ABSTRACT

THIS PROJECT INVOLVED THE DESIGN, DEVELOPMENT, AND DOCUMENTATION OF A PETROLEUM LEASEHOLD INTEREST ECONOMIC ANALYSIS SYSTEM FOR CARL OIL AND GAS, INC. THIS SYSTEM RUNS ON THEIR IN-HOUSE DATAPoint 6600 SYSTEM, AUTOMATING A CONSIDERABLE AMOUNT OF WORK PREVIOUSLY DONE BY HAND. SPECIFICALLY, ECONOMIC ANALYSES, STARTING WITH ESTIMATED FUTURE ECONOMIC PARAMETERS AND CALCULATING VARIOUS ECONOMIC INDICATORS, ARE RUN ON GROUPS OF PROPERTIES. THESE PROJECTIONS EXTEND UP TO 20 YEARS, OR UNTIL THE NET INCOME DIMINISHES, WITH UP TO TWO REVERSIONS OF WORKING AND REVENUE INTERESTS. DATA FOR THE ANALYSIS OF A GROUP OF PROPERTIES (I.E. PROJECT) IS STORED IN A FILE, WHICH CAN BE MODIFIED AND REUSED. THE SERIES OF REPORTS THAT ARE GENERATED FOR THE GROUPS OF PROPERTIES ARE SUITABLE FOR DISTRIBUTION TO MANAGEMENT AND CLIENTS. THE PROJECT HAS RESULTED IN A WELL-WRITTEN, DEBUGGED, AND DOCUMENTED SOFTWARE SYSTEM AND A USERS' MANUAL.
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INTRODUCTION

CARL OIL AND GAS CO. REQUESTED THAT A PETROLEUM LEASEHOLD INTEREST ECONOMIC ANALYSIS SYSTEM BE DESIGNED TO EVALUATE INDIVIDUAL OIL AND GAS PROPERTIES, PERFORM COMPOSITE ANALYSIS, AND GENERATE SUMMARY REPORTS TO DETERMINE INCREMENTAL ECONOMICS BETWEEN ALTERNATE PROJECTS. THE ECONOMIC ANALYSIS SYSTEM WAS TO BE DESIGNED WITH FLEXIBILITY THAT ALLOWED BOTH SIMPLE DATA PREPARATION AND ENTRY, SUITABLE FOR USE BY NON-TECHNICAL EMPLOYEES, AND THE SOPHISTICATED, COMPREHENSIVE ECONOMIC MODELING, SUITABLE FOR THE PETROLEUM RESERVOIR ENGINEERS AND FINANCIAL PLANNERS.

THE INPUT DATA FOR THE SYSTEM WAS TO INCLUDE COEFFICIENTS OF PRODUCTION CURVES AND/OR SPECIFIED PRODUCTION SCHEDULES. IN ADDITION, THERE WAS TO BE WIDE FLEXIBILITY WITH RESPECT TO THE ENTRY OF PRICE AND EXPENSE SCHEDULES, INVESTMENT DATA, TAXES, AND MISCELLANEOUS DATA. THIS WOULD ALLOW ADAPTABILITY IN THE GENERATION OF ECONOMIC INDICATORS.

THE SYSTEM WAS TO PRODUCE INDIVIDUAL REPORTS FOR EACH PROPERTY, I.E. WELL, A PROJECT SUMMARY COMPOSITE, AND SUMMARY COMPOSITES BASED ON THE RESERVE CLASSIFICATION. THESE REPORTS WERE TO CONSIST OF THREE PAGES: 1) MISCELLANEOUS WELL DATA, WORKING AND REVENUE INTERESTS, AND 20 YEAR SCHEDULES, I.E. TABLES, FOR GROSS AND NET PRODUCTION, PRICES, AND GROSS REVENUE, OF THE LIQUID AND GAS PRODUCTS; 2) SCHEDULES FOR
SEVERANCE, AD VALOREM, AND WINDFALL PROFITS TAXES, OPERATING EXPENSES, INVESTMENTS, AND DEVELOPMENT COSTS; 3) VARIOUS DISCOUNTED CASH FLOW SCHEDULES.

ADDITIONAL REQUIREMENTS SET BY CARL OIL AND GAS CO. WERE AS FOLLOWS:

1) ECONOMIC LIMITS WERE IMPOSED ON INDIVIDUAL WELLS AT THE POINT AT WHICH THE REVENUES NO LONGER SUPPORT THE OPERATIONS (I.E., PRODUCTION IS STOPPED WHEN THE BEFORE TAX CASH FLOW BECOMES NEGATIVE). HOWEVER, DEVELOPMENT AND INVESTMENT COSTS WERE TO BE EXCLUDED FROM THIS CALCULATION.

2) THE ECONOMIC MODEL WAS TO CALCULATE THE CASH FLOW ON A QUARTERLY BASIS, USING A STARTING DATE WHICH MAY PRECEDE THE ACTUAL DATES OF INITIAL PRODUCTION FOR THE WELLS. THIS WOULD ALLOW EVALUATION OF THE INDIVIDUAL PROPERTY PURCHASES OF A PROJECT, WITHIN A TIME FRAME OF 45 DAYS OF ACTUAL PURCHASE.

3) THE CASH FLOW WAS TO BE CALCULATED AS THE GROSS REVENUES ACCRUING TO THE SUBJECT INTEREST LESS THE ASSOCIATED PRODUCTION TAXES, AD VALOREM TAXES, WINDFALL PROFITS TAXES, INVESTMENT COSTS, LEASEHOLD DEVELOPMENT COSTS, AND DIRECT OPERATING EXPENSES, INCLUDING OVERHEAD.

4) IDENTIFICATION FIELDS WERE TO BE INCLUDED, TO ALLOW AMPLE DESCRIPTIVE TEXT ON EACH INDIVIDUAL WELL, TO INCLUDE THE OPERATOR WELL NUMBER, LEASE, FIELD, RESERVOIR, RESERVE PARAMETERS, ETC.

5) TOTAL REVENUES ACCRUING TO THE SUBJECT INTEREST WERE TO BE
CALCULATED AS THE SUM OF REVENUES FROM OIL AND GAS PRODUCTION. THE NET REVENUE INTEREST FRACTIONS WERE TO BE CALCULATED SEPARATELY FOR OIL AND GAS, WHILE THE WORKING INTERESTS FOR OIL AND GAS WERE TO BE COMBINED. THE REVENUE INTERESTS WERE ASSUMED TO HAVE BEEN ADJUSTED FOR ALL OVERRIDE AND ROYALTY FRACTIONS BEFORE DATA ENTRY.

6) CARL OIL AND GAS CO. REQUIRED VERY COMPREHENSIVE WINDBACK PROFITS TAX CALCULATIONS—THE SYSTEM WAS TO HANDLE BOTH THE LOWER RATES AVAILABLE TO INDEPENDENT PRODUCERS AND THE GENERAL RATES FOR MAJOR PRODUCERS, AS WELL AS THE RATES FOR STRIPPER PRODUCTION.

7) SUMMARY COMPOSITES WERE TO BE BROKEN INTO SIX RESERVE CLASSIFICATIONS: PROVED PRODUCING, PROVED BEHIND PIPE, PROVED UNDEVELOPED, PROBABLE, POTENTIAL, AND POSSIBLE.

8) CARL OIL AND GAS REQUESTED THE OPTION OF CALCULATING THE SEVERANCE TAXES BASED ON EITHER A PERCENT OF THE PRODUCT VALUE OR ON THE VOLUME OF PRODUCT PRODUCED.

9) AD VALOREM TAXES WERE TO BE CALCULATED BASED ON EITHER SPECIFIED SCHEDULES OR ON A PERCENTAGE OF PRODUCTION REVENUES.

10) DEFAULT PROVISIONS FOR THE OIL PRICES, GAS PRICES, TIER 1 BASES, AND TIER 3 BASES WERE TO BE PROVIDED TO FACILITATE THE EVALUATION OF LARGE PROJECTS. PROVISION TO OVERRIDE THESE VALUES FOR INDIVIDUAL WELLS WAS REQUESTED.

11) THE OPTION OF HAVING UP TO TWO REVERSIONS OF REVENUE AND WORKING INTERESTS WAS REQUESTED. THESE REVERSIONS WERE TO BE TRIGGERED EITHER BY A SPECIFIED DATE, OR BY THE ACCUMULATION OF A SPECIFIED NET CASH FLOW.
12) All individual wells, as well as the summary composites, were to have individual year breakouts for 20 years, plus a remainder. Since any production after 20 years would have a minimal impact on the overall project value, the remainder was grouped and discounted as such.
INITIAL CONSIDERATIONS

An initial study of the problem indicated that the input data should be saved as a file, not only to allow access to data used during the last project run, but also to facilitate the alternating of runs of unrelated projects, such as during an incremental economic analysis of two groups of properties.

The data pertaining to individual properties of a group should be viewed as fields making up a well records; the data pertaining to all properties (such as the start date, default prices, and tax bases) being included in a header record. These records would be accessible sequentially during data entry and review, and accessible randomly for error correction and parameter changes during incremental analyses.

It was determined that the in-house datapoint 6600/DUS 0/DS6 system supported the interactive programming language, Databus, which would allow the petroleum reservoir engineers to access the economic analysis system from their offices. A menu driven, fill-in-the-blank interface would allow for non-technical users, and it would allow efficient entry of the large amount of data. One limitation of using Databus at this installation, however, is the relatively small 4096 byte user data area allocated to each interactive user.