

Decision No. 92552 DEC 30 1980

ORIGINAL

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

In the Matter of the Application of Western LNG Terminal Associates, a general partnership, and of a Joint Application of Western LNG Terminal Associates, Pacific Gas and Electric Company and Pacific Lighting Service Company, California corporations, for a permit authorizing the construction and operation of an LNG terminal pursuant to Section 5550 et seq. of the Public Utilities Code.

Application No. 57626
(Filed October 14, 1977)

In the Matter of the Application of PACIFIC GAS and ELECTRIC COMPANY, AND PACIFIC LIGHTING SERVICE COMPANY, California corporations, for a Certificate that Public Convenience and Necessity require the construction, operation, and maintenance of a 34" Pipeline from the Point Conception area, Santa Barbara County, California to Gosford, Kern County, California, and related facilities.

Application No. 57792
(Filed January 9, 1978)

Investigation on the Commission's own motion into the matter of the adoption of regulations governing the safety and construction of a liquefied natural gas terminal in the State of California.

CII No. 1
(Filed October 18, 1977)

Investigation on the Commission's own motion into the impact of the decline in natural gas available to California from traditional sources and the need for and timing of deliveries from supplemental supply projects.

Case No. 10342
(Filed June 1, 1977;
amended August 23, 1977)

(For appearances see Decisions Nos. 89177 and 90372.)

Additional Appearance

Ellen S. LeVine, Attorney at Law, for the Commission staff.

O P I N I O N

Background

On October 14, 1977 Western LNG Terminal Associates (WLNG) and certain affiliates filed an application with this Commission in accordance with the terms of the Liquefied Natural Gas Terminal Act of 1977 to construct and operate an LNG terminal at Little Cojo Bay near Point Conception, California. Subsequently, the Commission instituted Order Instituting Investigation No. 1 (OII 1) to consider the safety and construction of an LNG terminal in California and consolidated it with Application No. 57626, Case No. 10342, and, later, Application No. 57792.

On July 31, 1978 the Commission issued Decision No. 89177 granting WLNG a permit to construct and operate an LNG terminal at Point Conception subject to certain terms and conditions. Condition 32 of that order requiring meteorologic and oceanographic monitoring, now before us, is as follows:

"Western Terminal shall continue its meteorologic and oceanographic monitoring program to further evaluate actual sea-state conditions at the Point Conception marine terminal area. A minimum of two years of continuous on-site measurement of sea-state conditions including wind, wave, swell, current, and fog shall be recorded. After review and analysis of this data, the Commission will make a further determination as to the safety and reliability of the project's maritime operations. If

deemed necessary, further conditions may be placed upon the permit in order to assure the safety and reliability of the marine operations.

"This data shall be submitted to the Commission not later than January 15, 1980 and shall encompass the period December, 1977 through December, 1979."

The discussion under Condition 32 is as follows:

"A preliminary conclusion that maritime conditions at Point Conception are acceptable for safe and reliable operations is based on evidence utilizing data developed by hindcasting methods. The record evidence shows there is some uncertainty in the conclusions reached on sea-state conditions at Point Conception due to differing interpretations of the source data. Therefore, the Commission finds it prudent to guarantee the satisfactory resolution of these weather-related uncertainties by requiring on-site measurement data to verify that the proposed maritime operations at Point Conception are conducive to safety and reliability."

Ordering Paragraph 16 of Decision No. 89177 requires further hearing on the issue of "additional wind and wave evidence required by Condition 32."

By Decision No. 89615 dated October 31, 1978, Opinion and Order Denying Rehearing and Modification of Decision No. 89177, the Commission reaffirmed and modified its order by adding a finding and conclusion and modifying some findings for clarity.

Finding 88 of Decision 89615 found WLNG's marine operating criteria for berthing vessels to be reasonable. Under the criteria, berthing will not be permitted when visibility is less than one mile, when winds exceed 25 knots, or when wave heights exceed six feet.

Pertinent reliability findings in Decision No. 89615 are as follows:

- "91. Analysis of the evidence submitted on sea-state conditions indicates that, while annual weather-related downtime at Point Conception may exceed 17% in some years, average annual weather-related downtime will fall within the range of 0% to 17% during the life of the project; however, further on-site observations of sea-state conditions are appropriate and additional evidence on these conditions shall be required.
- "92. Analysis of the evidence submitted on sea-state conditions indicates that the projected level of weather-related berth downtime is acceptable and will not seriously impair the project's ability to deliver the contract quantities; however, further on-site observations of sea-state conditions are appropriate and additional evidence of these conditions shall be required."

Hearing

WLNG commenced its measurement program in December 1977. This program was continued following the issuance of Decision No. 89177 because of the requirements of Condition 32. On January 14, 1980 WLNG submitted the required data to the Commission, and on April 8, 1980 it submitted its evidence for the further hearing.

On May 13, 1980 further hearings were set and the date for serving of testimony by other parties was set. The Commission staff filed its testimony on July 3, 1980.

A duly noticed public hearing was held before Administrative Law Judge J. J. Doran in Los Angeles on July 22 and 23, 1980, and the matter was submitted upon the receipt of briefs due August 13, 1980. The only parties who participated in the hearing were WLNG and the staff.

WLNG's Testimony

WLNG's consultant specializing in ocean and coastal engineering presented evidence on the results of the actual on-site measurement program and the long-term hindcast. During the two-year (1978-1979) measurement program, the following results were recorded:

1. Winds over 25 knots--1.8 percent of the time.
2. Wave heights over six feet--4.6 percent of the time.
3. Swells exceeded allowable limits--0.2 percent of the time.
4. Visibility less than one nautical mile--3.8 percent of the time.

Some of the visibility or fog data employed in the measurement program came from Goleta Airport. However, WLNG's witness testified that there is a high correlation between visibility conditions at the airport and at the project site. Furthermore, to the extent that they were available, on-site measurements were submitted.

WLNG's witness also sponsored a study on the long-term hindcast of wind and wave conditions at the LNG site. This study used data from the U.S. Navy Spectral Wave Model and covered 15 years (1964-1978). The witness testified that the 15 years of data was all that was available. He also testified that the hindcast shows 2.7 percentage exceedance of 25-knot winds and 4.7 percentage exceedance of six-foot wave heights. The witness testified that the evidence of swells exceeding allowable limits was insignificant, approximately 0.15 percent.

The witness concluded, based upon both the measurement data and the hindcast, that the average annual weather-related downtime is estimated to be 10.4 percent for measured data and 11.9 percent for the hindcast. He also concluded that the measurement program and the hindcast produced consistent data.

WLNG's manager of Operations Research sponsored the results of a computer simulation of the LNG throughput using sea-state information furnished by WLNG's other witness. The simulation model showed that the average throughput over the life of the project is expected to be 1,328.4 million cubic feet per day (M^2cf/d) compared to the contract volume of 1,300 M^2cf/d . The simulation also showed that over the 30-year run the probability of annual throughput falling below 1,300 M^2cf/d in any year is only 5.3 percent.

Staff Testimony

The staff's oceanographer, after reviewing WLNG's exhibits, presented his conclusions:

1. Issues concerning the development and interpretation of sea-state data for the LNG site have been resolved in a manner supporting the Commission's preliminary finding that the maritime aspects of the project will be safe and reliable.
2. Project reliability, in terms of maintaining the planned 1,300 M^2cf/d annual average throughput at the LNG terminal, is expected to be good.
3. If a shortfall year occurs (deliveries fall below contract), the magnitude of the shortfall is expected to be small.
4. It is virtually certain that all purchased gas will be delivered during the nominal 20-year project life.
5. Limiting sea-state and meteorologic conditions, within a range measured and hindcast for the LNG site, appear to have only a small systematic influence on LNG deliveries.
6. Previous staff conclusions to the effect that weather-caused downtime would not seriously impair operations at the LNG site are supported by WLNG's exhibits in this proceeding.

7. Oceanographic and meteorologic data now available for the site appear to be adequate. Additional data would not be expected to change the above-stated conclusions.

The staff witness identified a need for safety criteria on when a vessel should leave the berth due to sea-state conditions. The staff recognized that previous proceedings did consider the subject and that Exhibits 0-21 and 0-22 in the Phase I hearings address safety aspects of leaving the berth. However, the staff's view is that objective guidelines for a tanker to depart its mooring for the safety of the open sea during extremely adverse sea-state conditions should be adopted.

WLNG's Position

WLNG states that it has fulfilled the requirements of Condition 32 of Decision No. 89177 by means of its implementation of a meteorologic and oceanographic monitoring program, the results of which were submitted to this Commission and evaluated during the hearing. The data it presented shows that the average annual weather-related limiting conditions will be approximately 11 percent during the life of the project. The results of the on-site measurement program and related studies demonstrate that sea-state conditions at the project site will allow safe and reliable terminal operation of the proposed terminal at daily throughput rates of 1,300 M²cf/d. Therefore, WLNG states that there is no need for further on-site measurement and that the on-site measurement program should be discontinued.

WLNG also states that, based on the evidence presented, there is no need to impose additional conditions for ships at berth to ensure that the maritime operations will be safe and reliable.

Staff's Position

Based on an analysis of WLNG's empirical data and spectral wave hindcast study, the staff concurs with WLNG that the project reliability is not adversely affected by sea-state conditions. The staff pointed out technical deficiencies in the data, but stated that such deficiencies are not sufficient to alter the conclusions reached by WLNG.

The staff recommended guidelines for the preparation for departure of a moored tanker from its berth for the safety of the open sea during extremely adverse sea-state conditions.

Since Condition 32 does not specifically alert WLNG to this issue, the staff recommends that it be considered at this time under the general safety implications of Condition 32. The staff believes that material already entered in the record in Exhibit 0-21 is sufficient to satisfactorily resolve the issue.

Exhibit 0-21 indicates that manifold arm motions of greater than 10 feet and line forces of greater than 50 tons appear to be critical limitations and can be easily monitored at an operating terminal. The staff recommends that these motions and forces, if exceeded more than once in a three-hour period, trigger preparation of the tanker for departure. Preparedness would include, but not necessarily be limited to (1) cessation of cargo unloading, (2) activation of the ship's turbines, and (3) manning of crew stations. The shipmaster, however, would ultimately decide whether or not to leave the berth.

Discussion

Decision No. 89177 reflected our satisfaction with the project's reliability as it relates to sea-state conditions. However, in an abundance of caution, we required WLNG to provide two years of actual measurement data.

Condition 32 expressly prescribed that two years of on-site, sea-state observation data be obtained. WLNG obtained approximately two years of wind and wave data and only eight months of visibility data.

WLNG points out that it could only have obtained about 16 months of visibility data, beginning August 1978 through December 1979. However, WLNG did not begin to collect visibility data until April 1979, eight months after the issuance of Decision No. 89177. In response to the staff's concern, WLNG provided correspondence between Bixby and WLNG in explanation of the delay. The delay apparently stemmed from Bixby's unwillingness to issue a license to allow WLNG to connect its fog instruments to Bixby's power source. While the delay may have been reasonable, nevertheless eight months of data was lost. The staff, therefore, requested an additional six months of visibility data to substantiate the reliability of WLNG's submitted data which was marked as late-filed Exhibit 0-174. The staff is now satisfied that visibility will not adversely affect the project reliability.

We concur with the parties that the results of the studies presented concerning wind speeds, wave heights, swells, and visibility are reasonable and adopt them.

The results of the computer simulation study that the sea-state conditions at the LNG site will allow safe and reliable operations in terms of maintaining the 1,300 M²cf/d contract volumes are reasonable and adopted. Further, the forecast that the magnitude of any shortfall, if a shortfall year occurs, should be small is reasonable and adopt

There is no need for further reporting of on-site measurements. Therefore, we do not require the continuation of the meteorologic and oceanographic monitoring program.

In determining whether a tanker could remain at berth, the Commission, in Decision No. 89177, relied on allowable wave heights established in the Delft Hydraulics Laboratory Study (Exhibit 0-22). Allowable wave heights were based on specified physical forces and motions of a tanker at berth that were safely within the design limits of the terminals, mooring, and unloading equipment (Exhibit 0-21).

The staff recommends guidelines for the preparation for departure of a berthed tanker during adverse sea-state conditions.

WLNG believes that it would be inappropriate to develop any criteria at this time. In support of its position, WLNG cites its Exhibits 0-21 and 0-22 in Phase I on the subject of vessels leaving berth due to sea-state conditions. It also states that each shipmaster needs some flexibility and to exercise his judgment in deciding when to leave the berth. WLNG further argues that our General Order No. 112-D and our Safety, Construction, and Environmental Monitoring Program for LNG facilities (Decision No. 90372) contemplate that WLNG will develop procedures for berthing and leaving the berth.

Limiting sea-state conditions could affect project reliability in two ways. First, adverse sea-state conditions could prevent a tanker from arriving at the terminal. We have already adopted criteria for this situation. Second, if a tanker were already at berth, adverse conditions could cause the tanker to interrupt unloading and depart the terminal. In this latter situation, we heretofore relied on Exhibits 0-21 and 0-22 and did not adopt guidelines as we did for berthing.

The adoption of objective guidelines for berthing or departing in no way overrules the shipmaster. We recognize that the shipmaster's judgment will ultimately determine ship arrival and departure. Objective guidelines, on the other hand, serve two important functions: (1) they serve as an aid to the exercise of

the shipmaster's judgment and (2) they provide a measure of accountability of the action taken. The guidelines cause a state of readiness to depart. The shipmaster's discretion will, in every case, determine actual departure.

The Delft study criteria in Exhibit 0-22 pertaining to allowable wave heights do not adequately address the issue of safe departure of the LNG tanker. The criteria adopted must be translated into quantifiable terms that are readily understandable and measurable by the shipmaster. The criteria derived from Exhibit 0-21 refer to motions and forces on the ship's mooring apparatus with which the shipmaster is intimately familiar. Moreover, the effects of these forces, unlike the criteria in Exhibit 0-22, may be easily measured. These criteria allow the shipmaster to assess sea-state conditions in a manner familiar to him.

We are now of the opinion that guidelines are prudent for ship departure as well as for ship berthing. Both sets of guidelines are derived from studies prepared by WLNG. Such studies were relied upon to determine the project reliability and safety.

The staff-recommended guidelines, based upon WLNG's Phase I Exhibits 0-21 and 0-22, for the preparation for departure of an LNG tanker from berth during extremely adverse sea-state conditions are reasonable and adopted. It is expected that the sound professional judgment of the shipmaster will ensure safety of operation, including departure from berth. The shipmaster would ultimately decide whether or not to leave berth. However, the making of such judgment can be assisted by the guidelines, given the absence of actual operations and the uniqueness of the project.

Findings of Fact

1. Based on on-site measurements over an approximate two-year period, wind speeds exceed 25 knots--1.8 percent, wave heights exceed six feet--4.6 percent, and swells exceed allowable limits--0.2 percent of the time. Visibility of less than one nautical mile occurs 3.8 percent of the time.

2. The spectral model hindcast study, based on a 15-year period, indicates that winds exceed 25 knots--2.7 percent, wave heights exceed six feet--4.7 percent, and swells exceed allowable limits--0.15 percent of the time.

3. The long-term average annual weather-related downtime is estimated to be between 10.4 percent and 11.9 percent based on measurement data and the hindcast.

4. The simulation model showed that the average throughput over the life of the project is expected to be 1,328.4 M²cf/d compared to the contract volume of 1,300 M²cf/d.

5. The probability of annual throughput falling below 1,300 M²cf/d in any year is small, 5.3 percent or less.

6. If a shortfall year occurs, there is only a 5 percent probability that the shortfall would exceed 1 percent of the nominal contract volume.

7. It is extremely unlikely that sea-state conditions will prevent delivery during the nominal 20-year project life of any portion of gas supplies proposed to be purchased.

8. WLNG has complied with Condition 32 of Decision No. 89177.

9. There is no need for further reporting of on-site meteorologic and oceanographic measurements.

10. For purposes of ensuring the safety and reliability of the proposed LNG transportation system, a state of preparedness for the safe departure of the LNG vessel from its berth will be initiated if any of the following guidelines occur more than once per three hours on the average: motions of manifold greater than 10 feet or line forces greater than 50 tons. Preparedness shall include, but not necessarily be limited to: (1) cessation of cargo unloading, (2) activation of the ship's turbines, and (3) manning of crew stations.

Conclusions of Law

1. On-site measurements and the hindcast of the sea-state conditions support our initial opinion that maritime conditions are acceptable for safe and reliable operations at the LNG site.

2. Since there is no need for further reporting of on-site measurements, WLNG should be relieved of continuing its meteorologic and oceanographic monitoring program.

3. WLNG should be required to adopt the objective guidelines for initiating a state of preparedness for the safe departure of an LNG tanker from berth during adverse sea-state conditions to ensure the safety and reliability of the LNG project (see Finding 10).

O R D E R

IT IS ORDERED that:

1. Western LNG Terminal Associates (WLNG) shall adopt and implement the objective guidelines specified in Finding 10 for initiating a state of preparedness for the safe departure of an LNG tanker from berth during adverse sea-state conditions.

2. WLNG is relieved of continuing its meteorologic and oceanographic monitoring program.

The effective date of this order shall be thirty days after the date hereof.

Dated DEC 30 1980, at San Francisco, California.

John E. Bryan
President

Richard D. Shuck

Edward T. Sedwick

Samuel W. Pruitt
Commissioners

Commissioner Vernon L. Sturgeon, being necessarily absent, did not participate in the disposition of this proceeding.