<th>Remaining shortfall</th>
<th>employment</th>
<th>payroll</th>
<th>sales</th>
<th>added value</th>
<th>Employment priority</th>
<th>Sales priority</th>
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<td>MMCF per day</td>
<td>MMCF per day</td>
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</table>

#### Curtailment Percentage
- Employees: \(\frac{\text{employees per MMCF}}{\text{MMCF per day}}\)
- Payroll: \(\frac{\text{payroll per MMCF}}{\text{MMCF per day}}\)
- Sales: \(\frac{\text{sales per MMCF}}{\text{MMCF per day}}\)
- Added Value: \(\frac{\text{added value per MMCF}}{\text{MMCF per day}}\)

#### Allocation of Gas
- Substitute: \(\frac{\text{Substitute Fuel cap.}}{\text{MMCF per day}}\)
- Present: \(\frac{\text{Present gas usage}}{\text{MMCF per day}}\)
- Substituting: \(\frac{\text{Substitute cap.}}{\text{MMCF per day}}\)
- Residual: \(\frac{\text{Residual Demand}}{\text{MMCF per day}}\)
- Allocated: \(\frac{\text{Allocation of gas}}{\text{MMCF per day}}\)

#### Deficit on Weekly Basis
- Employment: \(\frac{\text{Remaining shortfall}}{\text{employment}}\)
- Payroll: \(\frac{\text{Remaining shortfall}}{\text{payroll}}\)
- Sales: \(\frac{\text{Remaining shortfall}}{\text{sales}}\)
- Added Value: \(\frac{\text{Remaining shortfall}}{\text{added value}}\)

#### Total Shortfall
\[\text{Total Shortfall} = \text{Total available} = (1) + (2) + (3) + (4)\]

#### Satisfaction Indicators
- Curtailment Percentage
- Amount available from pipeline
- Total available
- Total Shortfall for relief action

#### Priority Levels
- Employment priority
- Sales priority
<table>
<thead>
<tr>
<th>No. on A5 if appl.</th>
<th>Category</th>
<th>Sale</th>
<th>Relief mechanism</th>
<th>Quantity requested</th>
<th>Date initial</th>
<th>Applied to?</th>
<th>Action to date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comm. Ind.</td>
<td>Ind. direct</td>
<td>Distr. Pipeline</td>
<td>P.U.C. Other</td>
<td>by</td>
<td>to</td>
<td>Emergency</td>
<td>Extra-ord.</td>
</tr>
<tr>
<td>No. ofi appl.</td>
<td>Who applied?</td>
<td></td>
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</tbody>
</table>

**Record of FPC Remedial Actions To-Date (For guidance see chart, Section 2, page 2.2.7)**

<table>
<thead>
<tr>
<th>No. on A5 if appl.</th>
<th>End-user cat.</th>
<th>Desired Alternate</th>
<th>Relief Mechan.</th>
<th>State Set-aside</th>
<th>Quantity requested</th>
<th>Base Line</th>
<th>Date initial</th>
<th>Applied to?</th>
<th>Action to date</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. ofi appl.</td>
<td>Who applied?</td>
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</table>

**Record of FEA Remedial Actions To-Date (For guidance see chart, Section 2, page 2.3.17)**

<table>
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<th>No. on A5 if applicable</th>
<th>End-user cat.</th>
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<th>Relief Mechan.</th>
<th>Quantity requested</th>
<th>Base Line</th>
<th>Date initial</th>
<th>Applied to?</th>
<th>Action to date</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. on A5 if applicable</td>
<td>Who applied?</td>
<td></td>
<td></td>
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</table>

**Correction here**

Total quantity requested

Received to date
Summary of FPC, FEA and Local Relief Actions (All in MMCF/Day)
(For guidance see chart on page 2.4 of Section 2)

Go back to A6 and compute inevitable hardships as a function of residual energy shortfall

<table>
<thead>
<tr>
<th>Shortfall</th>
<th>FPC Type Allotment</th>
<th>FEA Type Allotment</th>
<th>Additional Supplies Obtained via Distributor</th>
<th>Savings Due to Conservation Program</th>
<th>Inevitable Residual Shortfall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Received</td>
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<tr>
<td>Requested</td>
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</tbody>
</table>
Glossary

ABSORPTION. The penetration of one substance into the inner structure of another. In physicochemistry, through the process of "absorption" a liquid takes up molecules of a gas or vapor.

ACETYLENE (H\textsubscript{2}C\textsubscript{2}C\textsubscript{2}). A colorless, highly flammable, explosive gas with an ethereal odor. It is soluble in alcohol and acetone; only slightly soluble in water. Acetylene is used in vinyl chloride and vinylidene chloride; vinyl acetate; welding and cutting metals; neoprene, acrylonitrile; acrylates; per- and trichloroethylene; cyclooctatetraene; tetrahydrofuran; and carbon black.

ADJUSTMENT CLAUSE. See CLAUSE, ADJUSTMENT.

ALLOCATED PRODUCTS. Residual fuel oil and refined petroleum products. (FEA)

ALLOWABLES. The permitted rate of production from a well or a group of wells that is allowed by a particular State or governing body. The rate is set by rules that vary among the various States or governing bodies.

ALTERNATE FUEL CAPABILITIES. A situation where an alternate fuel could have been utilized, whether or not the facilities for such use have actually been installed; provided, however, where the use of natural gas for pipeline transportation, feedstock, or process uses and the only alternate fuel is propane or other gaseous fuel then the consumer will be treated as if he had no fuel. (FPC)

ALTERNATE FUELS (AND ENERGY). Fuel oil (distillate and residual), coal, direct use of propane or butane, and electricity used in place of natural gas.

ANTHRACITE. A hard coal containing 86-98% fixed carbon, which has a brilliant luster, conchoidal fracture and is combustible. It is found generally in Pennsylvania, USSR, Europe, and Korea. It is used as an industrial fuel: in the manufacture of PRODUCER GAS and WATER GAS; and is the source of coke and amorphous carbon (see CARBON, ACTIVATED).

ASSIGNMENT. An action taken by FEA, or an authorized State official, designating that an authorized purchaser be supplied at an allocation entitlement level determined by the FEA or an authorized State official, by a specified supplier. (FEA)

ASSOCIATED NATURAL GAS. See GAS, NATURAL.

AVERAGE ANNUAL GAS CONSUMPTION PER CUSTOMER (BY CLASS OF SERVICE). Average annual therms used per customer by class of service; annual therms sales to a class divided by the number of customers for that class of service. (May use Mcf instead of therms.)

AVERAGE ANNUAL GAS REVENUE PER CUSTOMER (BY CLASS OF SERVICE). Total annual revenue exclusive of forfeited discounts and penalties (from a class of service) divided by the number of customers in that class of service.

ANNUAL REVENUE PER THERM OF GAS SALES (BY CLASS OF SERVICE). Revenue from the sale of gas to a class of service, exclusive of forfeited discounts and penalties, divided by the corresponding number of therms sold. (May calculate average revenue per Mcf.)

BARREL (OIL). A volumetric unit of measurement equivalent to 42 U.S. Standard gallons.

BASE PERIOD. Each calendar quarter during the period April 1, 1972, through March 31, 1973, which corresponds to the present calendar quarter, except that purchasers of propane may, at their option, use the period June 1, 1972, through June 30, 1972, as the base period. (FEA)

BENCH G. See COAL GAS.

BITUMINOUS COAL. A broad class of soft coals having 45-85% fixed carbon and approximately 20-40% volatile matter, which yields about 11,000 or more Btu per pound. It is combustible in bulk form. Bituminous coal is found in Pennsylvania, West Virginia, Illinois, Indiana, Wyoming, and Utah. It is used in fuel; coke production for the manufacture of pig iron; PRODUCER GAS, COAL GAS, and briquettes; and as a source of coal tar, hydrogen cyanide, and CARBON BLACK.

BLAST-FURNACE GAS. A by-product from the smelting of iron ore with coke and the pretreated air in the blast furnace. Its low Btu value requires regenerative preheating, as with producer gas.

BLOWDOWN. See VENTING.

BOILER RATING. The rating of a steam boiler expressed as the total heat transferred by the heating service in Btu per hour. Sometimes expressed in horsepower or pounds.

BONDED FUELS. Those fuels produced outside the customs limits of the United States, held in bond under continuous United States custody in accordance with Treasury Department regulations and destined for use outside of the United States, its territories, or possessions. (FEA)

BOTTLED PROPANE. Propane bottled in cylinders with a capacity of one hundred (100) pounds or less. (FEA)

BRANDED INDEPENDENT MARKETER. A firm engaged in the marketing or distributing of refined petroleum products pursuant to:

(a) An agreement or contract with a refiner (or a firm that controls, is controlled by, or is under common control with such refiner) to use a trademark, trade name, service mark, or other identifying symbol or name owned by such refiner (or any such firm), or

(b) An agreement or contract under which any such firm engaged in the marketing or distributing of refined petroleum products pursuant to:

(1) An agreement or contract with a refiner (or a firm that controls, is controlled by, or is under common control with such refiner), but that is not affiliated with, controlled by, or under common control with another refiner (other than by means of a supply contract, or an agreement or contract described in paragraph (a) or (b) of this definition), and which does not control such refiner. (FEA)

BRITISH THERMAL UNIT (BTU). The quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit under stated conditions of pressure and temperature. This is the accepted standard for the comparison of the heating values of fuels.

BURNER CAPACITY. The maximum Btu rate of gas that can be released by a burner, while burning with a stable flame and satisfactory combustion. Also called burner heat.

BURNER HEAD. The portion of the burner beyond the outlet end of the mixer or union that contains the ports.

BUTADIENE (C\textsubscript{4}H\textsubscript{6}). A highly flammable hydrocarbon gas or liquid produced from petroleum or alcohol, butadiene is used after polymerization in making buta (synthetic rubber); as a starting material for acrylonitrile (nylon 66); in latex paints; resins; and organic intermediates.

BUTANE (C\textsubscript{4}H\textsubscript{10}). A colorless, flammable, explosive gas with a natural gas odor, soluble in water and alcohol. Butane is a by-product in petroleum refining or natural gas manufacture, is used in organic synthesis; raw material for synthetic rubber; and high-octane liquid fuels; fuel for household and industrial purposes; manufacture of ethylene; solvent; refrigerant; standby and enricher gas; propellant in aerosols; pure grades used in calibrating instruments; and food additives.

BUTANE-AIR PLANT. A gasification plant, where liquid butane is vaporized and mixed with air and delivered into a gas distribution system for consumer use.

BY-PRODUCTS (RESIDUALS). Secondary products that have commercial value and are obtained from the processing of a raw material. They must be the residues of the gas production process, such as coke, tar, and ammonia, or they may be the result of further processing of such residues, such as ammonia sulphate.

CAPACITY, EFFECTIVE. The maximum load that a machine, apparatus, device, plant, or system is capable of carrying under existing service conditions.

CAPACITY, INSTALLED. The maximum load for which a machine, apparatus, device, plant, or system is designed or constructed, not limited by existing service conditions.

CAPACITY, PEAKING. The capacity of facilities or equipment normally used to supply incremental gas under extreme demand conditions and beyond contractual obligations.

CARBON, ACTIVATED. An amorphous carbon form characterized by high adsorptivity for gases, vapors, and colloidal solids. Activated carbon is used in decolorizing sugar; water purification; solvent recovery; waste treatment; sulfur dioxide removal from stack gases and "clean" rooms; deodorant; jet fuels removal from airports; catalyst; and natural gas purification.

CARBON BLACK. Almost pure amorphous carbon consisting of extremely fine particles, made by the incomplete combustion or thermal decomposition of natural gas or petroleum oil. The principal types, according to the production method, are...
channel black, furnace black, and thermal black. Carbon black is used as a reinforcing agent in producing rubber and other abrasion-resistant products and plastics.

CARBURETED WATER GAS. Largely a mixture of "blue" WATER GAS and rich OIL GAS. The richer oil gas is carbureted with the low Btu value water gas in order to enhance its heating value and luminous qualities.

CASINGHEAD GAS. See GAS, CASINGHEAD.

CATALYST. Any substance of which a fractionally small percentage strongly affects the rate of a chemical reaction. Though the catalyst itself undergoes no chemical change, it is often altered physically by chemically absorbed molecules of the reactants.

CERTIFICATE OF CONVENIENCE AND NECESSITY. (1) A special permit, which supplements the franchise, commonly issued by a State utility commission that authorizes a utility (a distribution company) to engage in business, construct facilities, or perform some other service. (2) A permit issued by the Federal Power Commission to engage in the transportation or sale for resale of natural gas in interstate commerce or to construct or acquire and operate any facilities necessary therefor, to which certificate the Commission may attach such reasonable conditions and restrictions as the public convenience and necessity may require.

CHANNEL BLACK. See CARBON BLACK.

CLASS OF SERVICE. Defines consumer types. The common classes of services as applied to ultimate consumers and as recommended for statistical purposes, by the American Gas Association for use by gas utilities are:

1. Residential Service
   (a) Without Space Heating. Service to customers supplied for residential purposes (cooking, water heating, kitchen heating, where another fuel is principal heat for premises, etc.) by individual meters, in a single family dwelling or building, or in a single flat or apartment, or to not over four households served by a single meter (one customer) in a multiple family dwelling, or portion thereof.

   Service for residential purposes supplied to live or more households served as a single customer (one meter) under one rate classification contract is considered as commercial and is counted as only one customer.

   Residential premises also used regularly for professional or business purposes (such as a doctor’s office in a home, or where a small store is integral with the living space) are considered as residential, where the residential use is half or more of the total gas volume; otherwise, these are commercial.

   Dormitories, hotels, religious and eleemosynary institutions (such as orphan houses, boarding and rooming houses, mother courts, camps, etc.), are considered as commercial customers for statistical purposes, even though they are supplied by the company on a residential rate contract. (See item 2 below.)

   (b) With Space Heating. Service to customers using gas to supply the principal space heating requirements of a dwelling; other residential uses are included herein, if supplied under the same rate classification.

   (c) Air Conditioning Service. Service to customers using gas to supply the principal space heating requirements of a dwelling; other residential uses (cooking, water heating, etc.) are included in this classification, is supplied under the same rate classification. These customers will be included under item (a) or (b) as appropriate, or the sum of (a) and (b) will be Total Residential Service. However, for statistical purposes, “Residential Air Conditioning Service” (including any other residential use) also should be tabulated separately to distinguish this from other types of residential use. This also applies to gas sold under interruptible or off-peak rates or contracts.

2. Commercial Service.
   Service to customers engaged primarily in wholesale or retail trade, agriculture, forestry, fisheries, transportation, communication, sanitary services, finance, insurance, real estate, personal services (clubs, beauty shops, five or more households served as a single customer, auto repair, etc.), government, and service that does not directly come in one of the other classifications of service. (See Standard Industrial Classification Manual.)

   (a) The size of the customer or volume of use is the criterion for determining Commercial Service. The nature of the customer’s primary business or economic activity at the location served determines the customer classification. If a particular load to a manufacturing or processing plant represents the catheria of the plant, or a heating load, with or without any processing load, whether or not separately metered, the account is classified as Industrial Service, item 3 (c).

   (b) Gas supplied to commercial customers for air conditioning or space heating is included under Commercial Service, whether or not supplied under a separate rate contract. See general definition at the beginning of section 2, and item (c) below.

   (c) For statistical purposes, Commercial Air Conditioning Service (including any processing load) should be tabulated separately to distinguish this from other types of commercial use. This also applies to gas sold under interruptible or off-peak rates or contracts.

3. Industrial Service
   Service to customers engaged primarily in a purpose that requires or changes raw or unfinished materials into another form or product. This includes establishments in mining and manufacturing. (See Standard Industrial Classification Manual.)

   (a) The size of the customer or the volume of use is not a criterion for determining Industrial Service. The nature of the company’s primary business or economic activity at the location served determines the distinction used. If a manufacturing corporation has only a sales office, no plant, at a particular location, this is classified as Commercial Service on the basis of primary activity. If, however, the sales office is part of a manufacturing plant, this is classified as Industrial Service.

   (b) Gas supplied to these customers for air conditioning or for space heating is included under Industrial Service, whether or not supplied under a separate rate contract.

   (c) For statistical purposes, however, Industrial Air Conditioning Service (including any other industrial use under the same rate classification) should be tabulated separately to distinguish this from other types of industrial use. This also applies to gas sold under interruptible or off-peak rates or contracts.

4. Other Services
   Service to municipalities or divisions (agencies) of State or Federal Governments under special contracts or agreements or service classifications, applicable only to public authorities using gas for general or institutional purposes. (Exclude sales properly included under items 2 or 3 above, such as manufacturing arsenals or publicly-owned power systems.)

5. Service to Other Utilities—Sales for Resale (Uniform System of Accounts, 483)
   Service to other utility companies, governmental agencies (municipal, county, state, or federal), rural cooperatives, etc., for distribution and resale to ultimate customers. Service to other utilities for use by them and not for distribution and resale, and especially classified as residential, commercial, or industrial, depending upon the primary business or economic activity.

CLAUSE, ADJUSTMENT. A provision in a utility tariff that provides for changes in gas rate charged a customer due to increases or decreases in costs incurred by the seller, such as purchased gas cost, transportation costs, or advances payments made for gas.

COAL. Relatively dense carbonaceous solid produced from prehistoric vegetable matter and found widely distributed in natural veins and deposits, which contains various amounts of hydrocarbons, complex organic compounds and inorganic materials. It is classified generally as lignite, sub-bituminous, and BITUMINOUS.

COAL CHAR. Residue from the gasification process that may serve as a power source (a fuel) for gasification plants.

COAL GAS. Also known as bench gas, coke-oven gas. A mixture of gases produced by the destructive distillation of bituminous coal in highly heated fire-clay or silica retorts or in by-product coke ovens. Coal gas is used directly in open hearth furnaces.

COAL OIL. Crude petroleum, kerosene, or the crude oil from the destructive distillation of bituminous coal.

COKE-OVEN GAS. See COAL GAS.

COKER FEEDSTOCK. Any crude oil or unfinished oil, as defined by Oil Import Regulation 1, Revision 5 (32A CFF 177 Reg. 106.2).
service will be implemented by pipelines concerning basic approaches are (1) pro rata, a Federal and State regulatory agencies in.

COMMODITY CHARGE. A charge per unit volume of gas actually delivered to the buyer.

COMPANY USED GAS. The quantity of gas consumed by a distribution company or transmission company for its own use as fuel for compressors.

CONSUMER, GAS. The ultimate user of gas, as contrasted to a "customer," who may purchase gas for resale.

CONTRACTED RESERVES. Natural gas reserves dedicated to the fulfillment of gas purchase contracts.

COVERED PRODUCTS. Crude oil, residual fuel oil, and refined petroleum products.

CRACKING. The process of breaking down a heavier HYDROCARBON by heat and pressure or by catalysts into lighter hydrocarbons of lower molecular weight, producing gasoline from petroleum or other lower-boiling materials useful as motor oils, domestic fuel oil, or other needed products. Cracking to lighter hydrocarbons is important to OIL GAS and CARBURATED WATER GAS production.

CRUDE OIL. A mixture of liquid hydrocarbons, including lease condensate that exists in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities. (See also PETROLEUM.)

CURRENT REQUIREMENTS. The supply of an allocated product needed by an end-user or wholesale distributor to meet its present supply requirements for a particular use of that product, but does not include any amounts that an end-user or wholesale purchaser consumer (a) purchases or obtains for resale, (b) accumulates as an inventory in excess of that purchaser's customary inventory maintained in the conduct of its normal business practices, or (c) uses in excess of the supply necessary to meet present supply requirements as constrained by the implementation of the energy conservation program required [10 CFR, 211.21.]

CURTAILMENT. The difference between the volume of gas interstate pipelines will actually deliver to their customers (i.e., the supply) and the firm requirements (i.e., contractual obligations) of these pipelines.

CURTAILMENT GUIDELINES. Policies of Federal and State regulatory agencies concerning the way a curtailment of gas service will be implemented by pipelines and/or distribution companies. The two basic approaches are (1) pro rata, a flat

pence stage reduction in supply, applied to all customers (by a transmission company) or to all consumers in a given class of service (by a distribution company) and (2) end use, a more selective approach, which considers the purpose for which gas is used in establishing priorities.

CUSTOMER CHARGE. A fixed amount to be paid periodically by the customer, without regard to demand or energy consumption.

CUSTOMER COSTS. The costs directly related to serving the customer, regardless of sales volume, such as meter reading, billing, and fixed charges for the minimum investment required to serve a customer.

DEFICIENCY, GAS. The difference between a distribution company's total gas supply and the total requirements of its customers. It may be expressed either in absolute volumes (Mcf) or as a percentage of total requirements.

DEGREE-DAY FORMULA. Any one of the various systems in use by retailers to provide wholesale purchaser-consumers or end-users with automatic delivery service of an allocated product for space-heating.

DEGREE-DAY, HEATING. A measure of the coldness of the weather experienced, based on the extent to which the daily mean temperature falls below a reference temperature, usually 65°F.

DEMAND. The rate at which gas is delivered to or by a system, part of a system, or a piece of equipment, expressed in cubic feet or therms or multiples thereof, for a designated period of time called the demand interval.

DEMAND, AVERAGE. The demand on a system or any of its parts over an interval of time, determined by dividing the total number of cubic feet or therms by the number of units of time in the interval.

DEMAND, BILLING. The demand upon which billing to a customer is based, as specified in a rate schedule or contract. Because it may be based on the contract year, a contract minimum, or a previous maximum (as may not necessarily coincide with the actual measure demand of the billing period.

DEMAND, CONTRACT. The daily quantity of gas the supplier agrees to furnish and the buyer agrees to buy, under a specific contract.

DEMAND DAY. The 24-hour period specified by a supplier-user contract for purposes of determining the purchasers' daily quantity of gas used (e.g., 8 a.m. to 8 a.m.). This term is used primarily in pipeline-distribution company agreements. It is similar to and normally coincides with the distribution company's "send-out" day.

DEPLETION. As applied to natural gas-producing land, the loss in service value incurred in connection with the exhaustion of the natural resource in the course of service.

DESIGN DAY. A 24-hour period of the greatest theoretical gas demand, used as a basis for designing gas purchase contracts, and/or production facilities, and/or delivery capacity.

DESIGN DAY AVAILABILITY. The amount of each type of gas arranged to be available on the design day and the maximum combination of such supplies. (In the case of purchased natural gas, the maximum day allocation, maximum day contract quantity, or FPC authorization.)

DESIGN DAY TEMPERATURE. The mean temperature assumed for the Design Day.

DESTRUCTIVE DISTILLATION. Decomposition of a material by heat and simultaneous distillation of volatile products, e.g., the destructive distillation of coal to form coke, coal tar, and other liquid and gaseous products.

DEVELOPMENT COSTS. With respect to hydrocarbons, include all costs in the reworking of hydrocarbon deposits for commercial production, including development well drilling costs. (FPC)

DIFFUSION. The spontaneous mixing of one substance with another. Any gas or mixture of gases will diffuse into others.

DIRECT FLAME PROCESS GAS. Gas use for which alternate fuels are not technologically feasible, such as in applications requiring precise temperature controls and precise flame characteristics for those customers who have contracted for service under specific rate schedules applicable only to this class of service. (For FPC definition, see PROCESSING GAS.)

DISPENSING STATION. Those retail sales outlets that sell less than 15,000 gallons per year and sell or fill only bottled propane.

DISPERSION. System of minute particles (solid, liquid, or gaseous) distinct and separate from one another and suspended in a liquid, gaseous, or solid medium, e.g., smog.

DISSOLVED NATURAL GAS. See GAS, NATURAL.

DISTILLATE FUEL OILS. Fuel oils produced by distillation as distinguished from RESIDUAL FUEL OILS, which are left from the refining process.

DISTILLATION. The process of vaporizing a liquid and collecting the vapor, which is usually condensed to a liquid, a distillate. Gasoline, kerosene, fuel oil, and lubricating oil are produced from petroleum through distillation.

DISTRIBUTION. The process of distributing gas from the city gate or plant to the ultimate consumers.

DISTRIBUTION COMPANY, GAS. A company that obtains the major portion of its gas operating revenues from the operation of a retail gas distribution system, and that operates no transmission system other than incidental connections within its own system or to the system of another company.

DISTRIBUTION SYSTEM. The gas mains provided primarily for distributing gas within a distribution area, together with land, structures, valves, regulators, services, and measuring devices, including the mains for transportation of gas from production plants or points of receipt, located within such a distribution area to other points therein. The distribution system owned by companies having no transmission facilities connected to such distribution systems begin at the inlet side of the
distribution system equipment that meters or regulates the entrance of gas into the distribution system and ends with and includes property on the consumer's premises. For companies that own both transmission and distribution facilities on a common line, the distribution system begins at the outlet side of the equipment that meters or regulates the entrance of gas into the distribution system and ends with and includes property on the consumer's premises. The distribution system does not include storage land, structures, or equipment. (FPC)

DRILLING-MUD WEIGHTING MATERIALS. Class name for materials added to drilling mud to control gas, oil, water, formation pressures and to aid in maintaining walls of the open hole.

DRY NATURAL GAS. See GAS, NATURAL.

DUTY AUTHORIZED REPRESENTATIVE. A person designated to appear before the FEA or a State office in connection with a proceeding on behalf of a person interested in or aggrieved by that proceeding. Such appearance may consist of the submission of applications, petitions, requests for reconsideration of a decision, or other documents, or of a personal appearance, verbal communication, or any other participation in the proceedings. (FEA)

ELIGIBLE PRODUCTS. Residual fuel oil, No. 2 heating oil and No. 2 D diesel fuel imported into the United States, except that import into United States customs territory from United States possessions, territories or foreign trade zones shall not be considered eligible products. (FEA)

EMERGENCY SERVICES. Law enforcement, fire fighting, and emergency medical services.

ENRICHING. Increasing the heat content of a gas by mixing with it a gas of higher Btu content. An example is CARBURETED WATER GAS.

ESSENTIAL HUMAN NEEDS. Hospitals, nursing homes, orphanages, prisons, sanitariums; gas used for water and sewage treatment, and boarding schools, where raw material for its chemical properties in creating an end product, including atmospheric generation. A variety of distillation that always involves the use of a fractionating column, and is characterized by a purposely added substance that modifies the vaporization characteristics of the materials undergoing separation, to make them easier to separate. (See also FRACTIONAL DISTILLATION.)

EXCHANGE GAS. Gas that is received from (or delivered to) another party in exchange for gas delivered to (or received from) such other party.

EXEMPTION. The release from the obligation to comply with any part or parts, or any subparagraph, of an FEA regulation. (FPA)

EXPLOSIVE LIMITS. The lowest (lower limit) and highest (upper limit) concentration of a specific gas or vapor in mixture with air that can be ignited at ordinary temperature and pressure of the mixture. Also called combustible limits or flammable limits.

EXTRACTIVE DISTILLATION. A variety of distillation that always involves the use of a fractionating column, and is characterized by a purposely added substance that modifies the vaporization characteristics of the materials undergoing separation, to make them easier to separate. (FPA)

FEDERAL ENERGY ADMINISTRATION (FEA). An agency of the United States Government created by the Federal Energy Administration Act of 1974 (P.L. 93-275) and includes the FEA National Office and Regional Offices.

FEDERAL POWER COMMISSION (FPC). An agency of the United States Government that has jurisdiction over the natural gas companies that sell or transport gas for resale in interstate commerce. With respect to the gas industry, the general regulatory principles of the FPC are defined in the Natural Gas Act, as amended.

FEEDSTOCK GAS. Natural gas used as raw material for its chemical properties in creating an end product, including atmospheric generation. For those customers who have contracted for service under specific rate schedules applicable only to this class of service. (See also PETROCHEMICALS as well as associated articles.)

FIELD PRICE. The price paid for natural gas at the wellhead or outlet of a central gathering point in a field.

FIRM REQUIREMENTS. Volumes of gas that make up the contractual obligations of interstate pipelines for sale to direct consumers and to gas utilities for resale. These requirements are determined from an historical base period, usually between 1968 and 1973 and are adjusted each year for load growth.

FIRM SERVICE. Services from schedules or contracts under which the seller is expressly obligated to deliver specific volumes within a given time period and which anticipates no interruptions, but which may permit unexpected interruption in case the supply to higher priority customers is threatened. (FPC)

FLARING. The burning of natural gas for the purpose of safe disposal.

FLASH BACK. The burning of gas in the mixing chamber of a burner, or in a piping system, usually due to an excess of primary air or too low a velocity of the combustible mixtures through the burner port.

FLASH DISTILLATION. Distillation in which an appreciable proportion of a liquid is quickly converted to vapor in such a way that the final vapor is in equilibrium with the final liquid.

FLASH POINT. The temperature at which a liquid gives off a vapor sufficient to form an ignitable mixture with the air near the surface of the liquid.

FORMALDEHYDE (HCHO). A readily polynuclear flammable gas that has a strong, pungent odor and is soluble in water and alcohol, derived from the oxidation of synthetic methanol or low-boiling petroleum gases, such as propane and butane. It is used in making resins; ethylene glycol; fertilizers; dyes, medicine (disinfectant, germicide); emulsifying fluids; preservatives; hardening agents; reducing agents.

FRACTION. Any portion of a mixture characterized by closely similar properties. The most important fractions of petroleum are naphtha, gasoline, fuel oil, kerosene, and tarry or waxy residues. These are obtained by fractional distillation.

FRACTIONAL DISTILLATION. Distillation in which rectification is used to obtain a product as nearly pure as possible. A part of the vapor is condensed and the resulting liquid contacted with more vapor, usually in a column with plates or packing.

FRAXURING, HYDRAULIC. A method of inducing flow in oil wells by injecting water or brine under pressure into the oil-bearing strata. The viscosity of the water is often increased by adding gelling agents such as guar gum, cellulose derivatives, or polyacrylamides.

FUEL OIL. A liquid petroleum product burned in a furnace for the generation of heat, or used in an engine for the generation of power, except oils having a flash point below 100°F. and oils burned in cotton or woolen burners. The oil may be a distillate fraction of petroleum, a residue from a refinery operation, a crude petroleum, or a blend of two or more of these. Because fuel oils are used with burners of various types and capacities, different grades are required. (See also NO. 1 DIESEL FUEL: NO. 1 HEATING OIL; NO. 2 DIESEL FUEL; NO. 2 HEATING OIL; BUNKER FUELS; DISTILLATE FUEL OIL: LIQUID AND RESIDUAL FUEL OILS.)

FURNACE BLACK. See CARBON BLACK.

GALLON. A unit of liquid measure. The U.S. gallon contains 231 cubic inches or 8.3359 pounds avoirdupois of distilled water at its maximum density and with the barometer at 30 inches.

GAS, CASINGHEAD. A very volatile gas extracted from the "wet" natural gas companying oil as it comes from the well. The chief components are the low-boiling liquid hydrocarbons, such as pentane and hexane, together with smaller amounts of lower- and higher-boiling components.

GAS, FLUE. The gases from the fire (before the draft hood or draft regulator) or products of combustion and excess air consisting principally of carbon dioxide, carbon monoxide, and nitrogen.

GAS, HYDRATE. A saltlike compound, crystalline solids insoluble in water, formed by a gas and water. The best
known gas nitrates are those of ethane, ethylene, propane, and isobutane.

GAS, LIQUEFIED PETROLEUM (LPG). A colorless, noncorrosive, nontoxic, compressed or liquified hydrocarbon gas obtained as a by-product in petroleum refining or natural gas manufacturing. LPG usually consists of pure propane or a 50:50 mixture of propane and butane containing both normal and isobutanes. It is used as a domestic and industrial fuel; automotive fuel; welding, brazing, and metal cutting.

GAS, MANUFACTURED. A gas obtained by destructive distillation of coal, or by the thermo decomposition of oil, or by the reaction of steam passing through a bed of heated coal or coke. Examples are COAL GAS or coke oven gases, PRODUCER GAS, BLAST FURNACE GAS, "blue" WATER GAS, CARBURETED WATER GAS. The Btu content varies widely.

GAS, MIXED. See MIXED GAS.

GAS, NATURAL. A naturally occurring mixture of the low molecular weight paraffin series hydrocarbons METHANE, ETHANE, PROPANE, and BUTANE, with small amounts of higher hydrocarbons, and fre

GAS, OIL. See OIL GAS.

GAS, PROCESSING PLANT. A facility that recovers ethane, propane, butane, and other natural gas products by a process of absorption, adsorption, compression, refrigeration cycling, or a combination of such processes, from mixtures of hydrocarbons that existed in a reservoir. (FEA)

GAS STATION. A place where gas is received into and transported through any part of the transmission system under a transportation tariff.

GATHERING STATION. A place where gas is gathered from underground gas storage or a producing natural gas field and inserted into the pipeline transmission system for distribution.

HEAT, LATENT. Change in heat content of a substance when its physical state is changed without a change in temperature.

HEATING VALUE. The amount of heat produced by complete combustion of a unit quantity of fuel.

HOLDER, GAS. A gas-tight receptacle or container in which gas is stored for future use.

HYDROCARBON. An organic compound containing only elements of hydrogen and carbon. The simplest and lightest of hydrocarbons are gaseous, the greater molecular weight of hydrocarbons are liquids, and those of even greater weight are solids. Hydrocarbons are derived principally from petroleum, coal tar, and vegetable sources.

HYDROCARBON, LIQUID. A gas liquid that is one of a group of hydrocarbon products derived from natural gas or petroleum (ethane, propane, iso- and normal butane, and natural gasoline.) Light hydrocarbons are produced largely in southwestern Texas and Louisiana and are used as feedstocks for a variety of organics. (See also GAS, LIQUEFIED PETROLEUM.)

HYDROFINING. A petroleum refining process in which a limited amount of hydrogenation converts the sulfur and nitrogen content in a petroleum fraction to form hydrocarbons in which they can be easily removed. Desulfurization, ultratining, and catining have a similar meaning.

HYDROFORMING. The use of hydrogen in the presence of heat, pressure, and catalysts (usually platinum) to convert petroleum hydrocarbons to molecular structures giving high-octane gasoline for automobiles and airplanes.

HYDROGEN. The lightest chemical element which as a gas is very slightly soluble in water, alcohol, and ether, which is nontoxic and noncorrosive. It is used in producing synthetic ammonia and synthetic methanol; refining petroleum; hydrogenating organic materials; a reducing agent for organic synthesis and metallic ores; as oxyhydrogen flame for high temperatures; atomic hydrogen welding; making hydrochloric and hydrobromic acids; and the production of high purity metal.

HYDROGENATION. The chemical combination of hydrogen with another substance, usually as unsaturated organic compound, by means of heat, pressure, and catalysts. It is widely used in the edible oil and petroleum industries.

ILLUMINANTS. Hydrocarbons other than methane present in carburated water gas and similar gases. It includes mainly thylene and the lower olefin and aromatic hydrocarbons, as well as ethane and higher paraffin hydrocarbons, and usually any aromatic, olefin, or cyclic hydrocarbons soluble in fuming sulfuric acid as used in absorption gas-analysis procedures.

IMPORTER. Any firm (excluding the Department of Defense) that owns at the first place of storage any allocated product or crude oil brought into the United States. (FEA)
INDEPENDENT. In the oil industry, usually refers to a nonintegrated producing company. The independent producer has operations only in the field of petroleum production, as a rule.

INDUSTRIAL USE. Usage by those firms primarily engaged in a process which creates or consumes raw or unfinished materials into another form or product. (See also CLASS OF SERVICE.)

INTEGRATED COMPANY. A company which obtains a significant portion of its gas operating revenues from the operation of both a retail gas distribution system and gas transmission system. An integrated company usually operates production, transportation, refining, and marketing facilities.

INTERRUPTIBLE CUSTOMERS. Those purchasers receiving an allocated product pursuant to a contract that can be abrogated unilaterally by the supplier.

INTERRUPTIBLE NATURAL GAS. Volumes of gas sold to some ultimate customers under a contract that allows the supplier to cut off the supply whenever the demand of the noninterruptible customers exceeds a certain value (usually as a result of severe cold weather).

ISOPENTANE ((CH3)2CHCH2CH3). A colorless, highly flammable, pleasant smelling liquid, soluble in hydrocarbons, oils and alcohol, but not in water. Isopentane, produced by FRACTIONAL DISTILLATION of petroleum, is used in solvents, the manufacture of chlorinated derivatives, and as a blowing agent for polystyrene.

LICENSEE. Any person, or State, licensed under the provisions of the Federal Power Act and subject to the commission’s accounts and reporting requirements under the terms of the license (FPC).

LINE PACK, GAS DELIVERED FROM. That volume of gas delivered to the market, supplied by the net change in pressure in the regular system of mains, transmission, and/or distribution. For example, the change in the content of a pipeline brought about by the deviation from steady-state flow condition.

LIQUEFIED NATURAL GAS (LNG). See GAS, NATURAL.

LIQUEFIED PETROLEUM GAS (LPG). See GAS, LIQUEFIED PETROLEUM.

LIQUIDS, NATURAL. See NATURAL GAS.

LOAD. The amount of gas delivered or required at any specified point or points on a system, load originates primarily at the gas consuming equipment of the customer. A load is the amount of gas, over a given pressure at the rate of gas flow through the governing valves.

LOAD FACTOR. The ratio of the average requirement to the maximum requirement for the same time period, as one day, or one hour.

LP GAS—AIR MIXTURE. Liquidated petroleum gases distributed at relatively low pressures and normal atmospheric temperatures which have been diluted with air to produce desired heating value and utilization characteristics.

MERCHANT STORAGE FACILITY. Any facility utilized to store propane for use other than the owner or operator of such a facility.

METER RATES. See RATES, METER.

METHANE (CH4). The first member of the paraffin series of hydrocarbons (also known as "marsh gas" and methyl hydrate); a colorless, odorless, tasteless, and flammable gas. Pure methane has a heating value of 1010 Btu per cubic foot and liquefies at -259°F. It is the lightest and the chief constituent of natural gas and of marsh gas; a major component of coal gas; and is present to some extent in coal mines.

Methane is used as a source of petrochemicals by conversion: (1) hydrogenation for carbon monoxide by steam partial oxidation. Important products are methanol, acetylene, hydrogen cyanide. Chloration gives tetrachloride, chloroform, methyl chloride and ethylene. In the form of natural gas, methane is used as a fuel and is also a source of carbon black.

METHANOL (CH3OH). A clear, colorless, volatile, flammable, poisonous liquid (also known as methyl alcohol and "wood alcohol"), soluble in water, alcohol, and ether. It is produced from (1) high pressure catalytic synthesis from carbon monoxide and hydrogen; or from carbon dioxide and hydrogen; (2) partial oxidation of hydrocarbons; and (3) purification of the pyrolysis acid resulting from the destructive distillation of wood. Methanol is used in organic synthesis; automobile antifreeze; formaldehyde production; denaturing ethyl alcohol; regent solvents, paint removers and varnish solvent; and chemical production. A dehydrator for natural gas; and fuel compositions used for heating and illumination.

MIDDLE DISTILLATE. Any derivatives of petroleum, including kerosene; home heating oil, range oil, stove oil, and diesel fuel, with a 50 percent boiling point in the ASTM D396 standard distillation test falling between 371° and 700°F. Products specifically excluded from this definition are kerosene-base and naphtha-base jet fuel, heavy fuel oils as defined in VV-F-815C or ASTM D 396, grades 7, 8, and 9; intermediate fuel oils (which are blends containing ≤6% oil), and all specialty items such as solvents, lubri-
cants, waxes, and process oil.

MINIMUM BILL CLAUSE (MINIMUM CHARGE). A clause in a rate schedule that provides that the charge for a prescribed period shall not be less than a specified amount.

MIXED GAS. A gas or mixture of natural or liquefied petroleum gas (except where the natural or liquefied petroleum gas is used only for commercial reforming) in such a manner that the resultant product has a heating value higher than that previously produced by the unit to the time of the introduction of natural or liquefied petroleum gas.

NAPHTHA. (1) A flammable, volatile, oily liquid produced by fractional distillation of petroleum, used as a solvent for various cracking processes of gasoline, special naphtha, petroleum chemicals, especially ethylene (the latter in turn producing propylene, butadiene, pyrolysis gasoline, and fuel oil). (2) Any of several flammable, volatile liquids produced by distillation of coal tar, wood, coal, and other carbonaceous materials.

NATURAL GAS. See GAS, NATURAL.

NATURAL GAS ACT OF 1938. A Federal law giving the Federal Power Commission jurisdiction over companies engaged in interstate sale or transportation of natural gas.

NATURAL GAS LIQUIDS. See GAS, NATURAL.

NATURAL GASOLINE. See GASOLINE, NATURAL.

NEOPENTANE (C(CH3)2) or (CH3CH2CH2CH3). A hydrocarbon present in small amounts in natural gas. It can take the form of either a colorless gas or a very volatile liquid which is soluble in alcohol but not in water. Neopentane is used in research and butyl rubber.

NEW GAS. Gas being made available for the first time by a contract of purchase and sale.

NONASSOCIATED NATURAL GAS. See GAS, NONASSOCIATED.

NONBRANDED INDEPENDENT MARKETING. A firm engaged in the marketing or distribution of refined petroleum products, who is (1) not a refiner, (2) not a firm that controls, is controlled by, is under common control with, or is affiliated with a refiner (other than by means of a supply contract), and (3) not a branded independent marketer. (FEA)

NO. 1 DIESEL FUEL. Diesel fuel grade No. 1 as defined in the American Society for Testing and Materials (ASTM) D975-71.

NO. 1 HEATING OIL. Heating oil grade No. 1 as defined in the American Society for Testing and Materials (ASTM) D396-71.

NO. 2 DIESEL FUEL. Diesel fuel grade No. 2 as defined in the American Society for Testing and Materials (ASTM) D975-71.


NO. 4 DIESEL FUEL. Diesel fuel grade No. 4 as defined in the American Society for Testing and Materials (ASTM) D975-71.

NO. 4 HEATING OIL. Heating oil grade No. 4 as defined in the American Society for Testing and Materials (ASTM) D396-71.

NONFIRM GAS. Gas that is not required to be delivered nor required to be taken under the terms of a gas purchase contract.

ODORANT. A substance with a distinctive, sometimes unpleasant, odor deliberately added to essentially odorless natural gas to provide warning of their presence. For example, mercaptan derivatives may be added to natural gas for this purpose.

OFF-PEAK SERVICE. Service made available on special schedules or contracts on
example, the cracking of petroleum produces ethylene, which, in turn, converts to ethylene glycol, a typical petrochemical. The term is applied also to chemicals produced from other sources as well as from petroleum. (Ammonia is referred to as a petrochemical, because the hydrogen used to form the ammonia is a product of petroleum refining.) These synthetic fertilizers are considered to be petrochemicals. Another example is butadiene, which is made from a variety of other sources as well as petroleum. At least 175 substances are designated as petrochemicals including alkene, naphtha, toluene, and aromatic hydrocarbons (methane, propane, ethylene, propylene, butanes, cyclohexane, ethene, toluene, naphtha, etc., their derivatives, even though they are not commercial production of origin other than petroleum.

**Pentane (CH₃CH₂CH₃).** A colorless, mobile, flammable liquid, soluble in hydrocarbons, nitriles, and ether, not in water. It is produced by fractional distillation of petroleum and purified by rectification. As one of the heavier, more highly condensed hydrocarbons, it is already liquid at atmospheric pressure and has a higher boiling point than the lighter hydrocarbons, i.e., methane, ethane, propane, and butane. Pentane is used in anesthetics; artificia-l respiration; as a refrigerant; and in solvents.

***PETROCHEMICALS.*** Chemical compounds for which petroleum or natural gas has served as the ultimate raw material. For example, the cracking of petroleum produces ethylene, which, in turn, converts to ethylene glycol, a typical petrochemical. The term is applied also to chemicals produced from other sources as well as from petroleum. (Ammonia is referred to as a petrochemical, because the hydrogen used to form the ammonia is a product of petroleum refining.) These synthetic fertilizers are considered to be petrochemicals. Another example is butadiene, which is made from a variety of other sources as well as petroleum. At least 175 substances are designated as petrochemicals including alkene, naphtha, toluene, and aromatic hydrocarbons (methane, propane, ethylene, propylene, butanes, cyclohexane, ethene, toluene, naphtha, etc., their derivatives, even though they are not commercial production of origin other than petroleum.
utility is permitted to earn a specified rate of return.

RATES, METER. The term is applicable to any method of charge for gas service based solely upon quantity, such as MCF or therms used.

BLOCK. Indicates that a certain specified price per unit is charged for all or any part of a block of such units, and reduced prices per unit are charged for all or any part of succeeding blocks of such units, each such reduced price per unit applying only to a particular block of units and to that part of the consumption in the block.

STEP. Indicates that a certain specified price per unit is charged for the entire consumption, the rate or price depending on the particular step within which the total consumption falls.

STRAIGHT-LINE (FLAT). Indicates that the prices charged per unit remain the same, i.e., does not vary with the number of units.

RECYCLING. The repetition of a particular process; the return of a stream or part of a stream to a previous process or location for additional recovery of the desired components.

REFINED PETROLEUM PRODUCT. Gasoline, kerosene, male distillate (including No. 2 fuel oil), LPG, refined lubricating oils, or diesel fuel. (FEA)

REFINERIES. Those industrial plants, regardless of capacity, processing crude oil feedstock and manufacturing refined petroleum products, except when such plant is a petrochemical plant. (LEA)

REFINERY GAS. A mixture of hydrocarbon gases (often together with some sulfur compounds) produced in large scale cracking and distilling crude oil and its heavy derivatives during refinery operations and used as a source of raw material for petrochemicals, high octane gasoline, and organic synthesis of chemicals.

REFINING. Essentially a distillation process whereby undesirable components are removed from various types of mixtures to give a concentrated and purified product. It includes not only fractional distillation of crude oil to naphtha, low-octane gasoline, kerosine, fuel oil, and asphalts, but also the processes involved in thermal and catalytic cracking, hydroforming, reforming, etc., and the production of high-octane gasoline (also called HYDROFORMING).

REFORMED GAS. A term applicable to gas transformed by suitable treatment, the term being applied to gas treated so as to produce a gas possessing position of by-products and in position of high heat value gas, such as natural gas or oil refined. The steam separators, carbon filters, etc., the steam medicines, carbon filters, etc., are other advantages. Carbon dioxide water apparatus is often used for reforming natural gas and oil gas.

REFORMING. A chemical process using heat to bring about a substance into desired components.

REGULATOR, PRESSURE. A device that maintains the pressure in a fluid flow line, less than its inlet pressure within a constant band of pressure, regardless of the rate of flow in the line or the change in upstream pressure.

REMEDIAL ORDER. A directive issued by FEA requiring a person to cease a violation or to eliminate or to compensate for the effects of a violation, or both. (FEA)

REPRESSURING. Forcing gas, under pressure, into the oil reservoir in an attempt to increase the recovery of crude oil; also done with water.

RESELLER. A firm (other than a refiner or retailer) or that part of such a firm which carries on the trade or business of purchasing petroleum products and re-selling them without substantially changing their form to purchasers other than ultimate consumers.

RESERVES, ENERGY. The bank of natural resources, such as natural gas, natural gas liquids, petroleum, coal, limited or non-renewable energy available from water power.

ESTIMATED POSSIBLE NATURAL GAS RESERVES. An estimate of the ultimate finding of natural gas in a specified area, whether or not presently considered proved or recoverable.

ESTIMATED PROVED RECOVERABLE NATURAL GAS RESERVES. An estimate of natural gas producible from tested reservoirs under present technology, including gas in underground storage, remaining reserves in gas and in those underground portions of proven fields where its productivity is considered assured by the known field geology.

RESIDENTIAL USE. Direct usage in a residential dwelling or church or other place of worship for space heating, re-lighting, water heating; and the like.

RESIDUAL OILS. Also known as asphaltum oil, liquid asphalt, black oil, flux oil, petroleum tars, and residuum. For allocation purposes FEA classifies the following fuel oils as "residual fuel oils": (1) No. 4, No. 5, and No. 6 fuel oils; (2) Bunker C; and (3) Navy Special Fuel Oil. Birds in Bunker C when burned are burned directly as a fuel, and all other fuel oils that have a 50 percent boiling point over 70° F. in the ASTM D-86 standard distillation test. See also BY-PRODUCTS.

RESIDUALS. See BY-PRODUCTS (RESIDUALS).

RESINOL. A coal-tar distillation fraction containing resins. It is the fraction obtained by boiling heavy residue in light petroleum, obtained by solvent extraction of low temperature tar or similar materials.

RULING. An official interpretive statement of general applicability issued by the FEA General Counsel and published in the Federal Register that applies the FEA regulations to a specific set of circumstances.

SANITATION SERVICES. The collection and disposal for the general public of solid wastes, whether by public or private entities, and the maintenance, operation, and repair of liquid purification and waste facilities during emergency conditions. Sanitation services also include the provision of water supply services by public utilities, whether privately or publicly owned or operated. (FEA)

SATURATION, APPLIANCE OR CUSTOMER. The number of specified appliances, or uses, divided by the basic units or total potential of the universe involved, i.e., Gas Heating Saturation related to customers in the total number of customers, or space heating divided by the total number of customers.

SCRUBBING. Process for removing one or more components (usually impurities) from a mixture of gases and vapors by its passage upward and usually countercurrent to and in intimate contact with a stream of descending liquid, the latter being chosen so as to dissolve the desired components and not others. The gas or vapor may be broken into fine bubbles upon entering a tower filled with liquid, but more frequently the tower is filled with coke, broken stone or other packing, over which the liquid flows while exposing a relatively large surface to the rising gas or vapor.

SEASONAL GAS. Gas sold during certain periods of the year. It may be sold either on a firm or an interruptible basis.

SECONDARY AIR. The air for combustion externally supplied to the flame at the point of combustion.

SECONDARY PRODUCTION OR RECOVERY. Oil and gas obtained by the augmentation of reservoir energy, often by the injection of air, gas, or water into a production formation.

SENDOUT GAS. Total gas produced, purchased (including exchange and reverts), or net withdrawn from underground storage within a specified time interval, measured at the point(s) of production and/or purchase, and/or with, the price, adjusted for changes in location or storage quantity. It comprises gas, exchange, deliveries, gas used by companies and unaccounted-for gas.

SENDOUT MAXIMUM DAY. The greatest actual sendout occurring in a specified 24-hour period.

SENDOUT MINIMUM DAY. The smallest actual sendout occurring in a specified 24-hour period.

SERVICE AREA. Territory in which a utility system is required or has the right to supply gas service to ultimate customers.

SERVICE LIFE. The time between the date the gas plant is in service or leased to others and the date of its retirement. A depreciation is accounted for on a production basis rather than on a time basis, then service life should be measured in terms of the appropriate unit of production. (FPC)

SERVICE VALUE. The difference between original cost and net salvage value of a gas plant. (FPC)

SHORTFALL. The actual deficiency in the supply of natural gas resulting from a curtailment. The shortfall is determined from the current actual demand by the end-users and includes, beyond the conventional deliveries by interstate pipelines, the available supplemental supplies in
natural gas and the utilization of alternate fuels. Thus the shortfall will in general be smaller than the administratively determined curtailment.

SHRINKAGE, NATURAL GAS. The reduction in volume of wet natural gas due to the extraction of some of its constituents, such as hydrocarbon products, hydrogen sulfide, carbon dioxide, nitrogen, helium, and water vapor.

SOUR NATURAL GAS. See GAS, NATURAL.

SPECIAL PRODUCTS. Gasoline, No. 2 heating oil, and No. 2-D diesel fuel. (FEA)

STATE OFFICE. A State Office of Petroleum Allocation certified by the FEA. (FEA)

STATE SET-ASIDE. With respect to a particular prime supplier, the amount of an allocated product made available to the State at a price that the prime supplier estimates will be sold to the State for sale to the ultimate consumer. See also STATE OFFICE, STATE SET-ASIDE.

STORAGE, BURIED PIPE. A system of storage in specially designed high-pressure pipe sections or bottles capable of storing natural gas at pressures near or equal to the pressure of maximum supercompressible. Not storage in ordinary steel pipe.

STORAGE, CAPACITY, PREVAILING. The amount of gas stored at any time in underground storage reservoirs. See also STORAGE, CAPACITY, ULTIMATE.

STORAGE, UNDERGROUND. See STORAGE, CAPACITY, ULTIMATE.

STORAGE, LOCAL. The storage facilities, other than underground storage, that are an integral part of a distribution system, i.e., on the distribution side of the city gate, whether for manufactured, mixed, natural, liquefied petroleum, or liquefied natural gas.

STORAGE MAINS. Those mains used primarily for injection and withdrawal of gas to and from underground storage.

STORAGE, UNDERGROUND. The utilization of subsurface facilities for storing gas that has been transferred from its original location for the primary purposes of (1) balancing, fuller utilization of pipeline facilities, and more effective and economic delivery to markets. The facilities are usually natural geological reservoirs such as depleted oil or gas fields, or water-filled sands sealed off by an impermeable cap rock. In some cases, they may be man-made or natural caverns.

CURRENT GAS. The total volume of gas in a storage reservoir in excess of the cushion gas.

CUSHION GAS. The total volume of gas that must be maintained for delivering gas during an output cycle.

EXTERNAL GAS. That volume of gas not indigenous to the storage reservoir.

FOREIGN GAS. Extrinsic gas.

NATIVE GAS. The total volume of gas indigenous to the storage reservoir at the time the gas storage started.

NON-CURRENT GAS. That part of the gas in underground storage containing the cost of which is included in the Utility Plant. This accounting figure may not be the same as Cushion gas, one reason for the difference being that some of the Cushion gas may not be capitalized.

STORED GAS. See EXTERNAL GAS above.

TOP GAS. See Current Gas above.

TURNOVER GAS. The total volume of stored gas available for delivery from a storage reservoir during one output cycle.

ULTIMATE RESERVOIR CAPACITY. The maximum volume of gas that could be contained in an underground gas reservoir when it is developed to its maximum pressure permitted by geological configuration of the reservoir.

WELL GAS. See CURRENT GAS above.

WINTER GAS UTILITY. A company that sells the major portion of its total supply revenue from gas operations.

COMBINATION UTILITY AND SUPPLEMENTAL GAS. See GAS, NATURAL.

SUBSTITUTE NATURAL GAS. See GAS, NATURAL.

SUPPLEMENTAL GAS. See GAS, NATURAL.

SOUR NATURAL GAS. See GAS, NATURAL.

SYNTHETIC GAS. Any mixture of carbon monoxide and hydrogen, usually intended for use for catalytic conversion to hydrocarbons, alcohols, or hydrogen gas. The hydrogen and carbon monoxide may be in various proportions; the production may be by high temperature reaction of steam on carbon monoxide, by partial oxidation of hydrocarbons, or by other processes. See GAS, NATURAL.

SYNTHETIC NATURAL GAS PLANT. A plant having synthetic natural gas wells from the manufacture, conversion, and distribution of petroleum hydrocarbons which may be easily substituted for or interconnected with pipeline natural gas.

TARIFF. A published schedule of rates and the general terms and conditions for which a product or service will be supplied.

THERMAL VALUES. The amount of heating value equal to the basic thermal units (Btu).

THERMAL BLACK. See CHANNEL BLACK.

TOTAL SUPPLY. The sum of a supplier's estimated production, including amounts received under processing agreements, imports, purchases, and any reduction in inventory of an allocated product made pursuant to 10 CFR, 211.17 except as otherwise ordered by FEA. Any existing inventory, or production, importation, or purchase of an of made product used to increase that inventory consistent with the provisions of 211.17 shall not be included in the total supply of that product.

TRANSPORTATION SYSTEM. The land, structures, mains, valves, meters, boosters, regulators, tanks, compressors, and other equipment used for the transportation of gas from a production plant, delivery point of purchased gas, gathering system, storage area, or other wholesale source of gas, to one or more distribution areas. The transmission system begins at the outlet side of the valve at the connection to the last equipment in a manufacturing gas plant, the connection to gathering lines to delivery point of purchased gas, and includes the equipment at such connection that is used to bring the gas to transmission pressure, and ends at a manifolded collection system of equipment which meters or regulates the entry of gas into the distribution system or into a storage area. It does not include storage tanks, structures, or equipment. Pipeline companies, including those companies that measure deliveries of gas to their own distribution systems, include city gate and main industrial measuring and regulating stations in the transmission function, (FPC).

UTILITY. A facility that generates electricity by any means, and sells it to the public. (FEA). (See also COMBINATION UTILITY AND STRAIGHT GAS UTILITY.)

VENTING. Also referred to as “blowdown.” (1) Clearing gas from a pipeline by blowing it into the atmosphere. (2) A pipe or valve used to vent gas to the atmosphere. (3) A procedure whereby gas pressure is reduced intentionally in a section of the line by venting the accumulation of gas which is accumulated by the opening of valves and closure fittings provided in each block of equipment.

WATER GAS. A fuel gas, also known as “blue gas” or blue water gas, made by composing steam by passing it over a bed of coke. The gas is used for fuel, and for gasification. It is characterized by its high hydrogen content, and is used for various industrial and power production purposes.

WELLHEAD. The assembly of fittings, valves, and control locations at the surface and connected to the flow lines, tubing, and casing of the well in order to control the flow from the reservoir.

WET NATURAL GAS. See GAS, NATURAL.

WOOD GAS. See GAS, WOOD.