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BEFORE THE OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF COLORADO

IN THE MATTER OF THE INVESTIGATION TO)
TAKE MEASURES TO PREVENT WASTE OF OIL)
AND GAS IN THE RANGELY FIELD IN THE)
STATE OF COLORADO.)

CAUSE NO. 2

PURSUANT TO NOTICE to all parties in interest, the
above-entitled matter came duly on for hearing at the State
Office Building, Denver, Colorado, at the hour of 10:00 o'clock
a.m., June 25, 1956.

BEFORE:

Mr. Warwick Downing, Chairman
Mr. H. C. Bretschneider, Commissioner
Mr. F. M. Van Tuyl, Commissioner
Mr. W. A. Dillon, Commissioner

APPEARANCES:

E. G. Knowles, Esq., Denver, Colorado,
Lee S. Osborne, Esq., Los Angeles, California,
D. O. Churchill, Esq., Los Angeles, California,
Read Winterburn, Los Angeles, California, for the
Union Pacific Railroad Company;

Walter E. Will, Esq., Denver, Colorado,
T. O. H. Mattson, Denver, Colorado,
Tom T. Freeman, Denver, Colorado, for the
Texas Company;

F. L. Kirgis, Esq., Denver, Colorado,
R. M. Williams, Esq., Bartlesville, Oklahoma,
Jack Turner, Bartlesville, Oklahoma, for the
Phillips Petroleum Company;

APPEARANCES: Continued

John Woolfolk, Esq., New Orleans, Louisiana,
V. P. Cline, New Orleans, Louisiana,
A. L. Vitter, New Orleans, Louisiana,
C. R. Blomberg, New Orleans, Louisiana,
E. N. Dunlap, Denver, Colorado,
C. L. Pickett, Denver, Colorado, for the
California Company;

R. W. Sullivan, Esq., Denver, Colorado,
John W. Stayton, Esq., Austin, Texas,
Samuel Butler, Jr., Denver, Colorado,
Max S. Loy, Denver, Colorado,
R. J. Corbett, Denver, Colorado, for the
Sharples Oil Corporation;

T. J. Files, Esq., Casper, Wyoming,
T. Murray Robinson, Esq., Tulsa, Oklahoma,
R. B. Laughlin, Esq., Casper, Wyoming,
R. B. Giles, Casper, Wyoming,
M. O. Heggland, Casper, Wyoming, for the
Stanolind Oil & Gas Company;

Peter Holme, Jr., Esq., Denver, Colorado, for
McLaughlin interests;

Fred Evans, Esq., Salt Lake City, Utah, for the
Equity Oil, Weber Oil, and Utah Southern;

M. F. Westfall, Cody, Wyoming, for the
Husky Oil Company;

A. J. Jersin, Denver, Colorado, Director,
Sam Freeman, Esq., Denver, Colorado, for the
Oil and Gas Conservation Commission.

(Whereupon, the following proceedings were had.)

I N D E X

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CHAIRMAN DOWNING: Needless to say, gentlemen, how happy we are to have all you gentlemen call on us, but we do hope that maybe this will be the last time; in other words, we will get this problem settled. I wish to say at this time that the Commission has requested the assistance of the Interstate Oil Compact Commission in the solution of our troubles. As you know, that Commission is dedicated to the cause of conservation and it has its committee upon which we find the ablest engineers in the country. It happens that the Chairman of the Secondary Recovery Committee and Pressure Maintenance Committee is Paul Torrey. You all know him and he is here. He is here at our invitation. He is here to testify if we ask him and to advise us as to the proper order that we will make on the premises.

Now before I go any further, I want to read to you something that happened way back in September, 1948. The Interstate Oil Compact Quarterly Bulletin of September, 1948, said, "The development of the very large Weber sand reservoir of the Rangely Field has been responsible principally for the recent great increase in Colorado's primary oil reserves. A preliminary recovery of 310 million barrels has been estimated from the hard and generally impermeable Weber sand." The writer estimates that within the probable proven area of around 25,000 acres the original oil content of the reservoir amounts to approximately 1 1/2 billion barrels, and that the presently

estimated primary recovery of the field might be doubled by adequate pressure control. That was in 1948 and that doctrine is still good if either you gentlemen will cooperate with the Commission or if you don't if we can make an effective order.

Now I also would like at this time to introduce into the record a document that has just recently been printed entitled, "The Principles of Petroleum Conservation," published by the Engineering Committee of the Interstate Oil Compact Commission, dated December 1, 1955. I imagine you are all familiar with it. If you are not, you better be, because I think that states the principles that ought to govern all of us at this hearing.

Now just one other thing. You gentlemen all know how anxious this Commission is that we may have a better result in Rangely than we are getting. We have felt that to a large extent the trouble has been the engineers of the various companies. The men at the local level have been disputing the claims of the other fellow and asserting the claims of their own company so long that they have gotten so habituated to it that they couldn't change; so we sent a letter to the top men of each company, identical letters. Now I don't know whether it did any good or not, we will find out at this meeting, but it does express in a general way the attitude of this Commission. I was just going to file it for the record but I don't think it would harm a bit if I read it

to you so it will remind you of our position. This letter happens to be addressed to Mr. Frank Pryor, but the same went out to the top men of each of the five operating companies: "My dear Frank: The importance of the matter has prompted, and I hope justifies, this letter to you personally. I am referring to the waste of oil and gas in the Rangely Oil and Gas Field in Colorado. As you undoubtedly know, last November, the Oil and Gas Conservation Commission of Colorado, of which I happen to be Chairman, ended all controls over the Rangely Field because there was such a wide difference of opinion between operators as to means of effective control, and particularly to give the operators an opportunity to work out their problems themselves. We also hoped that developments would lead to more definite steps for a unit operation which everyone recognizes would be the ideal basis for operating the Rangely Field.

"Since that time, almost six months have elapsed. The situation has not improved, but has deteriorated. Production has increased from about 65,000 barrels to 80,000 barrels a day, and the gas flare has increased from about 7 million to about 30 million cubic feet per day. It seems the operators are now involved in a serious competitive situation which will increase the gas flare and the production to a point beyond its present basis, which could, if it has not already done so, damage the reservoir and violate correlative rights of the

operators and some of their underlying interests.

"Under present operating conditions, each operator is endeavoring to recover as much oil as possible to the best interests of their respective companies. This is being done under the direct supervision of the local representatives. The time has now come that this matter must be solved by the top men in each company. The men with the power to compromise and who have the power to put into effect the principle that industry must solve its own problems by itself, which means give and take, and never to appeal to public authority to settle such problems.

"I would remind you that the differences that have arisen have been of opinion, and suggest each operator should give credit to the opinions of all the other operators. I am sure that each company will gain far more by unitization than it will lose if such compromise be had. Rangely, being a large field, needs the most advanced conservation practice.

"The purpose of this letter is to direct your attention to a serious problem which confronts our Commission. Our Commission, as you know, has a responsibility, but the operators also have a responsibility, not only to protect the interest of the State under the Conservation Statute, but also to protect their own interests. I think the time has come when you should take some personal interest in preventing waste in the Rangely Field.

"At the hearing on June 25th we expect to witness an attitude of cooperation among the operators, to the end that a practical plan can be decided upon concerning Rangely, and that such a plan will be a step toward final unitization of the whole area. Although I am not in a position to speak for the Commission as a whole, it seems logical that whether or not the operators will propose a practical plan upon which they have agreed, the Commission will be compelled to issue a new order on the Rangely Field, because it appears that conditions as they are now cannot continue.

"The unfavorable reaction of Senator Case's Senate Speech, followed by the veto of the gas bill by the President, has emphasized the purpose of the industry to settle among themselves on the principle of "give and take", all controversies with public authorities, and concerning conservation problems. Certainly, our Commission will do everything possible to avoid any such controversy.

"I have written this same letter to each of the top officials of the operators in the Rangely Field, and have sent a copy to your local representative. It will be very much appreciated if you would take serious thought of this letter, and of course, I would like to have a reply, with whatever observations you care to make at this time."

Let me add to that that I received a very nice letter from each person to whom this was addressed. They all

sound fine and I think they were sincere. They were probably partially at least confidential and it's not necessary to present them here, but whether they mean it or not we will soon find out. I hope they did. I cannot stress too strongly the danger, the method of suicide, that may follow if a public controversy results between the conservancy authorities of this state and the operators of the field. I think the people have a right to expect that these controversies be settled, and I think the industry cannot afford to take any more chances of the publicity of the character they have had. I can emphasize that, but I will not take the time to do it, but I have statements by Frank Porter, the President of the A.P.I. and others which have outlined precarious conditions of the industry relations with public relations, and above all else we ask you to agree with one another first. If you can't do that, agree with us, that this matter may be settled without a public controversy over it.

Now I think that is all, except I think maybe at this time I should introduce Mr. Torrey. He has prepared a statement, it's in rough form now but he will read it and it will soon be ready for distribution. It will be a very valuable contribution, I am sure, at this meeting.

PAUL D. TORREY

was thereupon called as a witness, being first duly sworn according to law, upon his oath testified as follows:

THE WITNESS: Mr. Chairman, Members of the Colorado Oil and Gas Conservation Commission: My name is Paul D. Torrey, and I was born in West Feliciana Parish, Louisiana, in 1903. I am Chairman of the Secondary Recovery and Pressure Maintenance Committee of the Interstate Oil Compact Commission, a treaty among sovereign states for the conservation of the oil and gas resources of the United States. I am appearing at this hearing at the request of Governor Johnson's official representative to the Compact Commission, Mr. Warwick M. Downing, who also is Chairman of the Colorado Oil and Gas Conservation Commission. The Interstate Oil Compact Commission is dedicated to serving its member states in promoting the conservation of oil and gas resources.

I am familiar with the Rangely Oil Field, Rio Blanco County, Colorado. I visited the field in the summer of 1925 while serving as an assistant to Dr. Willis T. Lee, Geologist with the U. S. Geological Survey. At that time some shallow oil production had been developed from the Mancos shale. Twenty-one years later, in April 1946, I returned to the field as an engineering consultant for independent oil operators. At this time, and previously, I studied reports of the drilling and completion of Raven No. 1 by The California Company, and shortly thereafter I was elected to serve temporarily as the first Chairman of the Rangely Engineering Committee in the place of J. J. Zorichak who had been prevented from undertaking

immediately this position, by reason of illness. During the time that I served as Chairman of the Committee I directed the commencement of a comprehensive study of the capacity and production performance of the Weber sandstone reservoir. I collaborated with the Bureau of Mines in the procurement and analysis of bottomhole samples of reservoir fluids; I directed the measurement of bottomhole pressures and the determination of productivity indices; I consulted with the various operators in the selection of wells in which the Weber sand was to be cored and I studied the analyses of cores with particular reference to the permeability of the producing formation and its fluid content. Subsequently, I represented independent operators at meetings where plans for the unitization of the field were considered. I wrote one extensive report on the Rangely Field as a consultant for a New York bank. Information from this report will be used here in part to evaluate the past production performance of the field and for the estimation of its future production possibilities.

The first measurement that could be made of the production performance of the Weber sand reservoir was for a period that extended from February 1, 1946, to June 1, 1946, inclusive. During this period of four months, the average bottomhole pressure declined 55 pounds per square inch and 2,102,234 barrels of oil were produced. This amounted to a production of 38,222 barrels of oil for each pound of pressure

decline. From this determination and from other information developed on the physical characteristics of the reservoir it was estimated that 310 million barrels of oil would be produced from the field out of a total original oil content of some 1,500 million barrels.

During 1946 the writer advocated the return of flare gas to the reservoir in order to preserve the gas-cap and thereby prevent the migration of oil into it. However, at that time it was recognized that complete pressure maintenance by gas injection in the Weber reservoir might not be feasible. For example, in May, 1946, the average daily production from the field amounted to 7,113 MCF of gas and 19,538 barrels of oil. At this oil production rate, the injection of some 30,500 MCF of gas per day would have been required and such volume of gas was just not available, for at that time the Rangely Engineering Committee was endeavoring to restrict gas production to the solution gas content of the crude as it was produced.

The return of flare gas to the Weber reservoir, that was not required for fuel and for other useful purposes, was urged repeatedly by the writer specifically for the preservation of the gas cap. The return of flare gas subsequently was ordered by the Conservation Commission, and, as a result, according to the June, 1955 report of the Rangely Engineering Committee oil recovery at that time amounted to 101,701 barrels

per pound less in pressure from the original bottomhole pressure, which represents an improvement of 266% since 1946. If more recent figures are used such as the oil production from April, 1953, to June, 1954, inclusive, it can be shown that 571,307 barrels of oil have been produced during this period for each pound of pressure decline, truly an impressive figure which represents an improvement of almost 1,500 per cent over production performance in 1946. Such figures rather conclusively support the belief that conservation of gas has been of direct benefit to the ultimate recovery of oil and that total oil recovery from the field can now be estimated in the range of some 400 million barrels, a gain of 90 million barrels over the estimation that was made in 1946.

In 1946 the speaker recommended water injection into the Weber reservoir as a method of pressure maintenance. In 1948, the Secondary Recovery and Pressure Maintenance Committee reported to the Interstate Oil Compact Commission that oil recovery from the Weber sand reservoir probably could be doubled by effective pressure maintenance. No reasons have been shown to change this estimation.

The speaker knows that sands possessing low permeability, such as the Weber, have been successfully flooded by artificial water injection. Furthermore, direct evidence of the effectiveness of the displacement of oil by water in the Weber sand reservoir can be shown in the western part of

the Rangely Field, where some natural water encroachment into the reservoir has taken place. All that seems to be needed is to supplement the natural water drive that already exists in part of the field.

Recently developed surface active chemicals will probably accelerate greatly the movement of water into the tighter sections of the Rangely reservoir. A peripheral type of flood is favored to take advantage of gravitational forces. Fortunately, the Weber sand reservoir has not been seriously damaged, from the standpoint of improved oil recovery possibilities, by past production largely because of the orders during the past four years of the Colorado Oil and Gas Conservation Commission. The early work of the Bureau of Mines indicates only a minor increase in the viscosity of the reservoir fluid as a result of the decline of bottomhole pressure that has taken place. Also, it will be recognized that it is going to be much easier to inject both water and gas at the pressure now prevailing in the reservoir than would be the case at the original bottomhole pressure. Unitization of the field should reduce the cost and will improve the efficiency of the pressure maintenance program.

The maximum economic recovery of oil from the Rangely Field is of vital importance to the State of Colorado, from the standpoint of the severance tax it receives. The state, therefore, is certainly justified in taking all legal means it

possesses to insure that such maximum economic recovery is obtained. However, in doing so the state must maintain equity and it is certainly preferable that the state should encourage the oil industry to do a good job rather than have to compel it to do so.

Benefits that will result to the operators and royalty owners and to service and supply companies by an early commencement of a pressure maintenance program are so obvious and are so well known that they require no specific comment.

One of the designated objectives of the Compact's Secondary Recovery and Pressure Maintenance Committee is to promote legislation and regulations in the respective states to enable the most effective recovery of oil. It has been recognized for years that the unit operation of oil fields permits effective oil recovery, particularly where fluids are to be injected into the reservoir for the purpose of pressure maintenance or pressure restoration. This fact is known to the operators in the Rangely Field and need not be elaborated on.

The hope can be expressed that measures will be adopted voluntarily that will permit the maximum economic recovery of oil from the Weber sand reservoir. In the absence of such voluntary action, it would be my recommendation that the Commission adopt an effective control order limiting production of oil and gas to a basis which will promote the maximum recovery of oil and gas from the Weber sand reservoir.

This nation's resources of oil and gas are just too precious to be wasted. Thank you, sir.

CHAIRMAN DOWNING: Does anyone want to ask any questions? The statement, of course, is rather general. Thank you very much, Mr. Torrey. I think that statement is a masterly statement and demonstrates beyond any question the value of the conservation orders of this Commission and the necessity of conservation control.

Now perhaps the next thing I ought to do is to ask the industry what have you done first about unitization, how much have you accomplished since our notice went out? Let me hear, what have you done? What has been tried? What has been accomplished? What conferences have you held? I gather you have done nothing, am I correct? If not, correct me. Let me ask one other question: What have you done towards agreeing upon principles of conservation, getting together on a conservation order? What conversations have you had? What progress have you made? Have you had any conferences? Hearing no answer I imagine you have not. In other words, the purpose of the letter we sent out, the attitude of this Commission, has been ignored.

MR. PICKETT: Judge, there have been some conferences between some of the operators to see if it were possible to come to common understanding on a conservation order, but due to the differences that prevailed for some time we were unable

to reach any common understanding.

MR. ROBINSON: Judge, I know of no formal conferences, at least I did not get to participate in any, but I am sure the operators have exchanged ideas since you issued notice of this hearing with the idea in mind, if they could agree among themselves on some sort of an order which would serve the purposes of this Commission, that they would do so. I take it from the fact that they do not now come here with an order which is the consensus of the operators it means that there is some differences of ideas, but I don't think you should believe from that that these operators are not going to be willing to abide by that which the Commission determines to be the proper order or that there is any antagonism involved. We simply have different ideas and we wish to present them to this Commission and let you select the proper ones.

CHAIRMAN DOWNING: Well, we will do the best we can. It seems we have some very good advice not only from Mr. Torrey but from Mr. Schwabrow.

MR. KNOWLES: Mr. Chairman, these other gentlemen have expressed that there have been some efforts to discuss one company with another and one operator with another, and I think we all have come here this morning with an intention of disclosing some information to the Commission. So far as any activity by the executives, I didn't understand we were to make a report on that at this session. I thought it was to

follow pretty generally what was set forth in the notice, which was to make certain reports on the part of the people who are making use of the Entrada and certain other information about the field that has developed; but I don't think there is any lack of desire to cooperate and do the best we can.

CHAIRMAN DOWNING: Let me also state that this is a subject we could spend days in taking testimony and discussions. This is not the first of these hearings, we have had a number, and we would like to finish at least this hearing today. In doing that we want you to present fully your facts, but in regard to your opinions can't you summarize that and let one witness or expert tell us about that instead of having cumulative evidence concerning opinions? In other words, let's do all we can to expedite the cause.

Now before we start the taking of testimony, do any members of the Commission want to make any remarks at this time? Mr. Schwabrow, we would like to hear from you. Remember this is a joint matter between our Commission and the U. S. G. S. Roughly half of Rangely's productive area is under the control of the U. S. G. S. and half under our control. Of course what we want is unitization which will put it all under the control of the U. S. G. S. What do you have to say, Mr. Schwabrow?

MR. SCHWABROW: Thank you, Judge. I have said this all before, and I will just have to repeat myself. According to what Mr. Torrey has given you, and that is about the same

thinking that we have on the matter, if we can recover 90 or 100 million more barrels of oil in the Rangely Field, why, it looks to me like it's a good thing for everybody to try to settle their slight differences in percentage under unitization to recover this additional oil. Now if they recover 90 million barrels of additional oil through the injection of gas, that is about 29% of an increase, and just a matter of half a per cent or something of difference between companies, it looks to me like it would certainly be more than paid for by taking a slight reduction in allocation at present to recover this additional oil. Now some people have a jealous attitude in that, but I don't know why they should be. With me, I don't mind somebody else making 50 cents or so if I can make a dime additional. That is the way the ball bounces. I certainly think that a good effort could be made to get together on some of these differences on allocation.

CHAIRMAN DOWNING: All right, let us then proceed with the taking of testimony. I don't know in what order you want to proceed. I understand there are five of you and I would appreciate it if you would start the testimony with a statement, either as testimony or by your counsel, stating your position and what you recommend. Have you any suggestion as to the order in which you should present your testimony?

MR. KNOWLES: Mr. Downing, I wonder if possibly since the notice asks for a report on the storage of gas in

the Entrada, and it is not an extended matter, whether it might not be proper to put that on now. We would like to offer to put that on first. It's one of the important things that we wanted to report to the Commission on today and we would be glad to go ahead, but we are not insisting on it.

COMMISSIONER BRETSCHNEIDER: I think that is a good procedure. I think we should take that into consideration first.

CHAIRMAN DOWNING: All right, if there is no objection we will proceed and take that up first.

R. L. MAGNIE

called as a witness for the Texas-Union Pacific, being first duly sworn according to law, upon his oath testified as follows:

DIRECT EXAMINATION

BY MR. KNOWLES:

Q. Will you state your name.

A. R. L. Magnie.

Q. For whom do you work, Mr. Magnie?

A. The Texas Company.

Q. Have you made certain studies about the Rangely Field?

A. I have made a study of the data accumulated concerning the Entrada gas storage experiment.

Q. Have you testified previously in this Cause No. 2?

A. No, sir, I have not.

Q. What is your experience as an engineer?

CHAIRMAN DOWNING: I think it's understood that all the witnesses introduced would be qualified unless there is objection. Your qualifications are known to all of us.

Q. State your position with the Texas Company.

A. I am Petroleum Engineer here in the division office of the Rocky Mountain Division.

Q. And this study that you have made of Entrada gas injection was on behalf of both the Texas and Union Pacific Railroad Company?

A. Yes, sir.

Q. You have had access to all the reports that have been made?

A. Yes, sir.

Q. Now where were those reports from?

A. The reports came from the Rangely Field Engineering Staff of the Texas Company.

Q. And also the Rangely Engineering Committee information?

A. Yes, sir.

Q. And have you reduced your findings to a statement?

A. Yes, sir, I have.

MR. KNOWLES: We have here copies of this statement to which exhibits are attached.

Q. Mr. Magnie, will you now proceed to read your report to the Commission.

A. Yes, sir. This is the progress report on Entrada gas storage experiment, Rangely Field, Colorado. Pursuant to this Commission's request as contained in its notice of hearing, Cause No. 2, dated May 16, 1956, for a report on the Entrada injection experiment, I am appearing here in behalf of The Texas Company and Union Pacific Railroad Company. At the hearing before this Commission on November 21, 1955, The Texas Company and Union Pacific proposed such an experiment and subsequently the Commission issued its Order No. 2-27 dated November 22, 1955, which authorized experiments directed toward ascertaining the feasibility of gas injection into the Entrada formation.

At the November 1955 hearing, Mr. Mattson of The Texas Company set forth the following three objectives of the proposed Entrada gas storage experiment:

1. To determine the rate at which gas can be injected into the Entrada reservoir and the reservoir pressure behavior attendant to such gas injection.
2. To determine whether or not the injected gas will stay in the reservoir.
3. To determine whether or not this injected gas can be reproduced.

The first objective has been accomplished to the extent that gas injection into the Entrada in one well has actually been sustained at rates up to 22.8 million cubic feet

per day, and pressure surveys to date indicate that injecting a total of approximately 1.2 billion cubic feet of gas has resulted in an increase of 38 pounds in static reservoir pressure.

In regard to the second and third objectives-- to determine whether or not the gas will stay in the reservoir and be reproducible -- we are more than one-fourth of the way along in our proposal to inject approximately 4.0 billion cubic feet of gas and two back flow tests have recovered gas with no water. Information obtained to date, although admittedly not conclusive, indicates that the gas will stay in the reservoir and that the majority of it will be reproducible. This information, which is presented in this report, warrants continuation of this gas storage experiment.

The storage test has been conducted using only the Texas-U.P. Well 70-32. This well is shown on Exhibit 1--a map of the Rangely Field showing contours drawn on the top of the Entrada porosity. Notice of intention was filed with the Commission on January 10, 1956, to re-enter the temporarily abandoned Texas-U.P. Well 70-32 to recomplete it as a gas injection well in the Entrada. Approval by the Director of the Commission was obtained on January 16, 1956, and work on this well was commenced on January 23, 1956.

When the Texas-U.P. Well 70-32 was temporarily abandoned in May 1954, an intermediate string of 10-3/4 inch

casing, which had been set at 3812 feet and cemented with 550 sacks of cement, was left in place. Upon re-entering this well cement plugs were drilled out, a 7-inch liner was hung in the 10-3/4 inch casing at 3750 feet extending down to 4185 feet, and the liner was cemented with 110 sacks of cement. The liner was perforated with 4 jet shots per foot over a 10-foot interval (3837 to 3847 feet) at the top of the Entrada porosity. Report of work done was filed with the Commission on March 13, 1956.

During the period February 20 to 27 tests were made to determine water productive capacity of the Entrada through the 10-foot interval of perforations. Pressure drawdown was determined for water flow rates over a range of about 800 to 3700 barrels per day. From the water production rates and pressure data thus obtained, average productivity index was calculated to be 18.7 barrels water per day per pound drawdown in bottom hole pressure. Static bottom hole pressure was found to be 1918 pounds.

Gas injection into the Entrada was commenced on March 14, 1956, into these same perforations from which water flowed on test. Injection has been made through 4 1/2 inch O.D. tubing with packer set at 3816 feet. Daily injection rates, pressure and cumulative injected volume are shown on Exhibit 2. Referring to Exhibit 2, it will be noted that for the first week injection rates did not exceed 4.8 million cubic

feet per day and surface injection pressure reached 1776 pounds. By the end of the second week the injection rate was 14 million cubic feet per day with a surface pressure of 1966 pounds. Injection rate was gradually increased and during the tenth week of injection averaged 22.8 million cubic feet per day with an average surface pressure of 2230 pounds. With the exception of a three-day shut-in (April 7 to 10) gas injection was continued over a period approximating two and one-half months.

As of May 28, when the injection well was shut in for pressure survey and back flow testing, a cumulative volume of 1.186 billion cubic feet of gas had been injected. After being shut in for seven days the bottom hole pressure opposite the perforations was 1970 pounds, and the shut-in surface pressure was 1760 pounds.

Following the seven-day shut-in period, the well was produced under restricted flow on June 4. It produced 3.075 million cubic feet of gas in 26 hours at an average rate of approximately 2.8 million cubic feet of gas per day with an average surface back pressure of 1731 pounds. No water was produced during the test.

On June 5 the well was shut in and remained shut in for seven and two-thirds days. Pressure surveys made during this period show that the reservoir pressure stabilized at 1956 pounds. This information indicates that the net injection

of 1.183 billion cubic feet of gas has resulted in an increase in reservoir pressure of 38 pounds. The second restricted flow test was begun on June 13. Flowing at an average rate of 2.7 million cubic feet per day for a period of 26 hours, the well produced 2.959 million cubic feet of gas with an average surface back pressure of 1733 pounds. No water was produced during the test.

On June 14, injection of gas into the Entrada was begun again at a rate of 8.5 million cubic feet per day with 1981 pounds surface pressure. Cumulative volume of gas injected through June 14 was 1.189 billion cubic feet.

Restating conclusions which may be drawn at this time:

1. Gas injection into the Entrada can be effected at rates of 20 to 30 million cubic feet per day with nominal injection pressures.

2. There is nothing to indicate that the Entrada is an incompetent gas storage reservoir in the area of the injection well. On the contrary, the data thus far obtained lead us to believe that the Entrada is a competent gas storage reservoir.

3. The gas storage experiment is progressing satisfactorily and should be continued to permit more positive conclusions as to competence of the Entrada as a gas storage reservoir and as to the ability to reproduce gas stored therein.

We propose to continue injection of gas into the Entrada in the Texas-U.P. Well 70-32 at rates in the range of

20 to 30 million cubic feet per day. Subject to the limitation of shut-down time for pressure surveys, back flow tests and possible remedial work, it is anticipated that more positive conclusions can be drawn within the next six months.

We request that this statement be accepted as the first three-months report on injection of gas into the Entrada in the Texas-U.P. Well 70-32.

Q. Mr. Magnie, do you have some additional information you want to give us to supplement this statement?

A. This statement carries through June 14, and there is this additional injection information.

Q. State that please.

A. Through June 23 the cumulative net injection volume would be placed at 1.373 billion cubic feet.

Q. Is there any other statement that you want to make supplementary to this report?

A. No, sir, I don't believe so.

MR. KNOWLES: Mr. Downing, that represents the position of the Union Pacific and the Texas Company based on this study that has been made, and as stated by Mr. Magnie it is the position of the companies that they want to continue that and get more positive proof, but they are at present satisfied with the progress that has been made.

We offer that as the report, and perhaps it should be marked as an exhibit to this hearing.

(Whereupon, a document was marked
as Texas-U.P. Exhibit No. 1
for identification.)

MR. WOOLFOLK: Mr. Chairman, I am John Woolfolk of
New Orleans, representing the California Company. I have
several questions I would like to ask the witness.

CHAIRMAN DOWNING: Go ahead.

CROSS EXAMINATION

BY MR. WOOLFOLK:

Q. Mr. Magnie, does the storage of gas in the Entrada
in any way influence the recovery of Weber oil in your opinion?

A. I am not prepared to discuss Weber performance or
the effect of injecting Weber gas into the Entrada, Mr. Woolfolk.

Q. Mr. Magnie, you reported producing back 3.075 million
cubic feet of gas after having injected 11.80 million. What
per cent does this represent that you have demonstrated to be
recoverable?

A. The portion of gas produced compared to that injected
would be about one over 200,000.

Q. In your opinion does this justify your statement
that the majority of the gas will be recoverable?

A. My statement with regard to the majority of the gas
being reproducible naturally is confined to the limits of the
data available, which is limited in time. We have injected
gas at these rates and to this volume, and although it is a
small quantity it has been reproduced in that small quantity
without water.

Q. One more question. Let's try it this way: Does the injection of gas in the Entrada in any way retard or tend to retard the decline of reservoir pressure in the Weber? I am asking for your opinion. Would you say that this injection in the Entrada would retard or tend to retard the reservoir pressure in the Weber?

A. I believe again I would have to disqualify myself as not prepared with regard to Weber performance.

Q. I am asking for a general opinion on that, not a specific opinion with respect to what your experience is as a Petroleum Engineer and I would like to have you give your opinion on the question.

MR. KNOWLES: I think, if the Commission please, that that is objectionable.

CHAIRMAN DOWNING: I think your objection is good.

MR. WOOLFOLK: No further questions.

COMMISSIONER VAN TUYL: I have a question. On page 2 of your statement you mention in the second paragraph that contours are drawn on the top of the Entrada porosity. "Structure" would be a better term there, would it not?

A. Mr. Van Tuyl, the contours were drawn on the top of the porosity and differentiated as such because the actual top of the Entrada includes some tight footage above that, so it's not exactly a top of Entrada formation but on the top of porous Entrada sandstone.

COMMISSIONER BRETSCHNEIDER: Do you have any idea of about how much area the gas pool would now come in?

THE WITNESS: No, sir, I have not speculated on the size of that gas bubble.

CHAIRMAN DOWNING: Is there any danger as the pressure goes up of causing a blowout of any sort even though at the same time the reservoir seems tight?

THE WITNESS: We have kept very close track of the annulus pressures, Mr. Downing, on the wells offsetting this injection well, and I understand that other operators in the area are watching theirs also.

CHAIRMAN DOWNING: Is there any limit to the capacity of gas that might be stored in your opinion?

THE WITNESS: Well, my answer would be speculative, and looking at the Entrada as a sand having approximately the same structural features as the Weber, if it were competent over the area of say some 19,000 acres and if the porosity were about the same and water saturation as we have estimated, the Entrada should be able to hold over 1 trillion cubic feet of gas; but that is very speculative.

COMMISSIONER BRETSCHNEIDER: By that time, or maybe sometime before then, would not the pool be moving over onto lands of some other operator?

THE WITNESS: Yes, Mr. Bretschneider. I was speaking of the Entrada in its same structural picture as we look at

the Weber of many thousand, 10,000 or more acres.

COMMISSIONER BRETSCHNEIDER: The area around the well has not been unitized in any way for a gas storage pool, has it?

THE WITNESS: To my knowledge, no, sir.

COMMISSIONER VAN TUYL: Gas probably has extended onto leases of other operators at the present time, has it not?

THE WITNESS: I don't know, but that would be possible. As I say, I haven't tried to speculate on the extent of this gas bubble.

COMMISSIONER BRETSCHNEIDER: It's bound to spread though, isn't it?

THE WITNESS: Yes, sir.

COMMISSIONER BRETSCHNEIDER: As your column increases

THE WITNESS: Yes, sir.

CHAIRMAN DOWNING: Any other questions?

MR. KIRGIS: What is the thickness of the section of injection?

THE WITNESS: Approximately 130 feet.

MR. KIRGIS: Of porous section?

THE WITNESS: We have used 100 feet as net sand section, although it may be as much as 130 or maybe slightly more than 130, I couldn't answer that specifically.

MR. KIRGIS: Do you know the porosity at the point of injection?

THE WITNESS: We estimated the porosity of 18%.

COMMISSIONER VAN TUYL: Do you have any figures on the permeability at the point of injection?

THE WITNESS: Yes, sir, the permeability based on calculated permeability from the water production would yield a permeability to water of 1300 millidarcies or 1.3 darcies.

MR. JERSIN: Mr. Magnie, if the Commission grants this additional six months period for your experiment in the Entrada, at the end of that time what type of test do you plan to conduct to establish definite good storage in the Entrada?

THE WITNESS: At that time, presuming that approximately 4 billion cubic feet of gas will fill the indicated area of local closure down to the elevation of U.P. Well 70-32, then there should be a leveling up and stabilizing of that amount of gas in that area of closure.

MR. JERSIN: Then one more thing. You mentioned that there were being some precautionary measures taken on offset wells. What type of precautions have you taken?

THE WITNESS: Daily -- not strictly daily recording of annulus pressures -- but it would be periodic. It was set out originally to be daily but it has not been recorded at quite that frequent an interval, but we would intend to continue on daily recording of the 11 wells immediately around the injection well.

CHAIRMAN DOWNING: Any further questions?

(Witness excused.)

CHAIRMAN DOWNING: Any further testimony along this line, Mr. Knowles?

MR. KNOWLES: No, sir, not about the Entrada. The one other point that we would like to cover that we think would be very brief--

CHAIRMAN DOWNING: Before we take up something else, does any other company want to present any further testimony about the Entrada? I assume therefore not. You may proceed.

MR. KNOWLES: This one other matter we would like to make a report on is the matter of the availability of a market for the gas at Rangely and the fact that a contract has been entered into by Union Pacific Railroad Company for the sale of its gas. We have here one of the officers of the Pacific Northwest Pipeline Company who wants to get away so he can get back to Houston, he is leaving this afternoon, and we could dispose of it.

CHAIRMAN DOWNING: Go ahead.

ALLAN B. HYATT

called as a witness for the Union Pacific R. R. Co., being first duly sworn according to law, upon his oath testified as follows:

DIRECT EXAMINATION

BY MR. KNOWLES:

Q. Your name is Allan B. Hyatt?

A. Yes, sir.

Q. Where are you from, Mr. Hyatt?

A. Houston, Texas.

Q. What is your position, Mr. Hyatt, with the Pacific Northwest Pipeline Corporation?

A. I am Vice President of the Pacific Northwest Pipeline Corporation.

Q. Are you acquainted with the Rangely Field?

A. Only in a general way, sir.

Q. Well, you know that there is a Rangely Field?

A. Yes, sir.

Q. And have you entered into any contractual arrangements or have you made any offers to purchase gas from the Rangely Field?

A. We have a contract signed with the Union Pacific Railroad Company, and we have made offers to purchase gas from several of the operators in the Rangely Field.

Q. Have you made an offer to purchase from the Texas Company, Mr. Hyatt?

A. Yes, sir.

Q. From the Phillips Petroleum Company?

A. Yes, we have.

Q. The California Company?

A. From the California Company.

Q. From Stanolind?

A. From Stanolind and from Sharples.

Q. Your offers to purchase gas have been on the same basis with them?

A. The same basis as with the Union Pacific Railroad Company, yes, sir.

Q. And where are your facilities at the present time, your pipeline?

A. Our pipeline is under construction. We have already completed the southern portion of it. It passes right through the Rangely Field in a northwesterly direction.

Q. Will there be any difficulty at all in making a connection with any of the plants or facilities in the Rangely Field?

A. None that I know of.

Q. As a matter of fact, have you made any application to the Federal Power Commission to authorize a connection?

A. We have a pending application with the Federal Power Commission to lay a line extending from our pipeline over to the gasoline plant outlet in order to take the gas we have under contract with the Union Pacific Railroad Company.

Q. And will your pipeline be in a position to take delivery of gas from Rangely Field in the next few months?

A. As soon as facilities can be installed. I would say it would be somewhere between the 15th of August and late fall.

Q. So that deliveries can be taken in Rangely Field of Rangely gas?

A. Yes, sir.

CHAIRMAN DOWNING: By August 15th was that?

MR. KNOWLES: August 15th or late fall.

COMMISSIONER VAN TUYL: Is there any limitation on the amount of gas that you are prepared to take from this pipeline in Rangely?

THE WITNESS: Yes, there probably will be on account of the heating value of the Rangely gas. We feel sure that we can take 20 million cubic feet a day into our line and believe that as our load comes on we will be able to extend that up as high as 40 million per day.

MR. JERSIN: Mr. Hyatt, would 40 million be the maximum amount of Rangely gas that you could take?

THE WITNESS: Under our present plans. If we get additional loads and expand our pipeline, of course, we will be able to take more gas in the years to come.

CHAIRMAN DOWNING: How long will it be before you could get it to 40 million?

THE WITNESS: Around 12 months.

Q. Mr. Hyatt, you have practically arrived at a contract with The Texas Company as well as Union Pacific, have you not?

A. Yes, sir, on substantially the same terms as with the Union Pacific Railroad Company.

Q. And the opportunity has been afforded to all operators in the Rangely Field to deliver gas to you?

A. Yes, sir. We are prepared to buy it from all of them.

MR. KNOWLES: I think that is all on direct.

CHAIRMAN DOWNING: Any questions by the operators?

MR. WOOLFOLK: Mr. Hyatt, will any producer or seller to Pacific Northwest be able to reserve priority of gas for field use or Weber gas injection by contract or by F. P. C. prevention?

THE WITNESS: Yes, sir.

MR. KIRGIS: May I inquire as to the price per thousand cubic feet in the existing contract?

THE WITNESS: As I recall it's 10 cents per thousand cubic feet on 1,000 B.t.u. basis.

MR. KIRGIS: Rated down if the B.t.u. content is less?

THE WITNESS: Yes, sir.

COMMISSIONER VAN TUYL: What is the average B.t.u. in Rangely for the Rangely gas?

THE WITNESS: My understanding is the residue gas is around 750 per cubic foot, and the gas produced in the field varies up to as much as 850, but I am not too sure of those figures.

MR. JERSIN: Mr. Hyatt, is there any restriction as to the type of gas you take in regard to dry or wet?

THE WITNESS: Only that we would require that the condensable liquids be removed from the gas, that is which might condense in our pipelines as we transport it.

CHAIRMAN DOWNING: Have any of the other companies

evidenced the desire to sell gas to you?

THE WITNESS: Yes, I believe that Phillips has evidenced some desire to sell gas, some of the gas which I understand is not going into the plant at the present time.

CHAIRMAN DOWNING: What effect has the possibility that if you put this gas in interstate commerce that the operator or producer may be in trouble later on?

THE WITNESS: I don't believe I am qualified to answer that.

COMMISSIONER BRETSCHNEIDER: You said a minute ago there were no restrictions for Weber injection or field use.

THE WITNESS: That is right.

COMMISSIONER BRETSCHNEIDER: That would come about by signing your contract?

THE WITNESS: We put a provision in our contract that the producer has the right to reserve any portion of the gas for use in producing the oil.

COMMISSIONER BRETSCHNEIDER: You don't think that the Federal Power Commission could invalidate that once you tie into a contract, do you?

THE WITNESS: I don't believe I am qualified to say what they would do.

MR. KNOWLES: Mr. Hyatt, do you know as a matter of fact whether the Union Pacific has submitted its contract to the Federal Power Commission for approval?

THE WITNESS: Yes, it has.

COMMISSIONER BRETSCHNEIDER: Is that specific provision in the Union Pacific contract too?

THE WITNESS: This reservation for field use?

COMMISSIONER BRETSCHNEIDER: Yes.

THE WITNESS: Yes, sir.

COMMISSIONER BRETSCHNEIDER: And Weber injection?

THE WITNESS: I don't know whether Weber injection is mentioned specifically in there or not.

COMMISSIONER BRETSCHNEIDER: Is it mentioned in the Texas Company's contract?

THE WITNESS: I believe not. I believe they are the same as the Union Pacific.

CHAIRMAN DOWNING: Any other questions?

(Witness excused.)

CHAIRMAN DOWNING: Now is there anyone else that wants to present any testimony on this phase of our inquiry, namely, the sale of gas? Any other testimony at this time? Do any of the other companies want to state their position in regard to sale of gas or storing it? All right, let's proceed. The next thing I guess is to get back to the regular order. Does anybody else have any matters of special inquiry that should be taken up first? If not, then we will proceed with the regular order and I think probably we ought to hear first from the California Company.

MR. WOOLFOLK: Gentlemen of the Commission, I am, as I said before, John Woolfolk from New Orleans. I would like to enter the appearances of Mr. V. F. Cline, Mr. A. L. Vitter, Mr. C. R. Blomberg of New Orleans, and Mr. E. N. Dunlap and Mr. C. L. Pickett of Denver. I thought we were ready to go on, but Mr. Dunlap just informs me that one of our important exhibits was delayed. It's on its way over and should be here in 15 or 20 minutes, so if we can step down in favor of someone for that short time I would appreciate it if you would let us do that.

CHAIRMAN DOWNING: Is Stanolind ready to proceed?

MR. ROBINSON: We are, Mr. Chairman, but it would materially lengthen the testimony if Stanolind proceeds first. We think that our testimony ties in with theirs and will not have to be nearly as long as it would be if we start at the beginning of this proceeding, and we are not prepared to go ahead and tell the Commission the complete story. We don't want any repetition and therefore our testimony is that which will only supplement the testimony of the California Company and I suggest an adjournment until they get their exhibit here.

CHAIRMAN DOWNING: Is Sharples ready?

MR. SULLIVAN: We don't intend to put on any testimony, Mr. Downing, the Sharples Oil Corporation.

CHAIRMAN DOWNING: How about Phillips?

MR. KIEGIS: Mr. Chairman, I too believe the

California Company should proceed. I believe they have an integrated complete case to present and whether or not we would have anything to add would depend on what exhibits they may produce.

CHAIRMAN DOWNING: Since you are not ready to go on with the testimony, we will adjourn until one o'clock.

(Whereupon a recess for lunch was taken.)

AFTERNOON SESSION

CHAIRMAN DOWNING: All right, let's get started. Are you ready to go ahead, Mr. Woolfolk?

MR. WOOLFOLK: Gentlemen of the Commission, it's apparent that the California Company has the only positive case to present to you, and our exhibits are here now so we are ready to go. In order that you gentlemen may know our position today, I would like to briefly summarize the purpose of our presentation and then ask Mr. Kaveler to present the evidence and make the required recommendations.

As you are well aware, there have been numerous hearings in connection with the Rangely Weber reservoir dating back before 1951. Twenty-seven orders have been issued all to no avail, and at the present time, the unrestricted production of oil with accompanying uncompensated drainage and depletion of reservoir gas energy has brought into focus the extremely wasteful conditions which exist and have been magnified many times since the issuance of your last order. Except for

procedural matters, that Order No. 2-27 which is dated November 22, 1955, left the field with no controls and the resultant production race has occasioned an increase in overall field production from approximately 64,000 barrels per day to over 83,000 barrels of oil per day. There are individual wells in the field producing as high as 800 barrels of oil per day. There is no question but that such rates are both physically wasteful and seriously abuse the correlative rights of owners in the common source of supply. Your statute requires that these things be stopped, gentlemen, and you have the power to stop them.

Much has been said regarding the power which the legislature gave you to prevent waste. There is no question in our minds that you not only have the power, but a mandate to act in the exercise of that power. Under your statute, waste in addition to the elements already mentioned, means the operating or producing of any oil or gas well in a manner which causes or tends to cause reduction in quantity of oil or gas ultimately recoverable from a pool under prudent operations. The Supreme Court in the Union Pacific case limited your authority to act but confirmed that you have such authority to act reasonably in preventing waste. Rule 3-b of Order 2-8, was stricken down only because you required total injection and would not permit the reasonable use of gas energy to produce oil. The Court, however, expressly recog-

nized your power to prevent waste of gas energy in producing oil in the following language from the opinion of that case, which I quote: "The language clearly shows that the Commission had the authority to limit the flaring of gas, but not entirely forbid it". You must remember that this decision was under the old more restrictive law before the 1955 amendment.

There is only one issue before you today, the prevention of waste as defined by Colorado law. Your notice which sets forth that you have instituted this proceeding to obtain additional information to decide what rules and regulations you may have to issue in order to prevent physical waste and protect correlative rights in the Rangely Field shows that you recognize this issue. We will show how waste is occurring and how you gentlemen can comply with the provisions of your law and issue an order which will bring about a reasonable solution to your problem and in our opinion will be invulnerable to attack. In this connection, I would like to call Mr. Herman H. Kaveler as a witness.

HERMAN H. KAVELER

called as a witness for The California Company, being first duly sworn according to law, upon his oath testified as follows:

DIRECT EXAMINATION

BY MR. WOOLFOLK:

Q. Will you please state your name, sir.

A. My name is Herman H. Kaveler.

Q. Mr. Kaveler, what is your occupation?

A. I am a Petroleum Engineer and Management Consultant residing at Tulsa, Oklahoma. I have been acquainted with the Rangely Field since about 1943. I appeared before the Commission in the Union Pacific case. I have participated in hearings held previously in respect to the Rangely Field. I have participated for some time in respect to the management and the engineering and the operation of the Rangely Field.

Q. Mr. Kaveler, are you familiar with the notice of this hearing which states in the fifth paragraph, "The Commission has instituted this proceeding to obtain additional information to decide what rules and regulations it may have to issue in order to prevent waste and protect correlative rights in the Rangely Field"?

A. Yes, I am familiar with the notice of the hearing and I am familiar with that particular paragraph which counsel has read.

Q. Mr. Kaveler, are you familiar with the existing orders which are in effect in connection with the Weber sand in the Rangely Field?

A. Yes, I am familiar with the orders that are now in effect. I think the order in effect is Order No. 2-27, which in my understanding provides only for well spacing and only for certain well testing procedures; otherwise, there are no provisions directed to waste prevention under any existing

orders of the Commission.

Q. In view of that, do you have any recommendations that you would like to make to the Commission at this time?

A. Yes, I do have. The recommendations that I will make to the Commission, and concerning which I intend to offer justifying testimony, would provide, among other rules, rules as follows: A rule that would provide for the production of not to exceed 150,000 cubic feet of gas in any day from any well. In other words, a rule providing for a limit on gas production on a per well basis.

Q. Mr. Kaveler, do you mean gas production or gas depletion from the Weber reservoir?

A. I mean, as the further recommendations will show, a net depletion of 150,000 cubic feet of gas per day per well. The recommendations that I shall make will be for a set of rules which give operators opportunity to return gas in a gas injection program so the 150,000 cubic feet per day would be the so-called "net limited production" or "limited net production".

CHAIRMAN DOWNING: You mean that amount could be flared?

THE WITNESS: That amount could be produced, Mr. Chairman. I have a recommendation to make to you in respect to the flare, which I will make clear as I go along.

CHAIRMAN DOWNING: But the total production you have

as 150,000 cubic feet of gas per well?

THE WITNESS: The net production of gas per well, yes, sir, or as I shall speak of it, Mr. Downing, the net depletion of gas per well per day.

I shall recommend to the Commission another rule which places a limitation upon oil production, and that limitation in my opinion should be in the range of 200 barrels of oil per day, but not more than 250, if the Commission should so find.

I would recommend to the Commission a rule which authorizes the injection of gas back into the Weber formation, and a provision for submission of monthly reports in respect to that operation.

I would recommend to the Commission that any well which is used for the injection of gas into the Weber have its oil allowable transferred to some other well capable of producing it.

Q. Mr. Kaveler, you are referring only to an oil allowable or both oil and gas allowable?

A. I am referring to both the oil allowable and the 150,000 cubic feet net gas depletion in respect to the transfer from any well which is used for gas injection. I would recommend to the Commission a rule which provides that any well authorized for use for the injection of gas into the Weber be a well approved by order of this Commission after

hearing, unless as a result of this hearing the Commission wishes to adopt the provisions of prior orders in respect to gas injection areas and in respect to wells hitherto designated for use as injection wells. It seems to me that the Commission having heard that matter at previous times might well adopt the gas injection well provisions of its prior orders as a result of this hearing.

I would recommend further that there be the usual provisions of the orders of this Commission in respect to gas-oil ratio tests, and some provision in respect to the manner in which those tests are to be conducted and other formal rules which this Commission usually provides. The counsel has handed me a proposed set of rules which reflect my recommendations to the Commission.

Q. Mr. Kaveler, in view of those recommendations, could you tell us on what you base those recommendations?

A. The recommendations which I have made to the Commission in respect to the content of an order that would lead to a high degree of conservation of the oil resources of this field are based upon the following considerations: I would suggest to the Commission that its waste prevention duties and responsibilities can be appropriately regarded as comprising two sets of responsibilities. As I read the statute, particularly subparagraph 10 of Section 100-6-3, the term "waste" is defined in one sense as constituting the escape,

the blowing, or the release directly or indirectly into the open air of gas; whether it be gas from gas wells, or whether it be gas in excessive or unreasonable amount from wells producing oil, or both oil and gas. So I regard that as a statutory mandate from this Commission which goes to the concept long familiar in the oil industry, the concept of surface waste.

The definition of waste, however, makes separate reference to another obligation, and that obligation is this: That the term waste shall also apply, and I quote: "To the production of gas in quantities or in such manner as will unreasonably reduce reservoir pressure or unreasonably diminish the quantity of oil or gas that might ultimately be produced." That goes to the concept long familiar in the oil industry which we generally refer to as subsurface waste, and I have written that down as the number one obligation of this Commission, as I see its responsibilities, in terms of waste prevention as defined by the statute. I regard that as the number one responsibility because subsurface waste is directed to the more valuable substance, oil, without a reasonable use of the gas which is the only lifeblood of this oil field, or at least the predominant lifeblood of the field; without proper use of that, the more valuable substance, oil, is lost.

As I see the Commission in discharging its administrative responsibilities, this Commission must first decide

how many cubic feet of gas it will permit to be depleted from the Weber sand pool in order to recover a barrel of oil, because the extent of the depletion of the gas is a measure of the extent of recovery that might be had. I am going to recommend to the Commission that 600 cubic feet of gas taken and permanently removed from the Weber sandstone constitutes a reasonable limitation on the use of gas for the recovery of oil. In my opinion if the amount of gas depleted to recover a barrel of oil is in excess of 600, waste will inescapably occur beyond the bounds of reasonable prevention of waste.

Now it is apparent in this hearing that there should be some justification for that number, and I say to you in the first place that that number is twice the average amount of gas in solution in the oil, and I think that is a reasonable measure of how much gas that the gas associated with two barrels of oil, shall be consumed for the production of one.

Now as I see the duties of the Commission, this question of surface waste, which we have referred to these many months in terms of flare, is an issue to be met separately and an issue to be met only after the Commission has made its decision with respect to how much gas should be depleted from this pool for the production of a barrel of oil. That is a separate question. In fact I would suggest to the Commission the possibility that two separate orders be issued in respect to the Weber sand; one order that goes to the question of

whether or not gas is being used efficiently, within the meaning of the statute, for the recovery of the more valuable substance, oil; and having made its decision in respect to that, the Commission may then face the question of what it shall do in respect to the utilitarian use of the gas which they permit to be withdrawn from the Weber sandstone. Now it's obvious that the gas which the Commission will permit to be produced in its waste prevention activity once produced to the surface can be disposed of in three ways: First, there is a useful disposal of that gas for let us call of lease operation. At the present time it is my understanding that about 22 million feet of gas are required for that purpose. Another useful place to dispose of the gas, which the Commission will permit to produce under its oil waste prevention authority, is to sales. At the present time it is my understanding that 3 million cubic feet of gas are being sold for domestic purposes. The witness Mr. Hyatt this morning said 20 million might go to the Pacific Northwest and ultimately 40 million. There is a third way in which this gas can be disposed of on the surface and that involves simply throwing it away, flaring it, and in my opinion putting the gas into the Entrada is flaring it in the sense of letting it be turned loose into the air; because the gas that is blown to the air or the gas that is sold from the field or the gas that is conveniently hidden in the Entrada is in my opinion gas that no longer

serves the oil recovery operation.

In my opinion flaring is not a great sin, because the Commission must protect itself from this paradox. Suppose that by some ingenious means the flare at Rangely is extinguished, it is no longer there. Can one then say per se and directly that the Weber sandstone is being operated in a conservative manner simply because the flare is absent? In my opinion this question of the flare deals with the surface disposal which follows after the Commission decides how much gas the people of Colorado can afford to be allowed to be depleted from the Weber sandstone.

Now certainly in August or by the first of January the likelihood is there will be no more flare in Rangely, but does that mean that the Weber sandstone is being operated in a conservative manner to the best interest of the State of Colorado? In my opinion it does not. So the recommendations that I make to the Commission are directed to these two different basic responsibilities, and I say, and I hope that my recommendations are such that they will serve this primary responsibility to the utmost, and that is to bring about a substantial increase in the ultimate recovery of oil from the Weber. Whatever appears to be reasonable in anyone's mind is not so important if this first and major obligation is fully met.

Q. Mr. Kaveler, would you please explain the general

principles that govern the formulation of a sound program in order to prevent waste and accomplish what you have already told the Commission.

A. If I turn my attention to the question of what constitutes a sound conservation policy in respect to the recovery of Weber oil, I would suggest to the Commission what perhaps has been suggested to them many times before, and that is that there are two general principles which in my opinion should guide you. The first general principle, although it embodies a very profound engineering concept, can be stated in a layman's language in this simple way: That oil does not produce itself out of the rock in which it is found. Oil does not produce itself, rather it must be pushed from the rock into wells. I managed to pick up a piece of Weber sandstone core, which is the tighter and denser type of the sand, all for the purpose of suggesting to the Commission that if that piece of Weber sandstone were filled with oil it would not constitute a piece of rock that had recoverable oil in it; because only with oil present the amount of oil that is recoverable from rock like that is economically small and does not represent the situation that we think of when we think of the Weber sandstone pool. Oil can be gotten from rock like that only under one circumstance, and that circumstance is that there must be either gas present with the oil under pressure, or there must be water under pressure with the oil

in the rock, or there may be both gas and oil. It stands as certain as is death that when the pressure of gas or the pressure of water is gone, then oil production is gone. There will be a Weber sandstone pool of economic value to this state only so long as there is pressure of gas or water in the rock to push the oil out of the rock into the wells.

Now I suggest to the Commission as we look at the waste prevention problem that there is a second principle that can be stated in equally simple terms, and that second principle is certainly this: That the Weber sandstone is a common source of supply. The rock with its oil and gas extends over 147 different leases, and each owner of a lease has the right to the production of some oil and some gas from that common pool. The consequence is that the common source of supply must be divided among those who have an interest in the 147 leases.

Now there are three ways to bring about a division of the oil and gas in this Weber sand pool. One way is the best, and that is by contract between all of the parties who own an interest in the 147 leases, by private contract, and that system is familiarly called "unit operation". That is the best way to do it. I never knew of a unit that ever presented a conservation problem to any Commission.

The second way in which this common source of supply can be divided is by the rule of capture. Let everybody go



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out there and exercise his own ingenuity and grab what he can and to hell with the other fellow; and that is almost the invitation that exists before these operators at the present time in the absence of another system of division.

The third method of division is a division under some order of this Commission, and it is an order of this Commission to accomplish a division of this pool that I think is one of the important elements of this hearing today. Now unfortunately there isn't an owner in that field who doesn't subscribe to the idea that the division of this pool by contract under plan of unitization is not the best way to do it, but we have got to be realistic, it can't be accomplished today; it hasn't been accomplished in the past, it can only be accomplished in the indefinite future, so that system of division is out. Certainly no one would recommend that this pool be ravaged by a division through the rule of capture. In fact the Legislature of Colorado has said that that shall not occur in this state and have provided that there shall be some other system than the rule of capture.

That leaves us then with only one possibility, and that is a division of this common source of supply under some lawful order of this Commission. Now those are the principles, as I see it, which go to the question of how can some degree of conservation of Weber oil be accomplished. I would suggest to the Commission that there is opportunity to apply

these two general principles to the Weber sandstone, and for that purpose I have had an exhibit prepared.

MR. WOOLFOLK: Mr. Chairman, I would like to have this marked as California Company Exhibit No. 1 and introduced into the record. I have some reductions of that which I will be happy to pass out to you.

(Whereupon, a document was marked as California Company Exhibit 1 for identification.)

Q. Mr. Kaveler, with that exhibit, will you please explain to the Commission how these general principles that you have outlined are applicable to the Weber reservoir in the Rangely Field?

A. Mr. Commissioners, California Company's Exhibit No. 1 is a schematic diagram of the Weber sandstone reservoir, which I suppose by this time has gotten to be a rather familiar picture to the Commission. This is an exaggerated picture just to have something to illustrate certain general principles. The Weber sandstone is not such a marked converted saucer as this suggests to you, but there is nevertheless a substantial structural feature to the Weber sandstone. In fact there is about 900 feet difference in elevation between the top of the structure and the water-oil contact, and the distance from the top of the structural high to the edge of the field is about 1 1/2 miles in one direction and about 3 1/2 miles in the other direction, east and west, and the field is narrower than

that north and south.

The purpose of this exhibit is to call the Commission's attention to certain features. First the Weber sandstone is like an inverted saucer; it has a structure, it is not like a flat sand bar. Now if the Weber sandstone were just a flat sand bar and had no structural feature to it and just a body of sand, the conservation problem would be one thing, but the fact that there is a structure feature here anticlinal in nature causes that fact to be taken into account when we consider how the pool might be conservatively operated. Furthermore, this exhibit purports to show that there was a small initial gas cap, about 1% of the total rock volume was occupied by free gas initially. The exhibit further shows that there is water associated with the Rangely oil, and while it is difficult to estimate it is reasonable to conclude that at the present time there is natural water influx into the field in the range of about 10,000 to 14,000 barrels per day. There is some water encroachment, not a major element in the operation of the field.

This Exhibit No. 1 further shows by notation that there is a large body of oil, something in the range of one billion to two billion barrels initially in this field, and that that oil has dissolved in it gas which varies from 200 cubic feet per barrel up to about 460, and I have used in my considerations an average amount of gas of about 300 cubic

feet per barrel; 300 cubic feet for each barrel of oil, gas dissolved in the oil. Now the major source of energy that must be taken into account in the conservative operation of the Weber sand is the gas in solution, the gas dissolved in the oil, with some additional energy associated with the gas in the gas cap and some additional energy associated with the water in the body of water that lies beyond the productive limits.

Now the question that goes to the conservation problem is how best can one use the gas energy? How best may it be used within the duties and the powers and the responsibilities of the Commission? Well, whenever one has a structural feature like this, one may say that the gas that is in the gas cap should be used because that is energy of production; that the water which moves in from the body of water on the flank of the field to the extent that it moves in, that should be utilized. Certainly since by far the greatest amount of energy is associated with the dissolved gas, that energy should be utilized.

Now in order as quickly as possible to present to the Commission the possibilities that are before you in respect to the utilization of that energy, I have made a chart which summarizes certain principles.

MR. WOOLFOLK: Mr. Chairman, I would like to have this chart which is entitled, "Rangely Weber Reservoir Energy

Sources and Recovery Mechanisms," received in evidence and marked as California Company Exhibit No. 2.

(Whereupon, a document was marked as California Company Exhibit 2 for identification.)

CHAIRMAN DOWNING: If there is no objection it will be admitted.

A. Now this exhibit is generalized and is to be used only for purposes of laying before the Commission certain broad principles. For example, this is intended to show the sources of energy that are available in the operation of the Weber sand, and the mechanisms that may be employed whereby that energy can be used to recover oil from the Weber. I have listed here as No. 1 the advantage that could be taken of the fact that there is dissolved gas, and if one looked at the amount of dissolved gas per barrel of oil in the Weber sandstone and thought of that dissolved gas only in terms of a flat sand bar without any structural feature, we would be thinking in terms that engineers usually think of when they speak of a dissolved gas drive. If the Weber sandstone were a flat sand bar the probability is that then it would not involve much necessity to control the rate of production because in a dissolved gas drive in a reservoir without structure, the rate of production does not substantially affect the ultimate recovery. In like manner, if one used the dissolved gas drive in connection with a structureless

reservoir, the recovery would also be low, probably in the range of 15%. Now the dissolved gas drive concept does not describe the conservation problem at Rangely at all for several reasons. The most important one is that Rangely has a structural feature to it, such that the gas which comes out of solution of the oil may be trapped in the reservoir in an expanding gas cap or in other ways; therefore, one must recognize that in Rangely there is a structural feature to be taken into account.

Now whether or not the main source of energy is dissolved gas and whether or not there be structure or not, there is always the opportunity to take advantage of a second mechanism, which is gas injection. The gas produced, having once produced oil, could be returned to the reservoir and give an opportunity to produce oil again. That is the second type of mechanism that can be used to utilize the energy source. At the present time under the operation of gas injection in the field that is the major energy source for Rangely. There is currently being injected 73 million feet a day and there has been a cumulative injection of 62 billion cubic feet, so that the gas injection has already been applied and I think the testimony that I will give later will show that it has been applied in a manner to bring about conservation and increased recovery.

There is a third mechanism that can be used to

convert energy into energy of production due to the structural feature at Rangely, and that is some advantage can be taken of the fact that the gas in the gas cap can expand down structure to bring about increased recovery. Certainly one would say that the Rangely Field should be operated in such a manner that this gas cap is not depleted or blown off, because if this gas cap were depleted and blown off then oil would move into the gas cap with the resultant loss in recovery. So as we look at this Exhibit No. 2, we would certainly be well founded in any conclusion which said that an order of this Commission should be such as to prevent the unreasonable dissipation of the gas in the initial gas cap; and if it's possible, some effort should be made to operate the field so as to take advantage of the expanding rather than contracting gas cap.

Now the fourth energy source involves water drive. At the present time in the Rangely Field, while a natural water drive can be a very significant source of energy, the movement of water into the Weber sandstone is limited, and in my opinion in the range of somewhere between 12,000 and 14,000 barrels a day. That is not sufficient for economic operation of the field. You couldn't depend upon that natural water drive completely, but water drive is a very effective means. It's an excellent means for recovering oil, and to the extent that that water drive does exist, an order of this Commission

ought to take it into account.

Finally, there is a fifth mechanism which involves the movement, which we generally refer to as gravity drainage. The Commission is aware of the fact that if there be gas, oil, and water in a container, that the natural separation of those three substances will occur in such a manner that the water will occupy the bottom of the container, the gas being the lighter substance will occupy the top, and the oil being intermediate in weight will occupy the position between the gas and the water. We speak of that as gravity separation. Now to the extent that any order of this Commission would foster or assist in the recovery of oil so that at all times the gas had a position in the topmost part of the structure and the water had a position in the bottom so that there would always be an effective gravitational segregation of gas and water to the extent that it is possible under an order of this Commission, the ultimate recovery from the field will be at a maximum; because gravity drainage effects are most important in Rangely because of the favorable structural dip, the thick section, and the fact that there is oil, gas, and water.

Now Exhibit No. 2 has been drafted for one primary reason, other than to give expression to these general principles, and that primary reason is this: That there isn't any one of these energy mechanisms that can be utilized unless there be some restriction to a reasonable amount of the

production of oil and gas. We certainly can't have a gas injection program unless there be some reasonable restriction of oil production and gas production. You certainly can't take advantage of the gas cap expansion as distinguished from gas cap contraction unless there be some regulation and limitation of the oil and gas production. You certainly can't take advantage of what little water drive there may be, granting that it's this small, unless there be some restriction of oil and gas production to fully utilize even that small amount of water encroachment.

Q. Mr. Kaveler, when you use the word "gas production" in these remarks, I would appreciate if you would explain to the Commission what you refer to there in connection with this gas production that you have spoken of.

A. Counsel, when I speak of gas production I am speaking of gas production in terms of the net gas depletion, concerning which I have made a previous recommendation. Gas production, as I intend to refer to the phrase, means the net gas that will be produced or the net gas that will be depleted, net depletion of gas to recover a barrel of oil, and if an order is written, as I recommended that the Commission give opportunity for people to inject gas, then the net gas depletion in the instance of any well would be the gas produced, minus the gas injected by the operator, minus the gas injected to give the net gas depleted in order to recover a

barrel of oil. When I state that there must be some limitation in terms of net gas depletion in order that there may be an opportunity for the operators to utilize any one of these five mechanisms, preferably 2, 3, 4, and 5, I am speaking of the limitation on a net gas depletion basis.

Q. Mr. Kaveler, at the bottom of Chart No. 2 there are several statements made there. I think for clarification purposes that it would be well if you would go into those for a moment for the benefit of the Commission.

A. On Exhibit No. 2 the first five lines are intended to reflect those circumstances that govern the recovery of oil, the conservation aspect of the Weber problem. Now I am mindful of the fact that the Commission is under a mandate of the Legislature under the law that exists to accomplish some degree of conservation. I would say to the Commission that some degree of conservation can be accomplished in the Weber sand pool if the Commission would write an order that would give operators an opportunity to utilize anything other than a destructful gas drive uncontrolled. The Commission must prevent avoidable waste and it must do so without abuse of correlative rights, and in my opinion the administrative action that the Commission can take in order to do that would be to restrict oil production, within reasonable limits, and to conserve gas energy by limiting the rate of gas depletion.

Q. Now, Mr. Kaveler, in connection with that have you

given any consideration to the possible abuse of correlative rights that might be associated with any effort of the Commission to do the things that are necessary to prevent waste in this field?

A. Yes, I have. In that connection I would say to the Commission that in my opinion it would be wasteful to permit a depletion of more than 600 cubic feet of gas from the Weber reservoir to recover a barrel of oil, but I would suggest to the Commission that the problem that various operators find themselves in, in respect to living under such a limitation, should be taken into account. For example, there are operators, in reference to Exhibit No. 1, who have leases high on the structure. There are other operators who have leases intermediate on structure. Certainly the operators with leases high on the structure have gas-oil ratios on their wells which are far in excess of 600 cubic feet per barrel, some maybe as high as 6,000 cubic feet; what we would call the "gross producing ratio". I would suggest, therefore, to the Commission that those operators are certainly entitled to an opportunity to recover the oil which lies beneath their so-called gassy lease. I think it would be fair and reasonable and prevent the abuse of correlative rights if the Commission would write an order that would give those operators having high gas-oil ratio wells an opportunity to return gas to the Weber in order to have an opportunity to recover the

oil beneath their lease without violating the rights of others to the use of Weber gas for production. Therefore, the recommendation I make is that the 600 cubic feet per barrel not be on a gross basis but be on a net basis, so that if a chap has a 6,000 to 1 producing well and must necessarily produce 6,000 cubic feet to capture a barrel of oil, that he be given an opportunity, if he wishes, to return 5400 feet of that gas to the reservoir so as to have a net gas depletion of 600 cubic feet per barrel and is therefore entitled to produce a barrel of oil even though his gross production is 6,000 feet. Various names could be attached to that particular system, but I think we should regard it as a "net depletion gas-oil ratio". Some people simply call it a "net gas-oil ratio". I recommend an order that would give the man the opportunity, if he so chooses, to return the gas by injection into the Weber so that he could recover a barrel of oil without violating the rights of others to the use of some gas energy for production.

Now it seems to me that a second consideration should be taken into account in order to recognize that there are some operators who had the good fortune to have leases on the so-called flank of the Rangely structure. Some people have leases down there which have producing gas-oil ratios as low as say two or three hundred cubic feet per barrel. Now the Commission in looking at the correlative rights of all of the owners in the field must recognize that there should be some

limitation on the man who can produce without the nuisance of produced gas. The Commission certainly can't let the fellow who is low on the flank run hogwild in oil production and drain oil down structure to him. As a result of his high rate of capture, which would only further aggravate the problem, the chap on top that has already too much gas finds his oil slipping away from him. So I think that in order to protect the correlative rights of those who already have too much gas to be comfortable or to protect the correlative rights of those who would elect to inject gas in order to bring about a greater recovery from the pool, that there should be a reasonable limitation on how much oil he should take. I would be inclined to say to the Commission that a limitation of 200 barrels per day would be fair, but there will be others with a difference of opinion; so I would say that there ought to be a range to my recommendation, and I would put the range from 200 to 250, certainly not more than 250 barrels daily oil production. That protects the correlative rights of all the parties in my opinion.

Q. Now, Mr. Kaveler, in view of your recommendations, do you have any further information that bears on those recommendations?

A. I have only some brief exhibits which I would like to refer to.

MR. WOOLFOLK: Mr. Chairman, I would like to have

this exhibit which is entitled, "Rangely Field, Weber Reservoir Performance, Pressure Data by the Rangely Engineering Committee", marked as California Company Exhibit No. 3 and received in evidence.

CHAIRMAN DOWNING: If there is no objection it will be admitted.

(Whereupon, a document was marked as California Company Exhibit 3 for identification.)

A. California Company's Exhibit No. 3 contains two sets of curves. One curve, on the left hand side of the exhibit, occupies the upper most part of the chart and is marked in red on the Exhibit 3. That simply shows the pressure decline of the Weber reservoir from the beginning to date. The Weber reservoir in the beginning had a pressure of about 2750 pounds. That was the initial pressure. It was up at this point 2750 pounds and no production. The Commission can perceive from the course of the red line on Exhibit 3 that, as is typical of a reservoir like the Weber where most of the energy is gas dissolved in oil, that there has been a steady decline in pressure up to a certain point where the pressure declines flatten out, and that point is at a point of 120 million barrels of oil recovery. The pressure declined rather steadily down to the point where about 120 million barrels was recovered. Now that point in time was on about August or September, 1953. Now the significance of that flattening

of the pressure lies in the fact which is demonstrated by the dashed line on California Company Exhibit No. 3. Now that dashed line represents from the beginning the amount of gas that was depleted from the Weber sand pool in order to recover a barrel of oil. For example, we might take a look at that dashed line at the interval 50 million-60 million barrels of production and see that at that time about 1,000 cubic feet of gas -- the gas is to be read on the right -- my attention was just called to the fact that it's about 400 cubic feet of gas that was being depleted from the Weber reservoir for each barrel of oil produced. The Commission will perceive, as that dashed line is carried to the right, that up to the point of about 130 million barrels of recovery the amount of gas depleted to recover a barrel of oil steadily increased until it reached a level of about 700 cubic feet, and that was about August or September, 1953. Then the Commission will recall without my urging that there was a rather large scale gas injection program carried on in the field, and that is indicated by the words "gas injection" at about 132 million barrels recovery, and it shows the effect of having returned gas back to the Weber Reservoir. The depletion, which was running at the rate of 700 cubic feet per barrel, was reduced to something in the neighborhood of 250 cubic feet per barrel, about 450 cubic feet per barrel out of the 700 was reinjected.

Now that is associated with the flattening of the

pressure curve, and I think that the Commission can regard this Exhibit No. 3 as evidence of the fact that if no gas injection had occurred at all between the time 120 million barrels was recovered and 170 million barrels was recovered, that the chances are that the reservoir pressure would have fallen along the line that I am now holding this pointer, and that there would have been a substantial diminution of reservoir energy, all to the end that the prospect is that the pressure would have fallen to zero before 300 million barrels was recovered from the pool. But with the gas injection to the extent of about 62 billion cubic feet, as shown on Exhibit 2, the energy has been restored and now the pressure decline, if one were to extrapolate it, could be carried beyond the point of 300 million barrels of oil recovery; so I think it's reasonable to conclude that there is not much doubt that gas injection in the Weber sandstone is something much to be desired by the State of Colorado because to the extent that that operation has been carried on there is already conclusive evidence of its great benefit.

Q. Mr. Kaveler, do you have an additional exhibit that you would like to show to point out the reason why you concluded that the rates should be as you have recommended?

A. Yes, sir.

MR. WOOLFOLK: Mr. Chairman, I would like to have the chart which is identified, "Rangely Field, Effect of Per

Well Oil Allowable on Well Production", marked as California Company Exhibit No. 4 and received in evidence.

(Whereupon, a document was marked as California Company Exhibit 4 for identification.)

CHAIRMAN DOWNING: If there is no objection it will be received.

A. On California Company Exhibit No. 4 I have taken the April, 1956, record of the Rangely Engineering Committee and have classified those wells which in April, 1956, produced at a selected group of rates such as is shown in the first column of the table on Exhibit No. 4. In April, 1956, for example only 38 wells were producing in excess of 400 barrels a day; there were 10 wells that were producing at the rate of 350 to 400 barrels a day; there were 25 wells that produced in the range of 250 to 300 barrels per day, and so on down through the table. Now I had that table drawn to suggest to the Commission that if they saw fit to place a limitation on oil production to the amount of 200 barrels per day that they would bring about a restriction of production over April, 1956, of 215 out of 476 wells, a little bit less than half of the wells. If the Commission saw fit to set the limiting amount of oil at 250 barrels per day then there would be -- I have drawn a circle around 250 and I made an error of drawing it around 250 in the second column and it should be around 250 in the first column -- if the Commission saw fit to restrict

the production to 250 barrels per day then based upon April production there would be only 99 wells out of the 476 which would be limited in production, and I would say that certainly the restriction of the production of 99 wells out of 476, which is only a matter of restricting about 21% of the wells, as I show by drawing on the chart which is on this Exhibit No. 4, that the restriction of about 21% of the wells in order that all may participate in an effective conservation program is not an unreasonable restriction. It seems that I need to correct the prior statement that I made. If the Commission found that 200 barrels per day was the reasonable limit, then the number of wells to be restricted would be 147. Based upon my recommendation, I would say that a limitation between 200 and 250 on the basis of these statistics would constitute a reasonable limitation.

MR. WOOLFOLK: Now this last chart which has been prepared, Mr. Chairman, is entitled, "Oil Production and Gas Distribution, Rangely Field, Colorado". I would like to have it marked as California Company Exhibit No. 5 and received in evidence.

CHAIRMAN DOWNING: If there is no objection it will be received.

(Whereupon, a document was marked as California Company Exhibit 5 for identification.)

A. This is simply a summary of statistics which

undoubtedly are familiar to the Commission. On one curve it shows the gross gas-oil ratio at the top, measured by the numbers along the left hand margin. It shows the daily oil production in the Rangely Field from December, 1953 up to the present time. The Commission will be interested to know that this curve is up to date to April, 1956. In April, 1956, the daily oil production from the field was 78,000 barrels, which I will mark on the chart at the end of the curve reflecting the daily oil production. In April, 1956, there were about 15 million cubic feet of gas disposed of in the Entrada, which represents the blue at the bottom of this chart, and to the right there was about 73 million which was injected into the Weber sandstone, 73 million cubic feet per day. There was for fuel and sales about 25 to 26 million, 25.8 in fact daily average, and there was non-utilized or if you wish to call it "flared" 32.7 million, which we can call 33 million, and that was the disposition of the gas. The total production of gas, the sum of all of those, is 147 million, which I write off to the right, 147 million cubic feet per day for the production of 78,000 barrels. It is my estimate that in May, 1953, the production of the Weber sandstone will be about 83,000 barrels, which will be at the spot that I mark with an "x" on the exhibit, so the production of May is about 5,000 barrels per day more oil than for April, 1956.

Now in so far as the conservation of oil in the

Rangely Field is concerned, and in so far as the evidence clearly shows that the injection of gas will bring about substantial increase in recovery, I would call to the Commission's attention that from a conservation point of view the only gas that counts is the gas shown as pink, the 73 million feet a day that was injected back into the Weber. The yellow is gone and so is the blue, it is no longer useful to the people of Colorado for the recovery of oil, and whatever reasonable disposition is made of that gas -- if the Commission decides that some 48 million should be taken out of service -- whatever disposition is made of that is in my opinion a relatively trivial question because if the flare is put out the Commission still must face the problem of whether or not the Weber sand is being operated the way the statute contemplates that you will cause it to be operated.

Q. Mr. Kaveler, in conclusion, will you please review your conclusions and make your recommendations again to the Commission.

A. Well, other than the formal requirements of an order which this Commission always provides, I would recommend a limitation on oil production daily of between 200 and 250 barrels per day. I would recommend a limitation on gas production in the amount of 600 cubic feet per barrel, with the Commission giving operators opportunity to inject gas into the Weber so that the 600 cubic feet per barrel limitation can be

enforced on a net gas depletion basis. I would recommend that all the allowables of gas and oil be on a per well basis. I would recommend that the Commission provide that any well used for injection shall have its oil and net gas allowable transferred to another producing well. I recommend that any well used for injection shall be authorized by order of this Commission after hearing unless the Commission would decide, as a result of this hearing, to use the gas injection areas and gas injection wells previously approved. I recommend that there be gas-oil ratio tests from time to time as the basis for determining the oil and gas allowable.

CHAIRMAN DOWNING: You stated before, as I understood it, that the limit of gas production per well was 150,000 cubic feet?

THE WITNESS: Yes, sir.

CHAIRMAN DOWNING: Has that been abandoned?

THE WITNESS: No, sir. That is for a 250 barrel allowable. If you set the allowable at 200 that should be 120, Mr. Downing.

CHAIRMAN DOWNING: In other words, the 200 to 250 barrels and the 600 feet of gas per barrel?

THE WITNESS: On a net basis.

CHAIRMAN DOWNING: That is the substance of your recommendation?

THE WITNESS: Yes, sir.

MR. WOOLFOLK: Mr. Chairman, that concludes our presentation. In line with Mr. Kaveler's recommendations, I would like to submit to you a proposed order, and I tender the witness for cross examination.

CHAIRMAN DOWNING: Now as to the question of cross examination, everyone, of course, is entitled to cross examine, but if you are going to try to make your case by cross examination we will be here a long long time. Would it be possible for each party to put on their case first and then cross examine later?

MR. ROBINSON: I don't believe that would be a satisfactory way for the Commission I think would lose a part of the understanding of the evidence.

CHAIRMAN DOWNING: We don't wish to control it, but I thought maybe we might make a little better time and have a little better understanding. All right, proceed.

CROSS EXAMINATION

BY MR. ROBINSON:

Q. Mr. Kaveler, I understand that your interpretation of the law of Colorado is that underground waste is limited to the protection of the ultimate recovery of oil, and gas is not involved except in so far as it may tend to recover oil?

A. I was speaking, I think, counsel, of the Weber sand when I made my pronouncements. I think that there should be conservation of gas in order to accomplish the conservation of oil.

Q. Now did you not say in respect to underground waste that that was limited to the recovery of such quantities of oil as might be squeezed out of the reservoir?

A. Well, I think that is a part of the waste prevention.

CHAIRMAN DOWNING: Murray, who do you represent?

MR. ROBINSON: Excuse me, I represent Stanolind, Judge.

Q. Now if it be true that the rules of the Commission should be directed to the recovery of additional quantities of oil, would it not be true that the rules of the Commission would be directed to something other than waste if they imposed a limitation upon wells which are producing at the low ratio of say 3 or 4 hundred cubic feet of gas per barrel of oil?

A. No.

Q. Explain to me.

A. Well, I think that the counselor has asked me a question directing my attention to the fact that there are some wells in that field which produce at very low gas-oil ratios, say 200 to 300 cubic feet per barrel, and probably he wishes to emphasize the fact that in the Weber sand, as in all oil fields, there are some wells produced with very low depletion of gas. But as I see the problem before this Commission, this Commission is not in any way able to draw its attention only to one particular well or two that the counsel may have in mind, but the Commission must look at this problem from the pool as a whole, and if there be some wells out there

that are particularly fine from the standpoint of being not wasteful, that is fine, that is wonderful, but they still have to stand some restriction in order that all may have an opportunity to engage in a conservative operation.

Q. Then you would say that unrelated to other wells that that well would not be occasioning any waste of reservoir energy or waste of oil?

A. Well, there may be one well out there that is a model example of conservative operation.

Q. No, just any well that produces at that ratio in so far as it's unrelated to the production of other wells it would not cause waste, would it?

A. In respect to that one well, gentlemen of the Commission, in respect to that well or wells which the counsel has in mind, the Rangely oil field is composed of 476 wells and I think the Commission's problem is to look at the conservative operation of all 476 and the correlative rights of all the owners of 476 and cannot judge the Rangely operation by what just a relatively few of the wells are doing.

Q. Dr. Kaveler, then what would be your legal interpretation of Paragraph 18 of the law of Colorado?

A. Well, I am an engineer and counsel is asking me a legal question. I will be glad to answer it if he wishes me to.

Q. You volunteered other legal interpretations so I ask you this.

A. Counsel, do you desire me to read this?

Q. No, I just want you to interpret it after you have read it.

A. Now the counsel has asked me my opinion of this. My opinion is that the Legislature was not very kind in its construction of the English language; it was a bit confusing. The counsel undoubtedly would wish to refer to the fact that this section says that there shall be no regulation or judgment requiring restriction of production of any pool or of any well to an amount less than the well or pool can produce without waste, and it's my opinion that there may be a one-well oil field in Colorado, but the Rangely Field is a 476-well oil pool and the Legislature was talking about the Rangely pool when it said production of any pool and was not talking about Rangely when it said the production of any well. Therefore, I think this Commission can limit the production of Rangely to whatever limit it considers can be produced without waste, and I think that the counsel's citation of this paragraph has no bearing upon this hearing.

Q. Mr. Kaveler, I want to be sure that I understand your answer. You say that if we look only to the one well that is producing at this low gas-oil ratio we cannot imagine waste?

CHAIRMAN DOWNING: Let me suggest that we don't get into argument over what is the law of this state, particularly in questions to an engineer.

Q. All right, this is back to engineering, that if you look at the one well which is producing at that low gas-oil ratio that you cannot imagine that that well is causing waste whatever its rate, but that related to other wells in the reservoir it may be proper to regulate that?

A. Well, the counsel poses a rather difficult question because the Commission has to be prospective in its orders; it has to look to the future. If there is one well of such pristine quality in the field that is not causing waste, I see no reason why the Commission shouldn't contemplate that that well is a part of a common source of supply and what is done in respect to that well has an effect on the entire pool; that the entire Rangely Field must be regulated so as not to bring about waste and therefore every individual well in that field must be regulated in order that the Commission may accomplish its objective.

Q. Mr. Kaveler, is it the consensus of engineering opinion that the rate of recovery from a solution gas field has no direct relationship to the ultimate recovery?

A. It is, counsel, to this extent: That there are no other recovery mechanisms available. If a fellow had the misfortune of having only a solution gas drive field and he was stuck with that and couldn't do anything else, then it has been the habit of the industry to go ahead and blow it away, but Rangely is not like that.

Q. But is it true also that there is a relationship between the use of such gas in the production of oil, that is gas-oil ratio limitations, which are instrumental in increasing the recovery?

A. To the extent that I understand you, counsel, gas once produced can be reinjected, and just as it has been in the Rangely Field, and a substantial increase in recovery can be had.

Q. You can maintain pressures by the reinjection of gas?

A. You can maintain them at higher pressures than they would otherwise be.

Q. Now let's suppose that the ownership situation is such that the gas can't be reinjected. Now if you put a limitation on the high ratio wells as to the amount of energy which they may use, that is a useful tool in conservation, is it not?

A. Yes, sir.

Q. That is to permit the greatest amount of recovery from the low ratio wells tends to increase the recovery from the pool?

A. Well, yes, if it's possible to operate a pool that way, counsel, the answer would be yes.

Q. You have testified concerning this reservoir on other occasions, have you not?

A. Yes, sir.

Q. I would like to read your statement from the hearing of November, 1951. You were not appearing at that time for the California Company, were you?

A. No, sir, unfortunately.

CHAIRMAN DOWNING: You said a hearing in November 1951 before what body?

MR. ROBINSON: Before this one.

Q. "In my opinion the Rangely Field is to be classified as a gas drive type reservoir. While there may be some water encroachment, from the standpoint of conservative regulation there is no water drive that will bear significantly on the conservation problem in this field. Furthermore, the history of the field is now so extensive that one could say with some certainty that there will not in the future be any significant water drive. All of the gas is essentially dissolved in the oil. The gas cap, while it is present, as Stanolind has shown by their last exhibit, represents but a small source of energy available for the production of oil." Then having stated that fact you drew this conclusion: "Now in the face of the fact that this is a gas drive type pool, this conclusion which the other witnesses have stated is equally true, that the rate of daily oil production, whether it be high in the mind of some or low in the mind of others, will not substantially affect the ultimate recovery."

A. I have changed my mind with respect to that.

Q. You have also changed your employer, haven't you?

A. Of course it's relatively easy to heckle, but I would say to the Commission, what appears to be to the delight of the counsel, there is substantially more history to the Rangely Field since 1951, and I think I am entitled to modify my opinion in the face of that history.

Q. Mr. Kaveler, did you also say this: "The alteration of the daily rate of production will not, in my opinion, contribute to the ultimate recovery"?

A. I didn't get that, read that last part.

Q. "The alteration of the daily rate of production will not, in my opinion, contribute to the ultimate recovery."

A. Well, you will have to be more definite about the alteration.

Q. I don't know what you were talking about but that is what you said.

A. I don't recall what the alteration was. If you would inform me I could answer your question.

Q. All right, quoting again, "Of course there must be some reasonable control of gas production. It is obvious that if some wells in the field go mainly to gas production with little oil and those wells produced mainly gas, that those gas wells will sap the reservoir energy without the production of oil. So that some reasonable restriction on the production of gas is something that the Commission could do which in

itself would contribute to the increased ultimate recovery."

A. Well, I think that is consistent with my testimony today, gentlemen.

Q. Well, if it be Stanolind's position that there ought to be some limitation upon the daily production of gas from each well, that would be entirely consistent with any position which you have heretofore taken in respect to that field, would it not?

A. Well, counsel, I think the answer to that is yes, but I would say to the Commission that recognizing the fact that Rangely has now reached a further stage of depletion over 1951, which counsel so kindly read to me, that it would be unreasonable to impose a straight gas limit without giving people an opportunity, if they so desire, to return gas to the reservoir; and the gas limitation that I propose to you would give people an opportunity to inject gas in order that they may have a more conservative operation and also that their correlative rights may be protected.

Q. Mr. Kaveler, one thing further. Did you make any projection as to what might be the daily rate of oil and gas production under the formula which you suggest?

A. Well, counsel, that is difficult to do.

Q. Well, I agree that it is, but did you?

A. Yes, if you will give me a chance I will tell you. If one went through the list of wells, and judging from their

present capacity in the Rangely Field, and if they were all produced to the capacity that they would be permitted to do under the gas and oil limitations that I have recommended to the Commission of 250 barrels per day, there would be about 74,500 barrels of oil production per day. The answer to your question, counsel, is about 74 or 75 thousand barrels under the 250 barrels and 600 feet depletion net gas-oil ratio.

Q. What is the amount of gas production?

A. The oil would be close to 74,000 barrels a day and the gas would be, as best as I could estimate it, about 141 million.

Q. And how much flare would there be?

A. If field use and local sales continue to 25 million, and if Weber injection continued at 90 million, the flare would be 26 million. The flare or pipeline sales would be 26 million.

Q. 26 million. Your recommendation calls for 26 million of flare with the use of present facilities?

A. Yes. I think that is a reasonable net that the Commission could allow.

MR. ROBINSON: I have no further cross examination.

CHAIRMAN DOWNING: Any further cross examination?

COMMISSIONER VAN TUYL: On your chart here, Exhibit No. 2, where you show the efficiency of the natural water drive and the high recovery that might be expected, an

artificial water drive should be equally effective, should it not, Mr. Kaveler?

THE WITNESS: Yes, sir.

COMMISSIONER VAN TUYL: Isn't it surprising then that the companies have not given more consideration to an artificial water drive?

THE WITNESS: Mr. Van Tuyl, the reason for that is you couldn't conduct an artificial water drive in the absence of unitization.

COMMISSIONER VAN TUYL: Isn't this a good reason to have unitization?

THE WITNESS: I would say yes there is every reason on God's earth to justify a unit.

MR. OSBORNE: I would like to supplement Mr. Kaveler's remarks on that water drive. Consideration has been given to water flooding at Rangely. As a matter of fact, California Company and Texas-Union Pacific are going to discuss the possibility of entering into a joint pilot water flood project which can be conducted without full unitization of the field.

CHAIRMAN DOWNING: I am glad to know that.

COMMISSIONER BRETSCHNEIDER: Where would that be?

MR. OSBORNE: Probably up on the north flank, a peripheral flood.

CHAIRMAN DOWNING: Does anyone else have any further questions of Mr. Kaveler?

BY MR. OSBORNE:

Q. How much additional oil do you estimate that gas injection would realize?

A. Under the plan that I have proposed?

Q. Yes.

A. Without trying to be too extravagant to the Commission and take a reasonable view, if gas injection were fostered in Rangely I would say that you could look easily to the additional recovery of anywhere from 50 to 100 million barrels of additional oil, and that is without trying to be extravagant about it.

CHAIRMAN DOWNING: That is gas injection?

THE WITNESS: Yes, sir. Now you understand, Mr. Downing, that I am talking not in terms of unit operation but in terms of the present method of operation.

Q. Suppose it was under unit operation.

A. I would say that under unit operation there would be a combination of water injection and gas injection program.

Q. Let's just go to the gas injection route first.

A. If you inject gas under some sort of a net depletion arrangement such as I have talked about, I think that you would get a recovery of between 50 and 100 million additional out of the field; that is under the recommended order, with gas injected to the extent of 80 to 90 million a day. Now what is it you wish to know?

Q. Now if you have the field unitized, how much additional oil would you recover?

A. I would say you could expand this to 100 to 150.

Q. 100 to 150 million additional barrels. Do you know whether your opinion represents that of the California Company or strictly personal?

A. Well, they pay me to advise them and I will give them that advice if they ask me about it.

Q. Well, it would be nice if you would advise the California Company if you could give them that much more oil under unitization.

A. I don't think they need to be whipped to death; they believe in unitization.

Q. You see I believe all but the California Company agreed to unitize when certain percentages were given. The California Company was given 50% interest but they didn't want 50, they wanted 56, so they are giving up 6% interest in order--

MR. WOOLFOLK: Mr. Chairman, I object to this line of discussion. We are not here to consider unitization at this meeting. While we are, as we told you, very much interested in and would like to see it come about in the field, we don't think this forum is the proper place to discuss it.

CHAIRMAN DOWNING: I think anywhere at any time it's proper to discuss unitization, and I think you ought to discuss

it until you agree about it. Proceed.

A. I will say this to the Commission, if you don't mind my interrupting you, that an order of this Commission that brings about a more orderly operation of this field might be a very substantial step toward unitization.

Q. Just one other question. If you could water flood the field successfully, do you have any estimate as to the additional oil that might be recovered?

A. Well, if Mr. Robinson doesn't read this answer back to me five years from now I will give you an answer. There is somewhere between 1.4 billion and 2 billion, depending on whose figures you take, of oil in this field, and if one took 50 per cent of that you would be talking about 700 million to -- gosh, it's hard to believe -- 1 billion; so my answer to you is this: You have a tremendous amount of oil to shoot for using the most efficient operation known to the oil industry so that I wouldn't blush to say to you -- now is this on a unit basis you are talking about?

Q. Yes.

A. On a unit basis, combining water flood and gas, it wouldn't surprise me that there could be from 200 to 250 million barrels of oil recovered, combining water injection and gas injection under a unit program. You don't have to sell anybody on unitization; that is the ideal thing.

Q. Then you think maybe just a few per cent like 3 or 4

or 5 per cent shouldn't interfere with unitization?

A. Well, you are just taking some liberties with me. I have my opinion about it. The California Company has their opinion and you have yours. Unitization has never been accomplished on a voluntary basis except by horse trading, and horse trading is their business and not mine.

Q. Horse trading usually involves making a little extra money, doesn't it?

A. Sometimes people tell me they lose out in horse trading.

MR. OSBORNE: That is all.

BY MR. TOM FREEMAN:

Q. I would like to clarify my understanding before I pose this question. Is the 600 cubic feet per barrel of oil which you have referred to as net depletion? Is that in my layman's language equivalent to a net gas-oil ratio?

A. I would think so, Tom, giving credit only for the injection into the Weber and the computation of the net, yes.

Q. Now in the case of an operator who cannot possibly produce oil at a 600 cubic foot per barrel gross ratio, then in order for that operator to protect his correlative rights, or stated another way, that the correlative rights of such an operator would not be violated.

A. Or to say that he would have opportunity to protect his correlative rights.

Q. Yes, that operator then would be required to inject all gas over the 600 cubic foot ratio into the Weber, is that correct?

A. Well, not exactly. Mr. Freeman poses the question of an operator who has a well that produces 6,000 cubic feet per barrel and he then asks me whether or not the proposal that was made on the basis of a net depletion gas-oil ratio of 600, whether the Commission's order would force him to inject gas.

Q. Into the Weber.

A. Into the Weber. My answer is that the Commission's order should only give him the opportunity to do so. If he elects not to do it, why, he is free to live under the 6,000 to 1, but the Commission's order would give him opportunity to protect his correlative rights by returning 5400 cubic feet and then be able to produce his oil without penalty. Mr. Freeman and I differ. He regards the order that I recommend to you as constituting compulsion; I am recommending an order to you that constitutes only permission for an operator to do what he elects to do.

COMMISSIONER BRETSCHNEIDER: Then you void more than 600 cubic feet per barrel from that well?

THE WITNESS: Mr. Bretschneider, under the rule he would get only 600 divided by 6000 divided by 250. He would get only one-tenth of 250 barrels, you see, because the

limitation would be on 150,000 withdrawal.

CHAIRMAN DOWNING: Is that rule in force in some states?

THE WITNESS: Yes, sir.

CHAIRMAN DOWNING: What states?

THE WITNESS: Well, the great state of Texas, Judge, uses that rule quite a bit, the so-called net gas-oil ratio rule.

CHAIRMAN DOWNING: And what about in other states?

THE WITNESS: It may have been used from time to time in Oklahoma.

CHAIRMAN DOWNING: How about Louisiana?

THE WITNESS: It may have, I am not too familiar with it, Judge, but it's not a stranger to the oil business.

Q. You have answered partially my question in your explanation to the Commission. If you assume that a well is producing at a gas-oil ratio of 6000 to 1, and let us assume that at that gas-oil ratio it could produce your top well allowable of I believe you said either 200 or not to exceed 250?

A. Let's make it 250.

Q. Now in order then that you produce that well at a net gas-oil ratio of 600 to 1, and let us assume that the operator elected not to inject it into the Weber, then do I correctly understand you that the oil production from that well, if you had a top per well allowable of 250 barrels, would

then be reduced to one-tenth of 250 barrels or 25 barrels per well?

A. Yes, sir, that is a correct statement. I would be glad to put it on the board if the Commission desires that explanation.

Q. Then may I ask you this one opinion. Do you believe that a well that is capable of producing 250 barrels per day, under those circumstances, do you feel that the correlative rights of the operator would be violated if that well should be reduced in production to 25 barrels per day?

A. Well, I would say this to you, Tom, that if that restriction, which you think would violate the correlative rights of the operator on that lease, were not imposed the correlative rights of all the other owners in the field would be violated, so the Commission has to look to the whole rather than to the individual in my opinion; so I would say in the face of that my answer to your question is no.

Q. Then the practical effect of your proposed order would be that in the event an operator elected not to inject the so-called excess gas we will say into the Weber, he would suffer then a reduction in his oil production of 90%?

A. Yes.

BY MR. KNOWLES:

Q. Mr. Kaveler, you don't recognize any use for that gas for which credit would be given except by injection into

the Weber, do you?

A. Well, Mr. Knowles, I would say this to the Commission: The Commission has two jobs, one of them is to cause the gas that is in the Weber reservoir to be used, and a reasonable extent to recover the oil in the Weber. When the Commission decides that they can permit the net voidage or net depletion of gas from the Weber, then the Commission has on its hands a quantity of depleted gas which can be disposed of. Now as to the manner in which that gas is disposed of, it's best to utilize it for domestic or industrial purposes or pipeline sale. I would say that the net gas which the Commission considers it can afford to be depleted from the field we ought to do all we can to get it into a pipeline, but I don't think that putting it in the ground for some indefinite future purpose under circumstances where there is substantial question whether you would ever get it back constitutes a useful disposition of the gas. I would say that you are just as well off burning it in the first instance.

Q. Your answer can be made shorter than that, can't it?
(Whereupon the reporter read back the last question.)

Q. That is in your recommendations today.

A. My answer, counsel, is that unless the gas is put back into the Weber to accomplish the conservation of oil purposes, then no credit should be given. I think that is a more direct answer to your question.

Q. In your statements here you have recognized water flooding and pressure maintenance as the ultimate thing in the field, haven't you?

A. Yes, sir.

Q. Is there any reason why there should be the earlier efforts to do it by gas injection when ultimately you have got to go to water injection to get the best recovery possible?

A. Well, counsel, the answer to your question can't be given in a simple statement, but I would say this to you: That to lose the gas from the Weber would be to commit waste, particularly if you can see that this field can be water flooded because you will need the gas at that time just as you need it now.

Q. Well, isn't the ultimate determination of the injection into the Weber whether or not it can be done on a commercial basis that will make it worthwhile? In other words, isn't there a point where the cost of putting that gas back in the ground is going to be greater than the recovery that can be made by the use of injection?

A. Counsel, that day may come, but I don't see it in the near future so long as 22 million feet a day are used up for lease operation. I think maybe the Weber sand will run out of gas in the field before all the oil that could be recovered is recovered.

Q. But it's going to go into tremendous equipment for

compression and injection.

A. Not necessarily, Mr. Knowles. I would think this Commission and this jurisdiction over the field could hold all these operations within reasonable bounds, and whatever order it writes today is always subject to a review.

Q. Then you don't see any solution except to put this gas all back into the Weber until such time as the Commission recognizes that the cost of it is much greater than the results to be obtained?

A. I think generally, and a brief answer, yes.

Q. But that would be improved if there was a unitization here?

A. I don't think there is a person in the room who wouldn't agree with the counsel on that.

MR. KNOWLES: Thank you.

CHAIRMAN DOWNING: I think now we have had enough cross examination. I don't want to limit you but I do want to get through, unless there is something very important.

MR. SULLIVAN: Well, it may not turn out to be important, but my curiosity is aroused. My name is R. W. Sullivan; I represent the Sharples Oil Corporation.

BY MR. SULLIVAN:

Q. Dr. Kaveler, did your current employer and my ex-employer not inform you prior to this hearing that they went through this same procedure and this same recommendation two

or three times last year?

A. Well, they didn't inform me, but if they repeated the performance I believe their hope is justified.

Q. Did you not acquaint yourself with the transcripts of the hearings that were held in July, August, and November of 1955 in this cause?

A. Well, counsel, I am just too high-priced to spend my time reading things like that.

Q. Then you are unaware as of the day you step on this stand that this same presentation and this same recommendation was substantially made to the Commission on two or three occasions last year?

A. Well, I understand that that is the case.

Q. Then it's quite obvious that the Commission did not act on that recommendation prior to this time?

A. I hope the Commission will take a different view at this time.

MR. SULLIVAN: That is all.

(Witness excused.)

MR. WOOLFOLK: That concludes our case.

MR. FREEMAN: Just as a matter of procedure, Judge, can we make all records of previous hearings on this matter a part of this hearing?

CHAIRMAN DOWNING: All previous records?

MR. FREEMAN: Yes, sir.

MR. ROBINSON: I object to that for the simple and personal reason I wasn't here when those hearings were held. I don't know what those witnesses said or what might be opened to cross examination, and I don't think it should be made a part of this record.

CHAIRMAN DOWNING: I think previous hearings can be made a part of the record if they are called to our attention, but not to put in an anonymous record, if that is the basis of your objection.

MR. ROBINSON: That is the basis of my objection.

MR. WOOLFOLK: Mr. Chairman, all of the operators were represented at all of the previous hearings. If counsel was not present that is not necessarily of concern because all of the parties in interest were represented. We would like to have those transcripts made a part of this record by reference.

CHAIRMAN DOWNING: What is it you want made a part of this record?

MR. WOOLFOLK: All of the transcripts of the previous hearings in connection with Cause No. 2.

CHAIRMAN DOWNING: Well, we have been having hearings here for ten years.

MR. WOOLFOLK: I understand that, sir.

CHAIRMAN DOWNING: Can't you be more definite than that?

MR. WOOLFOLK: All of the ones that took place last year then, starting with the July 14 hearing.

CHAIRMAN DOWNING: How about that, is that objectionable?

MR. ROBINSON: I think procedurally it's objectionable and I won't withdraw my objection for that reason.

CHAIRMAN DOWNING: I think if there is objection they ought to be introduced so that counsel can object specifically to anything he wants.

MR. ROBINSON: That is right.

MR. WOOLFOLK: We will pass it for the present.

MR. FREEMAN: Judge, we don't want to pass it. We will get them and introduce them individually.

MR. ROBINSON: May we have time then to examine the transcripts to object to that part that is not relevant in the present hearing?

CHAIRMAN DOWNING: Yes, if you have them there and you want to go through them.

MARTIN HEGGLUND

called as a witness on behalf of Stanolind Oil and Gas Company, being first duly sworn, upon his oath testified as follows:

DIRECT EXAMINATION

BY MR. ROBINSON:

CHAIRMAN DOWNING: The witness is qualified unless there is objection. Proceed.

MR. ROBINSON: Before calling on this witness to testify, I would like to explain the position of Stanolind in this matter. In the main we concur with everything Mr. Kaveler has said with respect to unitization and use of reservoir energy, but our recommendation is directed solely to the amount of gas which may be produced from any well in the field, and contrary to Mr. Kaveler's recommendation it would be a gross gas production. It would contemplate the proper use of the gas in producing the oil in the first instance and would not necessarily benefit those operators in the field who are fortunate enough to be situated in such manner that they can reinject gas and thereby obtain additional credits over and above that which is allowed the other operators in the field. Now Stanolind's position is such that it can reinject its gas, but basically that does not change our recommendation because we think that this Commission, if it makes an order regulating that field, should predicate it upon some legal and proper basis and we believe that a gross gas production is the proper order for this Commission to make. Now as I say, we further believe that these operators who are injecting into the Entrada may be storing gas in a place, on the spot storage, where it can be used in any type of operation which is engaged in in this field, and we think that is entirely proper rather than blowing or wasting or venting the gas; that it's better to be stored. But the storage of gas is not a part of our

basic order. We recommend a gas allowable per well of 350,000 cubic feet of gas per day, and that is a gross order.

CHAIRMAN DOWNING: 350,000 cubic feet per day?

MR. ROBINSON: Yes, sir. We do not make any recommendation as to an oil limit because we think that it has no relation to the questions of waste which exists in this field or the prevention of waste. Now we will hurry through our testimony because in part it is designed to show the very things which Mr. Kaveler has already testified to.

Q. Will you state your name please.

A. Martin Heggland.

Q. What's your capacity with Stanolind?

A. I am District Engineer for Stanolind in its Casper District. I might add that Rangely is within this district.

Q. And how long have you been studying the engineering information obtained by the development and operation of this field?

A. This goes back to about 1946.

Q. I might ask you first before we get into Stanolind's recommendation, has Stanolind recently done anything on its own account to cut down the amount of gas which may be produced from the Rangely Field?

A. Yes, we have. During the months of March and April we installed an additional compressor on our L. N. Hagood lease, which will handle about 2,000 MCF of gas per day. We

have already recently run liners in two wells adjacent to our L.N. Hagood injection well with the idea of controlling the amount of gas from those wells and to more efficiently use the gas. I might add that the cost of just this work alone is very close to \$200,000.

Q. You did that on your own leases to prevent the increase in the amount of gas which might be produced from such leases in the absence of any order of the Commission requiring you to?

A. Yes, sir.

Q. Let's turn first to the Exhibit 1 in the folder which I have handed to each of the Commissioners and we will put the big one on the board. That was prepared by you?

A. Yes, it was.

Q. And what is it designed to show?

A. It's a diagram that is designed to show the basic fundamentals of what happens when you produce oil and gas from a reservoir. It's entitled, "Reservoir Voidage Per Barrel of Stock Tank Oil Compared with the Producing Gas-Oil Ratio." Now let me elaborate a little bit. If we produce a stock tank barrel of oil, which is measured at the surface, at the current solution ratio, which approximates 200 cubic feet per barrel under the current reservoir pressure, you would void 1.14 barrels of space in the reservoir. Now then let's see what happens when we start to produce a little gas in addition

to what is in solution. Let's look at a 500 to 1 ratio well. The reservoir voidage of that gas over and above the solution ratio is equivalent to about 0.94 barrels of space in the reservoir and, of course, your barrels of stock tank oil still occupies 1.14 barrels of oil in the space. Thus a barrel of oil that is produced under those conditions vacates space in the reservoir about equal to 2.08 barrels. Let's go on up here to the 2,000 to 1 ratio well. Your barrels of stock tank oil still vacates, in so far as the oil is concerned, 1.14 barrels in the reservoir, but as far as the gas is concerned 5.5 barrels of reservoir space. This can go on with increased ratios, this progression could go on and on and on.

Q. What this chart shows is just the visual representation of the fact that the low ratio wells do not use as much gas or reservoir energy in producing their oil as do the high ratio wells?

A. That is very obvious by this comparison.

Q. Now is that a part of the material which you considered in arriving at a determination that the Commission's order should relate itself to the conservation of gas?

A. It's clear to me that what is involved here is the conservation of gas.

Q. But as an energy for the production of oil?

A. That is correct.

Q. Now would you turn please to your chart 2. Did you

prepare chart 2?

A. Yes, sir.

Q. What did you prepare that chart to demonstrate?

A. The purpose of Chart No. 2, or Exhibit No. 2 as it's marked here, is to look at the Rangely Field from a rather broad manner, and therefore we have looked at it from a statistical approach. In other words, let's look at this field from the standpoint of what kind of wells we have got in the field, how much they are producing, both from the standpoint of oil and gas.

Q. On the left hand column there you have the number of wells. Is that line designed to look across the chart at any place and see the number of wells you have reference to?

A. We have a column here marked "Cumulative Number of Wells". We have a scale, and on the bottom is marked "Gas-Oil Ratio". As a matter of clarification, what is marked 2 would be a 2,000 to 1 gas-oil ratio; what is marked 10 would be a 10,000 to 1 gas-oil ratio.

Q. Say you look here and go up until you hit your line there on the graph, how many wells approximately would there be that are producing at a 2,000 or less ratio?

A. At a 2,000 or less ratio it would be about 130 wells.

Q. So that the most of the wells in the field are producing at less than 2,000 to 1 ratio?

A. Yes, I think actually the number is 150.

Q. And the ratio does run up as high as 22,000 cubic feet per barrel?

A. There are gas-oil ratios in that magnitude, yes.

Q. Now on the chart on your right, what can you gather from that?

A. The chart on the right represents a reproduction of April statistics, it's the April production as a basis. I have plotted here the cumulative daily oil rate in thousands of barrels per day, again versus gas-oil ratio. The curve in green represents a comparison of the amount of oil produced from wells above a given ratio. Likewise the curve in brown represents the amount of gas produced from all wells above a given ratio.

Q. Now just for the purposes of illustrating to the Commission there, if you pick a ratio say of the wells producing at less than 1,000 to 1 ratio, how much of the oil from that field are they producing?

A. Let's enter in the chart at the point 1, which would be about half way, about 40,000 barrels a day.

Q. So that half of the oil from that field is coming from the wells that produce at the ratio of 1,000 to 1 or less?

A. That is right.

Q. Now about how much of the gas are those wells producing?

A. Let's go up to the same point on the gas curve, it

would be about the middle of this curve here, roughly 120 million cubic feet of gas per day.

Q. So they are producing half of the oil and very substantial quantities of the gas?

A. Yes. The total gas production is in the order of 150 million cubic feet per day as compared to 120 million cubic feet. There is 30 million difference.

Q. So again it's indicated to you that if you have some limitation upon the quantities of gas which the wells may separately produce that you are going to impose a limitation of some kind on the high ratio wells, which would benefit the ultimate recovery from this field?

A. It certainly would.

Q. Giving all factors proper weight, what did your company come up with as a recommended quantity for such limitation?

A. We are recommending that gas production, and I mean gross gas production, be limited to 350,000 cubic feet per day per well. We are suggesting that it be administrated on a battery basis in that your gas controlled in the field is measured on a battery basis. We are recommending no top limit on oil.

Q. Would that also provide the operator some flexibility on their own operations in conserving the quantity of gas which might be produced?



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A. Yes. The process of the battery basis would permit that operator to produce that oil in the most efficient manner within that battery.

Q. Would you turn now to your Chart 3 please. Now this is very similar to an exhibit which was introduced by the California Company, is it not?

A. It's very similar. We do have a little projection into the future.

Q. Pick out the point on that chart which would correspond to the time as of now, the date of this hearing.

A. Here is the month of June at this point here.

Q. Again the red indicates the injected gas?

A. The red indicates the gas that is being injected regardless of the point at which it is being injected. In other words, it includes both the Weber injection and the Entrada injection.

Q. The Entrada being only a small part presently?

A. That is right.

Q. And the green is the fuel, sales, and shrinkage?

A. It's the fuel, sales, and shrinkage as now experienced in the field.

Q. And the yellow is the non-utilized or flared gas?

A. That is right.

Q. Have you made a computation based upon your recommendation and what its impact would be upon the production

from this field, both as to oil and gas?

A. Yes, I have.

Q. Do you express that as an opinion?

A. It's an estimate based upon many calculations.

Q. What did your estimate as to the future production of gas lead you into please, sir?

A. I estimate that the field production will immediately be reduced to something like 74,000 barrels of oil per day. In so far as gas, I estimate that it will reduce the gas production from something like 150 million cubic feet per day down to something like 122.

Q. Now under your recommendation, assuming that the present compressor capacities are continued to be utilized, how much flare gas would there be?

A. I estimate about 11 million cubic feet per day.

Q. Have you prepared another chart to indicate percent-wise what these various uses of the gas would amount to? Wait a moment, before we go to that, I observe there is a slight increase in this amount of gas which might be produced from say 122 million to around 126 million over the period of six months. Why do you indicate that the amount of gas might possibly increase under your formula?

A. Well, let's look at it this way: If all the batteries in the field were presently up to this 350 MCF limit, that would be a flat line, there would be no increase. There

are a few leases in the field, however, which cannot produce the 350 MCF per well, and we can foresee a slight increase in total gas production, considering that those leases will increase.

Q. But not a significant increase and it might be even less?

A. It will not be significant, no.

Q. Now would you turn to your Chart No. 4 which indicates percentagewise the disposition of gas in that field. The whole circle is all the gas, I take it?

A. That is all the gas.

Q. You are employing the same colors that you used on the previous charts?

A. The same colors.

Q. So you have gas injection of 73%, shrinkage and fuel is 17%, and now what does that flare amount to?

A. 9.1% of the total. It's this area in yellow.

Q. Based on the industry experience, it's not a high percentage of gas to be flared in the production of an oil field, is it?

A. That is a reasonable value in the light of the industry experience.

Q. And less than the percentage of gas flared currently in the State of Texas?

A. In the State of Texas your statistics indicate that

for oil field reservoirs your gas flare is something in the order of 15%.

COMMISSIONER VAN TUYL: Isn't the State of Texas noted for its high gas-oil ratio wells?

THE WITNESS: The State of Texas is like any other state; they have a wide range on gas-oil ratios. I know there are fields in Texas with low gas-oil ratios and there are fields in Texas with high gas-oil ratios.

Q. Now would you turn to your Exhibit No. 5 please. Now, sir, if we assume everything that Mr. Kaveler has said with respect to the use of gas in producing the oil is correct, have you prepared some actual summaries of production figures for the month of April, 1956, to indicate the manner in which the operators within that field are using the gas which they have under their leases?

A. Yes, I have.

Q. Those figures on the left indicate the barrels of oil produced?

A. Yes.

Q. And the name clear over on the left is by each of the named companies?

A. This is each of the respective operators in the field.

Q. And the next figure to the right would be the gas produced in MCF?

A. The gas production in terms of MCF per day, that is

thousands of cubic feet per day.

Q. Then the produced gas-oil ratio, is that a gross ratio?

A. The produced gas-oil ratio is the gross ratio; it's merely the gas production divided by the oil production.

Q. In other words, if you take the total MCF of gas produced and divide by the total number of barrels of oil, you come out with the number of cubic feet which each operator used in producing a barrel of oil?

A. That is right.

Q. Now then that has no reference to reinjection of gas?

A. No reference to injection.

Q. Now the net gas-oil ratio, in what manner is that arrived at?

A. That is subtracting from the total gas production the gas that is injected into the Weber, so it's really the net depletion gas-oil ratio that Mr. Kaveler was speaking about.

Q. What is the far figure on the right hand side of the chart?

A. The far figure is the flare gas-oil ratio as determined for the month of April.

Q. That is the number of cubic feet of gas flared for each barrel of oil produced?

A. That is correct.

Q. Now if you say that you are practicing conservation

if you produce a barrel of oil and use the least number of cubic feet of gas in doing it, who has been most effectively using the gas under their leases?

A. Let's just put them down on the chart.

Q. All right, just list them.

A. On the first index here we will put Stanolind 1, Phillips 2, California 3, Texas 4, Sharples 5. I ignored those miscellaneous leases for which the gas is not collected anyhow.

Q. Now if you reduce it to a net under the assumption that his interpretation that it ought to be a net figure instead of a gross figure is correct, how do they come out?

A. On the net gas-oil ratio, No. 1 is the Texas Company, No. 2 Stanolind, No. 3 California, No. 4 Phillips, and No. 5 Sharples.

Q. All right, now on the flare gas, let's have another look at that.

A. Texas has the least flare per barrel of oil produced, Stanolind is next in No. 2, No. 3 is Phillips, No. 4 is California, No. 5 is Sharples.

CHAIRMAN DOWNING: What do you mean by "net gas-oil ratio"?

MR. ROBINSON: The net gas-oil ratio would be the amount of gas which is produced and giving credit for the amount of gas reinjected.

Q. So that in the gross gas-oil ratio, the California

Company, this great advocate of conservation, ran in place; and the net gas-oil ratio they still placed; and in flared gas-oil ratio they ran out of the money?

A. They ran out of the money.

Q. Now, sir, would you turn your attention to Exhibit No. 6. You prepared Exhibit No. 6?

A. Yes, sir.

Q. What basic data did you use in its preparation?

A. I used the March gas-oil ratio data for the field; that being the very latest data that was available on the day this map was prepared.

Q. In general do you find areas of high gas-oil ratios in the areas surrounding the injection wells?

A. Yes. I might add to the Commission that this is a gas-oil ratio map. It represents the individual gas-oil ratios by wells, and you do find, in answer to your question, high ratio areas around your injection wells. That might be emphasized by the fact that we do show in red all ratios in excess of 5,000 to 1. By red we mean the red flag.

Q. Does that indicate to Stanolind that in this dispersed gas injection program that there is going to come a time when it cannot be continued?

A. It's certainly becoming difficult. We are at or very near that time.

Q. In your opinion it's not in the remote future but

at some time soon when this field, if they are continued to prevent the distortion that is indicated on that map, that you are going to have to abandon the Weber injection?

A. We certainly have to recognize that possibility.

Q. Now if that time comes, you would be willing to investigate Entrada injection, I assume?

A. I would have to.

Q. So that a part of your recommendation would be that the gas may be reinjected either into the Weber or into the Entrada?

COMMISSIONER VAN TUYL: Or into a pipeline.

Q. Yes, or into the pipeline.

A. I think we have to look at all sources of injection realistically. However, the Weber situation will be quite critical, and like I say perhaps impossible here.

Q. Well, in the absence of unitization and assuming various ownership of the various tracts in that field, it indicates to you that you just can't continue to inject this gas, doesn't it?

A. That is right.

Q. If I may summarize, is it your recommendation that there be but one limitation placed upon the production from this field, and that is that each well be given credit for 350,000 cubic feet of gas per day and no more to be administered on the lease basis?

A. Yes, sir, on a battery basis.

Q. On a battery basis?

A. Yes, sir.

Q. Will such an order as that both tend towards the prevention of waste and tend towards the protection of the rights of the various owners of the reservoir?

A. In my opinion it will do so better than any rule proposed today.

MR. ROBINSON: You may cross examine. We offer in evidence all of the exhibits.

CHAIRMAN DOWNING: If there is no objection they will be received.

CROSS EXAMINATION

BY MR. WOOLFOLK:

Q. First of all, Mr. Heggland, does the storage of gas in the Entrada in any way influence the recovery of oil from the Weber?

A. The storage of gas in the Entrada? It has no effect upon the oil from the Weber.

Q. Does it in any way retard or tend to retard the decline in reservoir pressure in the Weber?

A. I suppose if you inject it back into the Weber as compared to injecting into the Entrada it would affect the Weber pressure and the Weber pressure would decline a little faster.

Q. Would you turn to your Exhibit No. 4 please. Mr. Heggland, at the bottom of that exhibit you show gas injection in storage of 90 million cubic feet and possible flare of 11 million cubic feet. Isn't it quite possible that those two could be added together and come out as 101 under the possible flare?

A. My whole concept was based upon the idea that the operators would use their present facilities to take care of that gas, whether it be for storage or sales or any other disposition.

Q. In other words, when you made that recommendation you were not aware of the fact that under this type of order the California Company will not use its injection facilities to return the gas, is that correct?

A. Well, you are telling me that now.

Q. I am asking you if you were aware of that when you made your recommendation?

A. I have known all the time that the California Company leans toward Weber injection.

Q. But did you know that the California Company would not use its injection facilities in the future if this type of order that you recommend is issued?

A. Well, I can't make their decisions. If that is what they want to do I guess that is the situation.

MR. WOOLFOLK: That is all.

BY MR. FREEMAN:

Q. Mr. Heggglund, on your recommendation you say 350,000 on a battery basis. Were all your calculations made on that basis, these charts?

A. They were made on a battery basis, assuming that the operator would produce within that battery progressively; that is he would produce starting with the low ratio oil and then progressively go up to the high ratio oil.

Q. Is it reasonable to assume that at lease lines that operators would not necessarily produce that way in order to protect themselves against drainage?

A. I would assume that the operators would take some due diligence there. It is possible that they might produce higher rates. The effect of it would be though you would probably produce less oil so you would have a compensating factor.

Q. But as a practical matter your figures are ideally situated; in other words, they represent how you would produce it under a unit as opposed to how you would produce it under separate ownership?

A. They are not strictly ideal, they were made with an effort to be fairly realistic about the whole thing. They will do this: They will establish the highest rate of oil possible. In other words, my 74,000 barrels of oil is on the high side.

Q. These charts that you show us of the gas-oil ratio figures, the relationship might not be accurate either, is that true?

A. You can't pinpoint it, but that is my best estimate.

Q. That is your best estimate on an ideally produced field. In other words, taking the lowest gas-oil ratio and then higher and higher on each battery?

A. If you were to operate under those rules, and if you were to operate competitively, you would certainly try to produce that oil from the lowest ratio possible; otherwise, you would be penalized on your oil, so therefore I think it's fairly realistic.

Q. Isn't it also true that you might try to operate your lease line wells at a higher oil ratio even though you would be at a higher gas-oil ratio in order to protect yourself?

A. Oh, it more or less depends on the operators own feelings. I don't think we would.

Q. Now on a battery basis, if you have 350,000 to each well on a battery basis and you have no oil limit and you are allowed to move that gas around as you so choose, couldn't an operator that has a particularly low gas-oil ratio well produce the drainage from another operator?

A. If you will recall that voidage chart -- I will put it back up on the board and I think it will help me answer that question. The bar graph, may I refer you to the bar graph.

The low ratio well depletes a little over a barrel of space for each barrel of oil produced. The higher ratio wells deplete gas voidage along with that oil. Let's just assume you have got a well producing at a rate of 400 barrels per day at the solution ratio. That well would deplete close to 500 barrels of reservoir space. This well over here, producing at the ratio of 1,000 to 1, would be depleting something like 4 times 4, 1600 barrels of space. Actually it's the high ratio well that is causing the voidage and causing the drainage.

Q. It's not the fact there would be no oil limit placed on any of the wells, is that right? I have here a mimeographed statement of yours of July 14, 1955, in which you stated, "As an aid to protecting correlative rights, we feel that the top individual oil limit of 350 barrels of oil per well per day should be established by the Commission." Have you changed your opinion?

A. I have in this respect. I reserve the same right as Mr. Kaveler, this drainage problem came up at that time and we made a rather elaborate study and presented our evidence there at the November hearing, and our November hearing represented our thoughts on drainage.

MR. FREEMAN: That is all.

BY MR. KNOWLES:

Q. Mr. Hegglund, that testimony of yours about the wells

surrounding the injection well indicates, does it not, there is a very substantial cycling and recycling of the gas that is injected into the Weber?

A. In a sense, yes. You can't go on forever injecting gas in a given well without that gas reaching the injection wells. At some time in the future there is some cycling taking place.

Q. And that is one of the problems that you say is going to have to be met very soon so far as injection into the Weber is concerned?

A. That is one problem. We have also got the problem of that imbalance in the reservoir due to the injection of your gas.

CHAIRMAN DOWNING: I understand your formula would produce for the field about 74,000 barrels a day?

THE WITNESS: Yes, sir.

CHAIRMAN DOWNING: It's my understanding that the formula presented here by the California Company would be about 64,000. Am I correct in that?

MR. WOOLFOLK: About the same thing.

THE WITNESS: There is one basic difference. The California formula would in effect, for all practical purposes, put no ceiling on your high ratio areas. In other words, it would be a matter of buying and buying compressors to produce more and more gas and more and more oil. It's a snowballing affair.

CHAIRMAN DOWNING: But the end result is the same?

THE WITNESS: The end result appears to be about the same, yes, Mr. Downing.

MR. FREEMAN: I just have one more question. I believe it was stated at one time that your formula was proposed to be administered on a well basis and at another time I believe on a battery basis. Could you clear us up on that?

THE WITNESS: On a battery basis is the intention.

CHAIRMAN DOWNING: On a battery basis?

THE WITNESS: A battery basis.

CHAIRMAN DOWNING: Are they both battery basis?

THE WITNESS: Ours is the battery basis and I don't believe the California Company specifically stated.

MR. WOOLFOLK: It's per well basis.

CHAIRMAN DOWNING: That makes quite a bit of difference.

MR. WINTERBURN: You get credit for injection wells in this 350 MCF per battery per well in your battery or lease?

THE WITNESS: This thing is being applied to the Weber reservoir now, and we are applying it on a gross basis. We would have no objection to injection wells getting credit for gas and oil.

MR. WINTERBURN: That is included in your proposed order?

THE WITNESS: Did you have one written out as the proposal?

MR. ROBINSON: No, that was the California's proposed order and they give credit to the wells used for injection purposes.

MR. WINTERBURN: Isn't it in yours too?

MR. ROBINSON: We haven't suggested an order.

MR. WINTERBURN: Would you suggest injection wells be given credit?

MR. ROBINSON: The witness just said he would think it would be fair. I have no reason to quarrel with the witness.
BY MR. SULLIVAN:

Q. Mr. Hugglund, will you refer back, without necessarily putting it up to your racing form exhibit, that was Exhibit No. 5, in which Sharples on a muddy track ran fifth in each category. You don't have to put it up, you remember it better than I do I dare say. Now you also remember, do you not, the demonstration that Exhibit No. 6 contained?

A. I do.

Q. Isn't there a surprising correlation and a simple one between the position of Sharples on Exhibit No. 5 and two high gas-oil ratio areas that are demonstrated on your Exhibit No. 6?

A. Yes, there is a similarity. The similarity is the combination of two factors; one, the gas injection, and 2, the natural location of the Sharples leases.

Q. In your opinion is not the Sharples position on

Exhibit No. 5, as you categorized the various positions there, directly a result of the Weber gas injection program on the leased basis?

A. Only in part. As I said, it was the combination of two factors.

Q. What proportion would you estimate?

A. I have no way of giving you a figure.

Q. A substantial proportion?

A. I think it could be called substantial.

MR. SULLIVAN: Thank you.

BY MR. KIRGIS:

Q. Mr. Heggland, may I ask a question. You were asked a moment ago by Mr. Winterburn about credit for Weber injection. I think I misunderstood at one time or another. As I understood it, you proposed 350,000 on a gross basis?

A. Yes, sir.

Q. Wouldn't that necessarily mean that there would be no credit allowed for Weber injection or anything else?

MR. ROBINSON: Sir, he didn't say credit for Weber injection, he said a credit for Weber injection wells, and its allowable might be transferred to another well.

Q. That is the only instance then in which credit would be concerned, is that right?

A. Yes, sir.

COMMISSIONER VAN TUYL: Witnesses for both the

California Company and Stanolind have recommended that credit be given the injection wells, yet no formula has been suggested as a basis for allowing credit to these wells. How much should they be permitted?

THE WITNESS: We give it the maximum, that is 350 MCF, and let the other wells on that lease make it up if they can.

MR. WOOLFOLK: Our proposed order is specific on that too, sir. We propose that the credit be allowed 250 barrels of oil and 150,000 cubic feet of gas on the same lease and on the same area.

CHAIRMAN DOWNING: Any other questions?

(Witness excused.)

MR. ROBINSON: That is all we have to offer on behalf of Stanolind.

CHAIRMAN DOWNING: All right, next we would like to hear from Texas-Union Pacific.

MR. KNOWLES: I wonder if we could have about a 5-minute recess to have a little discussion among ourselves.

CHAIRMAN DOWNING: Should we proceed with Phillips or wait?

MR. KNOWLES: Well, you can go ahead with Phillips and we will wait until you get through. I thought perhaps you would have a recess during the afternoon is all.

CHAIRMAN DOWNING: We will recess for five minutes.

(Whereupon a short recess was taken.)

CHAIRMAN DOWNING: All right, come to order please.

MR. KNOWLES: Mr. Downing, we won't take time by putting on a witness, but we have here a suggestion of an order, merely that latter part of your orders in which we have, as you will notice, set forth the following: "In order to prevent the blowing and releasing directly or indirectly into the open air of an unreasonable or excessive amount of gas, the maximum blowing and releasing directly or indirectly of gas attributable to all wells producing from the Weber Reservoir on any one lease shall not during any one month exceed an amount in cubic feet determined by multiplying the number of barrels produced from such lease by 300. All gas produced in excess of such amount (hereinafter referred to as "excess gas") shall be put to a beneficial use. In the event excess gas is:

1. Used for field operations, or
 2. Sold, or
 3. Injected into the Entrada or other formation for storage, or
 4. Injected into the Weber formation,
- or is disposed of in any one or a combination of two or more of such manners, it will be deemed that "excess gas" has been put to a "beneficial use", as that term is used herein.

The maximum production of oil from all wells producing from the Weber Reservoir on any one lease during any

one month shall not exceed an amount in barrels determined as follows: The number of wells on a lease times the number of days in the month times 300.

Any well used as a gas injection well shall be included, for calculation purposes hereunder, as a producing well on such lease.

MR. WOOLFOLK: Mr. Knowles, may I ask you a question about your proposed order? Under the proposed order that you have suggested, would the Commission have any assurance that any gas would be reinjected into the Weber?

MR. KNOWLES: No, sir, I don't think so necessarily.

MR. WOOLFOLK: Thank you very much.

MR. KNOWLES: Of course at the present time there is injection in the Weber under our program and it will continue for some considerable length of time, but depending on the future studies we might ultimately drop all injection into the Weber, and we do want to sell gas.

COMMISSIONER BRETSCHNEIDER: How long would the future study period likely to last?

MR. KNOWLES: We have suggested there be another six months of study for the Entrada.

CHAIRMAN DOWNING: As I understand it, you present this without any additional evidence?

MR. KNOWLES: We would be glad to put on a witness if anybody wishes to make any inquiries, but we thought that

for the purpose of shortening the hearing we would not put on a case and then submit the order.

MR. WOOLFOLK: We have no questions.

CHAIRMAN DOWNING: I don't think we will need it but if you want to you have the opportunity. That is then all at the present time, at least, of the Texas-U.P. Now that leaves next the Phillips Company.

MR. KIRGIS: Gentlemen of the Commission, we will follow the procedure with the permission of the Commission of having the witness propose an order rather than merely having one that is expounded by the attorney and ask the witness to justify that order as he proceeds.

JACK TARNER

called as a witness for the Phillips Petroleum Company, being first duly sworn, upon his oath testified as follows:

DIRECT EXAMINATION

BY MR. KIRGIS:

Q. Will you state your name please for the record.

A. Jack Tarner.

Q. What is your employment, Mr. Tarner?

A. I am employed by Phillips Petroleum Company.

Q. Have you testified in these proceedings before?

A. I have.

MR. KIRGIS: May his qualifications be accepted?

CHAIRMAN DOWNING: Oh, yes, there's no question

about his qualifications.

Q. You are a Petroleum Engineer, are you not?

A. Yes, sir.

Q. You are familiar, are you not, with the Rangely Field, Mr. Turner?

A. Yes, sir.

Q. From your study of the present conditions in the Rangely Field, do you have a proposal for the basic ingredient of an order which might be entered by this Commission?

A. Yes, sir.

Q. Will you state what that proposal is.

A. I suggest that the oil allowable per well be established at 300 barrels per day.

COMMISSIONER VAN TUYL: Do you have a copy of the proposed order which we can examine?

MR. KIRGIS: It is not in writing.

A. That a limiting gas-oil ratio of 1,000 cubic feet per barrel to be allowed. This means that each well in the field would be permitted to produce daily 300,000 cubic feet of gas. I suggest that the Commission plan for testing of each well every six months, and that from the results of those tests, which should be witness tests, the allowable would be determined. If a well produces with a gas-oil ratio of 1,000 cubic feet per barrel or less, it will be assigned an allowable of 300 barrels. If it produces with a ratio in

excess of 1,000 cubic feet per barrel its allowable would be calculated by multiplying 300 barrels per day by 1,000 over its test gas-oil ratio. Those allowables so calculated would be set forth on a schedule and each operator would then, to his best ability, produce exactly that allowable out of each well during the period during which this particular production test applied, say during that six months.

COMMISSIONER BRETSCHNEIDER: During the period between tests?

THE WITNESS: That is right, between tests. That for policing purposes or administrative purposes, operators could use a battery or a lease measurement of stock tank oil produced and gas production, but the basic order would be one intended to have a per well allowable and the operators try to produce that allowable out of each well as best they can.

Q. You mean by that that you would not be allowed to average the production from wells in a particular battery?

A. No, sir. Each well would have a given allowable and it would be set forth on a schedule.

Q. And the total would then be reached which would operate through the battery method of administration, is that correct?

A. That is correct.

Q. What objection do you have to operating your formula or any other on a strict battery basis?

A. There is no control under the battery or lease allowable system on individual well productions and an operator may with a large lease take all his oil out of a line well, and if there are to be any restrictions it should be therefore on a per well basis.

Q. That would result in protection of the correlative rights in the field in your judgment?

A. Yes, sir.

Q. Will you explain to the Commission the effect of your order on oil production and also upon the production of gas in the field?

A. We have gone through the April report and determined that with this order in effect the production from the field would be 56,700 barrels of oil per day and the gas production would be 84 million cubic feet per day.

Q. Have you made those calculations by examination of the data regarding the individual wells within the field?

A. It was made on each well.

Q. And the figures you have given are the cumulative totals, is that correct?

A. Yes, sir, that is correct.

Q. What, under your plan, would be the limitations, if any, upon the use of the gas which may be produced?

A. There would be no limitations on the use of that gas.

Q. Can you give a justification for a gas-oil ratio of

1,000 to 1?

A. Yes, sir.

Q. What is that?

A. In a solution gas drive field it usually takes the gas from three barrels of oil in the reservoir or the gas from a little more than three barrels of oil in the reservoir to produce one barrel of oil, and the amount of gas initially present with three barrels of oil in this reservoir approaches 1,000 cubic feet. If we were able to ultimately produce this field, using no more than the gas from three barrels of oil to produce one barrel of oil, you would have a recovery of around 30%; and under solution gas drive recovery, 30% is an excellent recovery from an oil field.

Q. In your general experience, does a ratio of 1,000 to 1 bear relationship to normally accepted conservation practices?

A. I believe it does, yes, sir.

Q. Can you explain why you believe it does?

A. Well, I believe the explanation I have just given indicates that, and also I call your attention to the fact that the States of Texas and Oklahoma, who have had conservation laws for quite awhile, allow a general producing gas-oil ratio of 2,000 cubic feet per barrel, but they start with reservoirs that have solution gas-oil ratios of around 700 to 1,000 cubic feet of gas per barrel.

Q. Have you, Mr. Turner, given any thought or made any study to the problem whether injection into the Weber, on the basis in which we have known it in this field in the past, is a practice which can be continued profitably or wisely?

A. It cannot be continued.

Q. Why?

A. Lease line injection is and has caused too many problems. We right today are receiving gas from the California injection well on their Fee 54. It's increasing the oil recovery from our well No. 15 but it's also increasing the gas-oil ratio, and they have had to shut in the well south of the injection well. While we are getting the benefit today, we look for the time here in the near future where we will have to shut in No. 15 from that injection. The same thing goes all over the field. Those red circles on the Stanolind exhibit shows that with lease line gas injection you cause too many problems with the individual operators; therefore, I do not see how this field can continue to have lease gas injection profitably.

Q. Do you have any opinion as to what the adoption of your formula or proposed formula, what effect it would have, upon the ultimate recovery by primary recovery methods in this area?

A. It will have no effect on it; it's as good as any others. I will further expand on that. We too agree that

unitization, with the pressure maintenance program, is the only proper way to operate the field. We do not see that an intermediate gas injection program of the present type is of any value. There is no question but what the field will be water flooded with the peripheral type flood proposed by Mr. Torrey. We have already conducted laboratory tests and show that the sand is very susceptible to water flooding. It only takes one thing to get it done, and that is a unit operation. Now if we let the pressure decline in this field to 500 pounds, people are going to be in a shake to unitize at that time, and water flooding is going to get every bit of oil that you will get under any type of gas injection program, especially the kind of half way program that Mr. Kaveler approved of here this morning. That program isn't worth a thing because you are going to get all that oil from a water flood operation.

Q. Do you then disagree with the suggestion, which I understood to be made, that continuation of Weber gas injection as we have known it in this field would itself be an aid ultimately to the water flood program?

A. It will not be an aid to the water flood program.

Q. And why is that your opinion?

A. I think it will just defer the time that the operators will get together and unitize.

Q. Is it your opinion that the full amount of oil from

water flood can be secured at a later date even if injection is not continued in the Weber at this time?

A. It very definitely can. Now we are not just preaching something here that isn't being done. We are already converting one big unit operation to this type of water flood in Oklahoma. We started out with a big gas injection program, but we have since found that the water flood that we have started on the pilot basis has done very much more than any of the gas injection, so we today are selling the gas, putting a little back into the gas cap, but have converted to an injection of 25,000 barrels of water per day and I would say within two years we will have all the gas injection stopped, converted to all water flood, because ultimately we get all the oil. We don't get all the oil but you get more oil from the water flood operation.

Q. Do you have anything further, Mr. Tarner, you wish to say in justification of your suggestion?

A. No, sir, I have not.

MR. KIRGIS: The witness is available for cross examination.

CROSS EXAMINATION

BY MR. WOOLFOLK:

Q. Under your proposal, Mr. Tarner, what could the possible flare from the Rangely Field be?

A. It could be 60 million a day. I would like to say

one thing further then. Try the order for awhile, let's see how it operates. I could have assumed that everybody would have kept their gas compressors operating and I could have told you that there would have been no flare, but I don't know, you don't know, and these people don't know what is going to happen out there. When you issue an order they may use all the compressors, they may not use them. I am suggesting this: Don't put any strings on the 1,000 cubic foot per barrel gas-oil ratio limit. Try it for two or three months, and if the operators put the gas away or take care of it by Entrada injection, sell it, keep it going; if you don't, you can always call us back in here for a hearing very quickly.

BY MR. ROBINSON:

Q. Mr. Tarner, I understand your recommendation would cut the oil allowable in this field to around 56,000 barrels?

A. Yes, sir, that is the figure we come up with.

Q. I understand you also to say that you don't think your order is going to be too helpful to conservation?

A. It is as helpful conservationwise as any of the other suggestions around here, and the fact that it would lead ultimately to unitization efforts it's probably better than the rest of them.

Q. But, Mr. Tarner, Mr. Kaveler said that his suggested order, which limited the oil to 250 barrels per day, would result in a production of oil from that field of around

73,000 barrels. Can you reconcile those figures? Do you think that that is a proper estimate?

A. I don't know where he got his estimate.

Q. Well, it would appear that they don't exactly tie in?

A. You ask me about mine and I will tell you what it is.

Q. I mean would you say those two estimates are consistent with each other or can't be reconciled?

A. I would say that there would be room for question, but I cannot explain it.

MR. ROBINSON: That is all.

MR. JERSIN: Mr. Tarner, wouldn't there be danger of oil getting into what was the original gas cap if gas weren't maintained at the top of the structure under this proposed order that you are recommending?

THE WITNESS: There is always that danger, Art, but after all the Sharples' leases had gas pushed to it for quite awhile now and maybe it's the only fair thing to do under competitive operations. Let them go ahead and produce. I don't know what the answer is.

MR. KIRGIS: If that should happen, Mr. Tarner, would it affect the results of water flooding at a future date?

THE WITNESS: Any time oil moves into a gas cap you lose oil production, it's wrong, but you can't get ultimate conservation and still protect correlative rights entirely so I have just suggested something here which I think is a road

which gives you an approach to conservation and at the same time giving some credit to correlative rights.

CHAIRMAN DOWNING: Any other questions?

(Witness excused.)

CHAIRMAN DOWNING: Any further testimony by Phillips?

MR. KIRGIS: That concludes our presentation.

CHAIRMAN DOWNING: I was hoping that Phillips would present a very feasible plan for unitization. I don't mean it in the sense that it ought to be acceptable to everyone, but certainly it was a good starting point. What has become of that unit plan?

MR. KIRGIS: It was not found acceptable to others. As far as the unitization features is concerned I believe our attitude is largely this: We remain, as we always have, thoroughly in accord with the Commission's suggestion that there should be unitization. That has been our independent belief and it still is. Mr. Turner says that our suggestion was acceptable to all except one, and wishes me to make that correction. We have, I believe I can say this in all honesty, made definite and assertive efforts in the past. However, we are a relatively small factor in the Rangely Field; comparatively, we are quite a small factor. We don't feel that we can be the tail wagging the dog, and although we believe in unitization and are anxious for unitization, have made our proposals for unitization, have done all we felt was proper

for us to do, we feel now having done all that, it's up to those having the most production in the field should make the proposals.

CHAIRMAN DOWNING: I was hoping on the principle of give and take you might get together on something along that line. I do think it's a very proper suggestion that the big producer, the big operator, should approach the smaller ones rather than vice versa.

MR. KIRGIS: That is certainly the history of successful unitization efforts in other areas.

CHAIRMAN DOWNING: In other words, let me follow that with this: We will soon be through, I mean this hearing, through with the testimony. Will you follow that up by a sincere talk with the other people along the lines suggested?

MR. WOOLFOLK: We are always ready to talk about it, Mr. Chairman. We will be very pleased to talk about unitization with them at any time, but as we have stated before we feel that the primary problem that is in front of us today is the issuance of an order which will bring about an equalization of the equities on which final unitization can be based. With that in mind, we ask that you consider issuing an order.

CHAIRMAN DOWNING: Pardon me for bringing this up out of order, but do I understand the difference in the opinion is the percentage that each company has or will have in the unit area?

MR. WOOLFOLK: Well, I don't think it's limited to that. There are various factors that would have to be considered.

CHAIRMAN DOWNING: In other words, your company I think wanted 56 or something of that sort and the others thought 50 was enough for you?

MR. WOOLFOLK: I really don't know what the numbers are, Mr. Downing.

MR. OSBORNE: Mr. Downing, I would like to point out the proposal made by the other four companies to the California Company used the California Company's form of unit operating agreement, so I think it's correct, it's merely a matter of percentages.

CHAIRMAN DOWNING: Well, let's go ahead and finish this hearing. Now the next one we are to hear from is Sharples.

MR. SULLIVAN: Mr. Downing, we have no testimony to put on. We have the benefit of the transcripts in the earlier hearings, and to avoid being repetitive, we will limit ourselves today to the making of a statement, which is as follows: The position of the Sharples Oil Corporation in this matter has not changed from the beginning. Repeatedly over several hearings, over a period of several years now, its opposition to Weber gas injection on a lease basis has been voiced in hearings before this Commission and in the Colorado Courts. This opposition has been grounded upon two premises:

First, the program was not sound from an engineering viewpoint, and particularly unsound from Sharples' viewpoint. It was doubtful in the beginning that it would be successful and likely that it might be detrimental to the field. The peculiar location of Sharples properties in the field made the program particularly unattractive and prospectively impossible for Sharples Oil Corporation. The continuation of Weber gas injection over all these many months has only aggravated the position of Sharples. It has not realized therefrom any apparent benefits at all but has been subjected to costly injection operations and increasingly difficult gas volume problem.

A substantial proportion of the gas that it now produces every day is gas that has already been produced and reinjected many times, either by it or by other operators. The gas that Sharples is now producing bears no realistic relationship at all to the gas volumes it would now be producing if the Weber injection program had never been inaugurated as it was, or had long ago been discontinued. This situation has been foisted upon Sharples over its constant protest and it has been disproportionately penalized and burdened by it, despite the fact that from the very beginning Sharples opposed the program and predicted this outcome for itself in the field.

Secondly, Sharples took the position, and it was maintained in the Courts, that Order 2-8 embodying the gas

injection program on a lease basis was illegal. It has consistently argued to the Commission that it could not validly impose such an order nor any variation of that order based upon the same principles. The continuation of the gas injection program in the Weber on the voluntary basis by all operators for a year now has not made the results thereof any more bearable to Sharples. Sharples again asks the Commission to review its position regarding the waste of gas at Rangely and to take a realistic view of gas production and waste as it's defined in the law.

In the first place, and it has been successfully shown, the law does not demand an absolute absence of flare. The Commission should recognize the geometric progression of gas flow per barrel of oil resulting from the ill-advised Weber injection program as it affects the Sharples properties. The Commission should recognize in any order the lack of unanimity regarding the benefits to be derived from Weber gas injection on a lease basis and give cognizance in that order to some other use or disposition of the gas, including injection into the Entrada or the sale of the gas.

Sharples is optimistic at this time that it will have in the near future two channels which will alleviate its gas distribution problem, which is a problem at least from the viewpoint of the Commission. One is the possibility of being able to arrange for Entrada injection; the second is the sale

to the Pacific Northwest Pipeline Company, and negotiations for sale to the Pacific Northwest Pipeline, as have been earlier mentioned, are in progress. Thank you very much.

CHAIRMAN DOWNING: Thank you. Now I think that all of the operators have had an opportunity to present their case and have presented it. Are there any lessees or royalty owners or any others that have something to say?

MR. EVANS: If the Chairman please, I would like to make an appearance for Equity Oil and Weber Oil Company. We would like to state that we subscribe to the recommendation by Mr. Torrey that there must be a limitation of production of oil and gas as a method of effective control of the field. We adopt the case of California Company as our case, and we particularly subscribe to the idea that two orders be issued; one setting forth a yardstick relating to the limitation on oil and gas production, and then a second order be issued relating to the permissive reinjection programs and credit as those things might be determined and their effect upon the correlative rights and the prevention of waste. Thank you.

CHAIRMAN DOWNING: Thank you very much. Your company, the Equity Oil Company, is as I understand it a large underlying owner in the field?

MR. EVANS: That is right.

CHAIRMAN DOWNING: And your properties are operated by the California Company, is that right?

MR. EVANS: That is right.

CHAIRMAN DOWNING: But your interest is a very considerable interest?

MR. EVANS: That is right.

CHAIRMAN DOWNING: We are very happy to have your statement. Are there any other statements?

MR. WESTFALL: Gentlemen of the Commission, I am M. F. Westfall. I represent the Husky Oil Company, and we have interest under several of the large leases operated by Stanolind. We cannot subscribe to the premise that limiting oil production in the Rangely Field will increase ultimate recovery. We think that the limiting of production of gas is the manner in which the recovery of oil can be increased. Therefore, the problem in our mind, the problem of preventing waste, resolves itself to limiting gas production to some reasonable value. Just what constitutes a reasonable value is not precisely determinable in our opinion.

We note here from the testimony and proposals that three operators, Phillips, The Texas Company, and Stanolind, propose a ratio of about 1,000 cubic feet per barrel. We believe that that proposal is reasonable. We feel that Stanolind's proposal to limit gas production to 350,000 cubic feet per day will in all probability accomplish a reasonable prevention of waste. We note for instance that the basis on which their calculations were based results in a flare of, oh,

up to 11 million cubic feet per day, which is only about 9% of the total gas produced in the field. In the past we have favored gas injection into the Weber. However, under competitive gas injection which now exists in Rangely, serious imbalances have resulted. We feel that continued competitive injection into the Weber will result in these imbalances becoming even more serious than they are today. We feel that we are near the time when it will be necessary to cease injecting gas into the Weber. We have no very definite ideas on injecting gas into the Entrada. We think that the lead taken by the Texas Company-Union Pacific Railroad in experimenting the problem of injecting gas, storing it in the Entrada, was to be commended. I think that our ideas on this will probably have to wait the outcome of the additional six months testing that they propose.

In this connection, that is in connection with the imbalances resulting from Weber gas injection, we don't think that the Commission should forget that they are obligated to protect the correlative rights of the royalty owners as well as those of the operators. It is difficult for us to see how the order proposed by the California Company will serve to protect the correlative rights of the royalty owners, particularly on small leases, because it does encourage gas injection, which as I stated before, will tend to make these imbalances become even greater than they are today.

We urge the Commission to consider these matters in formulating their order. Thank you.

MR. WOOLFOLK: Mr. Westfall, may I ask you a question. Why do you feel that the flare will be only 11 million cubic feet of gas per day as you suggested under the set-up you plan?

MR. WESTFALL: Well, as I said, I am using the same suppositions that the Stanolind made in that the present injection facilities will handle about 90 million cubic feet a day will be utilized. Now whether they will be utilized for injection into the Weber or Entrada I don't know. In other words, in flare I'm speaking of gas that would be burned or otherwise completely lost. Now there has been some discussion today that gas injected into the Entrada is lost; that we will have no future use from it. I don't think that we can come to that conclusion today. I think if we find we can inject gas into the Entrada and store it and recover a good portion of it that we have not flared it in the usual sense of the word. We may find that it may have a useful purpose down the road. It may become very useful for lease fuel down the road, but I don't think that it serves any useful purpose to continue to inject it into the Weber sand on a competitive basis.

Now I think that unit operation might present a different problem that would certainly bear study. Whether a

combination of gas injection into the gas cap area and water on the periphery would be better than to go ahead and continue to produce the gas and sell it and inject it into the Entrada or flare it, only study would tell which would be the best under unit operation. Of course the problem we are faced with first there is getting the field unitized.

MR. WOOLFOLK: Under the Stanolind proposed order you agree though that the flare could be as high as 101 million if the operators elected to flare it?

MR. WESTFALL: Well, I am not going to attempt to interpret Stanolind's proposed rule for them.

MR. WOOLFOLK: Thank you.

CHAIRMAN DOWNING: Do any other operators or lease holders or owners of underlying interest have anything they would like to present? Does anyone else have anything further to present?

MR. OSBORNE: I would like to make one correction in Mr. Westfall's statement. He said three companies, Stanolind, Phillips, and Texas all advocated 1,000 gross ratio. I don't think the Texas-Union Pacific proposal advocated 1,000 gross ratio. We advocated 300 net ratio.

CHAIRMAN DOWNING: Anything else? Gentlemen, thank you for your cooperation in getting through within a reasonable time, and I would ask the members of the Commission and the staff immediately to meet in the attorney's room on this floor.

MR. ROBINSON: Mr. Downing, may I make one further supplement before you close the case. I objected to the introduction of the prior records. I doubt seriously that testimony concerning the condition which existed in this field in any prior time should be made the basis of any present order, and that was the basis of my objection, but counsel for the Commission seems to feel that they should be in the record and I don't want to be obstreperous so I am going to suggest to the Commission with that admonition they consider only legal evidence in writing their order, and I withdraw the objection and let him put into the record what he wants.

CHAIRMAN DOWNING: As I understand it the transcripts of testimony taken in 1955 may be considered, is that right?

MR. ROBINSON: One thing further, counsel for the Commission stressed the fact that in prior hearings Stanolind had suggested 350 barrels top oil allowable. Now since I have been their counsel, why, I have suggested to them that that probably is not in conformity with the laws of Colorado, and so we have expressly refrained from setting any top oil allowable in any suggestion we make because, as a friend of this Commission, we want this order to be legal. But we have no objection, and as a compromise and as such compromises are made and without abandoning any legal position, why, we still say if you are going to set a top oil allowable we would limit it to 350.

CHAIRMAN DOWNING: As I understand it you do not object to a top oil allowable or a 350 top?

MR. ROBINSON: 350-barrel oil allowable if an oil allowable is to be set, but we think that the Commission should not write such in an order as somebody else might not have the same attitude we have toward it as we do and it might receive a challenge. So the Commission will know how we feel completely about this thing, we will live with any order that prescribes any flare limit which the Commission wants to set on it.

CHAIRMAN DOWNING: Now the Commission will go into session immediately. I haven't the slightest idea when we will agree, apparently there are no two of the operators agree, and I don't know whether that will be the same rule with our Commission or not.

MR. KNOWLES: Mr. Downing, one suggestion occurred to me, maybe you have had all the summary that you want on this but if it is agreeable to the Commission and the others desire it, or at least it could be in this form, that within 30 days after we receive this record anyone desiring it could file say a 20-page brief in writing, no big long extensive thing, and it might be helpful to the Commission. It just seems to me that that would just prevent anyone from feeling he had not had full opportunity to state his position to the Commission.

CHAIRMAN DOWNING: Well, it was my notion, I was about to suggest, it is possible that we might agree tonight and we will stay in session until midnight if it will do any good. I wonder where you will be tomorrow? It is possible that we might like to consult with you after our preliminary discussion further. Maybe we might ask you to stay over. The only thing, you remember the last time we followed that suggestion and we made an order which we thought was a fair compromise but when we got you together afterwards every one of you said, "To hell with that order, it's no good", so we don't want a repetition of that. But we do want you all to feel that you have had a fair hearing. We have always said we don't promise to decide right at all but we will do the best we can and do it promptly; and, of course, no matter what we decide, whether it is informally or in an order, anyone has a right to file and ought to file with this Commission any objection he has so that we may have a right to correct it if we have made a mistake before the matter might otherwise get into Court.

MR. WOOLFOLK: Mr. Chairman, with respect to your remarks about coming back, our witness Mr. Kaveler has returned to his home and we think we have presented to you today about as complete a case as you need on which to base an order.

CHAIRMAN DOWNING: Yes, I want to compliment you and

I want to compliment all of you. I think you have all presented it well and I think we understand it pretty fully.

MR. WOOLFOLK: Any meeting that we might have subsequent to your decision would lead to arguments and discussions and we think that you would not receive any benefit from anything of that sort, and if any order that you issue has to be tested then all we have to do is wait and test it in the Court. We believe you should issue an order. You have the authority and you have the power, and we believe we have given you a sound basis on which to do so.

CHAIRMAN DOWNING: Any other remarks? Is there anything else? All right, the hearing then is adjourned and the matter taken under advisement.

(Whereupon the hearing in Cause No. 2 adjourned at five o'clock p.m., June 25, 1956.)

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C E R T I F I C A T E

I, Donald E. Welmer, Certified Shorthand Reporter, hereby certify that I personally recorded in shorthand the proceedings in the foregoing matter in the first instance and that I later transcribed the same and that the foregoing record is true and correct to the best of my knowledge and belief.

Done at Denver, Colorado, the 30th day of
June, 1956.

Phone
FR7-0358

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