

15. INDEPENDENT MARKET RESEARCH REPORT

**F R O S T & S U L L I V A N**

**10 JUN 2004**

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Re: Independent Market Consultant Report on the Malaysia Atmospheric Corrosion Control Market

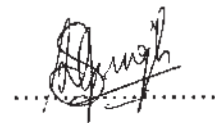
This market research report is prepared for inclusion in the prospectus of Perisai Petroleum Teknologi Bhd to be dated 16<sup>th</sup> June, 2004 in relation to its listing on the Mesdaq Market in Bursa Malaysia. This research is undertaken with the purpose of providing an analysis of the market position of Perisai Petroleum Teknologi Bhd within the petroleum industry in Malaysia. The report provides a special focus on the particular segment of the industry that Perisai Petroleum Teknologi Bhd is operating in.

The market research report was undertaken through both primary and secondary sources. Interviews were conducted with Petronas, the national oil company, to ascertain the Vendor Development Program (VDP) status of Perisai Petroleum Teknologi Bhd.

Secondary research includes a review of the in-house database of Frost and Sullivan, the Eighth Malaysia Plan 2001-2005, the Third Outline Perspective Plan 2001-2010, the Malaysia International Trade and Industry Report 2002, Bank Negara Malaysia Annual Report 2003 and others.

The research was completed in January 2004, with some updates done in April 2004. Findings in this study may be used in the listing prospectus with consent from Frost and Sullivan.

Yours faithfully  
For and behalf of  
Frost and Sullivan (M) Sdn Bhd



SANJAY SINGH  
DIRECTOR  
INDUSTRIAL TECHNOLOGIES, ASIA PACIFIC

Strategic Insight of the Malaysia  
Atmospheric Corrosion Control Market

April 2004

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The market research process for this study has been undertaken through detailed primary research which involves discussing the status of the industry with leading industry participants and industry experts. The methodology used is the Expert Opinion Consensus Methodology. Quantitative market information is based primarily on such interviews and therefore could be subject to fluctuation.

The market research was completed in January 2004, with some updates done in April 2004.

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# 1

## Executive Summary

### Global Economy

Macroeconomic stimuli, inventory dynamics and a stronger turnaround in the high technology markets are expected to set the stage for a wider recovery through the traditional channels of international transmission. With global trade steadily increasing, and interest rates at historically low levels, the global economy is poised for a gradual recovery. Lower interest rates helped keep the consumers' demand for durable products strong. Together with fiscal easing, that demand should provide support for an economic rebound in the US, and to a lesser extent in some Asian and European countries. The recovery in the global markets is shaped primarily by the developments in the industrial countries. Corporate spending on IT investments in the US, Euro Area and Japan picked up towards the end of 2003, putting on the momentum for further global recovery in 2004. Therefore, both the world economy and global trade are anticipated to improve, moving forward into 2005.

Uncertainties, especially geopolitical ones, are keeping investors cautious, throughout most parts of the world. In the developing countries, investment behavior has become a key element of the outlook. They are especially vulnerable to jitters in the financial markets. Sudden reversals in capital flows can dampen investments sharply and weaken the growth momentum. Hence, countries with strong policies in place are more likely to avoid or smoothly absorb external financial shocks. The downside risks to the forecasts include the emergence of other flash points in the Middle East, terrorist reprisals, the US economy slows down markedly, the US dollar declines too sharply and the further weakening of the Japanese economy. A weakened US dollar would translate into slower demand for imported goods into the US, with repercussions for the Asian export-oriented economics. Japan remains an important trading partner and a source of capital for many of the neighboring Asian countries, notwithstanding its prolonged economic weakness. Hence, its economic performance has a direct effect on its neighbors.

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## Malaysian Economy

Malaysia's economy expanded at 5.2 percent in 2003, with fiscal stimulus and low interest rates generating multiplier effects in the real economy. Increased intra-trade activities between China and Malaysia might also provide a relief from the weak market in the United States. As the rate of capacity utilization increases in the manufacturing sector and the inventory levels decreased, more manufacturing activities are expected, including increasing employment as well as both better consumer sentiments and business confidence. This would all translate into a more vigorous economy.

Since the Asian financial crisis, the government has been relying on a fiscal pump-priming policy to boost domestic demand, aimed at preventing recession and keeping unemployment down, in the wake of both volatility and uncertainty in the global economy. Assuming that the global economic recovery takes place gradually, fiscal pump-priming is projected to remain a tool in the hands of the government to boost consumption demand, and to a lesser extent, both physical investment and construction activities in 2004. As an indication of the continuation of this trend, another fiscal stimulus amounting to RM7.3 billion was announced in 2003, to counter the negative effects of both the Second Persian Gulf War and the Severe Acute Respiratory Syndrome (SARS).

Hence, the government has been faced with a fiscal deficit annually as it tries to pump in more money into the economy with fiscal stimulus packages. Fiscal expansion has further led to increased fiscal deficit and debt accumulation. The fiscal deficit, expressed as a percentage of the GDP, was recorded at 1.8 percent in 1998 and 3.2 percent in 1999, and subsequently, increased significantly to 5.8 percent in 2000, 5.5 percent in 2001, 5.6 percent in 2002 and 5.3 percent in 2003. These figures are much higher than the situation prevailing in the other economies in the region affected by the crisis, with the exception of the Philippines. The government plans to balance the budget by 2005 through a combination of containing growth in operating expenditures and scaling back non-core development projects.

The central bank is likely to continue its accommodative monetary policy to support consumer spending over the next 2 years. The economy, which has been dependent on domestic demand over the last several years, is likely to see external demand playing an increasing important role in 2004 and 2005, since the industrial countries' economies are likely to expand further than in 2003. Therefore, the Malaysia's economic growth in 2004 and 2005 should be more balanced with significant shares coming from consumption, investment and exports. Private consumption should also be boosted by rising disposal incomes, continued accommodative monetary and fiscal policies, and improving consumer confidence.

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Several downside risks are present that may adversely impact the economy and undermine the above projections. They include further delays in the recovery of both the US and Japanese economies, delayed corporate spending and the consequent demand for electronics products.

### Dependence on Other Industries

The market for atmospheric corrosion control products is dependent on both the upstream sector (offshore platforms) and downstream sector (onshore pipelines, refinery installations and petrochemical complexes). Due to the increasing competition from China in the non-resource based manufacturing industries, the government is keen to promote the development of the resource-based industries like petroleum. The move into deep water exploration and production activities is expected to boost the petroleum industry. Due to the maturing of existing petroleum fields, deep water exploration is viewed as the final frontier of the petroleum industry. Together with technological advances in seismic-imaging techniques and more powerful computers, the petroleum industry is expected to be the main source of power for an increasingly energy-deficient world over the next few decades.

To ensure more value added economic activities are being churned out in the economy, the petroleum industry in Malaysia has ventured downstream into refining and the manufacturing of petrochemicals. Today, there are around 5 refineries and 25 petrochemical plants in the country. They are also a potential market for atmospheric corrosion control products, as they are located near to the coastal areas. Due to both costs and structural strengths, metallic structures are widely used in the petroleum industry. Being mostly carbon steel, they are particularly susceptible to corrosion. Hence, the necessity for the installation of atmospheric corrosion control products, which in return would lead to less downtime and more safety at the production sites. Merchant marine ships are another group of end-users. Increasing trading activities due to the globalization process is projected to spur the global merchant marine fleets. Obviously, any buildings or structures with exposed carbon steel that are located in the maritime or coastal areas are subjected to the natural atmospheric corrosion processes.

### Overview of the Petroleum Industry in Malaysia

The word "petroleum" comprises both crude oil and natural gas. As at January 2003, Malaysia has about 3.2 billion barrels of crude oil reserves and approximately 2.5 trillion cubic meters of gas reserves. In terms of positioning, Malaysia has the 27<sup>th</sup> largest crude oil



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reserves and 12<sup>th</sup> largest natural gas reserves in the world. In 2002, daily production of crude oil and natural gas amounted to 698,000 barrels and 131.7 million cubic meters, respectively. At the current pace of production, the reserves of crude oil and natural gas are expected to last for around 13 years and 54 years, respectively. The importance of the petroleum industry can be seen from the fact it contributes more than 9 percentage points to the country's GDP. Ongoing and future production projects in the upstream sector in Malaysia are expected to amount to RM11.2 billion through 2005. In South-East Asia, ongoing and future pipeline projects are projected at approximately RM18.6 billion through 2009.

### Market Dynamics

The market size for atmospheric corrosion control products was estimated at approximately RM120 million in Malaysia in 2002. It is projected to expand to about RM201.2 million in 2008, yielding a compounded annual growth rate (CAGR) of 8.9 percent during the forecast period. The figure includes the installation or service component of contracts, in addition to the hardware. Typically, the installation or service component accounts for around 40 percent of the contract, as they require specialized skills and technical expertise that the petroleum companies are not able to provide in the first place.

Corro-Shield (M) Sdn Bhd ("Corro-Shield") is the only supplier of atmospheric corrosion control products to the petroleum industry in Malaysia, being appointed as a vendor under Petronas' Vendor Development program. The nearest product alternative to Corro-Shield's range of atmospheric corrosion control products are paints and coatings. In this context, Corro-Shield registered a market share of about 9 percent in the atmospheric corrosion control market in 2002. The remaining 91 percent was accounted by the various paints and coatings companies.

### Relevant Laws and Regulations

Petronas was incorporated in 1974 as the country's national petroleum company to develop the nation's petroleum resources, the ownership of which has been vested in the company by the Petroleum Development Act 1974, and to participate in the refining, manufacturing and marketing of petroleum products as provided under the same Act. The monopolistic status in the upstream operation, based on the same Act, is expected to remain in the foreseeable future. As the sole shareholder, the government controls the approval of all corporate matters under the Malaysian Companies Act, including the approval of dividends and the appointment of directors. Also, the same Act stipulates that the company is subject to the

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control and direction of the Prime Minister, making the company's management potentially affected by government policies. However, the government has provided the company with adequate latitude to manage itself based on commercial principles and will likely be the same for the foreseeable future.

Both the operators and contractors, as well as their subcontractors, are subject to the Occupational Safety and Health Act, 1984. This Act is enforced by the Department of Occupational Safety and Health (DOSH), a department under the Ministry of Human Resources. Under this Act, employers have the duty to ensure, as far as practicable, the safety, health and welfare at work of all his employees. This includes the provision of plant and systems of work that are, so far as is practicable, safe and without risks to health. Both safety and absence of risks to health in connection with the use or operation, handling, storage and transport of plant and substances must be present. The employers must also ensure the provision of such information, training and supervision as is necessary to ensure, as far as is practicable, the safety and health at work of his employees.

### Overview of the Petroleum Industry in Brunei

The economy of Brunei is heavily dependent on the petroleum industry. It generates between 75 percent and 90 percent of the government's revenues and accounts for slightly more than 50 percent of the GDP. Reserves of crude oil and natural gas were estimated to be around 1.35 billion barrels and 391 billion cubic meters, respectively in 2002. In the same year, daily output amounted to 197,300 barrels of crude oil and condensates, and 30 million cubic meters of natural gas. The petroleum industry in Brunei is also venturing into deep water exploration activities, due to the maturing of existing fields. In an effort to create more value added products, the Brunei government is also encouraging the development of large-scale petrochemical projects, to take advantage of the huge natural gas reserves in the country.

### Overview of the Petroleum Industry in Indonesia

In 2002, Indonesia has crude oil reserves and natural gas reserves of around 5 billion barrels and 2.6 trillion cubic meters, respectively. Daily production amounted to about 1.25 million barrels of crude oil and 86.1 million cubic meters of natural gas in 2002. In spite of its huge petroleum reserves due to its geological factor endowments, Indonesia is viewed as being beleaguered by issues of regulatory enforcement, taxation, labor disputes, political stability, native land claims and forced socio-economic contributions outside the regular taxes. In

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addition, Indonesian waters suffer the dubious reputation of being subject to the highest number of piracy incidents, as reported by the International Maritime Bureau. This affects the passage of merchant ships through Indonesian waters, and ultimately, docking at Indonesian ports that have the potential to generate the demand for atmospheric corrosion control products, through maintenance and repair.

### Substitute Products

There are many atmospheric corrosion control methods available and they include protective coatings, corrosion-resistant metals and alloys, corrosion inhibitors, polymers and anodic and cathodic protection. Protective coatings comprise galvanizing and metallizing. Stainless steel, nickel-based alloys and titanium alloys are also used for corrosion control purposes. Paints and coatings are the most common form of corrosion control substitute. However, they are more suitable for short-term remedial purposes, due to the hostile marine or near-marine environment, with saltwater being the main corrosive agent. Some substitutes require the suspension or shutting down of production during the remedial or repair phase. This translates into expensive downtime, as the petroleum operators are obliged to produce a certain quantity of petroleum per day. The selection of a particular technique of corrosion control is a function of a number of factors, like the intended service, application, planned service life and cost.

### Industry Reliance and Vulnerability to Imports

Most of the global suppliers of atmospheric corrosion protection products are either European or American companies. However, Corro-Shield, being a Bumiputera company, is given priority in the petroleum industry by Petronas in its Vendor Development Program, as part of the government's efforts to build and develop a strong indigenous business community. In this context, the company is working closely with Petronas Research and Scientific Services to jointly develop and patent several products globally, in the field of atmospheric corrosion control. Imports or foreign sources of atmospheric corrosion control products from the United States and Europe are much more expensive. Hence, Corro-Shield has a strong position in the atmospheric corrosion control market in Malaysia.

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## Industry Outlook

Both economic development and industrialization in Asia will fuel the need for more energy over the few decades. Globally, the demand for crude oil is expected to increase by about 60 percent over the next 25 years, with Asia leading the way. By 2020, Asia is projected to be the largest net importer of oil, with the demand for gas exceeding the demand for crude oil as well. With increasing trading transactions as globalization takes hold, there is also a need for more shipping activities. This presents opportunities for the supporting and ancillary industries, including atmospheric corrosion control products.

Although controlling atmospheric corrosion requires significant expenditures, the payoff includes increased public safety, reliable performance, maximized asset life, environmental protection and more cost-effective operations in the long run. Corro-Shield has a monopolistic advantage in the petroleum industry in Malaysia by virtue of its appointment as a supplier under the Petronas' Vendor Development Program. Being the only company in Malaysia able to provide a wide range of atmospheric corrosion control products, it faces virtually nil competition, except from the paints and coating companies, which are not direct competitors in the strictest sense of the word. It has the technical expertise, product quality, pricing, turnaround time and support facilities to meet the requirements of the petroleum industry in Malaysia. Also, by using Corro-Shield's range of products, a petroleum operator does not need to face production downtime.

Hence, Corro-Shield is able to meet the challenge of having to deal with the high bargaining power of petroleum multinationals like Petronas. As Corro-Shield's products are concerned with atmospheric corrosion control, they do not involve much chemicals, if at all, in their formulation. Therefore, its range of products is not subjected to stringent environmental regulations. Over the long term, the strategies for Corro-Shield's expansion is to come up with more innovative products that can compete in the market based on both price and quality, as well as turnaround time. With the VDP program implemented by Petronas, Corro-Shield is expected to maintain, or even increase its market share in Malaysia. If Corro-Shield is able to meet the technical requirements of the upstream sector, then it is able to leverage its strength to venture into the still untested market of the downstream sector of the petroleum industry.

# 2

## Strategic Analysis of the Malaysia Atmospheric Corrosion Control Market

### Market Overview

The global petroleum industry contains some of the world's largest companies and influences many of the world's significant geopolitical developments. The word "petroleum" refers to both crude oil and natural gas. The International Energy Agency (IEA) forecasts that global production of crude oil must rise from the present level of less than 80 million barrels a day to around 115 million barrels a day by 2020 if expected demand is to be met, representing a compounded average annual growth (CAGR) rate of 2.2 percent. This requires an investment of around RM3.8 trillion (in today's money) upstream over the next decade, much of it on technology.

The desire for atmospheric corrosion control (external corrosion), particularly in industrial applications, is well known and the global market for corrosion preventive products is estimated at around RM76 billion. Metallic structures are widely used in the petroleum industry. These metals, particularly carbon steel, will corrode in the absence of a coating, resulting in a reduction of the service life of the steel component part. Corrosion is a naturally occurring phenomenon, defined as the deterioration of a substance, usually metal, or its properties, due to the reaction with the environment. Coastal or marine areas are particularly susceptible to corrosion, due to the saltwater environment.

In the global petroleum offshore platform market alone, the demand is projected conservatively at RM5.9 billion, based on the estimated 5,848 platforms in the world. In Malaysia, the market for atmospheric corrosion control products was estimated at around RM120 million (US\$31.6 million) in 2002. This represented about 0.02 percent of the nominal GDP of Malaysia in the same year. In Brunei and Indonesia, the market is estimated at around US\$10 million (RM38 million) each, in the same year. These atmospheric corrosion control products assist in the life cycle cost of a system. Otherwise, normal corrosion processes may cause premature failure of a piece of the equipment, leading to expensive downtime.

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Malaysia has around 500,000 square kilometers of acreage available for petroleum exploration, of which 205,500 (41.1 percent) are currently covered under the terms of the production sharing contracts (PSC). Supported by the monopolistic and privileged status in the upstream sector, Petronas entered into the PSCs under advantageous terms and conditions for the company. The PSCs are normally undertaken with a number of petroleum multinationals and each contract obligates the contractor to provide all the financing and bear all the risks of exploration, development and production activities, in exchange for a share of the total production. Out of the 123 oil fields discovered, there are 47 producing oil fields currently. The production of crude oil and condensates increased by 4.9 percent to an average of around 698,000 barrels per day in 2002. Out of the 218 gas fields discovered, the 14 producing gas fields were producing approximately 131.7 million cubic meters per day in 2002. Several more gas fields are under development. In 2002, the country exported 16.2 million tons of crude oil, an increase of 7.4 percent over the previous year. In the case of liquefied natural gas, exports decreased slightly by 2.7 percent to reach 15 million tons in 2002.

The natural gas production from the gas fields offshore Terengganu is delivered to the gas processing plants in Kerteh. Subsequently, the processed natural gas is then delivered by pipeline as fuel to the end-users, which include households, manufacturers and power companies, as well as feedstock to petrochemical, ammonia and urea plants in the peninsula. Meanwhile, the natural gas production from the offshore gas fields in Sabah is transported to the processing plant on Labuan island, and subsequently to the methanol plant as feedstock and the direct reduced iron (DRI) plant as fuel. Lastly, natural gas production from the gas fields offshore Sarawak is channeled to the 3 liquefied natural gas plants as well as the ammonia and urea plants in Bintulu, Sarawak.

As at January 2003, Malaysia has about 3.2 billion barrels of crude oil reserves and about 2.5 trillion cubic meters of gas reserves. Under the current pace of development and production rate, the crude oil and natural gas are expected to last for approximately 13 years and 54 years, respectively. Of course, with more successful efforts in exploration activities, the reserves might rise in the future. Of the natural gas reserves, about 50 percent was located offshore Sarawak, 41 percent offshore east coast peninsula Malaysia and the remaining 9 percent offshore Sabah.

In July 2002, Murphy Oil Corporation, an independent contractor working for Petronas struck crude oil in 1,340 meters of water 150 kilometers in the Baram Delta off the coast of Sabah. The field has an estimated recoverable reserve of up to 700 million barrels, or nearly 21 percent of the country's current crude oil reserves. The country has the 12<sup>th</sup> largest gas reserves and 27<sup>th</sup> largest crude oil reserves in the world.

The importance of the petroleum industry is illustrated by the fact that although it contributes about 9.4 percent to the country's GDP, the value added is six times as large as that of the electronics industry. Every additional RM5 billion in investment in the petroleum industry

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can potentially add 100 basis points to the GDP growth. In addition, higher crude oil prices should provide more leeway to the government when it is adopting expansionary fiscal stimulus to strengthen the economic recovery. The petroleum industry generates around RM15.4 billion in revenues to the government, in the form of taxes and dividends.

### Product Definition

Corro-Shield is involved in the manufacturing, marketing and installation of atmospheric corrosion control products to the petroleum industry. Its range of products are as follows:

➤ Nuts and bolts protection:

Nuts and bolts are prone to corrosion due to the crevices in between. In addition, they are also subjected to both galvanic and stress cracking. The CorroCaps are made from silicon, which is a synthetic rubber. They are made with a unique one-way valve system, which essentially insulates the exposed products from the harmful effects of the corrosive environment by enclosing it within a near-vacuum environment.

➤ Flange protection:

Many crevices and annular spaces exist in the body of the flange and at the sealing faces. They suffer from mechanical damage during assembly, besides being difficult to coat. The FlangeShield system employs a non-toxic and a non-flammable rust-converting compound, which is injected to temporarily fill in the void spaces. The material is heated so as to lower its viscosity, allowing it to penetrate all crevices. There are no volatile organic compounds (VOC) present in the system.

➤ Pipe support systems:

Corrosion at the crevices is common at pipe supports, leading to external failures and premature paint failure on piping systems. The fibaroll is now employed to provide protection in these areas, by helping to eliminate the crevices and keep off the water.

➤ Pipe protection and leak containment systems:

Fibaroll is a unique form of fibre-reinforced plastic (FRP) and it provides a seamless solution for pipe protection. It can be applied to any surface. On steel piping, it is resistant to abrasion, high temperatures and corrosion. It also allows easy visual and non-destructive testing (NDT) of the condition of the pipe. It has also been tested and is proven to provide leak containment and to strengthen the pipes.

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➤ Riser clamp protection:

Besides using both CorroCaps and FlangeShield systems, the surrounding areas are protected by application with Corro-Cillin. It is a specially blended formulation of waxes containing organic corrosion inhibitors and agents for long-term cavity protection. No heating or disposal is needed as the product dries to an almost transparent film.

➤ Protective insulation system:

Completely non-flammable, perlite insulations are widely used as insulation materials for heated equipment, vessels and piping. They have a high ratio of sodium silicate to chloride ratio. As sodium silicate is a corrosion-inhibitor, it limits the corrosive effects of soluble chlorides, and the entry of soluble chloride into the system. Thus, it assist to avoid unnecessary shutdowns and loss of production hours at refineries, petrochemical plants and power plants caused by the corrosion of piping, fittings and vessels. Perlite insulations come in the form of pipe covers and boards and they consist of expanded perlite powder bound together by an inorganic binder and reinforcing fibre.

➤ Permanent sleeve repair

This consists of one, or several mating sleeve sections, which are welded or bolted together around the corroded or damaged pipe area. The sleeve is fabricated to allow an annulus between the original pipe and the sleeve. After preparation of the existing pipe, welding or bolting the sleeve section into position, and pressure testing; a specially formulated epoxy resin is injected into the annulus. By completely integrating the sleeve and the existing pipe, the epoxy provides an additional structural reinforcement. To arrest specific external corrosion, a range of epoxy formulas and annular space combinations can be used. Subsequently when cured, the external steel sleeve, epoxy and riser pipe act as a composite section. The sleeve isolates the riser, thus preventing further external corrosion.

➤ Marine growth removal and prevention:

Powered solely by natural ocean forces and their own buoyancy, the impactors and protectors assist to maintain the surface free of marine growth and colonisation. Organisms like anemones, hydroids and sponges are denied an environment of nutrients in which to breed and develop, resulting in a zero-growth surface finish. This is particularly critical in the splash zone areas as cathodic protection systems are ineffective. The impactors are deployed temporarily to remove the marine growth and the protectors are subsequently installed to prevent the formation of microbial slime, which is the food source for marine organisms, by the continuous rubbing action on the pile.



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## Market Engineering Measurement Analysis

Chart 2.1

Atmospheric Corrosion Control Products: Market Engineering Measurements (Malaysia), 2002

Measurement Name	Measurement	Trend
Market age	Matured	Up
Revenues	RM120 million	Up
Potential revenues (maximum future market size in 2008)	RM201.2 million	Up
Base year market growth rate	8 percent	Up
Forecast period market growth rate	8.9 percent	Up
Price Range	Project specific	
Degree of competition	2	Stable
Degree of technical change	5	Stable
Customer loyalty	8	Stable

Scale: 1 (lowest) to 10 (highest)

Source: Frost &amp; Sullivan

## Identification of Challenges Facing the Malaysian Atmospheric Corrosive Control Market

The first phase of the Market Engineering system is to identify the key challenges facing the industry. These challenges have an impact and are integrated into every phase of the Market Engineering system.

An industry challenge is any issue that can affect the development of the market or the competitors in the marketplace. Challenges include customer issues, regulatory programs, economic trends, market measurement trends, competitive strategies, new technologies, sales and marketing strategies, new market opportunities and market threats. In the analysis of the challenges to the industry, the time frame is important. Each challenge varies depending on the time frame that is likely to see the highest impact on the market. This time frame analysis directly affects the market forecasts and the development of market strategies and investment timing by industry participants.

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Figure 2-1 presents the challenges ranked in order of impact for the Malaysian Atmospheric Corrosion Control market between 2002 and 2008.

Figure 2-1

Atmospheric Corrosion Control Market: Market Challenges Ranked in Order of Impact (Malaysia), 2002-2008

Rank	Challenge	2003-2005	2006-2008
1	High Bargaining Power of Buyers	High	High
2	Increasingly Stringent Environmental Regulations	Medium	High

*Source: Frost & Sullivan*

### High Bargaining Power of Buyers

In tandem with the widespread mergers and acquisitions taking place in the world, many petroleum companies are also merging so as to achieve economies of scale. For example, both Exxon and Mobil merged to become ExxonMobil in 1998. The net effect is that there are fewer petroleum companies in the scene, which lead to a higher bargaining power on their part. This factor applies particularly when the purchases are conducted in large volumes and the supporting and ancillary companies are single customer-oriented. In general, the less product differentiation there is, the more bargaining power the buyers possess. This is due to the fact that only price differentiation exists among the products in the market, which can be obtained off-the-shelf like a commodity. The impact of this factor is anticipated to remain high during the forecast period.

### Increasingly Stringent Environmental Regulations

In line with increasing environmental awareness in the industrialized countries, and coupled with the fact that most of the foreign petroleum multinationals originated from these countries, there is the trend towards more environmental awareness among the petroleum companies in Malaysia. In general, these petroleum companies want to be seen as responsible corporate citizens. Both reasonable precautions and care are taken to mitigate the adverse impacts their business operations may have on the environment. Environmentally-friendly products are used which are in accordance with the appropriate industry standards and best practices, so as to conserve and preserve the environment. The ripple effects of these environmental regulations are also transmitted to the supporting and ancillary companies in the supply chain, with some effects felt in the production costs. The impact of this factor is projected to increase in the future, in consonant with rising environmental awareness.

## 15. INDEPENDENT MARKET RESEARCH REPORT (Cont'd)

## Market Drivers

Market drivers are factors that are stimulating growth in the market, and which increase sales and revenues for atmospheric corrosion control products.

Figure 2-2 presents the market drivers ranked in order of impact for the Malaysian atmospheric corrosion control market.

Figure 2-2

Atmospheric Corrosion Control Market: Market Drivers Ranked in Order of Impact (Malaysia), 2003-2008

Rank	Driver	2003-2005	2006-2008
1	Technological Advances Stimulate Exploration and Production Activities	Medium	High
2	Expansion of Downstream Gas Activities Spur Demand	Medium	High
3	Development of Petrochemical Industry Stimulates Demand	Medium	Medium
4	Promotion of Shipbuilding Industry Encourages Demand	Medium	Medium

Source: Frost & Sullivan

## Technological Advances Stimulate Exploration and Production Activities

The hydrocarbon potential of the Baram Delta has long been seen a promising, but the cost of deep-water prospecting repelled most potential investors. The recent discovery could bring about more deep water exploration and production activities in both Malaysia and Asia as a whole. Deep water exploration is the final frontier of the petroleum industry, with the maturing of existing petroleum fields. Over the past few years, there have been dramatic changes in technology that greatly reduces the cost of accessing a molecule of petroleum. Both ultra-deep platforms and next generation seismic-imaging techniques allow reservoirs to be visualized on a screen in minutes rather than the months it would have taken a few years ago. The arrival of three dimension seismic imaging in the late eighties and nineties helped transformed the petroleum industry. By assisting to make sense of what is going on inside the rocks underground, this has made the process of finding petroleum much less of a hit-and-miss affair. However, there is still room for further improvement. Another potential technological advance lies in the development of smarter drill bits that encase sensors capable of measuring conditions in the surrounding rocks. They act as the eyes and ears for the driller, by looking far ahead of the drill bit and communicating to the operator in real time. Thanks largely to technological advances, the average finding and development cost of crude oil has fallen to a third of the RM76 a barrel it was 2 decades ago. Meanwhile, the average extraction cost has fallen by half, to less than RM15 a barrel.

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**15. INDEPENDENT MARKET RESEARCH REPORT (Cont'd)**

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The average recovery rate for an oil field remains at between 30 percent and 35 percent. In other words, of all the crude oil proven to exist in a given reservoir, petroleum companies typically get only about a third to the market. The key is not simply to coax more crude oil from the oil-bearing rocks of a reservoir, but also to tap smaller fields nearby that were previously uneconomic, by using tools such as multi-directional wells. As a harbinger of things to come, the use of chemicals pumped down the wells under high pressure could enhance the fracturing of low permeability rocks and thereby increasing the production. In addition, installing compressors at the bottom of the wells could help to stave off the decline in reservoir pressure over a period of time, and so boost petroleum recovery. Hence, the arrival of sequential technological advances in three broad areas should collectively add up to improved recovery rates and lower extraction costs. This includes better visualization of reservoirs, better placement and drilling and better management once the wells are in production. Needless to say, the longer the reservoirs are producing petroleum, the longer are the platforms and associated facilities are needed, and the more corrosion control measures are needed. The impact of this factor is projected to increase during the forecast period.

#### Expansion of Downstream Gas Activities Spur Demand

Currently, Malaysia is the third largest exporter of liquefied natural gas (LNG), after Indonesia and Algeria. There are three LNG plants in operation in Bintulu, Sarawak. The first LNG plant came on-stream in 1983, the second one in 1996 and the third one in 2003. The natural gas comes from the offshore fields in Sarawak. Collectively, the 3 plants make the Bintulu LNG complex the world's largest LNG production center with a combined capacity of 23 million metric tons per annum.

Besides the LNG plants, other gas projects include the Peninsula Gas Utilisation (PGU) project in west Malaysia, gas supply to the western coast of Sabah and the Trans-Thailand-Malaysia Gas Pipeline System. Under the Trans-Thailand-Malaysia Gas Pipeline System, gas will be transported from the Malaysia-Thai Joint Development Area (JDA) to the Peninsula Gas Utilisation pipeline at Changlun, Kedah. This linkage is expected to make a mark a major step towards realizing the trans-ASEAN Gas Grid project. Petronas also owns and operates two of the five refineries in Malaysia, producing about a quarter million barrels per day. Due to constant exposure to the weathering agents, these gas facilities also need corrosion control products and the impact of this factor is projected to increase towards the end of the forecast period.

#### Development of Petrochemical Industry Stimulates Demand

To date, integrated petrochemical complexes have been established in Gebeng (Pahang), Kerteh (Terengganu) and Tanjung Langsat (Johore) in the country. Collectively, there are 25 petrochemical projects located in the three petrochemical complexes. To achieve self-

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**15. INDEPENDENT MARKET RESEARCH REPORT (Cont'd)**

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sufficiency in selected petrochemical products, Petronas is planning to invest around RM6.9 billion during the period between 2001 and 2005, with both local and foreign partners, on the petrochemical industry. The feedstock to these petrochemical plants comes from the gas deposits extracted by 66 petroleum platforms lying offshore in Terengganu. Being located near to the coastal areas, these petrochemical plants are subjected to constant corrosion, and hence, need corrosion control products. The impact of this factor is anticipated to remain constant throughout the forecast period.

#### Promotion of Shipbuilding Industry Encourages Demand

The government plans to gradually establish a shipbuilding and repair infrastructure, as the country is a major trading nation. The industry has developed naturally on the basis of national requirements and the need for transportation of goods along the coastline. Opportunities are present in the building of ships and boats such as small tankers, cargo vessels, ferries, tugboats and trawlers, the repairing of ships and boats and the fabrication of smaller craft like leisure yachts, pleasure boats and sailboats.

At present, only a handful of ship yards have the capability and capacity to build and repair ocean-going ships, generally in the range of not more than 5,000 dead weight tons (DWT). Repairs on a few foreign ships have been undertaken on a jobbing basis. All these activities require substantial amount of corrosion control products in the refurbishing and repairing phases. However, the development of the shipping industry is forecasted to be slow and relatively constant during the duration of the forecast period. Hence, the impact of this factor is expected to be moderate during the duration of the forecast period.

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**15. INDEPENDENT MARKET RESEARCH REPORT (Cont'd)**


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## Market Restraints

Market restraints are factors that affect the growth of the industry, and ultimately, sales and revenues for atmospheric corrosion control products.

Figure 2-3 presents the market restraints ranked in order of impact for the Malaysian atmospheric corrosion control market.

Figure 2-3

Atmospheric Corrosion Control Market: Market Restraints Ranked in Order of Impact (Malaysia), 2003-2008

Rank	Restraint	2003-2005	2006-2008
1	Regional Excess Capacity in Refinery Facilities Constrains Growth	High	Medium
2	Sweet Crude Reduces Demand	Medium	Medium
3	Industrial Overcapacity in Petrochemicals Confines Demand	Medium	Medium

*Source: Frost & Sullivan*

### Regional Excess Capacity in Refinery Facilities Constrains Growth

Although Petronas' refinery facilities maintain an operation rate of more than 90 percent, which is considerable higher than that in neighboring countries, there is still regional excess capacity. Hence, this leads to lower profitability and capital expenditure. Unlike the upstream sector where it enjoys a monopoly, Petronas' downstream activities face competition from both Shell and ExxonMobil. The impact of this factor is projected to decrease over the forecast period as the regional excess capacity situation diminishes gradually.

### Sweet Crude Reduces Demand

The crude oil produced in Malaysia tends to be of the sweet variety (containing less sulphur which is a corrosive agent), and hence, the refineries are not subjected to intense corrosion when using the feedstock. Reflecting this, major new investments in the domestic downstream sector, including atmospheric corrosion control, are not scheduled in the near future. The impact of this factor is projected to remain constant during the forecast period.

**15. INDEPENDENT MARKET RESEARCH REPORT (Cont'd)****Industrial Overcapacity in Petrochemicals Confines Demand**

Prices of petrochemicals, also known as polymers, are under pressure from increasing competition and industrial overcapacity, especially from the neighboring manufacturers based in Singapore and Thailand. The import duty on polymers is scheduled to be reduced to 5 percent from 15 percent previously under the terms of AFTA (ASEAN Free Trade Area) coming into play in 2003. Polymer facilities being built today, are significantly larger than they were in the last decade. The average size of a world-scale plant ranges between 250,000 tons to 450,000 tons a year. New advances in both operating and catalyst technology will allow existing and new facilities to be even more productive and efficient in the years to come. With narrowing margins as polymers become increasingly commoditized in the market, this leads to less capital expenditure ultimately on the part of the polymer manufacturers. The impact of this factor is projected to remain constant over the forecast period.

**Revenue Forecasts**

Both figures 2-4 and 2-5 refer to the costs of on-going and future production projects in Malaysia and the rest of South-East Asia. They exclude the exploration projects, which do not need much atmospheric corrosion control products.

Figure 2-4

**Costs of Ongoing and Future Production Projects in Malaysia**

Projects	Location	Type	Start	Status	Operator	RM Million
F6 gas field	Offshore Sarawak	Gas field development	1987	Ongoing	Shell	319
Angsi	Offshore Terengganu	Satellite oil field development	2000	Ongoing	Carigali	6,460
Larut			2000	Ongoing	ExxonMobil	
Bintang	Offshore Terengganu	Gas field development	2002	Ongoing	ExxonMobil	38
Joint Development Authority -	Offshore Thai-Malaysia	Pipeline	2004	Finalising	Petroleum Authority of Thailand -	2,147