INTRODUCTION

Operating Cost Benchmarking is a strong analytical tool for targeting *actionable* cost reduction opportunities. The objective of the Cost Benchmarking Analysis is to identify opportunities to *improve efficiency, lower costs, and enhance production*. The Ziff Energy Group Cost Benchmarking is a *meaningful and actionable operations analysis program.* There is a comparison of cost and field production operations of the fields against technically similar fields in the Ziff Energy database.

The Ziff Energy Cost Benchmarking Analysis has been implemented during the last 12 years by several companies in North America and for the last 3 years in Latin America. In an effort to make this *diagnostic* tool more effective, Ziff Energy provides direct assistance to operators, working with teams of client engineers and field staff to implement field improvement plans.

Moreover and due to the peso devaluation in Argentina, followed by overshooting exchange rate and instability of relative prices, an economic model was developed in order to assess the impact on operating costs during the period of economic instability.

Thus in the case of unstable economies, the cost data is corrected in order to assess results free of the distortions introduced by the devaluation processes and incorporated in the trend analysis which takes into account inflation, devaluation, and local content.

The scope of work of our services is structured into two phases as follows:

Phase 1: Field Operating Cost and Driver Analysis, including an Implementation Plan for reducing costs.

Phase 2: Best Practices and Production Process Analysis, including an Implementation Plan for improving specific field practices.

In general, Ziff Energy's approach to Benchmarking Field Operating Efficiency is to perform cost diagnostic benchmarking analysis to determine the extent of the operator performance 'gaps' **(Fig. 1)** compared to similar operations of other leading E & P companies, and use this information to develop a plan for closing the gaps identified that relate to specific practice areas (for example, Production and Productivity Variables, Well Servicing, Workovers, Surface Repair and Maintenance, Field People Productivity, etc).

OPERATING COST BENCHMARKING

This paper includes the following presentations:

1. Phase I. Field Operating Cost and Driver Analysis, including an Implementation Plan for reducing costs.
2. Phase II. Best Practices and Production Process Analysis, including an Implementation Plan for improving specific field practices.
3. Economic model for correcting upstream operating costs.

1. Phase I. Cost Benchmarking, Driver Analysis and Cost Reduction Implementation Plan

The benchmarking effort will focus on investigation of cost performance "gaps" relative to peer field operations derived from the Ziff Energy database. The data gathered for the analysis is typically the most recent data for a 12-month period.

In Phase I, Ziff Energy:

(i) Analyzes each of the fields against similar 'like kind' fields selected for this purpose from Ziff Energy's database. The analysis is made for different cost categories, establishing the performance "gaps" or diagnostic indicators.

(ii) Performs a "Driver" analysis, which provides a correlation between certain operating functions/activities and associated costs. Trends in the data are identified that lead to cost reduction opportunities. The drivers are selected after consultation with the operator's field operations professionals.

(iii) Puts in place an Implementation Plan to capture the savings. One of the major challenges for operators to seize potential opportunities is to implement findings of the study quickly and effectively. Having that in mind, Ziff Energy designs as the final stage of Phase 1, a process called the *Implementation Plan*, which is devised to be developed in collaboration with the operator.

Our benchmarking analysis encompasses the following activities:

A. Initial Data Gathering

- Ziff Energy provides to the operator team the initial Ziff Energy Field Screening Forms for each of the fields to be included in the study.
- With the completed screening forms, Ziff Energy analyzes the data and performs an initial/preliminary screening of existing fields in the Ziff Energy field-level database to identify the best comparable fields with which to benchmark each of the field included in the study.
- The operator team prepares a brief high-level technical presentation of the fields including reservoir data, fluid characteristics, geology, reserves, production characteristics, facilities and field operations related information. This material is presented to the Ziff Energy team.
- Ziff Energy submits data template forms (Cost Data Questionnaire) for the operator to gather the detailed operating cost accounts information for each of the fields. Definitions associated with each standard cost category is also provided and discussed with the operator team.

B. Data Collection

- Operator personnel (with ongoing assistance from Ziff Energy) completes the data template forms for each one of the fields.

C. Data Review and Confirmation

- Field data is entered into the Ziff Energy database and the first level of quality control is conducted through automated calculations.
- The Ziff Energy Project Manager and Analysts then review the accuracy and consistency of the data. During this process, any data anomalies are identified and discussed with the operator field and accounting personnel.

D. Asset Group Selection

- Technical properties of the fields are used to select fields from the Ziff Energy database that have similar producing characteristics.
- The operator and comparable fields are then assembled into Asset Groups based upon producing characteristics, such as well depth, API gravity, water cut, field vintage, and other physical parameters.

E. Data Analysis

- The individual cost items from each field expense statement is analyzed against similar fields in their Asset Group. A technical analysis is performed on the data submitted to determine high cost areas (the performance 'gaps') both for cost reduction and field operating efficiency. Specifically, the individual field analyses is structured to place expenses into the standard Ziff Energy cost categories, including:

  a) Surface Repair and Maintenance
  b) Chemicals
  c) Contract Services
  d) Well Servicing
  e) Lease Fuel
  f) Energy (Electricity and Diesel/Propane)
  g) Labor (Company and Contract)
  h) External Processing.

- Comparisons are made against the Average cost and Leader cost for each expense category.

F. Cost Driver Analysis

- A 'Cost Driver' analysis is performed to define key relationships between expenses and their technical drivers. This analysis often provides significant insight and clues regarding primary reasons leading to higher costs, and also identifies anomalies. Trends in the data is identified, and we highlight the individual field 'gaps' or opportunity areas. Finally, we analyze the gaps, leading to specific recommendations on field operating cost reduction opportunities

G. Field Performance Analysis - Reporting

- A cost performance evaluation is presented graphically for each field in (1) Field Cost Profiles (FCP), and (2) Cost Performance Signals (CPS). The FCP graph presents a ranking of the field analysis within the asset group, and its average operating cost as it relates to the overall Asset Group Average and the Leaders (Best in Class) Group. The CPS graph illustrates the variance of each cost and sub-cost category in relation to the peer group average and to the leader group. The analysis quantifies the average and leader or 'best in class' targets as $US/Bbl and also quantifies the potential aggregate annual cost savings for each field **(Fig 2**).

H. Report Writing / Debriefing

- A *report* is prepared including the analysis of total operating costs for each field against the peer fields from each Asset Group. Specific operating cost drivers are shown that provide direction for cost reduction.
- Of most importance is the "Cost Performance Signal" chart for each field that identifies 'Average' and 'Leader' targets for each cost category – we quantify specific cost reduction goals (e.g. cents/Bbl). Each high cost area offers potential savings.
- At the conclusion of Phase 1, Ziff Energy provides a custom debriefing presentation on the findings of this report. This presentation is typically made at the field and/or head office location. This process allows operations and managerial personnel to ask the Ziff Energy team specific questions regarding the competitiveness of their assets, key findings transcribed in the report, and of the analysis methodology used. The Ziff Energy team assists the operator in how to best use the results from the study.

I. Implementation Plan

- Following the debriefing meeting, Ziff Energy and a representative(s) designated by the operator jointly structure an Implementation Plan for the operating cost areas highlighted in the findings of the Phase I report.
- The implementation plan lays out the goals to achieve within a designated time frame and set the specific operational improvement measures to be used to track cost improvement. The objective is to set plans for "actionable" tasks to improve operations and reduce operating costs. Depending upon the findings of Phase I, the changes required for improved expense and production efficiency are handled as part of Phase II.

2. Phase II: Analysis of Existing Operating Practices/Production Work Processes against Leading Operating Practices/Work Processes and Implementation

The Production Efficiency and Best Operating Practices Review identifies and transfers relevant field operating practices and production processes that influence the expense areas identified from the cost diagnostic work and field reviews.
The focus of Phase II is two-fold:

1. Challenge cost areas within the fields where the impact of changing work practices have the largest effect, and
2. Install practices, or work processes that boost field production volumes.

Challenge areas are a combination of the expense items identified by Phase I and ideas from the field operators.

The diagnoses of Phase I pinpoints the cost areas that are most affected by inefficient field practices. The field operating practices to be investigated, as identified in the Phase 1 study, may concentrate in the two or three areas with the greatest potential for operating cost savings.

Our standardized approach to a Best Practices Analysis requires that Ziff Energy will conduct a comprehensive review of existing operating practices and compare these practices with those of similar but Leading, Low Cost North and South American operators.

Operating Practices may include for example:

- Maintenance of Automation Systems
- Optimum field personnel structure for utilizing field automation
- Viewing proven alternatives for automation usage in mature oil production
- Effective use of the well failure frequency and failure repair cost database
- Optimized artificial lift designs (rod pump, PCP pump, submersible pump) for maximum well production and minimum equipment downtime
- Visit with PCP pump manufacturers on system design, troubleshooting failures, and PCP pump repairs

On the basis of this comparison, Ziff Energy makes recommendations to the operator to change specific existing practices to those that have proven to be workable and cost containing for other companies. Per the scope detailed, the Best Operating Practices Report is delivered approximately 6 months after the start of the project.

3. Economic model for correcting upstream operating costs.

The methodology for correcting oil upstream operating costs in Argentina allows a year-to-year comparison with international data. Year-to-year oil cost comparisons initially shows a series of modifications due, on the one hand, to the company's business decision to introduce operational changes, and on the other, to modifications in the relative prices for such years. Such changes, usually considered of utmost importance in well-developed economies, were key to the Argentine economy, which underwent a devaluation reaching a peak with a nominal rate of 280%. At the same time, tradables' prices increased by 113%, while services increased 44%; furthermore, there occurred several shifts in the components of these large aggregates (e.g., some services did not undergo changes).

Accordingly, the methodology "deflates" the most recent cost data by converting its relative prices to values compatible with those before mega devaluation. Once these corrections are made, the comparison of both structures allows to isolate changes brought about by business decisions. Deflating the most recent structure instead of carrying forward the old structure allows a less restrained use of the most recent company-provided costs database.

Usually correcting nominal variables consists of expressing them through a homogeneous purchasing power by removing or adding an "inflationary component" to each observation between the period for the observation and the purchasing power target period. An "inflationary component" is the variation of a deflator selected for the variable under evaluation

Under this process, each cost item is associated to a price deflator reflecting its evolution between the year the data is obtained and 2001 period (pre mega devaluation). Each deflator is selected taking into consideration the nature of the goods or services involved. In the case of services rendered by third parties, information is obtained by separating the contract into individual items such as labor, imports and domestic components. Each contract item is corrected on account of the corresponding deflator.

The process for correcting operating costs is very simple. The cost data expressed in dollars is re-denominated in pesos using the average monthly exchange rate. Afterwards, these values in pesos are deflated by applying ad hoc indexes to express them in 2001 equivalent values.

A relevant example will facilitate the interpretation of results. In 2001, a service composed entirely by labor hired at a cost of US$100 equaled $100. In 2003, an identical service could be hired for $200. Evidently, given the new exchange rate of $3/U.S. dollar, the expense will amount to only US$67, and so will it be entered in the books. Although the cost in U.S. dollars has actually decreased, it is not guaranteed that such decrease will reflect an increase in efficiency due to the effect of devaluation. In fact, it would be interesting to know if such cost has decreased as far as possible, as salaries have increased much less than the dollar. Had salaries increased even 100%, as opposed to the 200% increase of the U.S. dollar, the 2003 equivalent value in 2001 purchasing power for the contract would be $100 (equivalent to 2001-U.S. dollars). This means that, when comparing costs, the exact same service as in the past has been acquired at the same equivalent value. The apparent reduction of costs in dollars for the same contract in 2003 only reflects the fact that labor costs evolved lagging the dollar.

Alternatively, let us assume that the service expense in 2003 had remained at US$100. In such case, the 2003 contract assessed in pesos would be equivalent to $300 which, if deflated to make it comparable to 2001 figures, would be equivalent to $150. This would indicate that, though apparently the cost in dollars is identical to that of 2001, as salaries increased lagging the evolution of the dollar, under the new contract

the company is either buying more working hours or else, salaries have been implicitly increased in a manner that exceeded the evolution of the salary-cost in the oil industry, according to the available index.

Additionally, the methodology also calculates the costs that would correspond to a long-term exchange rate in force during the cost period.

The "nominal exchange rate" between currencies of one country and another taken as reference, is the amount of local currency that must be delivered by the former for each currency unit of latter. The nominal exchange rate adjusted on account of differences between price levels of both countries is the "real exchange rate." If the reference currency is, for instance, the U.S. dollar, the real rate measures the amount of local currency required to buy one dollar at constant purchasing power.

Summarizing, the application of the economic model can make companies aware that:

- Mainly due to price discrepancies adjusted in excess of inflation , the differences in current and corrected cost structure may be interpreted as an early warning for the need to revise per-field costs by noting those divergences. Cost structure break down of each oil field sorted by labor, imports and domestic items is prepared for current and for corrected unit costs
- By calculating the unit costs at the long term exchange rate, the peso mega devaluation can generate a fictitious contraction of costs in U.S. dollars and an increase of competitiveness corresponding to actions entirely external to the production process.

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Figure 1
Benchmarking In Ten Key Steps

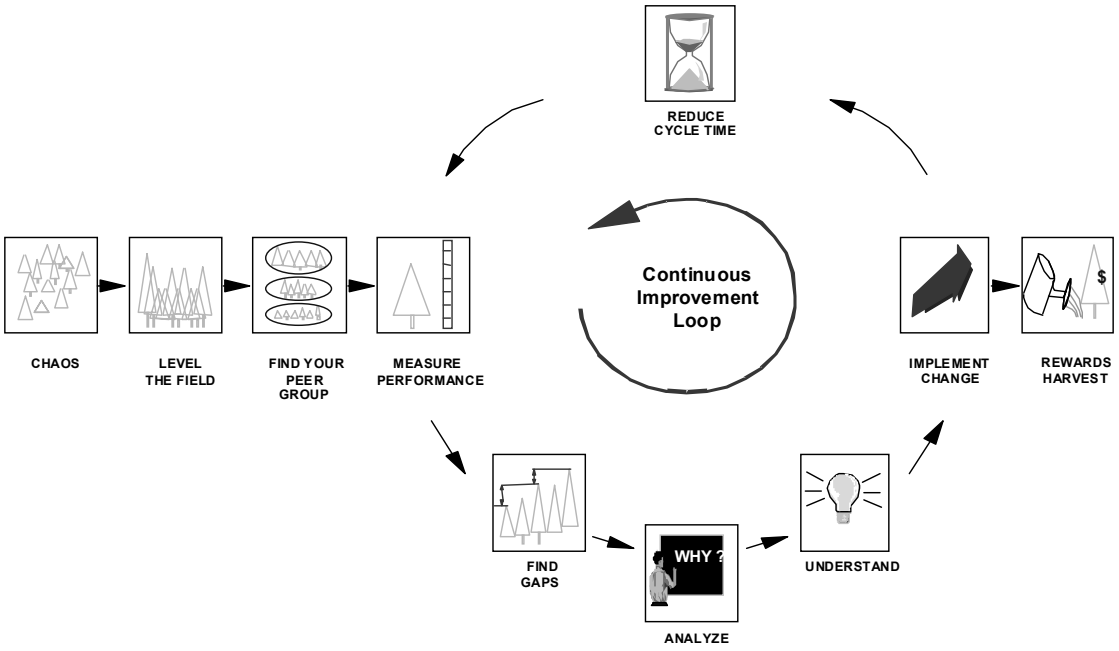

Figure 2
FIELD COST PROFILE