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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

August 31, 1983

RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION

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B-205030

The Honorable Charles H. Percy
Chairman, Subcommittee on Energy,
Nuclear Proliferation and
Government Processes
Committee on Governmental Affairs
United States Senate

RELEASED

Dear Mr. Chairman:

Subject: Capital Cost Associated With the Trunkline Liquefied Natural Gas Lake Charles Facility (GAO/RCED-83-237)

In response to your February 28, 1983, request and subsequent discussions with your office concerning the Liquefied Natural Gas (LNG) facility constructed by Trunkline LNG Company[1] near Lake Charles, Louisiana, we are furnishing you the information on the (1) principal elements in the cost per unit of natural gas from the facility, (2) capital costs associated with constructing the facility, and (3) status of the Federal Energy Regulatory Commission's (FERC's) review of these costs to determine which costs will be included in the rate charged for natural gas.

As agreed with your office, this is an interim report. When FERC completes its process of determining which LNG facility capital costs are reasonable and will be included in the rate charged for the natural gas, we plan to initiate a review to examine FERC's procedures for evaluating and allowing capital costs of the facility in the rate base.

In summary, the actual cost of constructing the LNG facility was about $589 million, an increase of approximately 258 percent over the $164 million cost estimate approved by the Federal Power Commission (FPC) in 1977. According to reports submitted by Trunkline LNG, the reasons for the increases included extensive modifications to plant design to ensure safe and reliable construction and greater operating efficiency and compliance with State and Federal regulations. Also, extension beyond the original estimated completion date, various labor problems, and general inflation resulted in increased labor and interest costs.

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[1]Trunkline LNG Company, a wholly owned subsidiary of Panhandle Eastern Corporation, is a natural gas company engaged in importing and selling liquefied natural gas.

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BACKGROUND

Prior to October 1, 1977, FPC had jurisdiction over LNG imports, including the responsibility for ruling on applications to (1) import LNG, (2) construct terminal facilities to accept the imports, and (3) sell the imported LNG to American consumers. Now these responsibilities are under the jurisdiction of both the Department of Energy's Economic Regulatory Administration (ERA) and FERC. Thus, any company desiring to import LNG must seek approval from these agencies.

On November 15, 1973, Trunkline LNG filed an application with FPC to seek authorization to construct a facility for receipt, storage, and revaporization of LNG into its natural gaseous state. The LNG was to be liquefied in Algeria and transported to the Lake Charles facility in specially constructed ships. Hearings commenced on Trunkline LNG's application on February 26, 1974, but were adjourned pending the filing by Trunkline LNG of final shipping agreements and other requested information necessary for the FPC staff to prepare a final environmental impact statement. On June 23, 1976, amendments were filed by Trunkline LNG to reflect increases in the cost of purchased LNG and construction.

The staff completed the final environmental impact statement in September 1976 and the hearings reconvened on October 18, 1976, and continued through December 17, 1976. Approximately 3-1/2 years after the original application was submitted, FPC issued Opinion No. 796 on April 29, 1977, authorizing Trunkline LNG to import LNG from Algeria for a period of 20 years. On June 30, 1977, FPC issued Opinion No. 796-A to modify and clarify the previous opinion. This gas will be used to supply gas customers primarily in large sections of Illinois, Indiana, Michigan, Missouri, and Ohio.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objective of our assignment was to obtain and analyze information available from FERC files and officials concerning the (1) principal elements in the unit cost of natural gas from the Lake Charles facility, including changes in cost and the reasons for them, (2) various component construction costs of the facility from the time of the initial estimate approved by FPC in 1977 up through the completion of the facility, including explanations for significant increases, and (3) status of FERC's review of the facility's cost. We interviewed FERC officials and examined FERC and ERA files to obtain records, documents, and data submitted on the Lake Charles LNG facility costs. We also reviewed applicable legislation and FERC regulations pertaining to the setting of rates for natural gas.

All dollar figures cited in the report are current and were not adjusted for inflation. We note that the period under discussion (1976 to 1982) was one of significant inflation. For

example, during this period the Consumer Price Index increased by 62 percent.

Your office wanted the results of our review by August 31, 1983. Therefore, we relied heavily on the information obtained from ERA and FERC files and discussions with FERC officials. We did not independently verify the information.

At your request, we did not obtain agency comments on the information contained in this report. We did, however, discuss the report's contents with FERC officials and incorporated their comments where appropriate. Except as noted above, we performed our work in accordance with generally accepted government auditing standards. Our audit work was performed during the period May through August 1983.

PRINCIPAL ELEMENTS IN COST PER UNIT OF NATURAL GAS FROM THE LAKE CHARLES FACILITY

The cost per thousand cubic feet (Mcf) of natural gas from the Lake Charles facility is comprised of three elements--the cost of LNG purchased from Sonatrach,[2] the cost of transporting the LNG, and the cost of unloading, storing, and regasifying LNG at Lake Charles. At the time the application was approved in April 1977, Trunkline LNG estimated that all activities necessary to implement the project (the three elements noted above) would result in a unit cost of about $3.33 per Mcf of natural gas. By the time the first regular shipments were received in December 1982,[3] this cost had increased to approximately $7.63 per Mcf, about 129 percent over the unit cost envisioned when the project application was approved. The following table compares the estimated 1977 unit cost and the 1982 actual unit cost for each of the three cost elements.

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[2]Sonatrach is the State-owned oil and gas company of Algeria engaged in, among other things, the sale of LNG to natural gas companies.

[3]Initial operations began in September 1982, however, regular deliveries of LNG from Algeria did not begin until December 1, 1982.

Comparison of 1977 Estimated Cost and 1982 Actual Cost per Mcf of Natural Gas from the Lake Charles Facility

	Estimated cost approved in 1977	Cost of first deliveries Dec. 1982 Cost[a]	Percent of total cost	Percentage increase of costs 1977 to 1982
Cost of LNG (FOB Algeria)	$1.47	$4.16	55	183
Transportation to Lake Charles	1.27	1.65	21	30
Unloading, storing, and regasifying LNG at Lake Charles[b]	0.59	1.82	24	208
Total delivered cost of natural gas	$3.33	$7.63	100	129

[a]This is the cost charged by Trunkline LNG for the regular first natural gas deliveries to its distributor as of December 31, 1982.

[b]Includes cost of gas used in the shipping and regasification process totaling $0.27 in 1977 cost estimate and $0.56 in December 1982 cost.

Source: The 1977 estimated cost elements were taken from FERC Show Cause Order 20 FERC 62,548 issued September 24, 1982. We calculated the remaining cost elements and percentages using the LNG contract purchases, LNG Mcf volumes, and LNG cost elements from the following documents: Trunkline LNG Semi Annual Report for September 1978 contained in FERC Docket Numbers CP74-138, CP74-139, CP74-140; Trunkline LNG Comparison of Rates, ERA Exhibit Number 113 contained in ERA Docket Number 2-12-LNG.

As shown in the table, the cost of LNG purchased from Sonatrach accounted for about 55 percent of the initial delivery cost per Mcf and had the second largest increase of the three cost elements. The increased costs were the result of a formula that allows the base price of the LNG to be adjusted semiannually according to the energy-equivalent for the weighted average prices of distillate (No. 2) and residual (No. 6) fuel oil in New York harbor. This increase in the price of LNG has resulted in pressure by FERC and ERA on Trunkline LNG to renegotiate its contract prices. Negotiations have resulted in a renegotiated price of

about $3.32 per Mcf for the period July through September 1983 and a 40-percent reduction in purchased quantities for the period April 1, 1983, through November 30, 1984. However, the 40-percent reduction has to be made up by purchases above contract quantities during the third through the tenth contract years. Since this element comprises over 50 percent of the total cost of delivered gas, any adjustments will have a significant effect on the delivered price of natural gas.

Shipping costs accounted for about 21 percent of the initial delivery cost per Mcf. It is composed of the costs of transporting the LNG from Algeria to Lake Charles in five specially constructed tankers. As shown in the previous table, this cost element is the smallest of the three cost elements and also had the smallest percentage increase of the three elements. According to Trunkline LNG's semiannual reports, these increased costs were mainly attributable to ship construction, increased fuel costs, and other ship operating costs.

The cost of unloading, storing, and regasifying, which include the capital costs of the Lake Charles facility, accounted for about 24 percent of the initial delivery cost per Mcf. With the 40-percent reduction in LNG purchases noted previously, capital and plant operating costs will be spread over a lower gas volume. Therefore, this cost element will grow in significance.

COST INCREASES ASSOCIATED WITH THE CONSTRUCTION OF THE LAKE CHARLES LNG FACILITY

A comparison of the April 1977 estimate with actual construction costs of the LNG facility shows an increase of $424.4 million or 258 percent (see enc. 1). The major cost increases occurred in the plant facilities category and in the associated interest expense. These two categories account for about 81 percent of the total facility cost. The plant facilities category includes land acquisition, site preparation, and other activities related to plant design changes.

A comparison of semiannual cost estimates submitted by Trunkline LNG (see enc. 2) indicates that by August 1979, about 2 years after FPC approval, the total estimated cost of the facility had risen from $164.3 million to $392.7 million, an increase of about 139 percent. During this period the most significant increase was in the plant facilities estimated cost, which almost quadrupled from $64.4 million to $236.9 million.

From August 1979 to July 1981, when the facility was substantially complete, the estimated cost rose by $102 million. During this period the estimated cost of two project components

about doubled (field engineering, supervision, and overhead[4] from $11.7 million to $20.4 million and construction interest from $49.9 million to $102.4 million).

Although construction work on the Lake Charles facility was substantially complete by mid-1981 and the plant was ready to receive the LNG, Sonatrach had not given notice as to when delivery of the LNG would commence. In meetings held in February 1982, Sonatrach advised Trunkline LNG that its facilities would not be ready until April 1982. Sonatrach officials also reported at this time their desire to modify the price provisions of the contract for sale of LNG to Trunkline LNG. Although initial operations began in September 1982, regular deliveries of LNG from Algeria began December 1, 1982. From the period July 1981 to August 1982, Trunkline LNG reported that the delay in LNG deliveries resulted in additional estimated costs of about $93 million, primarily in interest costs.

In a March 25, 1983, letter to FERC on the cost of the Lake Charles facility, Trunkline LNG provided the following reasons for the cost increases. According to Trunkline LNG, the 1977 approved cost estimate was necessarily based on historical data and studies of the most comparable projects rather than on any actual experience of designing and constructing a comparable LNG terminal in the United States, which was unavailable at that time. Plant construction required extensive additional procedures to provide greater quality assurance and quality control, and final design requirements for safety and operational reliability were much more extensive than could have been anticipated in the earlier estimates. Other design changes were made to reflect revised requirements of safety and construction codes; regulations of Federal, State, and local authorities; certificate conditions; and operating experience of other LNG terminals placed in service after 1976. In addition, there were problems with obtaining skilled workers in the areas of stainless steel welding and electrical fabrication which resulted in lower productivity and increased labor time to complete the project. Interest costs increased significantly due to the delays, which caused more funds to be borrowed at higher interest rates.

STATUS OF FERC'S REVIEW OF COST REASONABLENESS

FERC regulates the setting of rates that interstate pipelines may charge their customers. Pipeline companies are generally allowed to charge their customers a rate which enables them to recover direct expenditures--such as the natural gas they buy from producers--and to earn a fair and reasonable rate of return on their pipelines and other investments.

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[4]Cost of direct labor, other expenses, and overhead associated with Trunkline LNG's field supervision service, engineering and administrative service, and operational training.

A rate schedule, filed periodically with FERC, goes into effect after 30 days or after a suspension period up to 5 months. If suspended, rates go into effect at the end of the suspension period, subject to refund upon completion of a FERC hearing. If FERC determines that the rate is unjust, unreasonable, or discriminatory, it may order the natural gas company to refund, with interest, the excess payments.

As previously noted, FPC approved an initial unit cost, or rate, of $3.33 per Mcf on April 29, 1977, in Opinion 796. Opinions 796 and 796A provide that any changes to the initial rate, except adjustments to reflect changes in currency fluctuations and the pricing formula for the LNG purchases, would require a full rate filing in accordance with the Natural Gas Act, as amended (15 U.S.C. 717 et seq.), showing the prudency and reasonableness of any increased costs. Accordingly, Trunkline LNG submitted to FERC an interim rate filing on July 1, 1981, to reflect changes in costs, including increases in the Lake Charles LNG facility and transportation costs. FERC's opinion of July 31, 1981, made the rate effective on the day after the initial deliveries, subject to refund. This rate was subsequently adjusted by Trunkline LNG to reflect changes in the LNG purchased costs[5] and resulted in a rate of $7.63 per Mcf that remained in effect until December 31, 1982, with the first regular deliveries of LNG.

Because of previous indications of significant cost overruns for LNG facilities, in Opinion 796 FPC required Trunkline LNG to submit semiannual reports to provide an overview of project construction costs and work progress. According to a FERC official, significant construction cost increases had been experienced at other LNG facilities, with overruns as high as 143 percent. As previously noted, by August 1979 the estimated cost of the Lake Charles facility had risen by 139 percent, and by February 1980 it had risen by 162 percent. A FERC official stated that because the cost overrun had exceeded experience at other facilities and because of concerns and questions raised in FERC's review of the semiannual reports, in May 1980 a consultant was hired to examine the costs of the Lake Charles facility. According to a FERC official, the results of the consultant's work provided a historical picture of the project costs, raised concerns about project expenditures, and is being used as part of an ongoing FERC audit of the Lake Charles LNG facility cost.

Based upon the audit results and outcome of the public hearings, FERC can exclude from the rate base any costs it determines to be unreasonable. If FERC finds the rates to be excessive, it may order Trunkline LNG to refund, with interest, the excess payments.

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[5]In accordance with Opinion 796A, changes in LNG purchased costs due to adjustments in the pricing formula are not subject to the full rate filing under the Natural Gas Act.

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As arranged with your office, unless you publicly announce its contents earlier, we will not distribute this report until 30 days after its issue date. At that time we will send copies to the Chairman, Federal Energy Regulatory Commission; the Secretary of Energy; the Administrator, Economic Regulatory Administration; and other interested persons.

Sincerely yours,

J. Dexter Peach
Director

Enclosures - 2

ENCLOSURE 1

Comparison of Initial Estimate With Actual Costs of the

Trunkline LNG Facility at Lake Charles, Louisiana

	Project component	April 1977 approved estimated cost	Actual cost	Difference in cost (decrease)	Increase over initial estimate (percent)
I.	Plant facilities	$ 64,407,000	$283,850,167	$219,443,167	341
II.	Marine facilities	15,667,000	14,540,951	(1,126,049)	(7)
III.	LNG storage facilities	40,521,000	60,370,842	19,849,842	49
IV.	Field engineering, supervision, and overhead	3,985,000	34,932,439	30,947,439	777
	Total direct cost	124,580,000	393,694,399	269,114,399	216
	Contingencies	6,387,000	note a	(6,387,000)	-
	Interest during construction	33,373,000	195,032,322	161,659,322	484
	TOTAL COST OF FACILITIES	$164,340,000	$588,726,721	$424,386,721	258

[a]Contingencies included in direct costs above.

Sources: Trunkline LNG Company amended application filed June 23, 1976; FERC Docket Numbers CP74-138, CP74-139, and CP74-140.
Trunkline LNG Company cost of facilities report dated March 25, 1983; FERC Docket CP74-138.

ENCLOSURE 2

Semi Annual Estimates of Plant Cost

Trunkline LNG Facility at Lake Charles, Louisiana

Project component	Estimated cost at April 1977 initial	Sept. 1978	Aug. 1979	Feb. 1980	Jul. 1980	Feb. 1981	Jul. 1981	Feb. 1982	Aug. 1982
	(In thousands)								
I. Plant facilities	$ 64,407	$138,525	$236,917	$256,595	$268,938	$293,229	$293,473	$283,478	$281,718
II. Marine facilities	15,667	14,430	15,085	14,435	14,435	14,735	15,150	15,123	15,123
III. LNG storage facilities	40,521	39,995	54,449	57,277	62,846	60,435	60,776	60,670	60,670
IV. Field engineering, supervision, and overhead	3,985	7,420	11,663	13,700	17,175	17,375	20,337	29,940	30,087
Total estimated direct cost	$124,580	$200,370	$318,114	$342,007	$363,394	$385,774	$389,736	$389,211	$387,598
Contingencies (including FPC filing)	6,387	14,630	24,720	17,700	13,752	9,760	2,644	939	708
Interest during construction	33,373	24,521	49,872	70,293	74,147	90,426	102,351	169,015	199,435
Total cost of facilities at Lake Charles	$164,340	$239,521	$392,706	$430,000	$451,293	$485,960	$494,731	$559,165	$587,741
Increase above previous semi-annual estimate	-	$75,181	$153,185	$37,294	$21,293	$34,667	$8,771	$64,434	$28,576
Increase above initial estimate	-	$75,181	$228,366	$265,660	$286,953	$321,620	$330,391	$394,825	$423,401
Percent increase over initial estimate	-	46	139	162	175	196	201	240	258

Source: Truckline LNG Company amended application filed June 23, 1976, and semiannual progress and status reports submitted from 1978 through 1982, FERC Docket Numbers CP74-138, CP74-139, CP74-140.

ENCLOSURE 2