San Juan Basin Operators Committee
211½ WEST MAIN STREET
FARMINGTON, NEW MEXICO

May 18, 1954

Oil Conservation Commission
Santa Fe, New Mexico

Gentlemen:

Enclosed herewith is an outline of the work accomplished by the Engineering Subcommittee of the San Juan Basin Operators Committee in regard to gas proration in the Mesaverde formation of the San Juan Basin of northwestern New Mexico. An executive session of the San Juan Basin Operators Committee, as a whole, was held May 18, 1954. A report of the sub-committee was reviewed, amended and adopted by this committee and is enclosed with this letter.

At the meeting today of the San Juan Basin Operators Committee, there appeared to be a desire of the majority to compromise on a proration formula of 75% deliverability times acreage plus 25% acreage. However, there was a minority present who was not in agreement with this formula.

The San Juan Basin Operators Committee has not taken any stand for or against the proration of natural gas in the Mesaverde reservoir in the San Juan Basin. Any such position will have to be taken by the individual members and any testimony for or against proration would also have to be submitted by the individual members.

Because of the scope of this study, the operators committee hereby recommends that all proration hearings be heard on a separate day and not as a part of the monthly hearings, in order that there will be no interruption or interference with the testimony presented and this date be set not sooner than 30 days from today. This will also allow more adequate time to combine data, and provide the members an opportunity to prepare additional and more complete data to present to the Commission.

We sincerely hope that the enclosed data will be of assistance to the Commission to consider the problems of proration.

Respectfully submitted,

SAN JUAN BASIN OPERATORS COMMITTEE

Frank C Barnes

FCB:BW

By FRANK C. BARNES, Chairman

SAN JUAN BASIN OPERATORS COMMITTEE
Farmington, New Mexico

Subject: Report of the Engineering Sub-Committee on Allocation of Production to Gas Wells, San Juan Basin

To the Members of the
Oil Conservation Commission
Santa Fe, New Mexico

At a meeting of the San Juan Basin Operators Executive Committee held November 30, 1953, an Engineering Sub-Committee was appointed to study the effect and feasibility of rateable take of gas in the San Juan Basin. This Committee has held four meetings.

A report outlining the results achieved at these meetings follows. In the interest of achieving some measure of clarity, this report is divided as indicated below.

I. The Committee: Its purpose and business.

II. Scope of Study.

III. Characteristics of the Blanco Mesa Verde Reservoir.

IV. Type of Allocation Formulae considered.

V. Minimum and Maximum Allowables.

VI. Specific Formulae, Agreements and Compromises.

I. THE COMMITTEE: ITS PURPOSE AND BUSINESS

Five members were appointed by the Executive Committee to comprise the engineering sub-committee. These were:

Frank Barnes, Independent Geologist
Scott R. Brown, Western Natural Gas Company
Truitt Hollis, El Paso Natural Gas Company
Fred P. Crum, Jr., J. D. Hancock & Co. Ltd.
Albert R. Greer, Benson-Montin

Because of the general interest to all San Juan Basin producers, the meetings were open to any operator who desired to be represented, and those attending were also considered the same as members of the sub-committee. The meetings were well attended and in general considerable interest was shown by the members.

At the first meeting, the sub-committee concluded that the first order of business should be an attempt to devise an allocation formula suitable to the San Juan Basin and, if possible, acceptable to all the operators.

The committee, as such, had no authority designated it by the Oil Conservation Commission, nor was it empowered to vote for, or on behalf of, the San Juan Basin Operators Committee. It was merely an engineering sub-committee, which studied methods of gas allocation and which was obligated to report its findings to the Executive Committee. The general intent and purpose being that perhaps a formula could be devised which would be acceptable to most of the operators and perhaps could be recommended by the San Juan Basin Operators Committee, as a whole, to the Oil Conservation Commission.

II. SCOPE OF STUDY

It was generally agreed that the committee should devote its study to the determination of an allocation formula to distribute production among wells within a pool. The committee's thoughts relative to pool nominations and methods of handling over and under production and allowable schedules were that these matters should be left to the Oil Conservation Commission and the pipe line companies.

At the first meeting, the committee planned to study formulae for both the Blanco Mesaverde field and the Pictured Cliffs fields. Some of the general characteristics, which may affect proration, differ between the Blanco Mesaverde and the Pictured Cliffs fields. Although the same type formula may apply to both formations, the differences should be considered. Among other things, these differences are: (1) The Blanco Mesaverde has been developed on a fairly uniform pattern of 320 acres per well, whereas the Pictured Cliffs fields have been developed under spacing regulations varying from 40 acres to 320 acres per well. (2) The Mesaverde has been developed over a comparatively small interval of time, whereas the Pictured Cliffs development in one field has been continued for over thirty years. (3) Initial shut-in pressure differences in the Blanco Mesaverde show a limited range approximating 100#, whereas initial shut-in pressures of Pictured Cliffs wells vary from approximately 500# to about 1000#, and some wells which are currently being completed in the old fields have initial shut-in pressures as low as 300#.

Since the Mesaverde is the larger producer, the committee decided to work on it first. Inasmuch as the Oil Conservation Commission has a hearing scheduled in May for proration in the Blanco Mesaverde field, the sub-committee at its fourth meeting felt compelled to complete its work on this field, and it has not found time to make a separate study, as such, of the Pictured Cliffs fields.

In view of the foregoing, the committee's work and this report are therefore limited to the study of an allocation formula distributing production to wells within the Blanco Mesaverde pool.

III. CHARACTERISTICS OF THE BLANCO MESAVERDE RESERVOIR

It is not the intent of this section to present a reservoir study of the Mesaverde formation, but to point out some of the factors and opinions, part of which are controversial, but all of which affected the opinions of the members relative to a proration formula.

A. Sands open to production: In the area considered, the Mesaverde formation can be divided into three generally traceable members, which are the Cliff House, the Menefee, and the Point Lookout. The Point Lookout is thought to be the primary productive sand in most areas, and is the sole sand open to production in some parts of the field. In other parts of the field all three members are open to production.

For practical purposes of production the entire Mesaverde formation has been considered by the Oil Conservation Commission as a common source of supply. However, where it is productive, and open to the well bore, the Cliff House contributes gas to production in addition to that which might have been obtained from the Point Lookout alone. Some of the members of the committee also voiced the opinion that in some wells the Menefee is productive. In some parts of the field, then, production from any one well may be from more than one zone of the reservoir.

B. Core Data: The committee did not have the time to make a study of core analyses, or attempt correlations of core analyses with logs. Very little time was spent reviewing core data.

C. Range of Productivity: A considerable variation in productivity exists, not only by areas, but in offset wells. This gives rise to the question that a well's productivity may or may not truly reflect the average sand conditions under its tract.

D. Degree of Communication: No interference tests were made available to the sub-committee. Agreement among committee members was not reached as to degree of communication that exists between wells. Some held the opinion that the large wells were draining areas considerably in excess of 320 acres. Others held the opinion that no communication exists over areas greater than the 320 acres assigned to each well.

E. Relation of Productivity to Reserves: Discussions relative to formulae suggested inevitably ended in the controversial question of the relation of well productivity to reserves under its tract. Some of the members expressed the opinion that the unusually large wells resulted from a fractured condition, and as such, whatever relation might elsewhere in the field exist between productivity and reserves would not hold for the unusually large wells. Others stated the opinion that these high capacity wells resulted from thicker and better sand bodies.

IV. TYPE OF ALLOCATION FORMULAE CONSIDERED

A. The Kansas-Hugoton Formula: This formula is deliverability times acreage, in which the deliverability is measured at 80% of the field average shut-in pressure. This formula purports to equalize pressures in a field through the measurement of deliverability against a relative high back pressure, which is determined as a field average. Some members of the committee who have had experience with this formula reported that it does tend to equalize pressure, and hence, withdrawals, but is effective only on a regional, or areal, basis; and does not protect small wells against high productivity offsets. Also, this formula would have a very drastic effect in reducing allowables of low pressure wells. For these two reasons, the committee decided against use of deliverability as defined in the Kansas-Hugoton proration order.

B. Exponential Type Formula: There is considerable merit to an exponential type formula (acres times deliverability raised to a power less than 1) which can be developed analytically for any field where adequate core data is available. The committee, however, felt that it did not have the time, and perhaps not enough core data to be representative, to develop a formula of this type, so no effort was made to develop an exponential type formula.

C. Additive Type Formula: A formula in which there are two additive factors, namely acreage and deliverability, was considered by the committee as one having the best possibilities of permitting the committee members to reach agreement.

V. MINIMUM AND MAXIMUM ALLOWABLES

Some of the members thought that a minimum allowable should be one of the requirements of the allocation formula and that the formula should, in itself, provide the minimum allowable; or, if not provided for in the formula, then the minimum allowable should be separately specified. Full agreement was never reached on this issue. Qualified agreement was obtained in connection with one of the formulae, as later discussed herein. The member suggesting the minimum allowable originally recommended a figure of 400 MCF/day. Those opposing a minimum allowable never agreed to more than 250 MCF/day and this was in conjunction with a compromise formula only.

As used herein, the members define "minimum allowable" to be some particular rate of production from a well, below which that well will not be restricted in production rate by proration formula. This minimum allowable, however, must not exceed the well's deliverability as determined by the Oil Conservation Commission.

At the last sub-committee meeting, a maximum allowable of 5,000 MCF/day was suggested. This was the first meeting that this thought was introduced and, consequently, the sub-committee has not discussed its merits or drawbacks as fully as the minimum allowable.

VI. SPECIFIC FORMULAE, AGREEMENTS AND COMPROMISES

The committee agreed that possibility of reaching a unanimous approval of one formula by the Operators Committee would be best if it were composed of two additive factors as follows:

(1) "Deliverability" times "Acreage"
plus
(2) "Acreage"

in which "Deliverability" is the individual well's deliverability as determined by the method now in use in the San Juan Basin. For new wells which have not been tested, their deliverabilities and allowables would be estimated. The allowable so estimated would be subject to correction at such time as the well is tested and its true deliverability determined and appropriate over or under production would be calculated and proper adjustment made in future allowables.

"Acreage" would be 320 acres for each well, unless the Conservation Commission has approved assigning it less than 315 acres or more than 325 acres.

It was agreed that the weight given to deliverability should be in the range of 50% to 100% of the formula, and the weight given to acreage should be between 50% and 0%.

In the above form, three specific formulae were recommended by various members. These were as follows:

1. 100% deliverability times acreage plus 0% acreage.

2. 50% deliverability times acreage plus 50% acreage.

3. 75% deliverability times acreage plus 25% acreage.

Those members supporting Formulae 1 and 2 could not agree on an "in-between" formula which they would recommend on an engineering basis. An attempt, however, was made to reach a compromise by the use of the third formula and applying a minimum allowable which would be subject to possible correction and review by the Oil Conservation Commissior

It appeared that those members present at the fourth sub-committee meeting might finally agree upon the compromise formula, being 75% deliverability times acreage plus 25% acreage, and by setting a minimum allowable. ~~The qualifications to complete agreement by the sub-committee in the use of this formula as a compromise were with respect to the amount of the minimum and maximum allowables.~~ 7 M.

In conclusion, the sub-committee did not feel that it was in a position to make a definite recommendation as to a proration formula that could, in turn, be recommended to the Oil Conservation Commission in regard to the Blanco Mesaverde reservoir.

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