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# Striving for Excellence in Safety, Health & Environmental Management

Submitted by:

**The Bahrain Petroleum Company BSC© (BAPCO)**

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**THE ROBERT W. CAMPBELL AWARD - 2007 CASE STUDY SUBMITTAL**  
**BAPCO**  
Striving for Excellence in Safety, Health & Environmental Management



## **EXECUTIVE SUMMARY**

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The Bahrain Petroleum Company (BAPCO) BSC (c) is one of the largest and the oldest in the Middle East dating back 1936. BAPCO refines over 270,000 barrels of crude every day of about one-sixth originates from Bahrain fields; the remainder is pumped from Saudi Arabia in pipelines extending 27 kilometers over land and a further 27 kilometers under the sea before reaching the Northwest of Bahrain. Being the largest employer in Bahrain, BAPCO operates Refinery, Sitra Tank farm, Sitra Wharves, Marketing terminals, and Sea Island shipping docks, oil wells, Awali Village and all infrastructure and support facilities across the island.

BAPCO senior management believe that extraordinary business performance starts with extraordinary Safety, Health & Environment (SH&E) performance. Creating a safe working environment for employees, contractors and customers is a vital part of the Company management strategy which will later lead to one of BAPCO's ultimate goals of Operational Excellence. BAPCO support the value of SH&E across the Company with a dynamic process oriented toward eliminating injuries, ill-health and environment impact. The dedication to SH&E is a value incorporated into the daily planning, design and implementation of processes. BAPCO continuously improve SH&S processes to stay current with new issues, technology and regulatory requirements. BAPCO's main focus is to integrate SH&E into all operations.

Most of BAPCO's SH&E programmes are voluntary in nature and led by senior management costing the Company millions of dollars (e.g. spending over \$200 million on purely environmental projects). This demonstrates how senior management place importance to SH&E and treat it as a core value.

The Industrial Safety Committee (ISC) is the overall in-charge of SH&E management within the organization. This committee is headed by a most senior leader and made up of senior management. ISC lead the implementation and sustainability of SH&E programmes and ensure they are aligned with business operation dimension.

As a result of efficient and effective SH&E management, BAPCO now maintains a more reliable processes and less injuries, ill-health and insignificant environmental impact. This is evident in the international SH&E awards BAPCO received and operating 11 million employee-hours with no loss time injury.

There are a number of challenges facing the Company in its quest to *Striving for Excellence in managing SH&E*. These challenges include addressing human factors to prevent human related incidents, and merging Contractors SH&E performance with that of BAPCO.

Key words: BAPCO, SH&E performance, senior management, ISC, Environmental

## 1.0 BUSINESS PROFILE

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The Bahrain Petroleum Company (BAPCO) BSC (c) – (ISIC: Section B, Division 06, Group 061, Class 0610 and Section C, and Division 19, Group 192, Class 1920) one of the largest and the oldest in the Middle East dating back 1936 – refines over 270,000 barrels of crude every day. About one-sixth of this crude originates from Bahrain Fields; the remainder is pumped from Saudi Arabia in pipelines extending 27 kilometers over land and a further 27 kilometers under the sea before reaching the Northwest of Bahrain. BAPCO operates Bahrain Refinery, Sitra Tank farm, Sitra Wharves and Sea Island shipping docks, oil wells, Awali Village and all infrastructure and support facilities across the island.

The Company; the largest in Bahrain; reported record profits in 2005 and was responsible for 70% of government revenues to the national economy. Sales of crude and refined products totaled 152 million tones. Retail sales reached 7.4 million barrels and there were 4.3 million barrels of jet fuel sales.

There are a total of 25 processing units at this refinery with a capacity to refine various products including Liquefied Petroleum Gas (LPG), Naphtha, Gasoline, Kerosene, Aviation Turbine Fuel, Low sulfur Diesel Oil, Heavy Lube Distillate, Fuel Oil, and Asphalt. The prime customers for such products are based in the Middle East, India, the Far East, South East Asia and Africa which makes up 95% of the refined products are exported.

There are more than 170 storage tanks at different sites with a total capacity of over 14 million barrels.

BAPCO is the largest employer in the country employing 3800 full-time employees and more than 1300 contractors which reach 2500 contractors during shutdowns. The Company is pressing ahead with its ambitious human resource development programme to ensure that the skills of its workforce match the technological and business demands of this new century. In addition, its scholarship and sponsorship programmes annually support more than 150 students in higher education in Bahrain and abroad.

Protection of the environment continues to be a major focus of the Company's policy. In line with best practice, BAPCO has created an EHS Policy that integrates the functions of Occupational Health, Industrial Safety and Environment.

There are three major challenges facing BAPCO in managing Safety, Health & Environmental (SH&E) issues. Firstly, is addressing environmental impact created by an aging refinery. Secondly, is aligning contractor large workforce with BACPO SH&E management system and finally tackling first aid cases which are attributed to human behavior.

## **2.0 LEADERSHIP**

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### **2.1 Organizational Leadership**

#### **2.1.1 Management Committees**

BAPCO EHS Policy highlights that "...the primary responsibility for communicating and implementing this policy (EHS Policy) rests with Management" (attachment 1). With this said, Industrial Safety Committee (ISC) was founded in 1983 which is chaired by the Deputy Chief Executive. This high-profile Committee made up of all Company's General Managers and an employees' representative. ISC directs, monitors critical SH&E programmes development, implementation and ensures their effectiveness. The Committee meets monthly and to date met 238 times (attachment 2). Duties and responsibilities of senior management are detailed in the Company Safety Standard SS/370/SAF/001 (attachment 3).

Alongside ISC there is the Environmental Affairs Committee (EAC) which is responsible for overseeing the development of environmental plans and programmes and the implementation of any projects resulting from them. The EAC is chaired by General Manager Engineering Division and its members include GM – Refining Division, GM – Maintenance Division, Manager – Engineering Services, Manager – Technical Services, Manager – Shutdown & Major Services and Advisor Environmental Affairs. The Committee meets every two months (attachment 4) and reports to ISC chairperson.

#### **2.1.2 Strategic Planning**

Every year during July – August, executive management hold a workshop to develop corporate strategic plan. This strategic direction of "Striving for Excellence" reflects the spirit of the business statements of the purpose, vision, mission, and value (attachment 5). When developing corporate strategic plan, management take into account the Company internal strengths, weaknesses, opportunities and threats, the external environment related to the competitive position, and the expected political, economic, social and technological change.

To align all workforces onto a common theme towards the corporate strategic plan, a representative sample of middle management and employees participated in similar workshops to break down corporate strategic plan to divisional and departmental levels (attachment 6).

The chart in attachment 7 outlines how strategic plan is linked to Company purpose, vision, mission, and value, and how this plan is cascaded down to divisional and then departmental objectives. Figure (1) summarizes BAPCO Strategic Plan model.

### **2.2 Corporate Citizenship, National/Regional, Global**

BAPCO believes that the Company has a responsibility to be a force for good in the areas where we operate. Since its inception, BAPCO has been making significant investments in organizations that play major roles in education, the environment, health and human services, culture and the arts and civic endeavors.

In the mid-thirties BAPCO was the only industrial setting in Bahrain and probably in the region. With this said BAPCO contributed in creating not only SH&E legislation in Bahrain but also Bahrain Labor Law and other technical related specifications which are still used.

The following is some examples of BAPCO contributions in the community.

- \$5 million to train Bahraini jobseekers
- Donation to Bahrain Defense Force hospital – Cardiac Centre
- Sponsorship of 3<sup>rd</sup> Middle East Metrology Conference & Exhibition
- Financial support to Bahrain Centre for Studies and Research (BCSR)
- Donation to Bahrain Diabetic Society (BDS)
- Financial & technical support to Bahrain Health & Safety Society (BHSS)
- Donation to Ma'ameer Cultural and Sport Club
- Donation to Bahrain Maritime Sports Association
- Sponsorship of “Prevention of Eye injuries in the Workplace” symposium
- Support of “EnviroArabia 2007”
- Support of Bahrain Formula 1 (F1) race
- Donation to Bahrain Volleyball Association
- Technical assistance and sponsorship of The Fire Department Instructor's Conference in Bahrain (FDIC Bahrain)
- Helped in founding of the American Society of Safety Engineers (ASSE), the Middle East Chapter
- Hosting symposiums for all Human Resources managers in oil & gas companies in the region
- Hosting symposiums for all SH&E managers in oil & gas companies in the region
- Providing assistance to the community in the form of technical assistance and/or making fire fighting equipment available for the protection of properties in Bahrain in the event of fire outbreak (attachment 8).
- Helped in founding of the Regional Clean Sea Organization (RECSO)

### **2.3 Level of Commitment to SH&E Goals**

BAPCO believes that for any SH&E initiative to succeed everyone in the organization has to take part. As mentioned in this document, all SH&E initiative are implemented by steering committees made of employees such as ISC, EAC, Ergonomic Committee, BBS committee, etc.

A common theme notable in all BAPCO SH&E management systems is that all workforces have roles and responsibilities (attachment 3, attachment 1, attachment 28, attachment 47, etc.).

### **2.4 Quality of Labour/Management Relations**

SPS conducted in 2005 (see section 4.5) identified some areas for further improvement in employees'/management relation such recognition for safety performance which scored low by employees. The new bonus scheme, which is performance-liked, was launched to address this concern. Now employees SH&E performance can be recognized via this scheme.

As outlined in section 3.6.1.3, BAPCO Trade Union (TU) present approximately 2000 employees and is notably achieving results in favor of employees. BAPCO has established a committee (i.e. Negotiation Committee) consisting of management and TU board members to discuss and address employees' needs (attachment 9).

One of the priority outputs (i.e. Divisional Objectives) of Human Resources & Administration Division for 2007 is to conduct employees' satisfaction survey to identify and address areas for further improvement in employees/management relations (attachment 6).

Further, Employee Relation section – part of HR Department – provides advice to all management and supervisory levels on formulation and application of Employee Relations policies and procedures to ensure equitable and uniform handling of disciplinary, grievance and other labor cases as governed by Bahraini Labor Law. This section also provides a comprehensive counseling services designed to help promote a conducive and harmonious working environment for all workforces.

Some of other services provided by this section include:

- **Redeployment** – Responsibility for redeploying employees with medical restrictions and surplus employees to positions that match their skills and physical conditions
- **Monitors overtime** – Overtime monitoring and secures compliance with Labor Law requirements
- **Corrective Action Procedure** – Oversees the corrective action procedure
- **Grievance Procedure** – Oversees the grievance procedure
- **Employee Counseling** – Provides employee counseling services

### **3.0 SH&E MANAGEMENT SYSTEM**

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#### **3.1 Management Leadership & Commitment**

Senior management commitment to safety is demonstrated in the Company EHS policy (attachment 1). Duties and responsibilities of senior management are detailed in the Company Safety Standard SS/370/SAF/001 (attachment 3). The management-led committees mentioned above (section 2.1.1) oversee the implementation and sustainability of all Company SH&E programmes. These committees are supported by Departmental SH&E committees, which have direct links to first and second stage SH&E committees in all sections of the Company.

#### **3.2 Organizational Communications & System Documentation**

##### **3.2.1 Quality Management System**

BAPCO manages and operates a Quality Management System (QMS) meeting ISO 9001:2000 requirements to ensure that quality standards are met on a consistent basis at every stage of the manufacturing process. Quality Assurance Department (QAD) is the department ultimately responsible for managing QMS. This system has a view facility link in the Company Portal where employees can access and view any Company procedures.

### **3.2.2 Procedures**

All SH&E documentation including procedures and records are readily accessible to all employees either in the form of hard copies or electronically via Company intranet system (attachment 10). At the introduction of new any procedures, training is conducted and recorded.

### **3.2.3 Meetings**

The SH&E information discussed at the senior level i.e. ISC meetings get disseminated at divisional, departments and sections level through monthly SH&E meetings (attachment 11). Such meetings act as a channel of a two-way communication between employees and senior management. A SH&E representative attends all of these meetings to give timely information to any SH&E concern. Also on monthly basis Contractors Safety Committee meets to discuss Company, local and national related safety issues (attachment 12).

FHS department holds weekly meetings/sessions to discuss with employees (from all other departments) current SH&E issues (e.g. OHSAS 18001, ISO 14001, health surveillance, BBS, etc.) and give an updated accidents statistics and lessons learned.

Further, the FHS department hosts a “Quarterly Award” meeting where all departments engage in a dialogue/discussion with one another highlighting areas for improvement in the Company safety programmes. Based on certain criteria detailed in Safety Standard SS/370/SAF/ 001 *section 6.0*, best performers are awarded (attachment 3).

### **3.2.4 Incident Statistics**

BAPCO SH&E incidents statistics together with details of incidents are posted electronically on the Fire, Health & Safety (FHS) department bulletin board as part of the Company's electronic mail system (attachment 13). Also, incidents statistics are posted on the boards at the entrance of each Company sites. These boards are updated weekly.

### **3.2.5 EHS Week**

EHS week is organized every 18 months by BAPCO in collaboration with contractors, governmental and non-governmental organisations to encourage and increase awareness of safety among BAPCO, Contractors employees, and the surrounding community not only in workplace but also at home. Information in the form of booklets, DVD's, posters, etc. is disseminated to visitors (attachment 14).

### **3.2.6 Environment Fair**

BAPCO held its first ever Company-wide family event: BAPCO Environment Fair 2005, at the Heritage Village adjacent to Bahrain National Museum on Thursday, February 3, 2005, to coincide with Bahrain's National Environment Day celebrations.

The Environment Fair attracted over than 12,000 employees and their families. The event offered a



variety of activities aimed at highlighting what BAPCO is doing to help protect Bahrain's Environment, and also offered practical tips on what employees and their families can do to help improve the environment. A number of BAPCO stands featured displays and offered booklets, leaflets, give-aways and quizzes on a variety of environmental subjects, including information on BAPCO's efforts to achieve greater environmental protection, like the comprehensive Environmental Compliance Plan, BAPCO's Oil Spill Response Plan, the ongoing Energy Conservation campaign, the Company and Awali's recycling programmes. Other stalls addressed issues such as power and water conservation, composting, greenery, desertification and marine environment conservation.

A number of government and other organizations also participated in the Fair, including the Public Commission for the Protection of Marine Resources, Environment & Wildlife, Ministry of Water & Electricity, Ministry of Municipalities & Agriculture Affairs, as were other organizations such as Youth & Sports (GOYS), Environment Electronic Friends Society, GLOBE, Mother & Child Welfare Society, and several of BAPCO contractors.

### **3.2.7 SH&E Publications**

A normal practice in BAPCO is the production of calendars and sponsoring booklets aiming at raising its stakeholders' awareness in EHS management. Several booklets and leaflets on various EHS topics have been published and distributed in various events for BAPCO stakeholders to help in executing the Company EHS Policy.

### **3.2.8 Green School Award**

In order to instill environmental awareness in the youngsters, an innovative award scheme that reward Public Secondary Schools in Bahrain for environmental projects undertaken by students was launched by BAPCO in February 2005 (attachment 14). This unique programme aims to enhance environmental awareness of students by engaging them in developing and implementing a resource conservation project which will promote sustainable development attitude and environment friendly schemes, e.g. saving water, saving energy, recycling, etc., within their schools, homes and the surrounding community.

### **3.2.9 Others**

The Company issue annual report which is delivered to every employee by hand and any other interested stakeholders. There is also a Company-wide weekly Newsletter issued by BAPCO Public Relations Department containing major SH&E highlights of the week and other Company critical activities. This Newsletter is distributed all employees and also made available to interested stakeholders (attachment 15).

BAPCO further participates in SH&E national and international conferences to share and disseminate information to various stakeholders (attachment 16).

FH&S department publishes a 5-minute safety talk on monthly basis (attachment 17). Such publication which is written in Arabic and English is discussed through various safety meetings within the Company.



BAPCO has established a working committee aimed at publicizing, internally and externally, all the Company environmental protection efforts and activities. As part of the publicity campaign an Environment day was planned and pursued in early 2005 (attachment 18).

A summary of all major activities Company-wide is released to employees on a weekly (attachment 19) and an update on status of major projects is communicated to employees on a monthly (attachment 20).

### **3.3 Assessments, Audits, Evaluations and Continuous Monitoring**

High level planning for performance improvement is conducted every year by senior management. BAPCO management sets achievements targets for accident free periods and SH&E management implementation milestones. These objectives are then further broken down to smaller achievable and measurable tasks made in Key Performance Indicators (KPI's) format that are performed by departments' concerned (more details on KPI's in section 2.2). Examples of such objectives include:

- Implementation of Behavioral Based Safety (BBS) process.
- Achieving 11 millions accident free man-hours.
- Conducting Risk Assessments of individual operations (attachment 21).
- Conducting SH&E Inspection across Company facilities (attachment 22).
- Conducting Major Incident Procedures (MIP) exercise.
- Achieving ISO 14001.

Frequent SH&E audits are held according to established Company standards. There are three types of compliance audits conducted internally and programme reviews conducted by external auditors. All audits and programme reviews are documented using an approved audit protocol, which entails a rigid follow-up system that tracks recommendations to closure.

The Company internal audits consist of:

- **Monthly audits** conducted by section heads to ensure compliance with daily EHS activities such as Managers' tour, Permit to Work system (attachment 23).
- **Quarterly audits** conducted by department Managers and Safety Officers to measure SH&E performance (i.e. Health & Safety Performance Audit – HASP) and highlight any pitfalls within the system. This includes Personal Protective Equipment, safety inspections, housekeeping, etc. (attachment 24).
- **PSM compliance audits** are conducted to verify compliance with and effectiveness of BAPCO PSM policy, standards and procedures (attachment 25).
- **OHSAS 18001:1999 audits** are conducted every six months by Det Norske Veritas (DNV) to verify compliance with OHSAS 18001 standards (attachment 26).
- **ISO 14001 internal audits** are conducted by BAPCO internal auditors to find and address gaps in BAPCO Environmental Management System (attachment 27).
- **Environmental Impact Assessments** are conducted for all projects where deemed necessary by local

regulatory authority (attachment 28).

- **Operational Excellence audits** are developed by Chevron Texaco Corporation which is a systematic management of Safety, Health, Environment, Reliability and Efficiency to achieve world-class performance (attachment 29). OE specialist auditors conducted their first audit during 2005 (attachment 30).
- **Quantitative Risk Analysis (QRA)** is conducted to identify scale of the threats & vulnerabilities, analyze them to ascertain the exposures, and highlight how the impact can be eliminated or reduced.

For this purpose the Company has 17 approved and trained auditors, drawn from various departments in the Company, who meet annually to decide an audit plan for the coming year. These auditors report their findings to the full-time PSM Co-ordinator (in the case of PSM compliance audits) and to concerned department manager in case of monthly, quarterly and annual audits who collates information and forward findings to individuals concerned for action and follow-up. After corrective actions are established and agreed, an overall report is issued and distributed to all departments and management including employee representatives.

### **3.4 Hazard recognition, evaluation, and control**

In line with the Company EHS Policy, detailed risk assessments for all work activities are conducted where risks associated with work activities are identified and controlled to acceptable limits. These risk assessment (attachment 21) are reviewed on a regular basis to ensure their validity.

These assessments do not only address safety aspect but also occupational health and the working environment. Teams of employees drawn from various departments are conducting these risk assessments.

### **3.5 Workplace design and engineering**

#### **3.5.1 HAZOP Studies**

In 1983, BAPCO undertook a programme of Hazard and Operability Study (HAZOP) studies which is aimed at improving the safety and reliability of its operations. HAZOP is currently continuing under PSM element Process Hazard Analysis (PHA) of Existing Facilities (SS/370/PSM/402/SH) (attachment 31) and Hazard and Operability Studies (HAZAOPs) of Engineered Projects: Engineering Design Guide (SS/370/PSM/422/SH) (attachment 32). The purpose of such studies is to assess whether the SH&E measures are acceptable in new or existing projects or plants. HAZOP is conducted across the organization for existing and new projects to ensure that (attachment 33).

#### **3.5.2 Projects Review**

Before any new projects are approved a team of BAPCO experienced employees (i.e. operation specialists, process engineers, environmental engineers, Fire specialists, Safety specialists and occupational hygienists) review all design documents to ascertain their compliance with Company Engineering standards. The review takes place at 30% of engineering design completion, and 60% and 90% of design drawing completion.

### **3.5.3 Mechanical Integrity (MI)**

Mechanical Integrity (MI) is BAPCO's Process Safety Management (PSM) element #7. The objective of the mechanical integrity element is to ensure the integrity of process equipment, to prevent fires, explosions, toxic exposures and damage to the environment from releases of highly hazardous materials (attachment 34).

## **3.6 Operational SH&E Programmes**

### **3.6.1 Contractors Management**

BAPCO places great emphases on management of contractors to ensure that they are aligned with the Company SH&E management approach. Over the years BAPCO has developed a comprehensive contractors SH&E management system which is detailed below:

#### **3.6.1.1 Contractor EHS Committee**

The contractors' EHS programme is overseen by the ISC and audited on a regular basis by FHS department for their effectiveness and efficiency (attachment 35). The results of these audits are communicated to the ISC for review.

To encourage our contractors' participation in the Company's SH&E programmes, the Company has established a committee, which consists of Contractors compliance officers and Company's representatives, to address SH&E matters and they meet on a monthly basis (attachment 12). The committee also includes members from BAPCO Divisions/Departments dealing with contract work activities and major contractors serving the Company on a regular basis.

#### **3.6.1.2 Contractors Equipment Checks**

All Contractor Equipment is inspected annually by the Company's Plant Maintenance Department (PMD) and a tag is attached to the equipment, which indicates fitness for use and the date of next inspection.

The Equipment Monitoring System forms part of the Qualifications Registration System (QRS) - a computerized data recording system – utilized by Shutdowns & Major Maintenance (S&MM) and Plant Maintenance Departments to record and track details of contractors' personnel and equipment.

#### **3.6.1.3 Contractors Trade Testing**

Contractor's personnel must undergo trade testing as follows: -

The first part of the trade test consists of questions on the SH&E induction course. The employee must pass this part of the test before taking the skill part of the test.

The assessment and trade testing of contractor tradesmen or labour is conducted by the BAPCO specialist authority for the skill involved, as defined in the Contractors' Job Classification list.

FHS department audit Contractors' SH&E programme at least once every three years. The audit shall comply with the audit standard developed by the Contractors Working Committee or other written terms of reference.

#### 3.6.1.4 Contractors Pre-Qualification

The government of Bahrain has recently decided to have all contract works open to the public tendering versus having these contracts done by the Company's approved contractors. This situation raises a concern over the contractors' level of H&S management and its alignment with BAPCO SH&E management systems.

To ensure that all new contractors hired work with a high level of SH&E management system, the Company has started pre-qualifying contractors before they are allowed to bid on a tender. Pre-qualifying focuses on the contractors H&S management system in details, integrity of equipment used, personal protective equipment, etc. (attachment 36)

#### 3.6.1.5 Contractors Compliance Officers

All Contractors are expected to employ full-time qualified compliance officers to oversee the compliance and implementation of BAPCO and Contractors EHS Programmes.

In addition to the above, contractors are also expected to have (see attachment 37):

- Annual SH&E objectives.
- Comprehensive SH&E Management system
- Incident reporting procedure (i.e. incident causing harm to people, environment or process)
- Safety Inspections plan & hazards identification and analysis scheme.
- EHS Competition and Incentive Scheme.
- Emergency Response Procedure.

### 3.6.2 Process Safety Management (PSM)

Although not required by the law, the Company fully implemented Process Safety Management (PSM) system since 1995. Using this approach, the process design, process technology, process changes, operational and maintenance activities and procedures, non routine activities and procedures, emergency preparedness plans and procedures, training programs, and other elements that affect the process are all considered in the evaluation.

Departments' involvement is essential if the programme is to succeed. In developing our PSM System, various department championed implementation of the elements of the PSM System. (The Department assigned Lead Departments for the implementation of each of the PSM elements). It took us about four years to fully implement the 12 PSM elements. These are: Process Safety Information, Process Hazard Analysis, Operating Procedures, Mechanical Integrity, Safe Work Practice, Management of Change, Training, Incident Investigation, Contractors, Emergency Planning & Response, Pre-start up Safety

### **3.6.3 Management of Asbestos**

Throughout the long history of BAPCO asbestos has been used extensively in various forms. In the early 1970's, official Memorandums have been identified recommending the discontinuation of asbestos due to its health impact.

The early eighties saw the first Occupational Hygiene Report documenting the manner asbestos removal was conducted under uncontrolled conditions and this Report and subsequent Reports and Standards formed the beginning of asbestos control in maintenance activities within BAPCO.

With this said, the Company has developed a multimillion dollars, 5-year plan to remove all asbestos in the Company owned properties (attachment 38).

### **3.6.4 Mutual Aid**

The Company maintains a technical liaison agreement with local major companies to exchange EHS information and during emergencies (attachment 39). BAPCO is currently taking the initiatives further by going into EHS liaison agreement with all major oil companies in The Persian Gulf Region (attachment 40).

### **3.6.5 Ergonomic Programme**

BAPCO has established Ergonomic Programme to manage agronomical hazards within the Company. This programme is managed by a committee which is made up of representatives from various operating departments. The aim of this committee is to increase the awareness level for all employees in the principles of ergonomics. Figure 2 summarizes the workflow of this committee.

### **3.6.6 Behavior Based Safety (BBS)**

The need for behavior based safety (BBS) was first identified when an analysis of Company accidents was carried out and revealed that up to 90% of accidents were attributed to human behavior. This finding was supported by a study (i.e. Safety Perception Survey) conducted by the Company in 2005. A third party audit (i.e. Operational Excellence) then re-emphasized the need for BBS.

Based on the above, BAPCO decided to implement and sustain a BBS process in late 2006. The Company BBS initiative is now called “**BOOST**” which stands for Behavior Observation Obtains Safe Trends. Once **BOOST** is fully implemented, the following will be achieved:

- Greater involvement of all employees in risk assessment and work planning.
- Employees at all level use their discretion to spot and fix problems before they occur.
- Greater responsibility for their work, including utilization of safe working practices.
- Increased involvement and enhanced skills in conducting shift handovers, ensuring that both vital safety and production information are communicated.
- Improved knowledge of plant and process, which will enable employees to behave in a safer manner due to better understanding of the plant.

- Smoother operations due to increased uptime allow all staff more time to think ahead, rather than react to unplanned events.

### **3.6.7 Employees Medical Surveillance**

The purpose of medical surveillance is for the early identification of conditions, if any, that could present an increased risk of adverse health effects related to the task being performed. Based on the type of work being performed, including consideration of factors such as the duration of the task, the materials being used, and the potential for exposure, medical surveillance is either recommended or required for the job.

The Company Medical Surveillance standard (attachment 41) details BAPCO approach in maintaining this programme; and the roles and responsibilities of key players.

### **3.6.8 Public/Environmental Health**

The Public Health Section forms part of the Occupational Health Group, based at the Refinery Clinic. Public Health or Environmental Health, as it is more commonly known, is responsible for monitoring the health and well being of staff which covers areas of air borne infections, air quality, water quality, food safety and pest control Attachment 42 – is the end of year report which shows various monitoring parameters.

### **3.6.9 Material Recycling Programme**

The Company has an ongoing programme for paper and cardboard recycling. This has recently been extended to recycle printers and copiers cartridges. The programme is an extension of an already established Awali community activity.

### **3.6.10 Energy Conservation**

Part of its “strive for excellence” vision, BAPCO has recently launched a 100-day campaign called “Energy Blitz” with the aim to increase awareness of energy conservation issues both at work and at home, and to explore new ways to conserve energy at the refinery with the ultimate goal of reducing refinery energy consumption by 6.5% by 2007 (attachment 43).

Two Refinery Energy Teams (RET) were formed in 2002 as the result of a Refining Division Priority Output as part of the Company’s Strategic and Business Planning Process.

BAPCO’s Energy Vision, developed by the teams, is “*We constantly explore energy saving opportunities across all our business activities through committed and innovative staff*”; the Company’s Energy Mission is to reduce Refinery energy consumption by 6.5% by the year 2007.

Since 2002, RET teams have been reviewing operating practices, and have identified the required measurement device needed to implement energy best practices. They have also worked on motivating the Operations and Maintenance employees who are the Refinery’s energy front-liners to tackle the areas,

which can be improved to guide BAPCO towards more energy-efficient operations. A number of capital and non-capital expenditure projects, which will lead to energy conservation, have also been identified, together with ways to effectively monitor and measure the improvements expected.

During the 100-day Blitz, all employees received a booklet entitled “Energy Conservation - Your Daily Guide”, which explains the importance of energy conservation and gives simple ideas on how this can be achieved. Employees at the front line of the Refinery’s energy consumption also attended presentations on the roles they play in the Company’s energy conservation efforts and received additional publications about energy conservation at work. All material related to the Blitz will use the new energy-conservation logo. The Blitz was led by RET teams, with the support of Energy Champions from Refining and Maintenance Divisions who have been equipped with M3 ammunition: Monitor, Measure and Motivate. Posters and banners put up throughout Refinery areas reminded employees of the ongoing campaign. At the end of the 100 days, an audit was conducted to measure the campaign’s impact, including any reduction in the Refinery’s Energy Intensity Index (EII) (attachment 44). The programme started in the Refinery and will be extended to the rest of the organization in the near future.

### **3.6.11 Oil Spill Contingency Plan and Response**

It is the Company policy that any pollution incident at sea or land arising from its operations, will be promptly addressed, the first priority in all cases being to stop the pollution. A comprehensive Oil Spill Contingency Plan has been developed, which is aligned with the Bahrain National Oil Spill Contingency Plan (attachment 45). The Contingency Plan is exercised on a regular basis to ensure preparedness for emergencies and is intended to assist Company personnel in achieving a rapid and effective response to any oil spill arising from Company operations.

The oil spill response organization is manned with highly professional trained staff. Major exercises are regularly performed where concerned agencies from Bahrain, the Gulf countries and the US Navy are involved, to ensure preparedness and co-operation.

### **3.6.12 Major Incident Procedures (MIP)**

Any major emergency situation (defined by the MIP manual) requires an immediate response by General Manager Refining, Manager at-interest, Manager FH&S or their deputies (attachment 46). MIP manual specifies the actions to be taken to control major emergencies.

Fire Instructions Standard (SS/300/FIR/101/SH) outlines procedures to be adopted in the event of a fire or emergency involving Company properties and processes (attachment 47).

### **3.6.13 Environmental Projects**

#### **3.6.13.1 Refinery Gas Desulphurization Project**

The objective of the project is to improve the quality of fuel gas and also meet limits for SO<sub>x</sub> emissions prescribed in local Regulations which is in line with the World Bank Organization (WBO)



guidelines. This project will include new and modified absorbers, a new sulfur plant and tail gas treating unit, and new sour water treating facilities, all specified to meet SO<sub>x</sub> and effluent discharge emission limits. Due to the nature of this project, its implementation will be a gradual phasing of unit connection to the above centralized gas cleaning and sulfur recovery facility. The entire project is scheduled for completion in early 2008, at an estimated cost of US\$140 million.

#### 3.6.13.2 Point Source Emissions of Nitrogen Oxides

Typically the refinery is unable to meet the NO<sub>x</sub> point source requirements for five of the qualifying stacks, the HP Boilers, by a very small margin, and for three other stacks, the gas turbines by a larger margin. However, in a study conducted by Lehmeyer, a German Consultant, for the Government Environmental Affairs, it was concluded that BAPCO's NO<sub>x</sub> contribution to the ambient air quality is not significant.

Despite this, BAPCO's policy now is to implement Low NO<sub>x</sub> technology and equipment under any new service.

#### 3.6.13.3 Control of Volatile Organic Compounds (VOCs)

High vapour pressure fuels, especially motor gasoline, have been traditionally stored in single seal floating roof storage tanks, which result in the VOCs being released to the air.

The current local Regulations require the refinery to have a VOC abatement programme. The ongoing Refinery programme to retrofit secondary roof seals to the light product tankage such as Gasoline and Naphtha, and the on-site VOC pilot study to be planned for future phased implementation, will eventually result in compliance with this aspect of the Regulations.

The secondary tank roof seal installation programme has been ongoing since 1997 and is typically done when a tank is taken out of service for its normal maintenance cycle. It is anticipated that all regulated tanks will have secondary roof seals fitted by 2007, at an estimated total cost of US\$7 million.

#### 3.6.13.4 Low Sulphur Diesel Production (LSDP) Project

The project will produce Low and ultra-low Sulfur Diesel (50 – 10 ppm) to meet the local and international markets specifications. This will improve the air quality in Bahrain and other countries through SO<sub>x</sub> emission reduction. In addition to its environmental benefits, this project is fundamental to the strategic direction of the Company and its contribution to the national economy. The cost approximately US\$800 million and it is at commissioning stage since April 2007.

#### 3.6.13.5 Kerosene Merox Project (Figure 3)

The most significant pollution reduction was accomplished through the implementation of the Kerosene - Merox process in which sulphur compounds are converted to disulphides, eliminating discharges of Lead Sulphide (PbS) to the effluent system. This project constitutes the use of cleaner

production technology in producing jet fuel. The Merox process replaced an antiquated, environmentally harmful Lead based process. The project was commissioned in 2001 at cost of US \$29.5 million.

#### 3.6.13.6 VBU PbS Treating

A further potential source of lead in effluent came from the PbS Visbreaker Naphtha treatment unit. A study to eliminate the effluent considered replacing the PbS treating unit with a small-scale Metro treater, but eventually recommended a process alternative to re-route the Visbroken Naphtha stream to the existing Unifiner/Platformer Plant where sulfur is converted to hydrogen sulfide. This process change has now been implemented.

#### 3.6.13.7 Unleaded Gasoline Project

The unleaded gasoline project has eliminated the use of Tetraethyl Lead (TEL), and consequently removed the contamination by organic lead of tank water bottoms, hence refinery effluent. The project has also resulted in eliminating the lead emissions to the air in line with global leaded gasoline phase out. This project was completed and Bahrain was declared as unleaded in September 2000.

Additionally, BAPCO has ceased producing leaded gasoline for the international market. All shipments of gasoline since October 2002 have been unleaded.

The local and the international gasoline grades were made possible through reformulation (blending changes) of gasoline stocks material. This project was completed in July 2000 at a cost of US \$6.9 million.

#### 3.6.13.8 Re-routing of Sitra Tank Farm Wastewater

The liquid effluent from the Sitra Tank Farm site usually contains free and dissolved hydrocarbons, as well as phenols, as a normal consequence of tank farm operations. Certain other contaminants (sulphides and suspended solids) are sometimes present above the regulated limit. A project completed in 2002 has enabled the transfer of these collected effluents streams back to the main Refinery effluent treatment area, at a cost of US\$1.6 million. This project allows better treatment of hydrocarbons in the refinery.

A similar project to pipe the effluent from the marketing terminal to Sitra Tanks was completed in August 2003 at a cost of US\$150,000.

#### 3.6.13.9 Refinery Wastewater Treatment

Approximately, 3,500 USGM of wastewater is currently released to the sea after treatment through an API separator; skim pond and Induced Air Flotation (IAF) units. This treatment principally reduces oil and solid contents of the wastewater.

Other contaminants such as sulphide, phenol and ammonical nitrogen do not meet the required discharge limits due to lack of adequate treatment facilities. A project is underway to identify

opportunities for wastewater minimisation and for the design of a new treatment facility, which will provide tertiary treatment of the wastewater (dissolved solid pollutants) so that the effluent discharge quality will meet the required legal limits for all parameters. Currently, a pilot plant (Figure 4) is constructed in refinery to test the suitability and the effectiveness of the technology. The project cost is US \$7 million.

#### 3.6.13.10 Sewage Treatment Plant

At present all the refinery sewage is sent to the sea without treatment. Discussions over the last several years have focused on whether the Government would implement plans to build a sewage plant at neighboring village Ma'ameer, in which case the refinery would construct a sanitary sewage pipeline to that plant, or whether the refinery should construct its own facility.

Due to the lack of progress on Ma'ameer village project, the Company Board of Directors has decided to proceed with a sewage treatment plant at the refinery. The project cost is 5 US \$5 million, and the scheduled completion is 2009.

#### 3.6.13.11 Hazardous Waste Class (1) Landfill

Although not part of Environmental Compliance as there is currently no local Environmental legislation for the disposal of hazardous solid wastes, the Company adopted to proceed with this important project which have a positive and long-term impact on the environment. The landfill caters for the treatment and disposal of solid hazardous wastes resulting from BAPCO's operations. The project was commissioned in early 2007 with the construction cost of US \$2.9 million (Figure 5).

#### 3.6.13.12 Centralized Sludge Handling Facilities

In addition to that generated from its own operations, BAPCO receives waste oil from outside sources on the island which is generally in the form of oily sludge. In order to minimize the impact of this sludge on the effluent system and for the purpose of minimizing solid generation, a project is currently underway to build a centralized sludge handling facility. The facility will contain equipment to remove oil and water and separate the solids and will achieve a waste volume reduction of more than 60%.

This project is on hold since an alternative method for treating the sludge is scheduled for construction during 2005 by an independent company. The anticipated cost for this project is US \$5-10 million.

### **3.7 Employee Empowerment & Involvement**

#### **3.7.1 Individual responsibility for SH&E**

All job descriptions in the Company clearly define the individual's responsibilities for his/her position (attachment 3). All employees are assessed for Safety performance as part of their overall appraisals. They are also encouraged to participate in all related H&S programmes and activities

#### **3.7.2 Trade Union (TU)**

There are approximately 2000 employees in the trade union (TU). By actively involved in all Company existing and new activities, BAPCO TU maintains a strong relationship with the management. There is a TU representative in the ISC who act on behalf of Company's employees in strategic decisions concerning SH&E management. There is also a TU representative in the BBS implementation steering committee who participates in steering the implementation of such important programme.

### **3.7.3 Task Forces**

All Company standards and procedures are developed by task forces. These task forces consist of employees drawn from the department concerned with knowledge and competence in the subject matter such as Engineers, Occupational Hygienists, Occupational Health & Safety Professionals, Radiation Protection Advisors, Loss Prevention Advisor, etc. It is noted that this approach of involving employees in creation of Company standards, procedures, etc. create some kind of ownership between employees and SH&E programmes.

### **3.7.4 "Good Idea" Scheme**

Employee Suggestion Scheme "A Good Idea" launched in January 1996 to encourage employees' participation and involvement in the Company's business with their ideas on how to improve Company overall performance (attachment 48). This scheme not only taps the employees' creative and imaginative talents but also makes the employees feel part of the business and have pride in their contribution towards Company's successes and achievements. Every employee's suggestion to the "A Good Idea" scheme is looked at as an important individual contribution and given the necessary time and effort to evaluate it (attachment 49).

Every good idea accepted wins a cash award for the employee and his/her supervisor. Cost saving and award given since the introduction of the scheme is US\$6 million and the number of ideas submitted are 3,750 ideas.

### **3.8 Motivation, behavior, and attitude**

As recommended by the safety perception survey (SPS) conducted in 2005, on a monthly basis every senior leader tours a facility whereby he/she meets with employees and talk about their safety and well-being. Our experience indicates that senior management visibility can dramatically motivate employees and positively impact their behavior. Attachment 50 is the timetable of senior management tour for the year.

The Company introduced a scheme in 2002 which supports BAPCO effort of motivating employees and hence positively impacts their behavior. This progressive scheme recognizes exceptional employee behavior demonstrating the five BAPCO values: Business-Like, Respect, Teamwork, Integrity and Innovation.

The awards are known as the *Excellence Awards*. To merit an award, employee behavior must support of BAPCO values as well as support the Company's Mission and Vision (attachment 51).

Further, based on the recommendations of SPS the Company is now in the processing of implementing and sustaining a behavior based safety (BBS) process. This approach helps us identifying the barriers preventing employees working/behaving in an unsafe manner. These barriers will be removed once they have been identified. More details of BBS process in 2.4.

### **3.9 Competency-building**

#### **3.9.1 Employee competency-building**

Under PSM standard SS/370/PSM/404/SH (attachment 10) all new employees attend a one-day training programme (attachment 52). In addition, new employees undergo a structured training programme which is referred to as “Individual Training Programme (IDP)” (attachment 53) such programme is customized and linked to roles and responsibilities of individuals. Also, some training needs is identified by risk assessments while others are provided as part of new programme lunching e.g. Occupational Health and Safety Assessment Series (OHSAS 18001:1999). All training sessions including IDP’s are evaluated and analyzed to identify areas for improvement.

BAPCO have a well-equipped dedicated fire training school and a training centre for training of all employees. Regular EHS training courses are conducted for all employees and contractors dealing with Company’s various EHS related issues. Figure (6) shows a sample of the number of SH&E training conducted during 2006 verses number of employees attended.

The Company runs a modern training and development centre (Training & Development Department – TDD) which provides training and development services to satisfy BAPCO's present and future training and development needs (attachment 54).

The Department aims at achieving the following goals:

- Assist customers in identifying training needs to meet changing business requirements.
- Plan and implement cost-effective training to satisfy needs.
- Continuously validate and evaluate training effectiveness and customer satisfaction.
- Support Bahrainisation and succession plans.
- Promote continuous improvement philosophy.

TDD provides training for BAPCO employees in communication & IT, operations, supervision & management, and technical skills (attachment 55).

TDD maintains a modern Learning Resource Centre (LRC) which contains learning and reference materials in a number of media – PC, video and audio, as well as text-based. It has a number of multi-media computers, and video and audio work-stations which provide self-study facilities. The LRC also contains our library of books and reference material.

#### **3.9.2 Contractors competency-building**

BAPCO believes in the philosophy of that the more contractors are aware of the Company SH&E

procedures, the more they become aligned and hence easier managed. With this said contractors' personnel undergo trade testing, which consists of two parts; first part consists of questions on the EHS induction course, where the employee must pass this part of the test before taking the skill section of the test.

In addition, BAPCO facilitates regular training sessions to raise contractors' competence level. The following is a sample of the training provided:

- Fire Fighting training
- Behavioral Based safety awareness
- Permit to work procedures
- Emergency procedures
- Contractor safety procedures
- Environmental awareness
- Accident investigation procedures
- Report writing

#### **4.0 PERFORMANCE MEASUREMENTS AND INFORMATION MANAGEMENT**

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BAPCO recognizes that SH&E Performance Measurement/review is a vital part of the Company overall SH&E Management System. It consists of two parts namely Proactive and Reactive Performance measures.

##### **4.1 Reactive Indicators**

The Reactive (Lagging) SH&E Performance is measured by measuring the number of accidents/incidents and their rates, the number of lost days of work, and the number of occupational illnesses, environmental violations and other similar losses and comparing them to previous year's performance. BAPCO utilizes internationally accepted standards such as ANSI 16.4 so that it makes comparison and benchmarking possible with other refineries around the world.

##### **4.2 Proactive Indicators**

The Proactive (Leading) SH&E Performance is measured by employing Health and Safety Performance (HASP) measurement system. This system is designed and implemented by BAPCO (attachment 24). HASP is designed to give a comparison of each department performance under several factors. These factors include the quality of accident investigation reports, adherence to Personnel Protective Equipment Procedures, number of and quality of safety inspections, safety meetings, quality of follow-up system, etc. This system divides BAPCO departments into three risk categories (attachment 3). Such categories are based on the degree of man/machine interface that reflect the level of risk associated with the department's activities.

In addition each section in the organization has to perform SH&E activities and document the results in a purposely-located SH&E binder in the manager's office. These binders are audited every quarter and audit results are published by FHS department.

Other measurement tools are employed in an ad-hoc basis or as seen necessary by the ISC to complement

the ongoing SH&E performance measuring systems such as compliance audits, SH&E programme reviews and similar tools.

#### **4.3 H&S Key Performance Indicators (KPI)**

H&S Key Performance Indicators (KPI's) merge from the Company's Mission, Vision and Objectives (attachment 56). H&S KPIs employ both leading and lagging measuring tools to measure and highlight improvement areas in the Company-wide H&S management system and thereby bridge any gap identified.

#### **4.4 Environmental Performance Index (EPIs)**

Similar with H&S KPIs, EPI measures the Company-wide environmental performance and identify any improvement opportunities. EPI is updated a monthly basis and is made available to Company stakeholders (attachment 57).

#### **4.5 Safety Perception Survey (SPS)**

This survey is set out to measure the Company safety culture and also measure the gap in perception of top management, middle management and employees. The survey was conducted in 1998 and repeated in 2005 to compare the results and assess any improvement (figure 7 and attachment 58).

The survey result was presented to the ISC and later to all employees to seek their advice and directive especially regarding next steps to be taken to have the issues highlighted by the survey dealt with. The survey identified strengths and weaknesses in the Company H&S Management System. Many of the Perception Survey elements are on going and require continuous monitoring if the creation of a positive safety culture is to be sustained and be fully achieved in any organization.

#### **4.6 Environmental studies**

As part of its performance and continual improvement philosophy, BAPCO has been conducting environmental studies on Air Emissions, marine environment; and soil and groundwater. These studies; carried out by specialized consultants; were based on risk assessment to humans, and the surrounding eco-system.

##### **4.6.1 Air Emissions Studies**

A qualitative study on air emissions to environment was conducted during 2005. In addition, separate air dispersion modeling studies have been previously carried out for the Low Sulfur Diesel Project (LSDP) and Refinery Gas Desulphurization Project (RGDP) to assess the potential environmental impacts associated with the current refinery operations as well as post LSDP and RGDP refinery operations.

Additionally, a detailed assessment will be carried out in 2007 to identify and quantify the various Hazardous Air Pollutants (HAPs) including VOC and particulate emissions from the Refinery, Oil & Gas Production, Sitra Storage and Marketing terminal as well as selected service stations. The assessment will also include the identification of potential health impacts on the employees and the surrounding communities from the emissions.



#### **4.6.2 Marine Assessment studies**

The coastal and marine area along the Northeast coast of Bahrain is being subjected to significant influences from various anthropogenic activities. In order to evaluate the impact of these activities on the marine eco-system, BAPCO has been conducting regular marine assessments off the refinery and Sitra facilities since 1981 using the same well known International experts from the Universities of Stockholm and Kalmar, Sweden. Consequently their observations, knowledge of the trends in the local marine eco-system and data collected is unique covering a span of 21 years.

The marine assessment study includes measurement of parameters that require regular monitoring in order to ascertain whether the marine eco-system is improving or otherwise.

These parameters include measurement such as concentration of petroleum hydrocarbon in sediments and bivalves, heavy metals and PAH (poly aromatic hydrocarbons) in the sediment. The latest marine assessment (Figure 8) was completed in May 2007.

#### **4.6.3 Soil and Groundwater Studies**

The first phase of Soil and Groundwater contamination investigation study which comprised of a desktop study and a walk over survey was completed for the refinery, Sitra Tank Farm and Wharf between March and May 2005 (attachment 59).

The purpose for this study was to identify the potential sources of soil and groundwater contamination and to conduct a preliminary risk assessment associated with the potential contamination. The first phase of soil and groundwater investigation report has highlighted a number of areas within the refinery and Sitra which are potentially contaminated from past activities. These potentially contaminated areas could present a significant risk to human health and the environment. In order to confirm the first phase report findings, a detailed quantitative assessment of soil and groundwater contamination has been planned to be carried out in 2007. This would involve intrusive sampling of soil and groundwater from the study areas and analyzing them for harmful contaminants.

## **5.0 SH&E RESULTS**

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The Company recognizes the value in both proactive and reaction SH&E performance indicators. The outcomes of these performance measures are utilized to improve SH&E performance and in drawing the Company strategic SH&E directions.

The outcomes or recommendations of any study (e.g. SPS, Marine assessment studies, etc.) or internal/third party audits (e.g. OHSAS 18001, OE, etc.) are discussed at a high level where all recommendations are taken onboard. Notably, as a result of the SPS conducted in 2005 supervisors are now taking a 3-day training course to raise their H&S understanding and supervision level. Also, BAPCO has been addressing the outcomes of the Company energy conversation programme (i.e. detailed in section 3.6.10) which in turn

dramatically reducing the energy consumption.

The outcomes of reactive are also utilized to improve SH&E performance. Such as publishing lessons learned from accidents in the form of 5-minute safety talk leaflets, or using the incidents statistics to training employees to help them prevent reoccurrence.

The Company has developed tracking systems to help us keep track of recommendations actioning:

- *Incident Tracking System*

BAPCO is utilizing a system called “Meridum” to maintain data related to SH&E incidents.

This system captures the action items from SH&E incidents and update their status. There is a tool built within this software which can be utilized to analyze the data. Meridum is also used by the Reliability department and PMD to store and analyze equipment history to predict failure of equipment.

- *Action Item Issue Tracking System (AIITS)*

The Company is currently developing an application to define the procedure for Audit Issue Tracking and Project management solution for better control issues across multiple audits and follow-up of actions related to issues or tracking status of FH&S equipment (attachment 60).

## **6.0 LINKAGE BETWEEN SH&E AND BUSINESS PERFORMANCE**

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### **6.1 Integration of SH&E and Business Management System**

Figure 9 summarizes how SH&E is integrated with overall business management system. As demonstrated in the pervious sections of this document, SH&E values and goals are extensively found in the Company’s strategic objectives, mission & value statement, all policies including operation, engineering, and maintenance, and procedures. All of these activities supported by employees appraisals (i.e. bonus scheme) and employees recognition scheme; geared toward the integration of SH&E into BAPCO overall business performance.

### **6.2 SH&E as a Core Corporate Value**

As mentioned in this document, employees of all levels manage SH&E issues as part of their daily activities. All SH&E initiatives (e.g. ISC, EAC, Oil Spell Emergency Plan, PSM, etc.) are headed by senior management (i.e. custodians) which clearly demonstrates that SH&E is seen as a core corporate value.

Justifying multimillion dollar SH&E projects (e.g. RGDP, wastewater treatment, employee surveillance, BBS, etc.) exhibits senior management attitude toward SH&E management. The Safety Perception Survey conducted in 2005 highlighted that “Management Credibility” scored high not only by middle management but also shop-floor employees.

### **6.3 Alignment of SH&E with Corporate Objectives and Strategies**

SH&E corporate objectives and strategies are cascaded down to departmental level objectives (i.e. priority output). For year 2007, “Conducting Employees Satisfaction Survey” is a priority output for the HR

department which is linked the corporate objective “Improved Image”. Similarly, “Contractors Safety Management System Aligned” is a priority output for FHS department which is linked to “Improved Image” corporate objectives.

Also, LPO and ERM (see section 6.5) are tools which can be utilized to help senior management align SH&E with corporate objectives and strategies.

#### **6.4 Continuous and Systematic SH&E and Business Performance Improvement**

Figure 10 shows BAPCO’s approach in SH&E management and business performance continual improvement which highlights weakness and areas for further improvement.

#### **6.5 Dynamic Nature and Interactivity of SH&E with Other Operational Functions**

BAPCO’s Reliability Management System (attachment 61) assesses reliability of the performing assets through metrics such as Operational and Mechanical Availability of plant and equipment, On-stream factor and Lost Profit Opportunities (LPO) (attachment 62). Also in place is the Incident Notification and Investigation process which helps to identify root causes of incidents and recommends methods to prevent recurrences. In the Refinery, Area Reliability Teams (ARTs) drive the reliability initiatives, analyzing available data and using operating experience to identify and eliminate ‘bad actors’ and determine and prioritize reliability factors.

Enterprise Risk Management (ERM) is a new Company initiative that helps management be more confident in taking strategic decisions while all significant risks are identified and managed.

Attachment 63 outlines the risk metrics measured. Figure 11 shows how ERM interrelated to other business operations and benefits of ERM.

#### **6.6 Demonstration of Improvement in Productivity through SH&E**

BAPCO’s outstanding SH&E management played a significant role in the safe completion of the refinery’s Fluid Catalytic Cracking Unit (FCCU) shutdown in early October 2004. The shutdown took only 36 days and a half to complete, setting a new benchmark in shutdowns. Data from international surveys show that the average length of a turnaround and inspection for an FCCU is 44 days, and for a plant the size of BAPCO would be 49 days. SH&E plan is prepared before a major shutdown commenced and its compliance is vigorously monitored by employees and contractors involved in the shutdown (attachment 64).

In July 2004 the Company achieved a record 11 Million Man-hour without Lost Time Accident (LTA) (i.e. injuries involving a loss of work time exceeding 24 hours). An outstanding rate of reliability and safety at BAPCO facilities compares favorably with the oil industry worldwide as a whole.

Attained the best record on Energy Intensity Index (EII) during the 2nd quarter with all units running, no emergency unit shutdowns, minimal flaring and low gas purchase (see section 3.6.10).

LPO report shows the prime indicators of the overall performance of the business which are “Operational Availability”, “Mechanical Availability” & “On-Stream Factor”. These factors are influenced by SH&E, process reliability and efficiency.

## **7.0 OTHER FACTORS**

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### **7.1 H&S Awards and Achievements**

For two years in a row (i.e. 2004 and 2005) and 2002 BAPCO have been awarded “Royal Society for Prevention of Accidents (RoSPA) Highly Commended in the Oil & Gas Industry” which demonstrates the Company’s high commitment towards safety management. BAPCO has also been awarded with a British Safety Council (BSC) International H&S Award this year which distinctly exhibits the Company H&S performance not only at a national level but also internationally.

BAPCO was also recognized by the American Society for Safety Engineers (ASSE) for the company’s outstanding safety record acknowledging the excellent work placed on industrial safety by awarding the Company’s previous Chief Executive (Mr. Hussain Tadayon) the ASSE President’s Award. This prestigious award is presented to few executives across the world for their significant contributions to the safety profession and to injury illness reduction. Dr. Mustafa Al Sayed (current Chief Executive) was awarded the “2006 GCC best environmentalist award” by Gulf Countries Corporation (GCC) Secretariat for pioneering best environmental practices during 2005 -2006.

In July 2004 the Company achieved a record 11 Million Man-hour without Lost Time Accident (LTA) (i.e. injuries involving a loss of work time exceeding 24 hours). An outstanding rate of reliability and safety at BAPCO facilities compares favorably with the oil industry worldwide as a whole.

### **7.2 SHEQ Moments**

All meetings that take place in the Company begin with Safety, Health, Environment or Quality (SHEQ) moment including board meeting which is chaired by the Bahrain Minister of Oil & Gas. Topics of SHEQ moments include lessons learnt from an incident, saving made by Energy Conservation programme, success stories of BBS or any other SH&E programme, etc.

These moments, although very short in duration make it clear to all employees including management that SH&E are as important as the operational dimension.

### **7.3 Bonus Scheme**

The Company operates an annual bonus scheme. This scheme is based on a philosophy that helps BAPCO develop its performance (including SH&E) to be in harmony with its overall strategic direction.

Employees are periodically notified of the general performance of all the measurement and how the performance affects the bonus (attachment 65).

#### **7.4 Honoring Diligent & Outstanding Employees**

Every year, a number of diligent and hard-working employees are nominated and honored by the Ministry of Labor in a special ceremony under the patronage of His Majesty the King of Bahrain. Nominations are based on a number of criteria including employee's degree of discipline, working behavior, and level of his/her productivity.

#### **7.5 Enforcement History**

The Company has not filed any SH&E related prosecutions or enforcement notices from local authorities since its inception. BAPCO has developed Environmental Complaints Management Procedures (EW/600/EMS/503/EN) which details the steps to be taken to address any environmental complaints.

### **CONCLUSIONS AND RECOMMENDATIONS**

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It is important to note that BAPCO is a large organization in a small country whereby Bahrain economy is partly dependent on BAPCO survival. The Company is and has been a main contributor in drawing SH&E legislations in Bahrain. Since its inception, the Company has been managing SH&E because it wanted to rather than having to (e.g. PSM, OHSAS 18001, OE principles, etc.).

BAPCO senior leaders have a vision for maintaining SH&E performance and integrating it into the overall business performance. This vision is broken down into smaller objectives at departmental levels and translated into actions for individual employees.

Our experience notes that a very effective approach in management SH&E is encouraging and engaging employees to take part in SH&E activities. One way of engaging employees is maintaining a transparent SH&E management system by maintaining effective and efficient communication and engaging them through various activities (e.g. Good Idea Scheme, audits and inspections, task forces, etc.) proved to be a successful tool in improving SH&E performance. Another is through employees' performance recognition (e.g. achieving a target employees' hours, quarterly award presentation, annual luncheon, etc.) which significantly helps in changing employees' behavior toward SH&E.

Some areas for further improvement in the Company SH&E management is merging Safety & Health department with the Environmental Affairs section. Although SH&E is managed holistically, this merge not only optimizes resources and but also better address Environmental dimension as thoroughly as Safety & Health issues. A proposal to integrate SH&E functions under one management umbrella has been submitted to BAPCO board of directors for their approval.

Although the Company has established Contractors H&S management, their SH&E performance is not merged with that of BAPCO's. This is also an area for further improvement in BAPCO SH&E management system which will be addressed in due course.