International Journal of Development and Sustainability
Online ISSN: 2186-8662 – www.isdsnet.com/ijds
Volume 1 Number 2 (2012): Pages 456-465
ISDS Article ID: IJDS12081801

Safety practices in the oil and gas industries in Ghana

Osei-Wusu Achaw *, Eric Danso Boateng

Department of Chemical Engineering, Kumasi Polytechnic Box 854, Kumasi, Ghana

Abstract

The study uses plant visits, interviews and questionnaires to investigate safety practices in the oil, gas and related energy industries in Ghana. The study revealed that there are indeed peculiar safety hazards inherent in the operations of the oil, gas and related energy industries that have the potential to cause danger to life, property and the environment if not controlled or properly managed. It was observed that whilst pockets of regulations exist that address aspects of occupational health and safety in industry in Ghana, there is no national policy on occupational health and safety to guide the operations of industry in Ghana. As result, each of the companies investigated adopted its own safety regulations to guide its operations. Lapses were observed in the manner the companies practiced occupational health and safety at their plants. The Factories Inspectorate Department, the regulatory body responsible for promoting and monitoring occupational health and safety in Ghana was found to be under resourced and has not been monitoring the activities of the industries as required. The deficiencies observed in these industries and the non-performance of the regulatory bodies means that danger to life and property in these industries is imminent.

Keywords: Safety practices, Oil and gas industries, Occupational health and safety, Regulatory bodies, Factories Inspectorate Department of Ghana (FID-Ghana)

Cite this paper as: Achaw, O.W. and Boateng, E.D. (2012), "Safety practices in the oil and gas industries in Ghana", *International Journal of Development and Sustainability,* Vol. 1 No. 2, pp. 456–465.

* Corresponding author. *E-mail address:* owach@hotmail.com

1. Introduction

Recent fire outbreaks in the oil, gas and related industries in Ghana and the resultant adverse impact on life and property of the affected industries, and on the Ghanaian economy in general (GNA, 2010 and 2005) has suddenly brought to the fore the importance and practice of occupational health and safety in industry in the nation. In the case of the oil, gas and related industries the matter has particularly assumed renewed national importance in view of the recent oil discovery in Ghana and the inherent hazards in the form of inflammable hydrocarbons and derived products associated with the exploitation of crude oil. Safety and health risks lurk across all levels of the industry including production projects, facility operations, maintenance, construction, transport, storage, and during the application of the oil derived products. Moreover, the huge volumes of materials that are processed, handled or used exacerbates any accident situation in the industry. Added to this is the complexity of the instrumentation and technology used in these industries, the nature of the effect of the products, by-products and waste products on human health and the environment. The apprehension of the public is further heightened by the experiences in the Niger Delta of neighboring Nigeria where the devastation of environment and the consequent effect on the livelihood and health of inhabitants has been quite alarming (United Nations, 2011). As such concern is often expressed about the availability of requisite expertise and technology in the industry, and the adequacy of the regulatory regime to manage the newly found oil resources in a safe and environmentally friendly manner. In particular, the generally weak regulatory environment in the country, the recent accidents in the industry, and the continued pollution of the environment by industry (EPA, 2010) raises questions about the ability of these entities to effectively discharge their duties and thus safeguard the safety and health of the citizenry and the environment. Indeed, a number of standards and regulations exist worldwide (API, 2010; National Fire Protection Association, 2009) that provide guidelines for safety practice specifically in the oil and gas industry, but also for industry in general and which all manner of industries irrespective of geographical location could exploit to the benefit of safe operations of their plants.

This study was undertaken to investigate the safety practices in the oil, gas and related energy industries in Ghana with a view to ascertain if the industry has the wherewithal to handle the new developments in the industry in order to safeguard the safety, health and welfare of employees, property and the environment. Specifically, the investigation sought to answer the questions; to what extent are the industry players knowledgeable in the specific hazards and health risks associated with the operation of their plants; what management systems are in place to mitigate and control safety hazards and health risks in the industry; what specific protection measures to safeguard the workforce, equipment and the environment are in place; and the nature and capacity of the regulatory regimes within which these entities operate. It is anticipated that the insights gained from the investigation will inform the regulatory bodies in particular and the industry practitioners in general to develop measures to safeguard personnel and property from accidents and the employees from work related illnesses.

2. Methods and materials

The study covers companies in the downstream end of the oil industry, including crude oil refinery, petroleum products storage, and petroleum and gas products utilization companies. It also covers the key regulatory bodies in the country which have oversight responsibility of enforcing safety and health issues in the industry. Only those industries that responded to an invitation to participate in the exercise were included in the study. The study did not include companies that retailed oil and/or gas or stored oil and/or gas for subsequent retailing. The national regulatory agencies, namely, the Environmental Protection Agency of Ghana (EPA-Ghana) and the Factories Inspectorate Department (FID-Ghana) were also studied. The study employed industrial and institutional visits, interviews, questionnaires, and desktop study for the investigations. Designated personnel in management, safety, health and environmental departments were interviewed and made to fill structured questionnaires as part of the investigation. Planned visits to the plants were also undertaken during which a walkthrough of the facilities were carried out with guidance from technical personnel. During the tours, observations were made of equipment, personnel self-conduct, process safety measures and gadgets, waste generation and handling, housekeeping at the plants, health facilities, management of records, and the general operations and organization of the plants. Unit managers and factory level employees at the plants were interviewed wherever necessary. Lastly, safety literature and the legislative environment regarding Occupational Health and Safety were also reviewed.

3. Results and discussions

Regulatory bodies and legislative instruments that cover aspects of safety practices in industry in Ghana are listed in Table 1 (Asamoah, 2011). Besides the Petroleum (Exploration and Production) Law, 1984 which mandates companies in the oil production sector to adopt international best practices in their operations, no legislative instrument or body was identified that caters uniquely to occupational health and safety in the oil, gas and related energy industries. Rather, a number of legislative instruments were identified whose area of coverage included aspects of safety practices of the industries in this study (see Table 1).

The several bodies listed under Table 1 are responsible for regulating, promoting and administering OH&S issues in the country. Notable on Table 1 is that the individual legislations cover only specific occupations or specific aspects of OH&S. Moreover, these legislations come under the jurisdiction of different administrative bodies. The foregoing underlines the key weakness of OH&S practice in Ghana, namely, there is no unifying legislation or a central regulatory body to oversee its administration in Ghana. The disjointed array of legislations and bodies has made assessment of the performance of OH&S practice in the country difficult and consequently stalled its development in keeping with new trends.

The Factories, Offices and Shops Act 1970, by its contents, was identified as the single broad legislative instrument in the country that purports to tackle all aspects of occupational health and safety in all entities that by definition are considered as factory, shop or office premise. The Act is administered by the Factory Inspectorate Department (FID-Ghana) under the Ministry of Employment and Social Welfare. What

constitutes a factory, a shop or an office is defined in the Act itself. In a number of instances its area of jurisdiction overlaps with that of the other legislations and regulatory bodies as for instance in the area of promotion of fire prevention and control in factories, shops and offices which is also administered under the Fire Precaution (Premises) Regulations 2003(LI 1724) by the Ghana National Fire Service.

Table 1. Legislation relevant to safety practices in the oil, gas and related energy industries

Legislation	Jurisdiction	Administering Body
National Building Regulations, 1996 (LI 1630)	All physical structures	Ministry of Works & Housing
Factories, Offices and Shops Act 1970 (Act 328)	Factories, offices and shops	Factories Inspectorate Department
Labour Act 2003 (Act 651) (Section 118)	Employer & employee responsibilities	Labour Commission
Ghana National Fire Service Act, 1997(Act 537)	Fire prevention & protection in all facilities	Ghana National Fire Service
Fire Precaution (Premises) Regulations, 2003(LI 1724)	Fire prevention & protection in all facilities	Ghana National Fire Service
EPA Act 1994 (Act 490)	Protection of the environment at all levels	EPA-Ghana
Workman's Compensation law, 1987	Compensation during breach of safety of employees	Labour Commission
Boilers and Pressure Vessels Safety Regulations, 1970. L.I.663	All manufacturers, operators and importers of boilers and pressure vessels	Ministry of Employment & Social Welfare
Petroleum (Exploration and Production) Law, 1984	All petroleum operations	Ghana National Petroleum Company
National Road Safety Commission National Road Safety	Safety in road use	Road Safety Commission
General Health Service and Health Management Act 1999	Responsibility to oversee all all health practices including the health of all workers	Ministry of Health
Radiation Protection Instrument, 1993, L.I. 559	The control and use of any ionizing and radiation sources	Ministry of Science, Tech. and Environment
Mining Regulations, 1970, L.I. 655	All registered mines and works	Ministry of Lands and Natural Resources
Explosives Regulations, 1970, L.I. 666	The importation, storage, disposal and use of explosives	Ministry of Lands and Natural Resources
The 1992 Constitution of Ghana	Safety of all Ghanaians	The Judiciary

The key objective of FID-Ghana is to prevent occupational accidents and diseases that arise from stresses in the working environment by the promotion and enforcement of measures that would safeguard the health and safety of workers. To achieve this it performs a number of functions which include but not limited to; inspection of workplaces to ensure compliance with the Factories, Shops and Offices Act 1970; supervision of the statutory examination and or test of potentially hazardous plant and equipment to ensure that they are safe to operate; prosecution of offences under the Factories, Offices and Shops Act 1970 (Act 328); approval of building plans for premises which are intended to be used as Factories to ensure that the provisions for health and safety of persons intended to be employed are adequate and satisfactory; investigation of reportable occupational accidents and dangerous occurrences; organization of OH&S education programmes; and industrial hygiene surveys.

However, the Factories, Shops and Offices Act 1970 have a number of weaknesses for which reason its administration fall short of achieving its objectives. The principal weakness of the Act is that its edicts do not give much details of what a factory, shop or office should do to safeguard occupational health and safety at the workplace. For instance, whilst it directs industry what ends must be achieved to ensure safety, in many cases, it fails to provide specific procedures or guidelines on how to achieve those ends. Also, some of its edicts are obsolete. For instance, since its promulgation in 1970, the science of OH&S has developed significantly with new insights based on the experiences of OH&S practitioners, especially in the areas of safety management and materials handling which the legislation in its present form does not capture. Furthermore, new knowledge about the effects on health to exposure by materials has been identified. New materials have also been discovered and introduced to industry and new occupations have since emerged. How to safeguard health and safety of workers and property, especially, in the emerging occupations are not catered for by the Act. Most importantly, the Act lacks provisions for renewal or review of its edicts and addition of new knowledge to it. The Act is again limited in scope as many occupations that do not meet the definition of factory as spelt out in the Act, such as the fishing industry, fall outside its jurisdiction and are therefore not regulated. Yet another serious limitation of the Act is that the FID-Ghana can enforce the edicts of the Act only by recourse to the law courts. This last and serious omission often detracts from the effectiveness of the body. In particular, given the slow legal processes in the country, what this means is that in a number of occasions the power to enforce is obtained only after the harm to life, health or property has occurred.

EPA-Ghana is another regulatory body whose activities with regard to occupational health and safety in industry were studied. EPA-Ghana was included in the study because its jurisdiction covers all aspects of environmental and industrial pollution. As a result there are aspects of occupational health and safety that also fall under the jurisdiction of EPA-Ghana such as, for instance, the air pollution by poisonous substances that are wont to affect the health of employees.

3.1. Safety practices in the industry

The list of companies and institutions investigated are listed in Table 2. In view of the murky OH&S regulatory regime in Ghana, the OH&S practices of the companies in this study were done with recourse to

other more developed standards, namely, OHSAS 18001:2007 (NCSI, 2007). The safety practices of the companies were assessed on two levels. First, the OH&S management programs planned or instituted by the companies to ensure safety at their plants and thus safeguard life, health and property were assessed. The assessment took the form of investigating if or not specific OHSAS 18001:2007 guidelines were in place at the plants and/or how these specific programmes were being implemented by the companies. Also assessed were the observed OH&S practices during the plant tours. This latter assessment focused on practical measures instituted at the plants to safeguard personnel, plant and the environment. The assessment used a three level rating of excellent, good or poor to gauge the OH&S practices in the companies. A practice is rated excellent if the resources to achieve the objective are there and in addition if the employees have the demonstrable skills and knowledge to utilize the resources to prevent the occurrence or to control accidents. If on the other resources to control or prevent accident are there but the employees' skills and knowledge to use the resources are a suspect then the practice is rated good. Finally, a practice is assessed as poor if the resources to achieve OS&H objective are not there in the first place.

Table 2. Relevant companies and institutions studied

Company/Institution	No. in Ghana	No. Interviewed	Percentage Coverage (%)
Crude Processing	1	1	100
Bulk Oil Storage	8	1	12.5
Thermal Power Plant	4	1	25
Monitoring Agencies	2	2	100

Table 3 lists the selected elements from the OHSAS 18001:2007 Standards which were used as the basis to evaluate OH&S management in the companies. Noteworthy from the table is the fact that in addition to the Factories, Shops and Offices Act regulations, all the companies studied used other safety standards to guide their operations. The reasons are two-fold. First, as earlier mentioned in Section 3.0, the provisions of the Factories, Shops and Offices regulations are inadequate to guide the operations of these companies. Secondly, the country does not have a unified OH&S guidelines neither for industry in general or for the oil and gas industry. The inadequacy of the local legislation and the varied standards employed by the industry has the consequence that monitoring the safety practices in these industries is difficult.

This state of affairs makes across the board suggestions for safety improvement in the industry cumbersome. The nation thus needs a unified safety regulation for the industry if it is to avoid or minimize industrial accidents and industry related injuries and illnesses. Also notable on Table 3 is the absence of safety manuals and the poor record keeping at the refinery plant and storage company. Poor record keeping makes the planning of performance improvements measures difficult, while lack of safety manuals means that employees have no reference source at the work place to check their self-conduct with regard to safety and health risks at the work place. This practice does not promote good safety and health practices in the work place; moreover it has the tendency to lead to accidents.

Table 3. Availability of management programmes at the plants

	Industries		
Management programmes	**Refinery plant**	**Storage plant**	**Power plant**
Management Commitment	Poor	Poor	Excellent
Company Safety Policy	Available	Not available	Available
Employee training	Done yearly	Done regularly	Done weekly
Casual worker training	Done	Done	Done
Internal safety auditing	Not done	Not done	Done
Safety standards used	An Insurance Company's	OSHAS 18001	ISO 14001
Safety manual	None	None	Available
Emergency preparedness	Available	Available	Available
Emergency drills	Done regularly	Done regularly	Done regularly
Safety communication	Conspicuous	Adequate	Adequate
Fire training	Done regularly	Done regularly	Done regularly
Record keeping	Poor	Poor	Excellent
Safety inspection	Done daily	Done regularly	Done monthly
Awareness of plant hazards	Excellent	Excellent	Excellent

Among the companies studied, the safety management programmes of the thermal power plant were observed to be the most adequate. In this plant all the assessable management programmes are in place and functioning. Furthermore, in this plant there are weekly safety meetings of employees and management to discuss safety issues. On the other hand, safety programmes at the other companies leaves a lot to desire and require swift review and improvement.

Table 4 lists a number of practical safety indicators and how the companies are rated in those indicators. One area that all the companies were observed to be doing well is the provision of firefighting equipment and systems. This is an indication that these companies are very mindful of the inherent hazards associated with the operation of their plants, namely, the inflammability of hydrocarbons and have therefore prepared sufficiently to deal with any eventuality of fire outbreak. Another area where the practices were observed to be excellent in all the industries is in the provision of emergency response systems, process shut down systems, alarms, and emergency assembly areas. These companies have thus put into place measures to control accidents and protect life, property and the general environments in the event of fire and other accidents. Both the refinery company and the petroleum products storage company do not stock first aid kits at their premises. This situation has the rather serious implications that in the event of an accident injuries cannot be treated until victims are sent to a clinic or until medical staff arrive at the accident scene. This could lead to prolong suffering of those affected by accidents and may even lead to fatalities.

Table 4. Observed safety practices at the plants

	Industries		
Observed safety practices	**Refinery plant**	**Storage plant**	**Power plant**
Availability of alarms systems	Excellent	Excellent	Excellent
Availability of PSS systems	Excellent	Excellent	Excellent
Use of PPE's	Good	Poor	Good
Housekeeping	Poor	Good	Excellent
Safety information communication	Excellent	Poor	Good
Emergency assembly points	Good	Excellent	Good
Visitor safety training	Poor	Poor	Excellent
Integrity of equipment	Poor	Good	Excellent
Availability of first aid kit	Poor	Poor	Excellent
Provision of clinical services	Excellent	Poor	Excellent
Provision of firefighting equipment	Excellent	Excellent	Excellent
Segregation of structures	Excellent	Excellent	Poor
Dedicated safety officers	Good	Good	Good
Process containment systems	Good	Excellent	Poor
Ignition control measures	Excellent	Excellent	Excellent
Detection systems	Excellent	Excellent	Excellent

Yet another area in which the two latter companies fared badly is in the provision of safety education and training to the visitors to the plants. This practice is dangerous in that when there is an accident situation the visitors would be found wanting in how to conduct themselves. Furthermore, without safety education the visitor's self-conduct at the plant could be hazardous and risky to his safety and health and indeed the safety of the plant and employees of the plant. In general, in 22.9% of the cases the companies were rated poor in the manner OH&S is practiced at their plants while they were rate excellent in 54.2% of the cases. Thus taken together, the oil, gas and related energy industries must do better to improve safety at the work place. The company that was found to be doing well in the manner safety is practiced at the plants is the thermal power plant who scored excellent in 62.5% of the assessable areas and scored poor in only 12.5% of areas. The company with the worst performance is the petroleum products storage company which scored excellent in only 50.0 % of the cases and scored poor in 31.3% of the cases.

3.2. The role of the monitoring agencies

FID-Ghana was identified as the key national body with the specific mandate to monitor safety practices in industries in Ghana. However, FID-Ghana did not list any of the industries studied in this report among those facilities that it monitors on regular basis. This was collaborated by the responses received from the organizations as each indicated that no national safety monitoring agency visits their plant. Even though the

Factories, Offices and Shops Act of 1970 did not single out for mention the industries covered in this study, as indeed no industry was given a specific mention under the Act, the definition of a 'Factory' as spelt out in the Act suggests that the activities of the oil, gas and related industries in this study make them part of those entities whose safety practices are supposed to be monitored by FID-Ghana. The FID-Ghana cited lack of personnel and monitoring equipment and vehicles as the challenges that it faced in discharging it duties and which limits its effectiveness. Indeed the agency has only twenty-seven (27) employees nationwide even though there are over seven thousand companies registered with the agency and whose activities the agency is supposed to monitor (Asamoah, 2011). This lack of capacity could account for the lack of performance in the monitoring of the activities of the organizations of this study. However, the EPA-Ghana was found to have regularly visited these companies to monitor their activities.

4. Conclusion

The studies reported herein investigated the safety practices of the important industries in the oil, gas and related energy sector of the Ghanaian economy. The results suggest that even though there are a number of legislative instruments whose area of coverage included aspects of safety in the oil, gas and related energy industries, no legislation exits that exclusively caters for the unique safety practices of that sector of industry. Further, it was found that the provisions of the Factories, Shops and Offices Act are inadequate to provide guidelines to ensure safety and healthy work environment in the industry. In spite of the absence of specific national safety standards for the industry, the organizations studied were found to have adopted varied international safety guidelines for the operation of their plants. FID-Ghana that has the national mandate to monitor safety practices in the industries was found not to be exercising that responsibility with regard to the industries of this study. Fire prevention and control was observed to be taken very serious by all the companies investigated. The thermal power company was identified to have the best safety practices amongst the companies investigated. Finally, it is observed that until the FID-Ghana is adequately resourced to effectively perform its monitoring and enforcement role in the industry, accidents will continue to occur in these industries.

References

API (2010), ANSI/API Recommended Practice 754: Process Safety Performance Indicators for the Refining and Petrochemical Industries, API Publications, Englewood, CO., USA.

Asamoah, E.B. (2011), "Effective Regulation of Industrial Safety and Health in Ghana, Challenges and Successes", paper presented at Ghana Institution of Engineers (GhIE) Annual Conference 2011", 24th March, 2011, Kumasi, Ghana.

EPA-Ghana (2010), "AKOBEN Rating and Disclosure Programme", available at: www.epaghanaakoben.org (accessed 22 June 2011).

GNA (2005), "Kufuor inspects fire scene at Tema Shipyard", available at: http://www.ghanaweb.com/ Ghana Homepage/NewsArchive/artikel.php?ID=78180 (accessed 8 November 2010).

GNA (2010), "Tema Oil Refinery's loading gantry to be shut down for repairs", available at: http://www.ghana.gov.gh/index.php/news/general-news (accessed 15 November 2011).

National Fire Protection Association (2009), NFPA 59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG), NFPA, Quincy, MA, USA.

NCSI Publication (2007), "OHSAS18001:2007 Self Assessment Checklist", available at: http://www.ncsi.com.au/downloads/OHSAS18001SelfAssChecklistrev2.pdf (accessed 14 June 2011).

United Nations Environmental Programme (2011), "Environmental Assessment of Ogoniland", available at: http://postconflict.unep.ch/publications/OEA/UNEP_OEA.pdf (accessed 12 February 2012).