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The Impact of SOx Compliance on Hydrocarbon Accounting

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1 INTRODUCTION

The Sarbanes-Oxley Act of 2002 – US Legislation enacted as a result of the Enron affair – is having a significant impact on the development and operation of Hydrocarbon Accounting Systems. The legislation is intended to improve the transparency with which any public Company registered with the US Securities and Exchange Commission conducts its business. It includes requirements detailing what financial documents companies need to keep and for how long. A direct result of this is the need for full auditability of all data with a financial bearing on the Company.

This paper discusses how compliance with the Sarbanes-Oxley act may affect the operation of Hydrocarbon Accounting processes. Its structure is as follows: in Section 2, information about the SEC, the Sarbanes-Oxley act, and the response of businesses is given. In Section 3, the links between Hydrocarbon Accounting and the corporate balance sheet are explored. Section 4 looks at the impacts of Sarbanes-Oxley on Hydrocarbon Accounting practices and Section 5 looks at those impacts specific to the computer systems used in this area. Conclusions are drawn in Section 6.

2 THE SEC AND SARBANES-OXLEY

The Securities and Exchange Commission (SEC) [1] regulates the trading of securities in the United States of America. Its jurisdiction includes the New York Stock Exchange, where many oil and gas majors and super-majors raise capital. The commission was created in the 1930's to restore investor confidence. The faith of investors in such markets was devastated in the great crash of 1929 and had remained weak during the intervening years.

Under Franklin D. Roosevelt, the US Congress passed both the Securities Act (1933) and the Securities Exchange Act (1934), creating the SEC and enshrining in law the principles that companies offering securities for sale must tell the truth to their investors, and that companies involved in the trading of securities – brokers, for example – must act in the interests of investors. The resulting return of confidence was steady but slow: the market did not recover its 1929 value until the 1950s [2].

Since the creation of the SEC, Congress has, from time-to-time, been stimulated to legislate for increased control over public companies' behaviour. The most recent such increase in control, and the subject of this paper, was a response to a series of high-profile corporate accounting scandals, the first of which centred on Enron Corporation. For six consecutive years to 2001 [3], Fortune Magazine named Enron "America's Most Innovative Company". In late 2001, the full extent of that 'innovation' became clear. By using a number of irregular accounting practices Enron had concealed vast losses from its investors and was forced to file for bankruptcy on the 2nd of December 2001. The fallout from Enron's demise triggered a number of other collapses and resulted in the passing – a mere 8 months later – of the Sarbanes-Oxley Act of 2002.

On signing the act into law, George W. Bush is quoted as describing its contents as "the most far-reaching reforms of American business practices since the time of Franklin Delano Roosevelt". Certainly, it remains subject to a significant degree of controversy [4] and the general impact on businesses traded on United States exchanges is still unfolding.

The eponymous Senator Paul Sarbanes and Representative Michael Oxley were the primary architects of an act which aims, again in the words of President Bush, to: "deter and punish corporate and accounting fraud and corruption, ensure justice for wrongdoers, and protect the interests of workers and shareholders".

Running to 11 titles and more than sixty sections, the Sarbanes-Oxley Act [5] recommends a wide range of changes to the way in which the SEC regulates corporations. It also creates the Public Companies Accounting Oversight Board (PCAOB) to develop and police new accounting policies deriving from the act itself. There are three sections of the act which are of interest in the context of this paper: Section 302 – Corporate Responsibility for Financial Reports; Section 404 – Management Assessment of Internal Controls; and Section 409 – Real Time Issuer Disclosures.

Section 302 of the act makes the Chief Executive Officer (CEO) and the Chief Financial Officer (CFO) of a traded company personally responsible for the fair presentation of financial information to investors. It makes those parties liable for unacceptable errors in such information and is the origin of the received wisdom that usually accompanies everyday discussions of the act: "you could go to jail if you get this wrong". Under the act, not only are the CEO and CFO responsible for the presentation of financial information, they are also mandated to embed and assess an internal accounting control structure; they must personally state that such a structure exists and has recently been validated with each set of accounts. In the event of a financial mis-statement, ignorance will be no defence.

Section 404 is perhaps the most controversial in the act. It is also one of the most interesting in terms of its impact on Hydrocarbon Accounting. This section, spanning just four short paragraphs of text, reinforces section 302 by mandating that annual financial statements must include an Internal Control Report. This report must "state the responsibility of management for establishing and maintaining an adequate internal control structure" and must contain an assessment by the issuing company (backed up by a statement from that company's auditor) of the effectiveness of that control structure. One concept that arises often in the interpretation of section 404 of the Sarbanes-Oxley act is that of segregation of duties. A company should be able to assure itself and its investors that no single individual can control all the stages of a business process. This idea certainly impacts hydrocarbon accounting practices and will be returned to in later sections.

Section 409 prescribes that public companies must report on a "rapid and current basis" any change in their financial condition or operation. Events that may have a material impact on a company's value must therefore be reported quickly and accurately to the investment community.

Corporations whose securities are traded in the United States of America are currently engaged in the interpretation of and the compliance with the Sarbanes-Oxley Act. The range of interpretations and responses is broad. Some companies feel that they already have quite sufficient controls in place and that little change is required in order to comply. Others have concluded that existing controls are insufficient – either in their actuality, or in the way evidence of their effectiveness is collected – and have initiated wide-ranging reforms to business processes and systems. The work of the latter group of companies has not been made easier by the lack of clarity around the definition of 'acceptable' in the context of section 404 of the act.

Whether or not one accepts the full colour of President Bush's statement of them, the basic aims of the act are sound. Businesses themselves need reliable information about their financial position in order to make management decisions. To generate such information in a controlled fashion, and to regularly assure oneself of the effectiveness of those controls, would only seem like good business practice. Further, it seems quite reasonable that investors should have access to information about controls in addition to the financial data in annual statements. A knowledge of the circumstances in which any measurement is taken – be it one of flowing hydrocarbon or financial performance – is essential in assessing the relevance of the result.

The Sarbanes-Oxley Act of 2002 has quite a startling profile in the minds of oil-and-gas professionals and managers. This profile – undoubtedly partly justified – has proven to be a strong motivator and a facilitator of change. If a project or initiative can restate its objectives in terms of facilitating SOx compliance, its chances of being supported are significantly improved. At the grass-roots level also, change is facilitated by the profile of this legislation.

In the words of one professional in this area, SOx relevancy can change any particular project "from a 'Sell' to a 'Tell'".

Even such 'Tell' discussions are not completely without problems however. A not uncommon response to SOx related change is the question: "I do not work for an American company, so why does this law affect me?" Of course, the answer to this is straightforward: companies, especially those whose endeavours have high, front-loaded costs, depend upon readily available capital to survive. Trading securities on US exchanges is an effective way to access that capital. In order to trade there, one must comply with SEC regulations.

The advent of SOx legislation should be regarded as an opportunity. This is true not simply in that all such industry-wide challenges represent opportunities to demonstrate competitive advantage, but also because SOx is a powerful lever to force positive change through an organisation.

3 HYDROCARBON ACCOUNTING

It is not always clear what is meant by the term 'Hydrocarbon Accounting'. Definitions tend to vary from operator-to-operator and from individual-to-individual within those operators. For the purposes of this discussion, Hydrocarbon Accounting is the term used to describe how ownership of gas and oil is determined and tracked from initial extraction to sale. It encompasses several business processes that are usually defined or controlled by sales contracts or operating agreements. The grouping and governance of these processes differs from organisation to organisation but, at its simplest, Hydrocarbon Accounting can be broken down into data acquisition and validation, allocation calculations and results distribution.

Data acquisition usually involves the collection of measured information about the quantity and quality of oil and gas being produced. This is generally achieved via a combination of electronic interfaces and manual user entry. Allocation calculations are those operations that must be performed to determine properly and equitably the ownership of hydrocarbon products. The execution of these calculations is generally a key part of an operator's obligation to their partners, system users and to the relevant governmental bodies. The resulting information is then distributed to those interested parties via the usual spectrum of paper reports, electronic files and system interfaces.

The Sarbanes-Oxley Act concerns itself with the accurate and controlled disclosure of a company's financial position. What, then, are the links between Hydrocarbon Accounting and an operating company's bottom line?

Measuring the flow of hydrocarbons is a complex and potentially expensive undertaking. For this reason, the distribution of measuring equipment across a typical production network is not always as complete as might be desired. Hydrocarbon accountants are frequently involved in the processes of attempting to derive the most accurate available flow information from a selection of more accurate and less accurate raw measurements.

Well allocation is a typical example of this kind of calculation. In a typical case, it is on the basis of a selection of well tests, some measured separator volumes and a single fiscal-standard export volume, that daily well production volumes are calculated. Systematic errors in the allocation process could result in significant tax discrepancies. Allocated well volumes are also crucial to the tuning and monitoring of reservoir models. Those models are part of the basis for a company's statement of reserves. Such statements are a critically important component of an operator's financial position. Errors can be embarrassing and costly to resolve. An often over-looked fact is that intermediate data calculated during well allocation calculations are used as the basis for tariff invoices. Fiscal standard metering at tariff points is unusual, so allocated results are generally used. Errors in allocation will lead to errors in sums invoiced.

Attribution calculations – the generic term covering the division of a single sold quantity of gas between a number of selling parties – are another example of the link between Hydrocarbon

Accounting and the balance sheet. These calculations are normally done on the basis of measured gas quantities, nominations from shippers or their customers, and current borrowing and lending balances between the shippers. The results of these calculations generally feed directly into financial accounting systems for the purposes of invoicing for gas sales. Errors here, especially systematic errors, will have a direct impact on an operator's profitability, not to mention its reputation.

Stock accounting, more common in oil production than gas, is also frequently part of the hydrocarbon accounting function. Here, the correct calculation of stock positions, the carrying out of value adjustment calculations, and the differentiation between physical stock and entitlement to lift all determine an operator's ability to correctly assess its tax liabilities and its financial position.

The capacity to forecast short and medium term production and environmental emissions is also relevant to a company's profitability. This is particularly true for companies that may have traded away part of their emissions consent. If actual emissions are higher that those forecast, it may be expensive to repurchase entitlement to discharge. Generally, one of the major inputs to the calculation of such forecasts is forecast wellhead production volumes. These are usually converted into forecast product availability using recovery factors. In turn, these are calculated on the basis of hydrocarbon accounting data. This is another route by which errors in Hydrocarbon Accounting could impact the accurate assessment of a company's financial position.

Hydrocarbon Accounting monitors the movement of petroleum products. These are valuable assets, so it is not surprising to find many direct links between this function and the corporate accounts. This is an area that has hitherto perhaps been poorly understood, often overshadowed on one side by measurement activities and on the other by financial accounting. As the spotlight of Sarbanes-Oxley throws all of these functions into sharp relief, that situation is unlikely to persist.

4 THE IMPACT OF SARBANES-OXLEY ON HYDROCARBON ACCOUNTING

In preceding sections, we have seen that the Sarbanes-Oxley Act of 2002 aims to improve the accuracy of corporate financial reporting and we have seen that Hydrocarbon Accounting contributes to financial reporting in a number of ways. In this section, the impacts on business processes and day-to-day activities are examined and in the following section the specific impacts on hydrocarbon accounting computer systems are covered.

As mentioned above, 'segregation of duties' is an important theme. Under the current interpretation of the act, no single individual should have control over all the stages of a business process. A properly implemented segregation of duties should make errors less likely to propagate through the business – since work is reviewed and controlled at a number of individual stages – and should make fraud significantly more difficult to conceal – as more than one party would have to collude.

The most common realisation of this theme in Hydrocarbon Accounting arises where data must be entered and verified separately. Where, before Sarbanes-Oxley, this would often have been done by the same individual it is now regarded as necessary to have two people involved in this task: one of whom carries out the basic data entry activity and another who verifies the work of the first.

This example leads us to another consequence of the act: that of improved data ownership and responsibility. As the flow of information through an organisation is subjected to scrutiny in the interests of confirming SOx compliance, the importance of getting the inputs right is reinforced. For example, it often comes as a surprise to the individual responsible for entering well on-stream hours that there could be a direct link from those figures, through allocation to the company's tax liability. Random errors introduced here may be likely to have small overall effects, but a systematic error – consistently understating the producing hours of a particular well, for example – could have a significant effect over time. A better awareness

of the uses of data items allows an organisation to prioritise more effectively, i.e. to focus on those items that are of the highest importance. What this should precipitate is a reduction in the time spent by Hydrocarbon Accountants on checking and querying incoming data.

Senior management is obliged under the terms of the Sarbanes-Oxley act to satisfy itself that the relevant control structures are in place and are functioning effectively. This will lead to an increase in the depth and frequency of audits performed on Hydrocarbon Accounting departments. A larger part of the Hydrocarbon Accountant's duties will involve satisfying internal and external auditors that controls are working.

In the design of hydrocarbon accounting systems, organisations and business processes, the focus has quite understandably tended to be on *doing the work.* What is foreseen, as Sarbanes-Oxley beds in fully, is that *demonstrating the work* will become as important as actually doing it. A drive for transparency will change the way this work is carried out and the functionality of the systems used to do it. This is certainly relevant in the light of section 404 of the act; it may also prove to have relevance under section 409. Transparent internal processes and systems are a sound basis for rapid and current reporting of events to investors.

The challenge will be to support this change in the most efficient way possible; to identify the means of recording the evidence and providing the requisite transparency without reducing the activity to grinding inefficiency.

To fully satisfy the requirements of Sarbanes-Oxley, Hydrocarbon Accounting will have to do more than demonstrate that work is being done correctly. It will also be necessary to demonstrate that the correct work is being done. For too long, it has been almost an accepted reality that black-box calculation systems, or poorly understood spreadsheets carry out some of the most critical calculations. This is not compatible with the aims of Sarbanes-Oxley. Controls will be necessary to ensure that the calculations performed are in agreement with an operator's contractual and regulatory commitments. Often sales contracts or operator agreements require a degree of interpretation to be practicable day-to-day. Without recording the detail of this interpretation, there is no practical reference against which hydrocarbon accounting activities can be assessed for correctness. If that assessment is impossible, then controls cannot be fully effective.

So far, consideration has been given to the means by which an operator can assess the effectiveness of its own controls. In general, a significant component of an operator's overall value to investors is composed of its investments in non-operated assets. It seems unlikely that an operator can claim to have an "adequate internal control structure" without that structure including controls over information coming in from third parties. An increasing focus on control will raise the volume of 'repeat accounting' carried out in order to verify the allocations or invoices arriving from partner companies.

Hydrocarbon Accounting is perhaps in the process of maturing. Ultimately, it will have to graduate from its current position as the sometimes poorly understood middle ground between flow measurement and financial accounting. Perhaps it would be premature to call for a system of chartered hydrocarbon accountants or to try to apply the principles of double-entry bookkeeping to allocation but, ultimately, changes like these may prevail and the influence of the Sarbanes-Oxley act of 2002 will only serve to accelerate them.

5 HYDROCARBON ACCOUNTING COMPUTER SYSTEMS

Almost all of the activities that comprise Hydrocarbon Accounting are supported by computer systems. Forming a gamut of ad hoc spreadsheets, product-based implementations and bespoke developments, these systems tend to be neither as straightforward nor as standardised as might be expected. In this section, the current and future impacts of the Sarbanes-Oxley Act of 2002 are considered.

As context to that consideration, it is worth noting that computer systems are neither compliant nor non-compliant with the particulars of the act. Systems may help or hinder an organisation in the implementation of an adequate control framework, but they will not determine that organisation's compliance with the legislation. With the right surrounding controls, almost any computer system could support a company's compliance and, by contrast, *without* appropriate controls even the best systems cannot prevent non-compliances. There is no software magic bullet.

Conversely, there is no universal scapegoat. A surprising proportion of the problems in Hydrocarbon Accounting are perceived to stem from the widespread use of spreadsheets in this area. This is a summary analysis; and a potentially dangerous one. Certainly, the problems associated with spreadsheet use can be significant, but the spreadsheet is a fantastically powerful calculation and information-processing tool. It should not be maligned lightly. The challenge facing system designers and integrators is to capitalise on the flexibility and power of this ubiquitous technology without falling foul of the lack of control and absence of rigorous testing that are *sometimes* concomitant with its use.

In the same way as the Sarbanes-Oxley act is driving the spread of good practice in business processes, the same may be said of software implementation activities. Examples of this can be seen in software testing procedures and system documentation. Without testing a system thoroughly and recording that activity, how can the system's use be deemed properly controlled? If software documentation is not clear and up-to-date, then the link between contractual or regulatory obligation and system functionality cannot be maintained in a controlled fashion.

In the previous section, the increasing need for transparency and rising audit obligations were discussed. These changes will affect the design of computer systems in this area and will drive a fuller realisation of the 'audit trail' functionality currently included in most systems. Generally today's system will employ four of Kipling's "six honest serving men" and capture the 'when', the 'what', the 'who' and the 'why' of user operations. The recording of such information satisfies only part of the underlying requirement however. To efficiently support audits, it must also be possible to reconstruct the narrative of the accounts for a particular year, month or day. It must be possible to view the accounts as they stood, in their entirety, at a certain time in the past and understand subsequent changes. The world that can tolerate a black-box hydrocarbon accounting system is gone. One cannot have control without transparency.

The segregation of duties concept arising from interpretations of section 404 of the Sarbanes-Oxley act means that departments will have to control user access to system functionality on a much stricter basis. It also heralds the demise of the 'functional account'. It will no longer be acceptable for a number of users – each member of a shift pattern, for example – to authenticate themselves using the same system account. System audit trail functionality is ineffective if the system cannot distinguish between different users.

Pursuing this idea further, in order to have full control over user access to systems – necessary to ensure adequate segregation of duty – procedures for password management will often need to be reinvigorated. How these needs can be properly reconciled with the frequent requirement for system administrators to have full, end-to-end access to systems remains to be seen.

In the midst of what will doubtless be a general trend towards increasing sophistication in computer systems, there may be a curious outlier: that of the so-called 'check system'. As described in previous sections, some interpretations of the Sarbanes-Oxley act mandate that a company must be reasonably satisfied that calculations carried out on its behalf by partners are correct. The resulting increase in 'repeat accounting' is likely to lead to a blossoming of demand for straightforward allocation systems. Such systems will have no need for advanced audit functionality or web interfaces. It must therefore be concluded that any report of the death of the spreadsheet in Hydrocarbon Accounting is almost certainly exaggerated.

6 CONCLUSIONS

In common with all such industry-wide changes, the signing into law of the Sarbanes-Oxley act of 2002 represents both a threat and an opportunity. The full ramifications of this change remain unclear: four years after the act, industry is still in the process of tuning its response. What is already apparent is that SOx has precipitated two specific opportunities in the area of Hydrocarbon Accounting: the first is the chance to raise the profile and understanding of this important link in the value chain, and the second is a driver to further embed good practice in our business. Managed correctly, the act should not drive any unnecessary change in Hydrocarbon Accounting.

An important component of managing the impact of Sarbanes-Oxley will be spreading an understanding of the aims of the act. Without this, the proliferation of rules and the accompanying discussions will destroy rather than create value. In any case, rules by themselves cannot guarantee good behaviour.

One final consideration is that significant debate persists as to whether SOx was an appropriate or an entirely effective piece of legislation. It is not impossible that some of its more controversial components will be subject to review by Congress in the foreseeable future.

7 REFERENCES

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