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UNITED STATES OF AMERICA
BEFORE THE
FEDERAL POWER COMMISSION



EL PASO ALASKA COMPANY, ET AL.)

Docket No. CP75-96, et al.

ATLANTIC RICHFIELD COMPANY RESPONSES TO INTERROGATORIES

I. POLICY

QUESTION 1. Were you ever a member of a group investigating the feasibility of bringing gas from Prudhoe Bay and/or the Mackenzie Delta to the Lower 48 states?

ANSWER 1. Yes.

QUESTION 1. a. If yes, please describe your participation in the group.

ANSWER 1. a. Atlantic Richfield Company has participated in two such feasibility studies. Atlantic Richfield joined with El Paso Natural Gas Company in a study to determine the economic feasibility of bringing gas from Prudhoe Bay to the West Coast of the United States by means of a trans-Alaska gas pipeline, gas liquefaction and regasification facilities and LNG tankers. Atlantic Richfield contributed its expertise and financial support to this study from April 23, 1973 to October 23, 1974.

Atlantic Richfield has participated in a study to determine the economic feasibility of bringing gas from Prudhoe Bay and the Mackenzie Delta by means of a trans-Canadian pipeline to markets in Canada and the Lower 48 states. Atlantic Richfield contributed its expertise and financial support to this study from July 14, 1970 to November 30, 1975.

QUESTION 1. b. Are you still a member of such a group; and if not, please explain the reasons for departing.

ANSWER 1. b. No. Atlantic Richfield withdrew from these groups since we felt that the purpose for which we had joined, i.e., to determine the feasibility of transporting arctic gas to the Lower 48 states, had been accomplished and that our further participation was unnecessary. We continue to cooperate with both groups.

QUESTION 2. Why haven't firm gas purchase contracts been executed for Prudhoe Bay?

ANSWER 2. As a result of the FPC's Order of December 31, 1975, in Docket R-411, et al., and subsequent action by the California PUC in, sua

sponte, reopening of CPUC decision #84729, Atlantic Richfield's funding agreement with Pacific Lighting Development Company (PLGD), which gave PLGD a call on 60% of its Prudhoe Bay gas, has been terminated. Our advance payment agreements with Texas Eastern Transmission Corporation and Panhandle Eastern Pipeline Company covering the remaining 40% of Atlantic Richfield's Prudhoe Bay gas will be terminated should the FPC Order become final. Under present circumstances we have no basis for negotiation of a definitive gas purchase contract. Neither unit agreements nor a plan of development for the field have been formally submitted to or approved by the State of Alaska.

Additionally, in light of certain language appearing in the Commission's Order of December 31, 1975, in Docket No. R-411, et al., we are uncertain as to whether any gas purchase contract would be certificated or if the Commission would require a full-blown allocation case for North Slope gas.

QUESTION 3. Please explain the relationship of a unitization and operation agreement for Prudhoe Bay to the execution of gas purchase contracts.

ANSWER 3. The Prudhoe Bay Field consists of a gas cap and an oil rim. The field has a diversity of ownerships in the tracts with differing interests in the gas cap and oil rim. Efforts are underway to unitize the entire field so that it might be developed and operated in the most efficient manner. The plan of development agreed to by the producers must then be approved by the State of Alaska. Until such time as these events occur, it is not known what precise amount of gas production and oil production will be owned in the unit by each party nor is it known to what extent and at what time the State will permit gas sales.

QUESTION 4. Do you have any present intention to provide equity for either the El Paso Alaska project or the Arctic-Canadian gas project should either of them be issued a certificate?

ANSWER 4. No.

QUESTION 5. If the natural gas pipeline and distribution companies are unable to commit the amount of equity required by lenders as necessary for either the Arctic Gas or the El Paso project, would your company be willing to help provide some of the needed equity?

ANSWER 5. A decision on the question would be dependent upon conditions at the time such a need becomes apparent; however, it seems highly unlikely that our other capital requirements would permit such an investment.

QUESTION 6. Will your company bear the cost of gathering and treatment facilities on the North Slope? If no decision has been made on this, what factors would influence a decision and by when would such a decision have to be made?

ANSWER 6. The cost of gathering and treatment facilities on the North Slope will be borne in accordance with gas purchase contracts yet to be negotiated. Under our remaining advance payment agreements (which will be terminated in the event the Commission's Order issued December 31, 1975, in Docket No. R-411, et al., becomes final), Atlantic Richfield would bear the initial cost of installing the gas gathering system but would have the option to require the gas purchaser to purchase all gas handling facilities. A decision relative to exercising such option would have been made at the proper time in light of circumstances existing at the time. It was contemplated that the gas conditioning

plant (treatment facilities) would be installed and operated by or for the gas purchasers.

QUESTION 7. Can your company categorically guarantee that the purchase price of Prudhoe Bay gas under future gas purchase contracts would be no higher than the commodity price of gas in the market area to be served adjusted for applicable cost to market?

ANSWER 7. No. So long as the price of natural gas sold for resale in interstate commerce is subject to Federal Power Commission regulation, producers will receive no more than the regulated price permitted at the wellhead. In the event of price decontrol, Atlantic Richfield hopes to receive fair market value at the wellhead for its gas. The commodity price (which is subject to many variables) of gas in any particular market area to be served, adjusted for applicable delivery cost to that market, may or may not have relevance in determining the regulated rate or fair market value at the wellhead.

QUESTION 8. Would your company oppose any attempt by a potential gas purchaser to place a minimum daily delivery volume provision in a gas

purchase contract for the Alaskan North Slope?

ANSWER

8. Yes. We cannot guarantee to deliver any specific volume of gas at any period of time. As mentioned in answer I, 3., the unitization agreement and State action will have a bearing on the volume of gas that can be sold by each company at Prudhoe Bay. As in all oil or gas fields, it is impossible to predict with certainty what volume of gas will be available from day to day.

QUESTION

9. How did you choose or how will you choose a purchaser or purchasers for your Prudhoe Bay gas? Explain the steps that will be taken or have been taken in this matter.

ANSWER

9. In July, 1974, Atlantic Richfield sent letters to 17 prospective gas purchasers, requesting bids for its share of the natural gas in the Prudhoe Bay Field. With the FPC's Order No. 499 advance payment program in mind, Atlantic Richfield stated that it was interested in offers which include interest-free loans repayable over time as gas is delivered.

Eleven of the 17 companies responded by making offers for Atlantic Richfield's Prudhoe Bay gas. Interstate pipeline companies generally offered to make advance payments

pursuant to Order No. 499 in the form of interest-free loans. Pacific Lighting Gas Development Company (PLGD) offered to make an advance payment for Prudhoe Bay gas, but stated that it was not feasible for PLGD to raise the funds needed to make an interest-free loan. Instead, it offered to make payments to Atlantic Richfield to cover the interest expense and other costs associated with Atlantic Richfield's raising the money through the sale of a production payment.

The offers made by Pacific Lighting Gas Development Company (PLGD), Panhandle Eastern Transmission Corporation and Texas Eastern Pipeline Company, most nearly fulfilled Atlantic Richfield's needs and we proceeded to conclude agreements with them. As noted in the answer to question I (2), the PLGD agreement has been terminated and if the FPC's Order in Docket R-411, et al., becomes final, the remaining advance payment agreements will be terminated. All of these agreements expressly recognize that certification and construction of either of the

proposed Alaskan Gas transmission systems would be satisfactory to both seller and buyer.

In light of the confusion brought about by the Commission's Order in Docket No. R-411, et al., and other uncertainties existing at this time, Atlantic Richfield is in the process of reevaluating all options open to it and has made no decision as to its future action.

II. RESERVES

- QUESTION 1. Please describe your exploration and development activities on the North Slope of Alaska through 1975 indicating, among other things, the following:
- a. Total amount of acreage held in Prudhoe Bay Field as defined by the Alaska Oil and Gas Conservation Committee;
- ANSWER 1. a. Atlantic Richfield Company holds interests in 181,689 gross acres or 94,490 net leasehold acres in the Prudhoe Bay Field as defined by the Alaska Oil and Gas Conservation Committee.
- QUESTION 1. b. Number of wells presently drilled in the Prudhoe Bay Field and the success ratio of well completions;

ANSWER 1. b. Fifty-three wells have been drilled on the Atlantic Richfield Company/Exxon Company, U.S.A. acreage in the Prudhoe Bay Oil Pool limits. Six of these wells are not commercial.

QUESTION 1. c. An estimation of the total amount of gas reserves in Prudhoe Bay held by your company and an estimate of its deliverability;

ANSWER 1. c. DeGolyer and MacNaughton, our reserve consultant, has estimated that the proved gas reserves in the Prudhoe Bay Field total 24 Tcf of hydrocarbon gas, with Atlantic Richfield Company's net share calculated to be in excess of 7.08 Tcf. Atlantic Richfield's share of the gas deliverability from Prudhoe Bay Field will depend on the outcome of unitization. Insofar as the total field is concerned, gas production will begin with the start of oil production; but gas sales cannot begin until the gas transportation system is built, gas conditioning facilities constructed and a plan of operation which includes gas

sales is approved by the working interest owners and by the Alaska Oil and Gas Conservation Committee.

QUESTION 1. d. Total amount of acreage held on the North Slope including the offshore area outside of Prudhoe Bay and location of such leases;

ANSWER 1. d. Atlantic Richfield holds interests in 817,734 gross acres or 417,016.41 net leasehold acres on the North Slope of Alaska including the offshore portion and the interest set out in answer II, 1., a., above.

QUESTION 1. e. Number of wells drilled outside of the Prudhoe Bay Field on the North Slope, including offshore areas, their location and an indication whether they were successful; and

ANSWER 1. e. Atlantic Richfield Company has participated in the drilling of 31 wells outside of the Prudhoe Bay Field on the North Slope through 1975. These wells, their location and results are as follows:

ARCO No. 1 Colville, 25-12N-7E, Dry and Abandoned (D and A)

ARCO No. 1 Itkillik, 10-8N-5E, D and A

ARCO No. 2 Kavik, 11-3N-22E, D and A
ARCO No. 3 Kavik, 8-3N-23E, gas
ARCO No. 1 Little Twist, 34-3S-4W, D and A
ARCO No. 1 Nora Federal, 5-2N-14E, D and A
ARCO No. 1 North Franklin Bluffs,
20-8N-14E, D and A
ARCO No. 1 Schrader Unit, 18-3S-5E,
D and A
ARCO No. 1 Susie Federal, 22-2N-13E,
D and A
ARCO No. 1 Toolik Federal, 4-8N-15E,
D and A
ARCO No. 2 Toolik Federal, 5-8N-12E,
D and A
ARCO No. 3 Toolik Federal, 4-8N-9E, D and A
ARCO No. 1 Ugnu, 22-12N-9E, oil
ARCO No. 1 West Sak River, 2-11N-10E, oil
ARCO No. 2 West Sak River, 22-11N-10E, oil
ARCO No. 3 West Sak River, 26-11N-9E, oil
ARCO No. 5 West Sak River, 11-10N-10E
(confidential)
ARCO No. 6 West Sak River, 29-11N-11E
(confidential)
Pan Am Kavik No. 1, 7-3N-23E, gas
BP East Ugnu No. 1, 17-2N-10E, oil
BP East Umiat No. 1, 19-1S-2E, gas
BP Kemik Unit No. 2, 6-1S-21E, D and A
BP Itkillik Unit No. 1, 11-1N-6E, D and A
BP Shale Wall Unit No. 1, 2-5S-5E, D and A

Exxon East Mikkelsen No. 1, 17-9N-21E,
D and A

Forest Kemik Unit No. 1, 17-1N-20E, gas

Mobil Beli Unit No. 1, 8-4N-23E, D and A

Mobil Echooka Unit No. 1, 32-1N-16E,
D and A

Mobil West Kadleroshilik No. 1, 14-5N-14E,
D and A

Texaco East Kuparuk Unit No. 1, 10-2S-8E,
D and A

Texaco West Kavik Unit No. 1, 20-5N-20E,
D and A

QUESTION 1. f. Total amount of gas reserves estimated to be held on non-Prudhoe Bay field lease and their deliverability.

ANSWER 1. f. DeGolyer and MacNaughton, our reserve consultant, has not assigned any proved reserves on the North Slope outside the Prudhoe Bay Field.

QUESTION 1. Explain the method and data used in determining any reserve estimates.
(cont'd.)

ANSWER 1. DeGolyer and MacNaughton has said that "since Prudhoe oil pool is essentially a shut-in field with no reservoir performance data, we have based our reserve estimates on the volumetric method. By volumetric method we mean that we have used individual well data -

logs, cores, fluid samples, and flow tests - to determine the sand thickness in each well and to determine certain average reservoir properties. We then used standard mapping techniques to determine the oil and gas in place throughout the field, including the Atlantic Richfield acreage. Then we have estimated an overall recovery factor based on our experience with other fields of similar reservoir characteristics."

QUESTION 2. Has your company made an independent estimate of the amount of potential reserves on the North Slope of Alaska? If yes, please describe your findings.

ANSWER 2. Yes. Atlantic Richfield has estimated the potential reserves yet to be discovered on the North Slope of Alaska using a method based on recovery factors times the cubic miles of sediment capable of containing hydrocarbons. The area included extends northward from the Brooks Range to the 300 foot water depth at the edge of the Continental platform in the Chukchi and Beaufort Seas. A large part of this area lies under the Polar ice cap. We estimate that recoverable reserves

could range up to 45 billion barrels of oil and 135 Tcf of gas. Estimates of potential reserves derived by this method for untested frontier areas are generally regarded as being optimistic.

QUESTION 3. Based upon your company's drilling experience to date, does it appear that the areal extent of the Prudhoe Bay Field as defined by the Alaska Oil and Gas Conservation Committee is larger than anticipated?

ANSWER 3. No. However, additional wells drilled on either Atlantic Richfield or other companies' acreage may allow the boundary to be moved.

QUESTION 4. Has your company studied the possibility of drilling in the Yukon-Kandik Basin, Middle Tanana Basin and Copper River Basin areas of Alaska? If yes, what do your studies indicate, what has been your past experience in such areas, if any, and what are your company's current and future plans with respect to such areas?

ANSWER 4. Yes, Atlantic Richfield has made evaluations of the Yukon-Kandik, Middle Tanana and Copper River Basins. Atlantic Richfield's experience in these basins has been as follows:

a. Yukon-Kandik Basin

Atlantic Richfield conducted a field program in the basin in 1962. Several areas of interest were found, however, the

structural fabric was complex and was accompanied with a very limited sedimentary section with good reservoir characteristics.

b. Middle Tanana Basin

No meaningful rocks are exposed in the basin for examination. A well drilled in the basin in 1962 revealed a thin, non-marine tertiary cover.

c. Copper River Basin

Atlantic Richfield drilled two of the eight wells in the Copper River Basin. We did not find significant shows of hydrocarbons in these wells, nor adequate amounts of reservoir quality rock. In addition, the presence of permafrost and surficial volcanic rocks make it difficult to obtain the quality geophysical data necessary for pinpointing new drill site possibilities.

We have no current plans for additional evaluation of these areas.

QUESTION 5. With respect to oil production from the Prudhoe Bay Field, what are the anticipated deliverability rates for the first 12 years? Will this affect the deliverability of your gas? What effect would a 2.25 Bcf deliverability capacity pipeline have on oil production during this period?

ANSWER 5. The production rate for the early years in the Prudhoe Bay oil field will be limited by the completion, expansion and operation of the Trans-Alaska Oil Pipeline. In later years the oil production rate (as well as gas deliverability) will be determined by field performance. It is not possible to predict with certainty either of these events. Thus, the oil production rates which can be forecast today must be viewed only as reasonable estimates.

The Trans-Alaska Oil Pipeline is expected to begin operation in mid-1977 at 600 thousand barrels per day and reach a sustained throughput of 1.2 million barrels per day before the year's end. As yet, no agreement has been reached on pipeline expansion; however, this expansion could take place by the first of 1979. We have assumed that this expansion will take place as early as possible and have

projected a 1.5 million barrels per day production rate from the Prudhoe Bay Field commencing on January 1, 1979, and continuing until field performance can no longer sustain that rate. The field performance predictions used in this production forecast are based on numerical simulation studies conducted during the past five years. These studies have been conducted for several alternative methods of reservoir management. The studies have also considered the sensitivity to many of the reservoir unknowns. Based on these studies, Atlantic Richfield believes that the following is a reasonable projection for the oil production rate from the Jurassic-Triassic formation and is consistent with 2.0 to 2.5 BCF/D gas sales:

Prudhoe Oil Pool Production^{1/} 1977-1988

<u>Year</u>	<u>Rate, MB/D</u>
1977	900 ^{2/}
1978	1,200

(cont'd.)

1/ Production forecast for the Jurassic-Triassic crude oil only, does not include condensate or crude oil from other zones, such as Lisburne or Cretaceous formations.

2/ Average for the last six months of 1977.

(cont'd.)	<u>Year</u>	<u>Rate, MB/D</u>
	1979	1,500
	1980	1,500
	1981	1,500
	1982	1,500
	1983	1,500
	1984	1,500
	1985	1,485
	1986	1,280
	1987	1,020
	1988	900

QUESTION 6. Please describe your proposed exploration and development activities for the North Slope, if any, for 1976.

ANSWER 6. A. Exploration

Atlantic Richfield will continue its geological studies on the North Slope during 1976. The Company plans to drill four exploratory wells in search of oil. We have no plans for geophysical work on the North Slope this year.

B. Development

Atlantic Richfield will be drilling development wells with two rigs through-

out 1976. This activity should result in the completion of 20 to 22 wells. In addition, eight to 10 gas injection wells will be drilled and existing wells will be completed and perforated for production.

III. FACILITIES AND COSTS

QUESTION 1. What is the type of gas that will be produced from your Prudhoe Bay leases?

ANSWER 1. Solution gas and gas cap gas will be produced.

QUESTION 2. What type of facilities would be needed to process and/or treat each type of gas?

ANSWER 2. Gas handling and conditioning facilities will be required. The gas handling facilities include the gas compression and treating facilities at the flow stations as well as the gas gathering pipelines, compression facilities, gas injection pipelines and injection wells. The gas conditioning facilities will include equipment to achieve dehydration and removal of excess liquids and carbon dioxide from the gas.

QUESTION 3. Which facilities mentioned in interrogatory 2 will be constructed and operated by the producer and which will be required to be purchased entirely or partly by pipeline purchaser? Who will operate those owned by the pipeline?

ANSWER 3. Our advance payment agreements contemplated that the producer would construct and the gas purchaser would acquire, at Atlantic Richfield's option, those gas handling facilities from the outlet of the oil and gas separators and flash tanks at each flow station or separation center to the gas conditioning plant. No decision was made and no discussions were held as to who would operate these facilities. The gas conditioning plant (at the entrance of the gas pipeline system) would have been constructed and operated at the expense of the gas purchaser or the gas pipeline system.

These agreements have been or will be terminated if the FPC Order becomes final.^{3/}

QUESTION 4. What is the quality of the gas at the wellhead and what will be the acceptable quality for pipeline delivery?

ANSWER 4. The gas at the wellhead, in addition to containing the basic hydrocarbon constituents, also contains approximately 12% CO₂ and will

^{3/} See Answer I, 2.

be saturated with water. Although this gas could be delivered to a pipeline specifically designed to handle this quality of gas, gas purchasers (or transporters) will probably condition the gas to meet such requirements as the gas transportation system may determine.

QUESTION 5. It is noted that certain agreements between various producers on the North Slope and pipeline purchasers reserve the right of the producer to process Prudhoe Bay gas in the Lower 48 states. What type of processing is contemplated by your company, where, when and how much? What type of transportation arrangements would be necessary to implement this provision?

ANSWER 5. At the present time, Atlantic Richfield does not have in mind any specific plans for processing in the Lower 48 states. Any transportation arrangement would have to be made with the gas purchaser and gas transporter and presumably approved by the FPC.

QUESTION 6. What would be the cost of each separate facility mentioned in interrogatory 2 ?

ANSWER 6. The current estimates of costs of the gas handling and conditioning facilities are \$1.333 billion and \$877 million respectively. It should be noted that it is extremely difficult to estimate these costs at this

time due to the uncertainties of the timing of these facilities and the cost inflation which will occur prior to installation of the facilities.

QUESTION 7. How would you allocate the cost between oil and gas production with the facilities which would be either owned by the pipeline or jointly with your company? Please explain your rationale for such allocation.

ANSWER 7. We do not anticipate the joint ownership by a pipeline company and Atlantic Richfield of any facility handling oil and gas production.^{4/} If we were to utilize any facilities owned by the pipeline for such purpose, we would expect to negotiate a charge for such use.

QUESTION 8. If the Prudhoe Bay gas is to be processed through facilities owned by the pipeline or jointly by the producer, who will have benefit of the liquid products and how will the operation and maintenance costs be allocated and on what basis?

ANSWER 8. If your word "processed" is intended to mean conditioned or treated, then under the present agreements^{5/} on our Prudhoe Bay gas, Atlantic

^{4/} See Answer I, 6.

^{5/} See Answer I, 2.

Richfield would have the option to take in kind any liquid hydrocarbons incidentally recovered therein. Details were never negotiated but, since it was contemplated that the gas would be sold on a BTU basis the purchaser would have been compensated for the heating value of any liquids extracted and redelivered to the producer.

QUESTION 9. Provide the (a) length and size of the gathering facilities for your operation, (b) estimated cost of such line, (c) ownership of such lines, and for those lines to be owned by the pipeline purchaser or jointly with the producer how will costs be allocated for that portion of the facilities attributable to the transportation of gas?

ANSWER 9. (a) Assuming that your question pertains to natural gas gathering facilities, the natural gas gathering facilities consist of lines connecting the six separation centers to a conditioning facility. These lines are expected to be as follows: 30" diameter, 7 miles; 34" diameter, 5-1/2 miles; 38" diameter, 5-3/4 miles; 42" diameter, 5-1/2 miles. These data are for the entire field.

(b) The cost for these lines is currently estimated to be slightly in excess of

\$60 million.

(c) See Answer to I, 6.

QUESTION 10. What type of design would be required for the gas gathering system, i.e., buried, above group pipe, chilling facilities, etc.?

ANSWER 10. The gathering system will be installed on supports above ground and insulated.

QUESTION 11. Would your cost estimates vary depending upon whether the Arctic Gas or El Paso project were certificated?

ANSWER 11. No. We assume that the pipeline delivery specifications, both as to gas quality and pressure, would be identical for either project.

QUESTION 12. What percentage of gas available at the wellhead will be lost in treatment and/or processing?

ANSWER 12. We anticipate that approximately 6% of the hydrocarbon gas could be consumed in conditioning the gas to pipeline requirements. This estimate does not include fuel for operation of the Prudhoe Bay Field.

QUESTION 13. What state approvals will have to be obtained in relation to Alaskan North Slope gas production and when will your company make the necessary filings to obtain such approvals?

ANSWER 13. The lease owners of the Prudhoe Bay Field are actively engaged in discussions to

unitize the field. The Prudhoe Bay Field should be unitized prior to commencement of oil production and the agreement must be approved by the Alaska Oil and Gas Conservation Committee. The unitization agreement should contain a plan for the development and operation of the Prudhoe Bay Field, including gas sales timing and volumes, as well as facilities, wells and liquid production rates. The Prudhoe Bay Field owners expect to request approval of these documents during the last half of 1976.

Respectfully submitted,
ATLANTIC RICHFIELD COMPANY

By P. T. Davis ERX
P. T. Davis

AFFIDAVIT

DISTRICT OF COLUMBIA)

EDWARD R. LEAHY, being duly sworn, deposes and says that he is an attorney for Atlantic Richfield Company; that he is authorized to verify and file this document; that he has examined the statements contained in the submittal and that all such statements are true and correct to the best of his knowledge, information and belief.


EDWARD R. LEAHY

Subscribed and sworn to before me this 13th day of February, 1976.


NOTARY PUBLIC

(SEAL) My Commission Expires: March 18, 1977