Exhibit 97
EP Presentation to Financial Analysts

8 April, New York – 9 April, Rijswijk

EXHIBIT

SMJ00014615
J. van der Plas

EP Presentation to Financial Analysts

8 April, New York – 9 April, Rijswijk

CONFIDENTIAL
planned to drill a deepwater well with Houston-based partner Ocean Energy <OELN> this year.

((Andrew Mitchell, London newsroom, +44 171 542 5024, fax +44 171 542 4453)

Friday, 9 April 1999 15:45:37 ENDS [nL09256109]

Any views expressed in this message are those of the individual sender, except where the sender specifically states them to be the views of Reuters Ltd.
Shell E&P Technology

- strengths - ready money, new opportunities, long-term value

- Tim Warren, presentation to financial analysts,
April 8-9, 1999
Shell E&P technology strengths – ready money, new opportunities, long-term value

Tim Warren, presentation to financial analysts,
April 8-9, 1999

SIEP 99-5233

Cautionary statement
This document contains forward-looking statements that are subject to risk factors associated with the oil and gas businesses. It is believed that the expectations reflected in these statements are reasonable, but they may be affected by a variety of variables which could cause actual results or trends to differ materially, including, but not limited to: price fluctuations, actual demand, currency fluctuations, drilling and production results, reserve estimates, loss of market, industry competition, environmental risks, physical risks, legislative, fiscal and regulatory developments, economic and financial market conditions in various countries and regions, political risks, project delay or advancement, approvals and cost estimates. Confidental

SMJ00014619
Tim Warren -

Director, Global EP Technology & Technical Services

Born in India and educated in the United Kingdom, Tim Warren graduated in applied mathematics from the University of St. Andrews in Scotland. He joined Shell International in 1970 and worked in Brunei, Malaysia and Oman. In 1985 he returned to The Netherlands to hold a series of management positions in Shell International.

In 1992 he went to Nigeria as general manager of Shell Petroleum Development Company of Nigeria's Western division. Tim Warren has been director of Research & Technical Services for Shell International Exploration and Production since 1995.

CONFIDENTIAL

SMJ00014620
Shell E&P technology strengths – ready money, new opportunities, long-term value

Tim Warren, presentation to financial analysts, April 8-9, 1999

Shell E&P has always emphasised technological development. However, I recognise that there is a perception that we have been more excited by long-term technological possibilities than short-term returns. This has changed. We have transformed our structures, processes and attitudes. Our technology efforts are delivering ready money, new business opportunities and long-term value for our shareholders and I am pleased to outline to you how we are doing this.*

* Examples of the estimated impact of technology in different ventures are for the ventures as a whole, not just Shell share. Value figures refer to net present value, discounted at 7%.

Hi-fi seismic acquisition and processing

seeing to cut development costs

Shell companies use 3D seismic data to cut the cost of developing fields. Shell research has focused on developing new, proprietary techniques for (re)processing seismic data — much cheaper than acquiring new data — to improve interpretation and modelling.

PSDM and PROMISE are two advances which have delivered significant returns. PSDM (pre-stack depth migration) improves the resolution and accuracy of seismic images. PROMISE extracts vital reservoir properties — such as porosity and thickness.

PSDM (or the Shell proprietary software PSI) is used to optimise data quality close to large fault structures or salt domes — ensuring wells do not miss their targets and revealing new reservoirs. In the Netherlands, PSDM prevented two wells from being drilled into the wrong reservoir block in the Grijpskerk field, saving $12 million. In the Gulf of Mexico, PSI has helped to identify several hitherto 'unseen' reservoirs.

Similar techniques are now being used to open new opportunities in the North Sea. The Fram prospect — on the flank of a salt dome — is an example with an expected hydrocarbon volume of some 60 million barrels of oil equivalent. Poor results from standard seismic processing made it too risky to drill. Reprocessing using PSI — followed by integrated reservoir modelling, including PROMISE — revealed its potential. Drilling is planned for 1999.

Reservoir quality properties such as porosity and thickness — the main determinants of hydrocarbon distribution — vary considerably within reservoirs. PROMISE shows the best location for production wells. In the Gulf of Mexico, PROMISE will help to save at least one additional well in the Rum-Powell field, saving $20 million. Similar savings in other Gulf of Mexico fields amount to at least $130 million.
Technology dependence
I don't think there can be any doubt that this industry's future depends on developing its technology:
- It plays a vital role in cutting costs - which I believe will become even more important as it becomes harder to squeeze further operational efficiencies;
- It is essential for replacing reserves - increasingly difficult as resources are depleted;
- It develops our business - extending our reach, revealing new exploration plays, offering new recovery possibilities, commercialising more gas; and
- It enables us to meet the increasingly stringent environmental standards society requires.

But there's a debate about how to access technology. Should we rely on others - service companies, academia, other industries - or develop it ourselves?

In-house imperative
In Shell, we are convinced it would be very dangerous to rely wholly on others. Here are some reasons.

Service companies don't always share our need to introduce new advances immediately. If they have a profitable technology their interest is to delay bringing forward a replacement until they have milked maximum value from the existing product. Moreover exploiting advances from other sources - universities or other industries - often depends on our own technological capabilities.

Our worldwide operational experience enables us to develop the technologies which meet our business needs. We don't just want static technology. Technology leadership depends on maintaining a learning-curve advantage. Unique technology differentiates us from our competitors - including, of course, major service companies.

Finally, a technology base is essential for monitoring the quality of the technology services we obtain from others. For we don't, of course, do everything ourselves. On the contrary, we only commit limited in-house

Vertical cross sections through a field in the southern North Sea demonstrate how PSDM (pre-stack depth migration) helps to 'focus' the image on the right so that costly wells can be drilled accurately.

Extrapolating reservoir information between wells doesn't reveal variations in reservoir quality. Shell PROMISE identifies the best areas - in blue - enabling more productive wells to be drilled.
resources to those technologies which give us both high and unique added value. Otherwise we rely on the market. And we recognise the need to manage, our technology portfolio, just as we do our other assets.

A commercial return

One aspect of this is our drive to commercialise advances. In the past we often licensed technologies as a means of getting them deployed. Now we want a return as well. We do this through joint-ventures – offering us a financial return, the rapid deployment we need, and close involvement in the learning curve.

We have formed Shell Technology Ventures to pursue these opportunities. Recent deals include those for expandable tubulars – from which we look for an early return – and for our revolutionary Twister gas separation technology. I will say more about these valuable advances.

Figure 1

Quickers and better application

I have been speaking about technology development. But there is another vital source of competitive advantage – being able to apply advances more quickly and better than others. The race is increasingly close.

Integrated subsurface modelling

Getting it together to grow reserves and increase production

Shell proprietary integrated modelling combines static reservoir models – showing detailed field geology – with dynamic models simulating the flow of oil, gas and water in the reservoir. Integration allows a range of different production scenarios to be modelled quickly and effectively. Shell companies are leaders in subsurface modelling.

Oman’s hydrocarbon resource development guidelines require stable plateau production to be maintained for ten years and reserves to be depleted by no more than 5.5% a year. Adding to reserves means production can be accelerated, generating immediate cash flow. Wider application of the new modelling suite could add twice as much to the company’s reserves over the next five years.

Integrated modelling enabled Petroleum Development Oman to add 450 million barrels to reserves in the Nasir, West Halib, and Wafra fields over the past five years. The three fields are in carbonatite rocks for which recovery factors are less well understood than in clastic fields.

The additional reserves – and the accelerated production made possible – raised the value of the fields by $600 million. Three unnecessary wells were also avoided in the Wafra field, saving $4 million in capital expenditure.

Shell Nigeria operates more than 100 fields – many have been in production for a quarter of a century. Shell integrated studies of five fields last year added 390 million barrels of oil – with a development cost of some $2 per barrel.

CONFIDENTIAL

SMJ00014623
In a shrinking, accelerating world, technology advantage can be fleeting. Retaining it depends on climbing the learning curve as quickly as possible - with your competitors snipping at your heels.

Shell has, for example, more experience of developing deep-water fields than any other international company. But our competitive advantage depends on our ability to learn from this experience and apply the knowledge profitably. Shell Oil recently brought its fourth deep water tension-leg platform, Ursa, into production in the Gulf of Mexico. The development cost per daily barrel of production was just 40% of that of Auger, the first tension-leg platform. The Brutus development announced today will be even cheaper (see figure 1). The capacity to realise the value of experience is clearly even more important at low oil prices.

Success in applying technology depends on people - their calibre, experience, training and attitudes - and on organisation. Our efforts were hindered by a fragmented organisation. We have transformed our organisation, processes, communications and ethos to work seamlessly across the world and expect benefits to flow more rapidly as a result.

The most fundamental change in this regard is the creation this year of a unified global E&P technology organisation - with two hubs in Rijswijk and Houston. It has three business units:

- Research, Technology Development and Technical Services - providing a seamless technological service for our worldwide customers,
- Deepwater Services - to exploit the technological leadership gained in the Gulf of Mexico around the world, and
- Commercial Technology Venture Services - to drive forward the commercialisation of our technology.

We have developed a capacity to work seamlessly at a distance in virtual teams. The worldwide effort engaged

Shell integrated modelling revealed the extent, nature and potential of the Fram prospect - below a salt dome in the North Sea

CONFIDENTIAL

SMJ00014624
in unlocking the complex geology of Oman’s Athel field is an example.

**Value from technology?**
Has our investment in in-house technology delivered a commercial return? We have certainly outperformed our competitors in long-term growth of reserves and production (see figures 2 & 3). Of course this should not be pursued to financially unattractive limits. We don’t want growth for growth’s sake, rather profitable growth.

Recently, our performance has been affected by failures to deliver forecast production in a few locations, although the vast majority performed very well. Pushing forward the bounds of technology always increases the risk of failure – producing

---

**Complex multi-laterals and intelligent wells**

*drilling cheaper, more productive, more intelligent wells*

In the early 1990s, horizontal drilling brought about a dramatic improvement in well performance. Now advanced multi-lateral wells are delivering a similar advance. These have several producing bore holes extending – like tree roots – into the reservoir. They cost more than conventional single-hole wells but deliver much greater production.

Shell companies are industry leaders – responsible for around half the advanced multi-lateral wells drilled so far.

In Oman, multilaterals have reduced well costs in the Yibal, Nimr and West Haima fields by 20–30%. Together with novel horizontal side-tracks they have added some $640 million to cashflow by accelerating production. In Brunei, multilaterals have helped to cut the cost of further development of the Champion field by two thirds ($140 million) – avoiding the need for two new platforms and reducing the number of extra wells needed from 37 to just eight. In the United Kingdom, they have saved a fifth of the capital cost ($13 million) of further development of the Barque, Galleon and Tern fields, and improved their value by $9 million.

Shell companies are now focussing on developing intelligent wells – the next breakthrough in well technology. These will combine downhole control and measuring technology to manage production and injection into different areas of the reservoir automatically. Such wells could bring about a further 20–30% improvement in well costs. Multilateral wells are particular suited for retro-fitting such technologies.
gas in water a mile deep, for example, is far from standard technology.

However, there is another side to this — connected with our transformation efforts in the mid-90s. We knew that Shell engineers had been too cautious. The fact that we had very few failures was a measure of this. So we emphasised risk-taking, stretch-targets, a "can-do" approach. In a couple of cases we stretched too far.

Our present plans are based on a sober appreciation of the potential for technological problems. And there is no doubt that caution is a virtue at $10 oil. But the occasional problems in meeting our stretch targets should not obscure the continuing commercial benefits delivered by technology development throughout our operations.

Let me focus on just one country, Oman (see figure 4) — where I spent several very happy years. Oman's resources are smaller than those of some of its neighbours — and geologically much more complex. Observers have long expected the Sultanate's production to start declining. Thanks to advancing technology — and a lot of hard work —

The Shell intelligent well concept envisages wells spreading like tree roots — responding to changing underground conditions and producing only the desired fluids.
Figure 5

these observers continue to be disappointed.

Shell discovered oil at Yibal in 1962. Production from this field – Oman’s largest – is still rising 30 years after it began. This is a testament to successive technological advances.

Our growing imaging and modelling powers help us to locate more of the field’s resources and understand how to produce them better. New drilling techniques enable us to access them. For example, as the field matured the cost of wells rose to some $1,400 per daily barrel of initial production (see figure 5). In the early 1990s, horizontal wells halved this. Horizontal side- tracks and advanced multilateral wells are now halving the cost again. Yibal wells are cheaper today than during primary development.

An evaluation of the value of the new technologies applied there over the past five years was recently completed. These are some of the benefits it identified:

- multilateral wells (~$650 million)
- integrated subsurface modelling (~$622 million)
- advanced seismic (~$220 million)

### Integrated water and gas management

Oil reservoirs are produced for targeting quick recovery of reserves. As a consequence the co-production of water and gas accelerates. Remedial actions against the unwanted influx of water and gas are taken when wells start producing unacceptable amounts of water, or unacceptably high gas oil ratios (GOR).

Shell E&P companies produce more water than oil; 1 million m³ per day, this will double by 2002 if no action is taken. As water production increases, it dramatically reduces the amount of hydrocarbons coming to surface. Discharge of produced water needs to be environmentally friendly, the cost, to Shell, of cleaning and disposing of produced water is $400 million per year. In addition, high water cut wells and high GOR wells must be closed in leaving hydrocarbons in the ground. Such wells must be replaced by drilling new wells. Halving the amount of produced water would save $250 million per year.
• cheaper horizontal wells (+$160 million)
• improved well fracturing (+$70 million)
• reduced drilling costs (+$60 million).

Overall new technology delivered over $1 billion in additional cash – from capital and operating cost savings, and incremental production. Reserve additions added more than $1.3 billion in future value (see figure 6). Shell technology was directly responsible for 58% of this added value – without taking into account the additional value from our ability to customise contract technology to meet PDO’s particular business needs.

Figure 6

We seek three things from our technology:
• ready money from lower costs, more production and – now – commercial sales,
• business opportunities from new exploration plays, development opportunities and enhanced attractiveness as a partner – particularly to major resource holders,
• long-term value from growing reserves, commercialising gas and meeting environmental requirements.

Another Industry First for Shell
Shell is ahead of its competitors in having successfully trialed a foam for blocking gas production and avoiding well shut-in due to high GORs. The foam is injected into the entire reservoir interval in a gas bearing interval. The foam coagulates to block gas production whilst in an oil bearing section it is flushed out with no effect on production.

In trials in Brunel the foam reduced the gas production from two wells by 75% per well, enabling them to remain in production and recovering the investment in these wells in 200 days.

Downhole Separation

The technology to separate oil and water downhole, rather than at surface, consists of a hydrocyclone and a pump which pumps water into the subsurface while carrying hydrocarbons to the surface. It was field trialed in Germany on a well which was producing 10 bbl/d of oil and 490 bbl/d of water; this resulted in oil production increasing fourfold, water production was reduced by 60%. Further trials are planned on the Yibal Field in Oman later in 1999.

Downhole separation can revitalise an ageing field. Early installation can prevent the requirement to upgrade water treatment facilities and application in more costly developments offshore can lead to a reduction in the requirement for infrastructure and even the number of platforms. The next technological breakthrough in this area is the Intelligent Well with Downhole Separation. This enables the monitoring and control of fluids in the wellbore and works to keep all undesirable products underground while leaving the production of hydrocarbons unhindered. This is Shell’s Zero Waste Well™.
Let me illustrate the returns from some recent technological advances in four key areas:
- sharpening subsurface vision,
- installing cheaper plumbing,
- avoiding costly waste,
- turning gas into cash.

**Sharpening subsurface vision**
Better subsurface vision is central to this business – to identify reserves, drill them cheaply, and produce them effectively. During the 1980s, 3D seismic transformed this vision. Shell companies benefited from being faster than others in applying 3D – in the early 1990s we may have been responsible for around half the 3D data acquired. We continue to benefit from developing subsurface technologies.

These include advanced seismic which allows us to map reservoirs in difficult conditions – for example under salt domes – accurately. And tools which tell where to drill the most productive wells. Such technologies cut drilling costs, increase production and open up new reserves.

Integrated subsurface modelling enables reservoir engineers to test many different development possibilities quickly and cheaply in the search for the most cost effective options. Shell companies are leaders in developing such tools which are already responsible for adding significant economic reserves. The studies which added 390 million barrels to reserves in five Nigerian fields last year had a ‘finding cost’ of some $2 a barrel.

**Installing cheaper plumbing**
Underground plumbing is the most expensive aspect of developing fields, up to 60% of the costs. Learning how to drill cheaper and more productive wells is a key challenge facing this industry. I believe the revolution in well technology now underway will have as profound an impact as 3D seismic had in the 1980s. We intend to be leaders in applying these advances as well. Shell companies have been responsible for half the advanced multilaterals drilled (see figure 7).

As I mentioned in connection with the Yibal field, advanced multilateral...
wells offer huge cost savings. The technology is playing a vital part in making field developments economic at low prices. Shell companies are going further by developing 'intelligent' wells which will use downhole measurement and control technology to optimise production from different reservoirs automatically.

I discussed commercialisation of our expandable tubular technology. This will allow deeper, slimmer wells - to reach otherwise inaccessible reserves - which are more productive and cost less to drill. It is a major breakthrough which will transform our business - as well as providing significant commercial returns. World-wide sales could exceed $100 million within five years.

Avoiding costly waste
Society rightly demands higher environmental standards from all industries. For the oil industry, one need is to deal with the water - and in some cases the gas - produced with the oil from the reservoir. This is a costly and growing burden.

Shell companies now produce more water than oil. Volumes are expected
to double in five years, as fields mature. Handling water on the surface – cleaning it for discharge or re-injecting it – costs as much as handling oil. Dealing with unwanted gas without flaring is even more expensive.

The best way of responding would be to shut off the flow in the reservoir before it ever gets to the surface. We are working on mechanical and chemical ways of doing this. Resolving this problem could save us up to $4 billion over the next 20 years. The technology would also be commercially valuable – as other producers, including major resource holders, face similar challenges.

**Turning gas into cash**

The best way of dealing with gas, of course, is to sell it. Shell companies are leaders international gas marketers. We see gas as an increasingly important part of our business. So commercialising more gas is one of our central business thrusts. New technologies – such as floating LNG and gas-to-liquids plants – will play a vital role in this.

But let me focus on our revolutionary Twister gas separation technology which, as I mentioned, we are putting on the market. This is simpler, smaller and cheaper than competing ways of removing liquids from gas. It has no moving parts – working by creating a supersonic gas vortex. It will cut the costs of removing valuable condensate, and of drying gas for transport, liquefaction and sale.

Outside this industry it may have uses in air conditioning and many industrial processes. It is a very valuable advance which will enhance our own business and provide a significant commercial return.

**Changing the game**

Both Twister and expandable tubulars come from our ‘Gamechanger’ programme which promotes and pursues innovative thinking. Another product is our ‘Light Touch’ remote sensing exploration tool developed from a technology Shell researchers first

---

**The gamechanger process**

*realising the value of radical innovation*

Making money at low prices and reaping the opportunities of a changing world requires radical innovation. Shell EP’s global ‘game-changer’ programme has unleashed this – resulting in hundreds of radical ideas. A portfolio of the best opportunities is being pursued.

The programme uses a venture capitalist approach to stimulate and fund innovation. Entry into the portfolio is competitive – work on a project may be discontinued if a more promising opportunity emerges. Projects follow a structured plan to accelerate progress from concept to money-making venture.

The gamechanger programme is already generating revenues. ‘Light Touch’ is a novel means for sensing underground hydrocarbon reserves by measuring surface emissions – developed from Shell technology for detecting refinery emissions. Last year, it was used to help locate up to 30 million barrels of additional oil reserves in the Rabi field of Gabon.

‘Greening the Desert’ is a scheme for using wind and solar technology to clean produced water for agricultural irrigation. In Oman, confidence in this tool has allowed planned expenditure of $15 million on water injection facilities to be postponed.

Other projects currently being implemented by Shell companies, or being commercialised, include:

- wearable instrumentation for production operators,
- inter-well seismic to provide detailed understanding of reservoir conditions,
- shoe track conveyed logging to cut the costs and risks of logging horizontal and long-reach wells.

**CONFIDENTIAL**

SMJ00014631
developed for locating fugitive emissions from refineries – a benefit of our increasing emphasis on sharing knowledge.

Radical innovation could transform our business. Shell researchers are working on fuel cell technology for producing efficient, emission-free electricity from gas at the wellhead, with carbon dioxide fed back into the ground. Shell conversion technologies may provide a way of turning associated gas into valuable liquids.

The same technologies are being used to develop cleaner cars.

We believe, and I hope you concur, that our investment in E&P technology does provide a valuable return – in ready cash, business opportunities and long-term value.

The boxes show examples of how specific technologies are contributing hundreds of millions of dollars, and we expect substantial future contributions to the bottom line in all our ventures around the world.

The important point is that our technology effort is now driven by a much clearer focus on financial return. And we have organised ourselves everywhere to deliver this return for our shareholders.

Such radical innovation can transform our business. For example, Shell researchers are working on solid-oxide fuel-cell technology to convert gas to electricity at the wellhead. Carbon dioxide would be re-injected directly back into ground – providing efficient, emission-free power. Another project involves using Shell catalytic conversion technologies to turn associated gas produced with oil into valuable syncrude, rather than flaring it. These conversion technologies are also being used to develop cleaner motor cars.

'Light Touch' helps oil and gas explorers by sensing hydrocarbon emissions released naturally into the atmosphere from underground resources.