GCA Gaffney, Cline & Associates Inc.
Technical and Management Advisers to the Petroleum Industry Internationally Since 1962

Four Oaks Place
1360 Post Oak Boulevard, Suite 2500
Houston, Texas 77056

Telephone: (713) 850-9955
Facsimile: (713) 850-9966
Email: gcah@gaffney-cline.com

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MEMORANDUM

RE: Expected Returns and Approval Economics

INTRODUCTION

Some of the scenarios being evaluated as part of the Alaska gas pipeline project will require production not only from existing resources, such as Prudhoe Bay Unit (PBU), but from "yet to find" (YTF) resources as well. This need for YTF resources, depending on the final commercial arrangement, will place a degree of risk on producers, shippers and/or pipeline owners.

To evaluate that risk requires an evaluation of the potential for finding hydrocarbon deposits of considerable size, the costs to find and develop those resources and the range of likely economic returns each participant in the value chain can achieve. The results of this evaluation would then be compared against the criteria each company has established for their capital spending budgets. Other experts in this AGIA process have reviewed, evaluated and commented on these three key risk areas. Gaffney, Cline & Associates (GCA) has been asked to assess how the projected economic returns on the YTF would compare to other world scale projects.

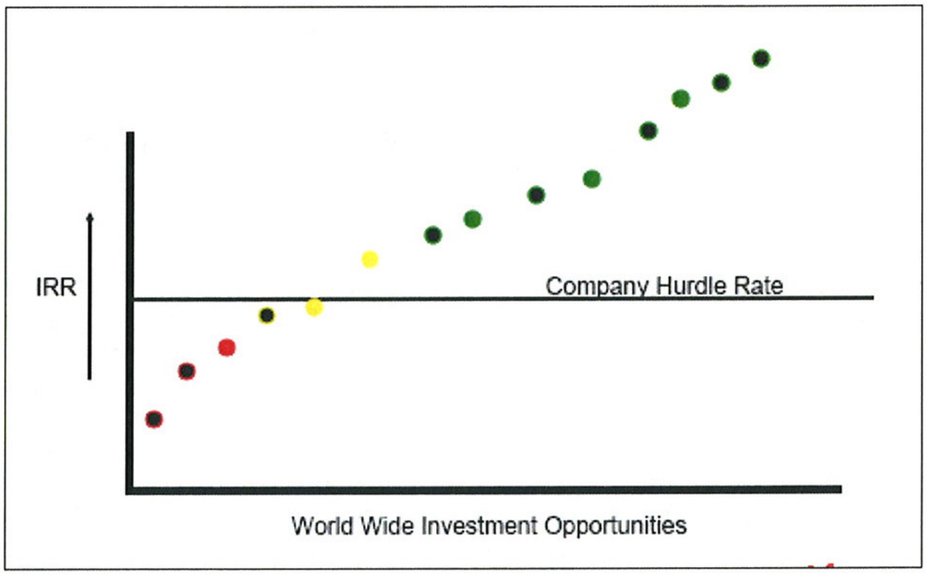
The answer to this is provided in two parts: (1) by an analysis of what companies say about their investment decision-making processes, as also verified by their investment in actual projects; and (2) by considering market dynamics. In reality, these are all the same basic considerations, just articulated in each company's separate way, and can be summarized as "risk-reward, in the context of the company's human and financial capital, and opportunity portfolio".

Investment Criteria

During the ACES special session in 2007 fiscal regimes from around the world were reviewed and compared to the terms proposed under ACES. Given the extremely high government share in many countries, and the fact that many of the Alaska producers were investing substantial sums in those countries, members of the legislature quite reasonably inquired as to the parameters the oil companies used to make their investment decisions.

While the oil companies did not offer up any definitive criteria, they did stress several points. Conoco[1] mentioned that projects from around the world would be reviewed, ranked, and compared with an Internal Rate of Return (IRR) cut-off (or hurdle) rate. Those projects "above the line" would receive funding. Figure 1 below is the conceptual example presented by Conoco.

Figure 1



Chevron[2] presented a slightly more comprehensive view. They stated that the project approval process involved multiple factors, factors (typically strategic or geological) which could overcome the high government take in many locales around the world in which Chevron was operating. These factors include the Rock (What is the resource potential?), Costs (What are the finding and development costs?), Time (How long until revenue can be generated?), Risk (What is the probability of success?) and Fiscal Regime (How much does the producer get to keep?). Chevron went on to say that models are then developed, opportunities ranked and investment decisions made on an after-tax Net Present Value (NPV) or Expected Monetary Value (EMV) basis.

Pioneer[3] commented that energy companies invest where they see the best risk/reward ratio. Projects are analyzed over a range of price and cost assumptions to asses that ratio.

[1] http://www.revenue.state.ak.us/ACESDocuments/ConocoPhillips/Mitchell%20Oct%2022%20Testimony%20Final.pdf
[2] http://www.revenue.state.ak.us/ACESDocuments/Chevron/Chevron%20-%20ACES%20-%20Testimony%2010-23-07P.pdf
[3] http://www.revenue.state.ak.us/ACESDocuments/Pioneer/ACES%20final%20Oct23%20(S)RES.pdf

Real World Projects

The ranking or funding criteria presented by the oil companies was similar but not identical. In an attempt to better understand their decision making processes several large, complex, world-scale projects with significant capital exposure were reviewed. The background data for each of these 10 projects were obtained by the Alaska Department of Revenue in 2007 from 3 independent consultants.

GCA analyzed the various cash flow models of the following projects:

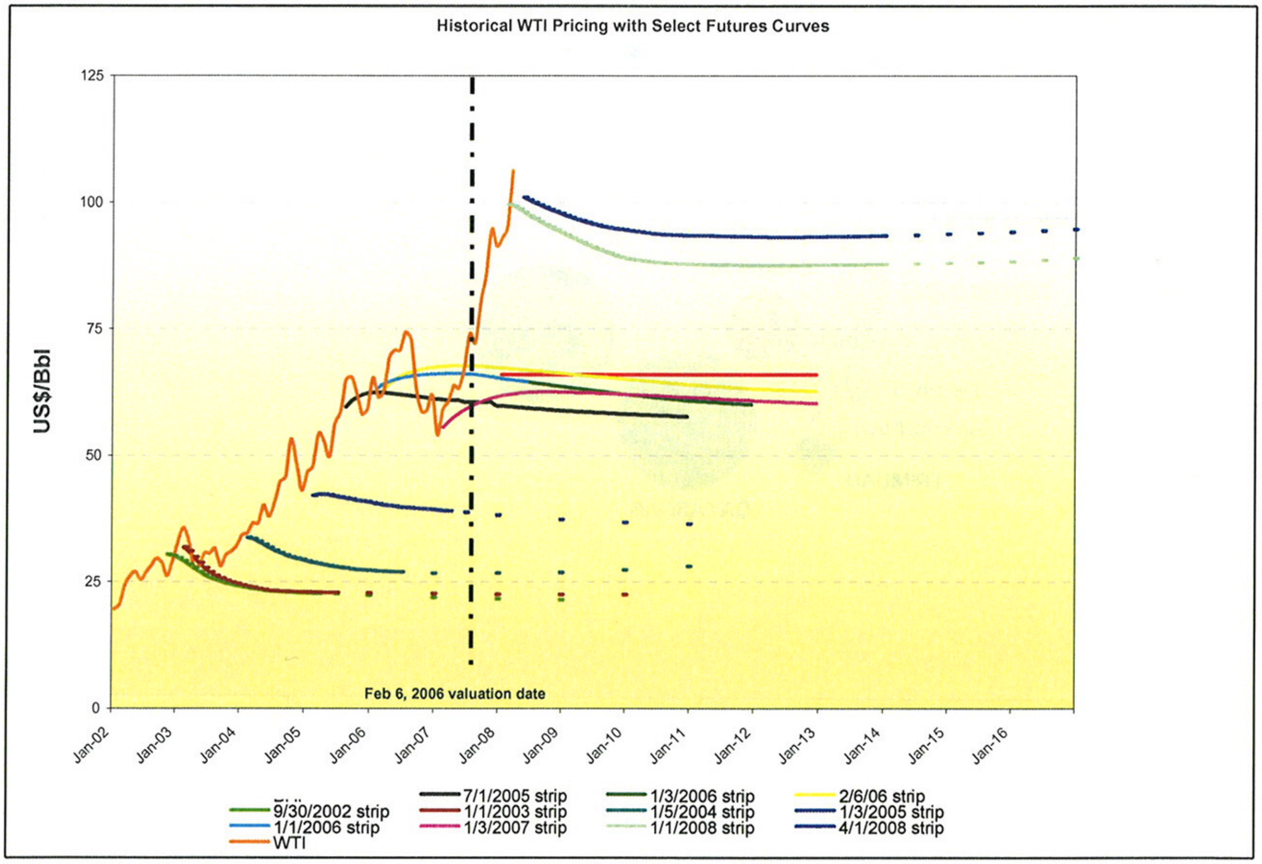
- **Bayu Undan** – a gas-cycling condensate then LNG project. This project includes upstream development located in the offshore joint Australia/East Timor treaty area, the transit pipeline and the liquefaction plant in Darwin, Australia;
- **Camisea** – a large, predominately gas, field located in the Andes and the pipeline to markets on the Peruvian coast;
- **IDKU** – Egypt LNG plant and the associated upstream infrastructure;
- **Ormenlange** – ultra large offshore Norwegian gas field;
- **Pearl** – Middle East based GTL plant;
- **QatarGas** – One part of the multiple consortia that comprise Qatar's growing LNG business;
- **Snohvit** – Norwegian based upstream/midstream integrated LNG project;
- **Tangguh** – Indonesia based upstream/midstream integrated LNG project;
- **Trinidad** – Trinidad based upstream/midstream integrated LNG project; and
- **West Libya** – onshore and offshore upstream development and connecting pipeline across the Mediterranean to Italy.

Each integrated project represents substantial investment by the owners with total capital commitment ranging from just under US$3 billion to as much as US$10 billion. Gas production commitments range from approximately 3 to 20 TCF. The data for each project are summarized in the following table.

	TCF	CAPEX ($MM)
BAYUUNDAN	4	$3,350
CAMISEA	7	$5,800
IDKU	7	$4,000
ORMENLANGE	12	$10,700
PEARL	13	$5,000
QATARGAS	20+	$6,200
SNOHVIT	6	$5,400
TANGGUH	9	$5,000
TRINIDAD	5	$2,703
WESTLIBYA	6	$7,000

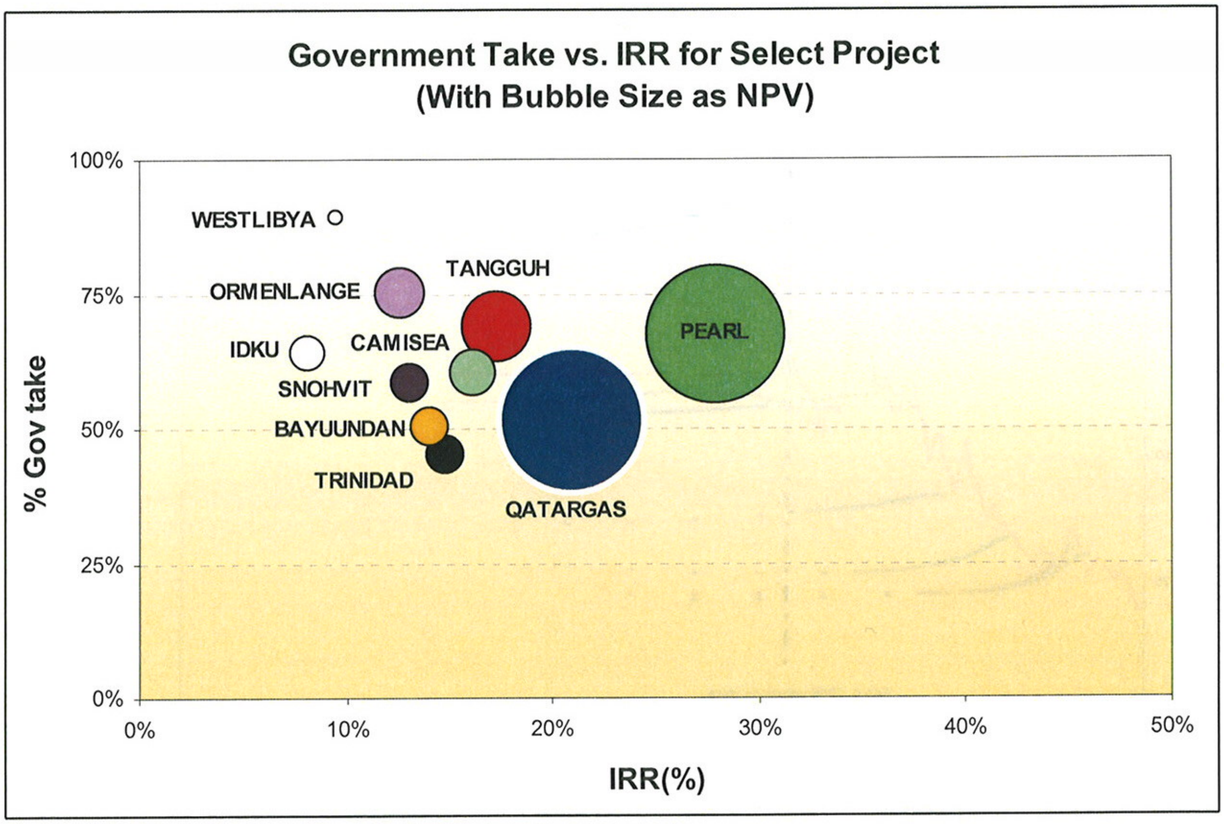
The data supplied included capital expenditure, operating expenditure and production profiles, from which GCA has attempted to recreate the economics ***that existed at the time the project was sanctioned*** by the joint venture companies (roughly 4 years prior to first production). Many of these projects were sanctioned prior to the recent run up in prices, and in order to adjust for that GCA assumed prices reflective of the oil and gas prices futures market curves available at the time of project sanction. Figure 2 shows how the forward curves (in this case for WTI) have changed over the last 6 years. Gas prices outside of North America better track oil prices than the Henry Hub marker, except where cargoes are being sold into the USA (which is a minority of the gas being considered in the above projects).

Figure 2



As the oil companies noted during the ACES debate, not only is the project IRR important but, particularly in the case of the larger companies, so is materiality (as approximated by NPV). In Figure 3 the results of the analysis of the 10 major projects are plotted, showing the estimated oil company IRR (x-axis), percentage government take (y-axis) and relative NPV (size of circle).

Figure 3



The majority of IRRs lie between 10% and 20%. A general industry rule of thumb is that a 15 to 18% return for large projects would be acceptable. It should be noted that the fiscal systems in which these projects reside all work a little bit differently so these do not all scale the same when today's $100+ oil price is applied.

A key point to note is that all the government takes are fairly high – most all in excess of the US Lower 48 takes. But oil companies still committed to many billions of dollars in investment mainly due to materiality – i.e. high NPVs – as such materiality simply cannot be found in sufficient quantity in the US Lower 48 (except maybe deep water Gulf of Mexico).

Market Dynamics

The economic analyses prepared by Black & Veatch illustrate the robust returns achievable from the YTF project component.

Modeling the economics of any undiscovered resource (i.e. Alaska YTF) is always difficult. This applies even when specific exploration prospects have been identified for drilling, let alone when having to rely on high level "play concept" assumptions of the total volume likely to be recoverable from an area.

In this case, GCA understand from the Black & Veatch report that analysis from the National Energy Technology Laboratory has been used as the basis of reasonable expectations of YTF resources – the simplified assumption being "yes, there is recoverable hydrocarbon resource potential, in large enough scale, both to attract the industry and to make discoveries economic" (albeit that without the latter the former would not occur).

Care needs to be taken to avoid confusing returns to be expected from:

1. The full cycle of investments and projects from a basin or play (which is what the YTF represents);

2. The full cycle of an individual prospect (in other words, exploration and development costs of just one field);

3. The development phase only of a field, the discovery already having been made.

The returns identified in the 10 world-scale projects shown in Figure 3 are equivalent to those in the third point above, after the discovery has been made. In other words, they ignore the costs necessary to make that particular discovery, and the cost of dry holes and other exploratory activity that resulted in no discoveries. Yet, all these other costs have to be carried – which will occur in part by companies that never make any money, and by others for whom it is part of their portfolio costs.

In order to bring in industry in the first place, particularly to a new play, there needs to be an offer of returns that can cover full-cycle costs including dry holes on unsuccessful wells (the first of the three sets of returns discussed above); offering sufficient returns on an already discovered resource is not enough.

To this end GCA considers that a full-cycle expectation of 15% - 20% rate of return on a basin or play is within industry expectations. The Black & Veatch model illustrates that returns of above this level are readily achievable for the YTF, which is what is necessary to incentivize industry to explore, find and bring forward the volumes for development.

SUMMARY

In summary, while exercises of this nature require a starting point based on such data as are available, results should also be benchmarked against what markets in general will dictate. At the bottom end they will suppress activity if the risk appears to outweigh the reward / materiality, and at the top end they will strip off any appearance of systematically high returns or excess rent.