

Decision No. 38118

BEFORE THE RAILROAD COMMISSION OF THE STATE OF CALIFORNIA

CITY OF FRESNO, a municipal corporation,)
)
 Complainant,)
 vs.)
)
 PACIFIC GAS AND ELECTRIC COMPANY, a)
 corporation,)
)
 Defendant.)

ORIGINAL

Case No. 4723

C. M. OZIAS, City Attorney, FRED N. ASHLEY, Commissioner of Public Works, ARTHUR L. HILDERBRAND, Commissioner of Finance, MAYOR Z. S. LEYMEL, and GEORGE H. BALL, Legislative Commissioner, for the City of Fresno.

R. W. DUVAL, for Pacific Gas and Electric Company.

J. J. DEUEL, for the California Farm Bureau Federation.

ROWELL, COMMISSIONER:

O P I N I O N

The burden of this complaint brought by the City of Fresno is that the Pacific Gas and Electric Company wrongfully increased its gas rates on October 15, 1943, when it reported that the heating value of the gas then being delivered had increased sufficiently to justify an automatic upward adjustment of its rates. The City rests its complaint mainly upon the contention that the representations then made by the Company as to the heating value of the gas supplied were based upon inaccurate calorimeter recordings. The prayer is that the Commission order a restoration of the rates in effect prior to such increase and direct that reparation be made of the excess charges exacted from all gas consumers within the City of Fresno.

More specifically, the City alleges that commencing in January of 1943 it caused a number of tests to be made of the quality of the gas being served; that

such tests were made by the Twining Laboratories in Fresno by the use of a Sargent water-flow calorimeter, and that all such tests revealed a considerably lower heating value content than that regularly reported by the Company; that the Company has never demonstrated that its two Thomas automatic recording calorimeters indicate the correct B.t.u. content of the gas delivered; and, therefore, that its rate increase in October, 1943, premised upon the delivery for the two preceding months of gas with a heating value of only 3 B.t.u. in excess of the 1135 B.t.u. required to justify such increase, should be set aside.

Although the particular rate adjustment which gave rise to this complaint was made on October 15, 1943, the complaint was not filed until May 29, 1944. Previously, however, the City had informally questioned the accuracy of the Company's reported heating value. Hearings on this formal complaint were had on September 15, and October 19 and 20, 1944. At these hearings evidence was introduced showing the results of thirty-two tests made by the Twining Laboratories between January 22, 1943 and August 12, 1944, and also the readings of the Thomas automatic recording calorimeters of the Company from the beginning of 1943 to the date of hearing. By stipulation of the parties, further data prepared by the Commission's engineering staff were admitted in evidence subsequent to the hearings, and the matter was then taken under submission in January of this year.

The City's main contention, as noted above, is that the Company's reported heating values based upon the recordings of its Thomas automatic calorimeters are inaccurate, and most of the record consists of expert testimony on gas calorimetry methods and the accuracy of the results which may be obtained by each. Although this question of the relative accuracy of gas calorimetry results is the only issue pressed upon us in this case, underlying it are other issues necessarily demanding consideration. The City does not claim that the tariff rule of the Company providing for the adjustment of rates upward or downward to coincide with B.t.u. fluctuations in the gas delivered is in itself unreasonable, or that the Company has in any way misapplied that rule. Nevertheless, for an understanding of the question of gas calorimetry practices it seems necessary first to examine the

provisions of that rule and then to observe its actual operation as evidenced by the facts of record in this case.

Pacific Gas and Electric Company was required by the Commission's Decision No. 36082 of December 29, 1942, to establish a rule by means of which gas rates would automatically be geared to fluctuations in the heating value of the gas delivered. The first rate adjustment made in the Fresno area under such a rule was that of March 15, 1943. Immediately prior to 1943 the Company's schedules merely obligated it to supply natural gas within a range of from 1000 to 1100 B.t.u.

The material part of Rule and Regulation No. 2 which the Commission then prescribed, and still remaining in effect, reads as follows:

"Rate Adjustment for Heating Value:

"The effective rates in those schedules providing for B.t.u. adjustment, as per the heating value of the natural gas served, shall be raised or lowered in accordance with the following rule:

"The base rates set forth in the schedules for natural gas are predicated on an average monthly heating value of 1100 B.t.u. per cubic foot (determined as the average of daily heating value tests on a "dry" basis). A maximum variation in the monthly average of 35 B.t.u. above or below 1100 B.t.u. is contemplated. When the actual variation exceeds 35 B.t.u. for two consecutive calendar months, the effective rates will be changed by increasing or decreasing the rates to conform to a new average heating value, adjusted in steps of 50 B.t.u. from the base of 1100 B.t.u., which is the nearest the average of that experienced during the two months which occasioned the change. The effective rates will be determined by an adjustment in all base rates (except for the fixed and/or the minimum charge portion of the rate) in accordance with the percentage set forth in the schedule for each 50 B.t.u. step, computed to the nearest one-hundredth cent per 100 cubic feet and will become effective fifteen (15) days thereafter. Changes in the rates resulting from variation in heating value will not be made more frequently than each two-month period except when definite changes in the source of gas occur the appropriate rates will be made effective fifteen (15) days after the date of changeover. In case rate changes are to be made in conformity with this rule and if other rate changes, due to the operation of the fuel oil clause (as provided in the respective tariffs), are due to become effective within fifteen (15) days of each other, then the two shall be combined and the later date of the two effective dates shall govern."

When the above rule was proposed during the course of the hearing in the case leading up to Decision 36082, the Commission witnesses made it quite plain, as the rule itself clearly enough declares, that there would be no rate adjustment more frequently than each two months unless the source of gas be changed, and that to justify an adjustment either upward or downward, the average B.t.u. content for

the two preceding calendar months must have shown an increase or decrease of at least 35 B.t.u. Upward or downward rate adjustments were to be based on 50 B.t.u. steps or changes in heating value, thus creating zones of 20 B.t.u. within which two rate levels were applicable. This result is brought about by the fact that when the Company started with the delivery of a gas of 1100 B.t.u. and applied the rates fixed for gas of that quality, it could not increase the rate to an 1150 B.t.u. basis until the heat content of the gas delivered for two consecutive months averaged at least 1135 B.t.u. Nevertheless, after once adjusting the effective rate to an 1150 B.t.u. basis, the rate would not again go back to the 1100 B.t.u. base until the average heating value for two consecutive months dropped to 1115 B.t.u. Thus, within the zone between 1115 and 1135 B.t.u., the applicable rate depended upon whether the Company came within that zone from above or below. The effect was to establish two rates, both presumably just and reasonable, applicable to gas falling within that B.t.u. zone.

The above explanation of the operation of the automatic adjustment clause may serve to explain in part the contentions of the City of Fresno in this case. Although the City alleges that the Company's calorimeter readings were inaccurate, underlying this assertion must be the feeling that the Company unjustifiably increased its gas rates when in fact it was not then delivering a gas of a quality substantially higher than that theretofore delivered, and continued thereafter to deliver gas having substantially the same heating value as before.

The actual effect of a 4% rate increase in the gas delivered to domestic customers served under the general service schedule applicable within the City of Fresno is shown by the following table.

Monthly Use	Prior to Increase on October 15, 1943		After Increase on October 15, 1943	
	Rate per 100 cu. ft.	Charge	Rate per 100 cu. ft.	Charge
First 300 cu. ft.		\$.68		\$.68
Next 2200 "	5.1¢	1.12	5.30¢	1.17
Next 7500 "	4.4¢	2.30	4.58¢	2.43
Total for 10000 "		\$ 5.10		\$ 5.28
Next 10000 "	4.0¢	4.00	4.16¢	4.16
Total for 20000 "		\$ 9.10		\$ 9.44

The Company's justification of the increase made on October 15, 1943, is that the average B.t.u. content of the gas delivered during each of the preceding calendar months reached and exceeded the requisite 1135 B.t.u. standard. This may be illustrated by the following table of figures compiled from Exhibits 9, 10, and 13, which show the actual monthly B.t.u. value of the gas delivered by months between January 1, 1943 and August 31, 1944, as computed from the average daily recordings of its two recording calorimeters, together with the B.t.u. upon which the effective rates were based during that period.

1943	B.t.u. Basis for effective rates	Monthly average B.t.u. recorded at		Recordings plus or minus effective B.t.u. basis	
		Gas Plant	Meter Shop	Gas Plant	Meter Shop
Jan.	1050	1107	1108	+57	+58
Feb.	"	1119	1122	+69	+72
Mar.	1100*	1129	1129	+29	+29
Apr.	"	1121	1118	+21	+18
May	"	1125	1126	+25	+26
June	"	1126	1129	+26	+29
July	"	1126	1134	+26	+34
Aug.	"	1138	1143	+38	+43
Sept.	"	1138	1140	+38	+40
Oct.	1150	1145	1143	-05	-07
Nov.	"	1142	1146	-08	-04
Dec.	"	1138	1141	-12	-09
<u>1944</u>					
Jan.	"	1130	1135	-20	-15
Feb.	"	1123	1133	-27	-17
Mar.	"	1124	1129	-26	-21
Apr.	"	1135	1140	-15	-10
May	"	1131	1140	-19	-10
June	"	1127	1138	-23	-12
July	"	1114	1138	-36	-12
Aug.	"	1135	1147	-15	-03

* Rate changes were made effective on 15th of month, but the monthly averages of B.t.u. delivered are on a calendar month basis. Hence, for the month of October, 1943, the indicated deficiency of B.t.u. applied to the second half of the month only.

The Company relies upon the readings of the calorimeter located at its Gas Plant, this being a point where there is a convergence of gases received from several producing fields to the west of Fresno. The readings of the calorimeter located at this point were generally somewhat lower than those recorded by the instrument located in the southern section of the city where the gas tested is

primarily that coming from the southern part of the San Joaquin Valley. It may be seen, therefore, that if the Company's recording calorimeter readings for the months of August and September, 1943, be accepted as correct, the rate increase put in effect fifteen days thereafter was an increase made in exact accordance with provisions of its rate schedules. The 1100 B.t.u. basis that had applied since March 15, 1943 was then changed to an 1150 B.t.u. basis, the latter continuing in effect during the remaining months of 1943, and through August, 1944, the last month for which figures were presented in this case. A comparison of the figures in the above table shows that the average monthly heating value of the gas delivered for the seven calendar months from March to October, 1943, exceeded the 1100 B.t.u. base by approximately 29 B.t.u., as measured by the calorimeter at the Gas Plant, and by 31 B.t.u. as measured by the one at the Meter Shop. However, for the eleven month period beginning with October, 1943, the average B.t.u. content of gas delivered was about 19 B.t.u. below the 1150 B.t.u. basis applicable during that period, as measured at the Gas Plant, and 11 B.t.u. below as measured at the Meter Shop.

Looking, then, at the record of gas heating values and rates for the entire period of twenty months, it is seen that gas consumers within the City of Fresno were not disadvantaged by the application of the automatic rate adjustment rule. Assuming the recorded B.t.u. monthly averages as shown in the above table be correct, it is seen that in some months more heat units were supplied in excess of the mean upon which the applicable rates were predicated than the deficiency in other months when the heat units fell below that mean. However, it is obvious that the rule is not so designed as to allay completely the fears of gas consumers that they may at times be charged more than the actual heating content of the gas justifies. This was evidenced by questions asked during the course of the hearing seeking an explanation for the fact that domestic rates were increased by 4% in October, 1943, when the B.t.u. content of the gas increased by a much lesser percentage, and for a temporary period only. The rule, of course, does not bring about rate adjustments immediately upon the occurrence of changes in heating value,

and could not have been intended to bring about such a result. It was designed, rather, to provide for the gearing of rates to heat content with reasonable fairness when applied consistently over a period of some months. We may take notice of the fact that after the submission of this case the rule was again applied to effect an adjustment of rates, and this time by a downward revision.

Whether a more perfect automatic adjustment rule can be devised is not the primary question before us in this proceeding. Yet, the above discussion of the problem seems essential to the understanding of the issue most sharply drawn by the City's complaint, namely, that during the months of August and September, 1943, the true B.t.u. value of the gas delivered did not reach 1138 B.t.u. as reported by the Company. This brings us to the question of the accuracy of the Company's automatic recording calorimeter readings.

Pacific Gas and Electric Company has generally adopted the Thomas automatic recording gas calorimeter, particularly since it began the distribution of natural gas. It has nineteen machines installed at various points upon its system, two of which are in the City of Fresno. No technical description of the Thomas calorimeter will here be attempted. As distinguished from the ordinary water-flow type of calorimeter, which is primarily a laboratory instrument by which a heating value test may be made of a specific sample of gas, the Thomas instrument is a larger and considerably more expensive device which constantly measures the heat content of the gas flowing through the line at the point where the instrument is installed. By means of a continuous recording chart, a permanent record is maintained of the B.t.u. content of all gas passing such point throughout the day. It was shown that this type of calorimeter is in quite general use throughout the United States. The Southern California Gas Company now possesses six of these instruments and will acquire five more when their manufacture can be resumed. There are several other like instruments owned by the smaller gas utilities of the State, and one by the City of Los Angeles.

Much evidence was presented in this case relating to the technical process of making gas calorimetry tests, and many references to studies made by the

National Bureau of Standards upon the subject. The Company sought to show that in the making of an occasional test by the laboratory method there would be a far greater possibility of an inaccurate result because of the greater chance of error in making the various parts of the test and computations involved in each. It contends that the Thomas machine, on the other hand, is so designed as to eliminate the human equation to a maximum degree when the machine is properly installed and maintained. Upon one point the witnesses seem to agree. It is that by any calorimetry method, even when the accepted techniques are carefully followed, it is practically impossible to test the true heating value of gas without acknowledging a degree of inaccuracy of as much as one percent. If this be true, it may be seen that when testing a natural gas of approximately 1100 B.t.u. heating value, deviations of as much as 10 B.t.u. may be expected.

When in the early part of 1943 the Company first applied its automatic rate adjustment rule in the Fresno area, the City caused a number of tests to be made by the Twining Laboratories located in that city. The instrument used by the Laboratories was a water-flow calorimeter of Sargent manufacture. The record shows that there were twenty-three of such tests made during the year of 1943 and nine during the first eight months of 1944. However, only one test was made during the months of August and September, 1943, the months during which the Company's B.t.u. recordings indicated the delivery of gas of sufficient heating value to justify the rate increase which thereafter became effective on October 15th. The gas tested by the Twining Laboratories was taken from the Company's distribution mains at the site of the laboratories near the business section of the City. Unfortunately, the exact hours at which such calorimetry tests were made, except on six occasions, are not revealed. A fair comparison of the results made by such laboratory tests with the readings of the Thomas automatic recording calorimeter cannot be made without a knowledge that the gases analyzed were substantially the same. The Company's Exhibit 22 compares the results of each of the Twining Laboratory tests with the B.t.u. recordings made by its Thomas calorimeters during the entire day. Upon analysis of these figures for those days on which the hours of the

Twining Laboratory tests are known, it must be concluded that in reality the difference in results between the laboratory tests and the Thomas calorimeter recordings becomes much less significant than first indicated. This is illustrated by figures in the following table compiled from Exhibit 22 and from Exhibit 27 later received in evidence by stipulation. The Company's recordings here shown are those of the Gas Plant calorimeter only.

	City's Tests of Btu.	Co's daily avg. recordings	City tests + or - Co's daily avg.	Co's recording $\frac{1}{2}$ hr. before test	City + or - Co's recording $\frac{1}{2}$ hr. before test.
<u>1943</u>					
Apr. 5 - 10:30 A	1101	1120	-19	1100	+ 1
Apr. 5 - 2:30 P	1114	1120	- 6	1105	+ 9
Apr. 6 - 1:30 P	1072	1108	-36	1100	-28
Apr. 8 - 1:30 P	1090	1115	-25	1100	-10
Apr. 9 - 10:00 A	1083	1076	+ 7	1073	+10
July 23- 3:30 P	1099	1133	-34	1111	-12

The tests made by the Twining Laboratories were begun at approximately the hours indicated in the above table, but the record is not entirely clear as to the exact time the gas samples used in making the tests were taken from the distribution mains of the Company. Therefore, to check the laboratory tests with the Company's calorimetry readings, sufficient time must be allowed for the passage of gas from the calorimeter to the point where the samples were taken. Although this time differential cannot be accurately estimated, nor do we know whether the gas passing the Gas Plant calorimeter was wholly representative of that taken from the distribution mains, nevertheless, the above comparison of the laboratory tests with the Gas Plant calorimeter readings one-half hour before serves to demonstrate that the laboratory results might not have differed greatly from the recordings of the Company's calorimeter. Whereas the six tests made by the laboratory averaged about 19 B.t.u. less than the daily average of the Company's recordings, the difference is reduced to an average of but 5 B.t.u. when compared with recordings at specific hours rather than the daily averages. It is evident that a heating value test made of a specific gas sample may bear little relation to daily average B.t.u. readings of the Company's continuous recording calorimeters, for the record shows that there occurs a rather marked variation in the quality of gas served during a

single day, or even during a single hour. For example, on the days of April 6, 8, and 9, when the daily average B.t.u. recordings respectively, as above indicated, were 1108, 1115, and 1076, the minimum B.t.u. recordings during the same days were 1063, 1058, and 1050. While a gas utility should use every effort to maintain as uniform a heating value as possible in the gas delivered, it is inevitable that there will be some variation when gas is derived from various production fields, especially during periods of heavy consumer demand.

From the evidence presented in this record, it is impossible to judge the exact degree of accuracy attained with the use of the Thomas automatic recording calorimeter. The problem of devising standards for the maintenance and operation of all types of calorimetry equipment is a matter which the Commission is inquiring into in another proceeding instituted upon its own motion. All the evidence in the instant case points to the conclusion that with this type of instrument there can be maintained an accurate record of the actual variations in the heat content of the gas being served. We adverted above to the fact that in the testing of the heat value of gas by any calorimetry method an inaccuracy of at least 1% must be expected, thus compelling a tolerance of at least 10 B.t.u. when considering a natural gas of the type now being supplied. As important as exact calorimetry methods may be to safeguard consumers' interests, an error of more serious consequence may result from the location of calorimeters at points on supply lines where the gas is not of the same quality as the mixed gas generally being delivered through the distribution system. However, the evidence in this case does not indicate that the quality of the gas supplied throughout the city could have differed materially from that being tested by the two recording calorimeters relied upon. Also, an equally important inquiry was whether the daily averages of the B.t.u. recorded were not unduly weighted by a high B.t.u. content at an hour of the day when relatively little gas was being consumed. Accordingly, by stipulation of the parties, such a study was made by engineers of the Commission's staff after the close of the hearing. The results indicate that for the months of August and September, 1943, when the reported arithmetical average heating value

for the two months was 1138 B.t.u., the average for the same months, when weighted by the volumetric gas send-out, was 1139 B.t.u., an indication that the gas received by the average consumer within the city was not of lesser heating value than the reported value upon which rates were predicated.

The prayer of this complaint is that the Commission order the Company to make reparation to gas consumers within the City of Fresno in the event the Commission finds that the heating content of the gas supplied for the two months preceding the rate increase on March 15, 1943 did not average in excess of 1135 B.t.u. The Commission's power to make any reparation order is a power derived from Section 71 of the Public Utilities Act, and is a power subject, of course, to the limitations prescribed in that section. If the Company has exacted charges that were in accordance with the automatic rate adjustment rule which the Commission theretofore had found reasonable, no reparation order would be permissible.

It must be concluded that Rule and Regulation No. 2, does not prohibit the use of the automatic recording type of calorimeter. Therefore, as it has not been shown that the Company's two recording calorimeters failed to measure the heating value of the gas with substantial accuracy or that the readings of such instruments were incorrectly reported; it follows that the rate increase of October 15, 1943 was a rate change made in accordance with the Company's lawfully filed and effective rule.

Accordingly, the relief prayed for by the City must be denied. We are cognizant of the necessity for a more thorough study of all gas calorimeter practices, as well as the problem of measuring the heating value of mixed natural gases derived from various producing fields. But these are subjects of inquiry which are before us in another proceeding.

I recommend the following order.

ORDER

The complaint herein brought by the City of Fresno against the Pacific Gas and Electric Company having been heard and submitted, the matter considered, and basing this Order upon the conclusions reached in the foregoing Opinion, and good cause appearing,

IT IS ORDERED that the relief sought in said complaint be denied, and said complaint be and hereby is dismissed.

Dated at San Francisco, California, this 27th day of July, 1945.

Harold Anderson
Justus F. Casner
Frank C. ...
Leo H. ...

Commissioners.