

rate base approach. This, combined with staff attitude which seems to be very negative with regard to the industry and its former regulator, means the industry faces some trying and potentially damaging times in the near future. Hopefully, the general rate making procedures will be developed on a factual basis and not an emotional one. It is obvious the financial viability of a critical industry is at stake.

The second area of government activity which I said I would discuss is that of ownership of oil pipelines. For several years there have been various administrative and legislative assaults on the ownership of oil pipelines by vertically integrated oil companies. The substantial majority of existing pipelines have just such an ownership. While the Justice Department and some members of Congress have been advocates of divestiture in the past, the banner is currently being carried by the FTC. The FTC has asked for public comments and appears to be moving forward on a thesis which presumes divestiture is warranted. The issues here are whether or not ownership of oil pipelines gives "shipper-owners" unfair advantages in the marketplace through either unreasonably high pipeline earnings or by control of access to those markets. The proponents of divestiture have proposed several theories to support their position but have presented no facts to support those theories. Once again, choices are available to us and once again they must be made on a factual and not an emotional basis. It would come as no surprise if I said our nation's energy supply is becoming increasingly tenuous. As the supply of petroleum is limited to the point that it equals or surpasses demand the elasticity is removed from the logistics system. The refining capacity in this country is concentrated in a limited geographic area and in turn serves a broad geographic area. This obviously requires an extensive distribution network which, for the most part, consists of pipelines. The logical question one might ask regarding the existing pipeline network is why should the tightening of supplies have any impact. The answer is fairly simple. Historic supplies have allowed sufficient inventories to be carried in the ultimate distribution areas to allow pipeline capacity to be designed at essentially average annual throughput rates with the storage accommodating the winter demand peaks for middle distillates and the summer demand peaks for gasoline. Because of the broad geographic areas served by our refining centers they must concentrate an increasing percentage of the inventory at the refinery origin as the overall inventory levels decline. In effect the pipelines are being asked to accommodate current demand on a current basis. In many cases this requires capacity increases and much wider fluctuations in month to month capacity demands.

Without question, the level of general business uncertainty in the energy area is as high as it has been in the modern history of our country. With in excess of 50% of our petroleum needs being supplied by foreign countries over which we have no control and, in many cases, little influence, the supply picture is very unclear. With nothing other than these fundamental supply/demand questions to be faced, it is obvious the oil pipeline business would be faced with making investment and operating decisions in an even higher risk environment than has been the case for the past 30 years.

Now we move to the point which I feel is the crux of the issues I just outlined. What is the current impact of these issues and what is the range of future impacts on the industry.

When you superimpose the unanswered questions of, What is my real earnings potential even assuming I realize the volume of traffic I anticipate? and Will I be able to retain ownership of this property even if I make the investment? On the substantially increased levels of normal business risk growing out of the uncertain supply situation the impact on the industry is predictable. Investments will be minimized, if made at all, and even those that are made may require business needs external to the basic transportation system to support them.

The question I pose to this group today is, At this critical point in our country's history can we afford to chill an industry that plays such a vital role in helping meet our nation's critical energy needs? It seems to me the answer is no. This is an industry with a proud history of innovation and one which I am confident can rise to meet our nation's needs if it is allowed to do so. But it is also one whose very roots are being threatened. The time to make the choice is now.

A COAL SLURRY PIPELINE

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Twenty years ago Florida Gas began the transportation of natural gas to Florida and remains today as the only major gas transmission company supplying Florida. One of the major factors justifying the construction of the Florida Gas system was the availability of a plentiful supply of cheap natural gas which could be supplied to the Florida electric utilities as well as to industry and for domestic use. Another key factor that made the Florida Gas system possible was the contractual commitments from the electric utilities to transport their gas needs over long periods of time. The pipeline system was expanded over its first ten years as the demand for natural gas grew.

In the early 1970's the demand for natural gas began to exceed the new discoveries of natural gas. Studies made in 1974 of the future supply of natural gas convinced Florida Gas that one of its parallel pipelines from Louisiana to Florida would not be required for natural gas service upon the expiration of some of the original transportation contracts. Florida Gas proposed to convert a 24-inch (610 mm) line into a petroleum products pipeline to bring up to 350,000 barrels (55,700 cubic meters) per day of gasoline, jet fuel, and heating oil to Florida. The Federal Energy Regulatory Commission has yet to approve this project. However, approval is expected in the near future.

As most of you know, the evolving energy policy of the Federal government over the past several years indicates that the use of natural gas under boilers is an inferior use and compels the utilities to switch to other fuels. The oil embargo of 1973 and the present proposed restrictions limiting the amount of imported oil have increased and will accelerate the interest of the electric utilities in the use of coal for future plants. The cost, delays in permitting, and perceived danger of nuclear plants have also increased the appeal of coal as the fuel preferred for most future electric power plants.

With Florida Gas' history and experience in energy transportation, and the obvious need for radical solutions to our energy problems, Florida Gas decided to study the feasibility of supplying the transportation of the future coal requirements of the Florida utilities by the construction of a coal slurry pipeline. Since the likely sources of

coal are in Illinois, Indiana, Kentucky, and West Virginia, it was obvious that the route of a coal slurry pipeline to Florida would cross Georgia. Florida Gas, therefore, contacted utilities in both Florida and Georgia to determine their coal requirements and their possible interest in coal slurry pipeline.

Six utility companies joined with Florida Gas in a study of alternate systems. Bechtel was retained to perform the study. The study was finished last November. It clearly demonstrates that the project was economically viable and would save billions of dollars for the electric customers in Florida and Georgia.

A system that could ultimately deliver up to 55 million tons (50 million metric tons) per year to the six utilities was developed in the study. For comparison, it would require 42 miles (68 km) of trains per day to handle a like amount of coal. The system would be as much as 1,500 miles (2414 km) long and cost up to \$3 billion.

Transportation of coal by pipeline is not a new technology. The Consolidation coal line started up in 1957. This pipeline which ran from Cadiz to Cleveland, Ohio was 108 miles (174 km) long, 10 inches (254 mm) in diameter, and had a capacity of 1.3 million tons (1.2 million metric tons) per year. It was mothballed when the railroads offered to reduce rates drastically on all 5 million tons (45 million metric tons) of coal transported from this district of Ohio. The Black Mesa pipeline began operations in 1970 and is still in operation. This pipeline in Arizona is 273 miles (439 km) long, 18 inches (457 mm) in diameter and has a capacity of 4.8 million tons (4.4 million metric tons) of coal per year. Other groups are studying coal slurry lines also. Some of these are:

| | <u>Miles (Km)</u> | <u>Million tons/yr (metric)</u> |
|--|-------------------|---------------------------------|
| Wytex (Montana-Houston) | 1,260(2,027) | 22(20.0) |
| ETSI (Wyoming-Arkansas/ Louisiana) | 1,378(2,217) | 25(22.7) |
| Houston Natural Gas Co. Colorado-Houston) | 900(1,448) | 15(13.6) |
| Northwest Pipeline Corp. (Wyoming-Oregon) | 1,100(1,770) | 10(9.1) |
| Nevada Power Company (Utah-Nevada) | 183(294) | 12(10.9) |

Other commodities that have been successfully transported in water slurries include ore concentrates, limestone, gilsonite, and phosphate.

While this paper is not intended as a technical paper, a brief review of the operations may be useful. In a typical coal slurry pipeline 2" x 0 (51 mm x 0) coal is supplied to the coal preparation plant where it is pulverized and mixed with water. The mixture consists of approximately 50% coal by weight of water. The slurry awaiting transportation is stored in agitated tanks. Perhaps the most critical aspect of coal slurry pipeline operations is the proper grinding of the coal and accurate blending with the required amount of water.

The slurry is pumped through the pipeline by piston-type pumps usually driven by electric motors. Inhibitors are added to the slurry as required to control internal corrosion. The pipeline itself is

constructed in much the same manner as an oil or gas pipeline. It is externally coated and cathodically protected to resist external corrosion. An allowance is made in the wall thickness for anticipated erosion rates to provide a design life of 40 years or more.

At the termination point of the pipeline, the slurry is again placed in agitated storage tanks. Dewatering is accomplished by heating the slurry and passing it through a series of centrifuges and driers. The dried coal is then either stockpiled or fed directly to grinders for feed to the boilers.

While the final configuration and size of the Florida Gas system is yet to be resolved, we are convinced that very favorable economics and proven technology for this system exist. The essential elements of a large quantity of coal over a long haul over a long period of time are present. The problems remaining relate to

1. Right-of-way and permits
2. Water supply and disposal
3. Project timing
4. Project financing

1) There is, of course, strong opposition from the railroads to the construction of coal slurry pipelines. Obviously, the railroads would prefer to keep their virtual monopoly on overland coal transportation. Building a cross-country pipeline without the right of eminent domain to force permission for railroad crossings would be very difficult. Crude oil, petroleum products, and gas pipelines have the right of eminent domain in most States. Coal pipelines enjoy this right in only a few States - West Virginia, North Carolina, Ohio, Utah, North Dakota, Louisiana, Texas, Oklahoma, and as of a few weeks ago -- Florida. The other States the proposed system would cross have not enacted any such legislation.

In 1978 Congress considered but defeated a bill granting coal slurry pipelines the right of eminent domain. It appears the primary reasons for the bill's defeat were the concern for water use in the arid western States and a concern over the economic welfare of the railroads if coal slurry lines were permitted to compete freely with them. The bill was, of course, opposed by the railroads and some environmentalists.

In 1979 a strong continuing interest in eminent domain legislation is present in the current Congress. In spite of differences in opinion on certain provisions, such as a commodities clause, it is hoped that such a bill will be passed in this session.

Faced with a growing energy supply and cost problem, it will be a tragedy for the nation to deny the benefits of coal slurry pipelines to an energy hungry society for the lack of rights now enjoyed by the railroads and other types of pipelines.

2) As noted earlier, the water required to transport coal in a slurry is approximately equal to the weight of the coal -- one ton of water for one ton of coal.

The project envisioned would require a maximum of 44 cubic feet (1.2 cubic meters) of water per second. For comparison, the Ohio River has an average flow of 77,000 cubic feet (2,180 cubic meters) per second and appears to be a logical water source. It is believed that water resource studies

will show that the resources are sufficiently adequate so that it should not be the sensitive issue it is in the western states.

Disposal of the water after separation from the coal must also be carefully considered. Where the water can be used as cooling tower make-up, it would represent only 10-15% of the cooling water requirements. In these cases, the water disposal presents no problems. Where the plants use once-through cooling and, therefore, cannot use the slurry water, it will need to be treated and disposed of in ways acceptable to the water quality agencies.

3) The timing of the project is another critical consideration. Coal slurry pipelines can only operate in a fairly narrow range of throughput rates. The reason for this limitation is that the flow velocity must be maintained in the range of approximately four to six feet (1.2 to 1.8 meters) per second. Lower rates permit the coal particles to drop out resulting in capacity restriction or even plugging the line. Higher rates cause undue erosion. It is believed that the coal requirements for a system in the range of 30 to 40 million tons (27-36 million metric tons) per year will be feasible to commence operation in 1986.

4) The proposed system in today's dollars would cost in excess of \$2 billion and with today's inflation, could run as high as \$3 billion by 1986. In order to finance a project of this size, large, long-term commitments will be required from users of the system -- the electric utilities. Preliminary studies indicate that initially the cost of transportation of coal in a slurry pipeline will be equal to or slightly better than the prevailing railroad tariffs. However, in an inflationary economy, over the life of the project considerable transportation savings could be realized. The reason for these savings is that pipelines are capital intensive with only a small part of their costs subject to inflation. Railroads are labor intensive with a large part of their costs escalating with inflation. This being the case, the shippers should be willing to contract for long-term transportation, permitting the project to be financed.

Another important issue is the environmental impact of coal slurry lines. The Congressional Office of Technology Assessment has said "... the environmental issues amount to a choice between the water use and temporary construction impacts of slurry pipelines or the noise, land use, disruption, railroad crossing accidents, and inconvenience of increased train traffic. All other impacts are relatively insignificant or roughly equivalent for both modes...." It is hard to visualize any formidable environmental hurdles for the coal slurry pipeline.

President Carter in his July 15 energy speech emphasized conservation of energy and use of America's own energy resources including coal. The present annual production of coal in the U.S. is about 670 million tons (608 million metric tons). The railroads transport about 65% of that coal. The government has indicated coal production should be increased to 1.2 billion tons (1.1 billion metric tons) by 1990. If all of the coal slurry lines proposed for this time frame were built, they would carry only 150-200 million tons (136-181 million metric tons) of coal per year. These pipelines, then, will not replace the railroads but merely help provide the huge capital requirements needed to transport the coal the nation will need.

The pipeline will be built, it has too many savings for electric customers to overlook. The only question is when, considering the work remaining to be done.