INDIAN BASIN GAS PLANT

Eddy County, New Mexico

PROPOSED OPERATIONS

FIELD

The Indian Basin Field consists of gas-well completions in the Cisco and Morrow formations. At this time, approximately 40 to 45 sections are considered productive in the Cisco and possibly 12 to 15 sections in the Morrow

Based on the estimated recoverable gas in place, the sales volume from the field will be approximately 120 MMCFD. This would amount to about 1.0 MMCFD per Morrow completion and 2.5 MMCFD per Cisco completion initially.

The gas from both zones is very lean in both condensate and liquefiable hydrocarbons. The average condensate content of the Cisco is 9 bbl/MMCF and 1.3 bbl/MMCF for the Morrow.

About 95 per cent of the reserves are dedicated to Natural Gas Pipeline Company of America who expects to begin taking gas in December of this year.

The majority of the Working Interest Owners have agreed to join in the construction of gathering facilities and a gas treating and processing plant. All producers within the productive area have been offered an opportunity to participate in plant ownership and/or to have his gas processed.

FACILITIES

I. Lease Facilities

The lease facilities at each well are shown schematically on the attached diagram. They consist of a safety shut-in valve, choke, heater, and separator-dehydrator from which the gas will be metered and delivered into a common gas gathering system. The condensate and water from the high pressure separator will dump into a 125-psi working pressure, dump type, three phase metering separator. The gas from the metering separator will make up part of the heater and dehydrator fuel requirement. The water and condensate will be separated and metered in separate dump chambers and recombined for delivery into the common liquid gathering system.

The only additional facilities required for a dual gas well is a separate safety shut-in valve and choke, a second coil section in the heater and meters and check valves for each of the wet gas streams.

A. Equipment

1. Safety Shut-In Valve: This valve will shut in the well upon either high or low pressure downstream of the choke. It will be of the type to shut-in when high pressure occurs and reset itself when the pressure again becomes normal, and will shut-in and require manual reset if activated because of low pressure. If an emergency arises whereby the gas must be blocked at the plant inlet, the pressure will build up and shut in each well rather than damage equipment or allow gas to flare. In event of abnormally low pressure because of a freeze up in the choke or line rupture,

the well will shut-in and remain so until the valve is manually reset.

2. Choke: The choke will be either a hand-operated adjustable choke or a diaphragm operated choke. Consideration is being given to having the flow recorders combination recorder-controllers. With a controller, the desired flow rate will be preset and would maintain the flow rate constant until reset. This would facilitate operating the wells with a minimum of personnel. The person changing the flow rate would be relieved of having to stay at each well until the well stabilized. This would also provide a basis of estimating production if a pen were to stop inking or a clock stop.

3. Heaters: This will be an indirect fired heater with a water bath having one high pressure pass upstream of the choke and two or more passes on the low pressure side.

4. High Pressure Separator: This separator will either be a separate vessel or an integral part of the dehydrator, and in either case, dump total liquids into the low pressure separator. The separator and dehydrator will be equipped with pressure-relieving devices.

5. Dehydrator: The dehydrator will be of conventional type, either glycol or expendable desiccant, to lower the water dew point enough to prevent hydrate formation in the gas gathering system.

6. Gas Meter: Conventional flange tap meter run with two-pen recorder and either 7-day circular or 30-day strip chart.

As mentioned previously, consideration is being given to incorporating the control feature in the recorder.

7. Low Pressure Metering Separator: This separator will be either vertical or horizontal, but in either case, will have two vertical-walled dump chambers for metering the condensate and the water. The chamber for condensate will, and for water may, be isolated from the separator portion by valves to prevent fill-up during the dump cycle. The metering separator will have sealable non-reset counters suitable for the service.

B. Ownership

The facilities upstream of the gas meter at the dehydrator outlet and upstream of the point where the liquids are recombined will be owned by the well owners. Marathon has made an offer to each Unit Operator to purchase and install all lease facilities at cost. This would provide fieldwide uniformity in equipment and lower the unit cost. Indications are that this offer will be generally accepted.

II. Common Facilities

A. Gathering Facilities

The high pressure gas gathering system will consist of from 3-inch to 16-inch buried pipe connecting each well with the central facility. There will be block valves and vents as required for testing and maintenance of the system. At the central gathering point will be emergency shut-in valves to block the entire system.

The low pressure liquid gathering system will parallel the gas system and be of PVC pipe rated at 125 psig at 120° F. This line will be padded with rock-free soil prior to backfilling.

B. Central Facilities

The high pressure gas will enter an inlet gas scrubber from which any liquids collected will be dumped into the liquid gathering system. The gas from the inlet scrubber will be sweetened, dehydrated, and processed for the removal of liquefiable hydrocarbons and metered for delivery to the gas purchaser.

The liquids from the liquid system will enter a water separator to remove the produced water. The condensate will then be mixed with fresh water for salt removal and enter a water wash tank. The condensate will then go to the stabilizer and storage. The vapors from the water wash tank will be compressed one stage, combined with the stabilizer overhead gas, and compressed and metered for delivery into the plant inlet separator.

The plant will have two shutdown systems. The primary shutdown will by-pass treated and dehydrated gas to sale and inlet condensate to storage when the water wash tank becomes full, by-passing the processing and stabilizer facilities. The water wash tank will have surge capacity for three hours production. The secondary shutdown will stop the entire plant and block the inlet gas there-by shutting in all gas wells.

PRODUCTION

I. Ownership

Title to the processed gas and condensate will remain with the

Producer. Title to the plant products will pass to the Processor as and when recovered in the plant. The Producer will be paid 20 or 25 per cent of the value of the liquids recovered, depending on the price received.

Gas from the plant condensate facilities will be metered and treated as gas well gas and liquids from the inlet gas scrubber will be treated as condensate.

II. Allocation

A. Condensate will be allocated to each well on the basis of the meter readings at the lease corrected for shrinkage.

B. Processed gas delivered to pipeline will be allocated to each well on the basis of the volume metered at the well multiplied by the sum of the nitrogen, methane, and ethane contained in the gas expressed as a per cent.

C. In accounting for the value of plant products, each plant product saved and sold will be allocated to each well on the basis of the volume of gas metered at each well times the content of each such particular product contained in the gas delivered.

OPERATION

I. In accordance with the Gas Processing Agreement, the following tests will be conducted by Plant Operator and may be witnessed by the Well or Unit Operators.

1. At least every three months, Plant Operator will calibrate the lease liquid meters. This will be done by comparing dump levels in the sight glass with calibration marks stamped on

the vessel by the manufacturer. Operating temperature for volume correction will be observed from a thermometer two to three times a week and recorded. The arithmetic average of the temperature when the well is flowing will be used for the correction.

2. At least each three months, all gas meters in the field and plant will be tested and calibrated according to accepted standards. The volumes will be corrected for gravity, temperature, and super-compressibility.

3. Plant Operator will obtain samples semiannually of lease separator gas and analyze same for acid gases, inert gases, and hydrocarbon components through pentanes and heavier. This analysis is to be used in connection with the processed gas and product allocation.

4. The gravity of the gas will be determined at least each three months by one of the acceptable methods.

5. The shrinkage factor for the lease condensate will be determined each three months by the calibrated "shrinkage bomb" method. The "shrinkage bomb" will be graduated in 1/4 of 1 per cent increments. Attached is a detailed description of its construction and operation.

II. General

A. In accordance with the Gas Processing Agreement, the Processor will allocate processed gas, condensate, and plant products to each delivery point on the lease. In cases of dual wells the

Well or Unit Operator will be responsible for allocating the production between zones on the basis of data furnished by Plant Operator.

Note on the attached diagram that the total well stream is metered from each zone before the production is commingled. Periodically each zone will be tested for its gas-liquid ratio by shutting in the other zone. This test will provide the gas-liquid ratio and a factor to correct the total well stream volume to the dehydrated gas metered volume. The wet gas measurement from each zone can be corrected to a separator gas volume for residue gas allocation. The actual volume of condensate from each zone will be determined on the basis of the metered gas volume and the gas-liquid ratio.

B. Any malfunction or significant error in condensate measurement will be easily detected and accounted for since the gas-liquid ratio will be constant and independent of rate.

C. Temperature corrections will be made by periodic observation of the operating temperature by use of a thermometer installed in the system. Since the condensate will flow continuously from the heater to the high pressure separator to the metering separator, fluctuating temperatures are not expected. The actual temperature would have to vary from the average of more than 15° F. to cause a one per cent error.

D. It will not be necessary to sample the separator condensate

for BS&W or gravity. The BS&W will be nil due to the nature of this product, and the small variation of the gravity should not affect the price.

E. The condensate metering chamber will meet the specifications of a prover device as described in the last paragraph on Page 6 of the "Manual for the Installation and Operation of Commingling Facilities".

F. Internal plastic coating of the condensate dump chamber would not improve the accuracy of the measurement and could possibly become a source of operating difficulty.

It is not probable that rust would build up on the walls of the chamber which will be continuously washed with condensate. The condensate has a cloud point of -20° F.; therefore, no paraffin build-up is expected. Clingage will be no problem with this product which has viscosity and surface tension properties in the range of gasoline or kerosene. The surfaces of the calibrated section used in metering will be vertical.

EEW/mt