ABSTRACT
This study was a health and safety audit of the cement market near Ran Gate, along Ran road, Bauchi. Observation and interview was used to find out the occupation health and safety hazard that existed. The areas of deficiency were identified and remedial measures were recommended.

Key words: Occupational hazards, Cement dust, Health and Safety, Market, Risk

INTRODUCTION
Every human activity is associated with one potential hazard or the other, but the chances of becoming accident depends on the way and manner the risk is handled. Risk is the danger inherent or potential hazard that can result to accident except some sort of caution is put in place as a way of managing the situation to avoid the potential risk from manifesting as accident eventually. Risk assessment should be the foundation for all the Health and Safety precautions in all premises (Department for Communities and Local Government, 2006). Risk assessment is a careful examination of what could cause harm to people (hazard). He further states that the purpose of risk assessment is to allow us to weigh whether enough precaution have been taken or more should be done to prevent accident. Hazard is anything that can cause injury or death; these include dust, chemical, electricity, working on ladders, etc while risk is the chance that somebody will be harmed by the hazard. The only product handled in the market is Cement, during handling it gives rise to cement dust which is injurious to health; other areas of risk include lighting, ventilation, motor vehicle accidents, long working hours and sitting position. Many people are exposed at work daily to different types of health hazards which are risk factors in developing occupational disease. Cement generates dust during its handling. this dust causes lung function impairment, chronic obstructive lung disease, restrictive lung disease, pneumoconiosis and carcinoma of the lungs, stomach and colon.

Portland Cement
Portland Cement Powder is a grey powder-like adhesive substance (Yang, Huang, Chiu, Chiu, Lan, and Ko, 1996); which is a major materials used in the construction of buildings. This is an odourless white-grey powder containing, principally calcium, silicate compounds of alumina & gypsum, it’s a mixture of Calcium oxide (CaO) (62% - 66%), Silicon oxide (SiO2) (19% - 22%), Aluminium tri-oxide (AL2O3) (4%-8%), Ferric oxide (Fe2O3) (2% - 5%), Magnesium oxide (MgO) (1% - 2%) (Oleru, 1984) and other impurities (Short and Petsonk, 1996), was first used by Joseph Aspdin, in October 1824. It is a mineral dust which when mixed with a water form a plaster like adhesive mass (Bazas, 1980).

Risk
Risk is the potential that a given action or activity (including the choice of inaction) will lead to a loss which is an undesirable outcome. The notion implies that a choice having an influence on the outcome of the action or inaction sometimes exists (or existed), this choice is attitude to safety precautions. OHSAS (2007) defines risk as the product of the probability of a hazard resulting in an adverse event, and the severity of the event. Any human endeavour carries some risk, but some are much more risky than others.

Review of Cement Dust Risk (effects to Health and Safety)
Pathogenesis: The aerodynamic diameter of Portland cement particles range from 0.05 to 5.0 micrometer in diameter makes it dangerous to human respiration, therefore, it is a potential cause of occupational lung disease (Yang, Huang, Chiu, Chiu, Lan and Ko, 1996).

General clinical manifestations: High concentration due to prolonged inhalation of cement dust can provoke clinical symptoms and inflammatory response that may result in functional and structural abnormalities (Short and Petsonk, 1996). The most frequently reported clinical features in cement mill workers are chronic cough and phlegm production, impairment of lung function, chest tightness, obstructive and restrictive lung disease, skin irritation, conjunctivitis, stomach ache, headache, fatigue(Oleru 1984) and carcinoma of lung, stomach and colon(Rafnsson, Gunnarsdottir and Kiilunen 1997,Mc Dowall 1984).
Respiratory system (Larynx): Vestbo (1991), Maier (1992), and Olsen and Sabroe (1984) observed a relation between exposure to cement dust and cancer and showed the increased risk of overall cancer among cement workers and cancer in semiskilled and unskilled workers exposed to cement dust. Izycki, Gielec, Sulkowski, Kowalska (1979) and Laraqui, Laraqui, Rahalli, Tripodi, Caubet, Belamallem (2002) demonstrate that cement causes chronic bronchitis.

Stomach: Oleru (1984) found that cement dust cause stomach ache

Colon: Jakobsson (1990) reported that cement dust causes the cancer of the colon.

Urinary system (Kidney): Brochaus, Dolgner, Ewers, Kramer, Soddemmann and Wiegand (1981) sows that exposure to thallium containing atmospheric dust causes increased in the concentration of thallium level in the urine of cement workers. Schaller (1980) as it that that increased in concentration of thallium affects the nephron.

Head and Neck: Maier, Tisch, Dietz and Conradt (1999) and Maier, Dietz, Gewelke, and Heller (1991) suggested that workers in the construction industry carry an increased risk for head and neck cancer due to exposure of occupational carcinogenic agents such as cement dust, asbestos, tar products, metal dust, wood dust, and paints.

Eyes: Cement dust has been identified as an eye allergen and can cause runny eyes and conjunctivitis (Oleru, 1984).

Skin and hairs: Lachapelle (1986) described that, cement dust has been identified as a skin problem factor that can cause itching, skin allergen irritant and also cause skin boils and burn.

Musculoskeletal system:
- Bone: Reichtrova (1986) found the bioaccumulation of cement dust components in laboratory animals exposed by inhalation of cement emission and reported that, the chemical components of the cement dust particles inhaled by animals are accumulated in bones of the exposed animals.
- Muscles: intercostals muscles of cement mill workers exhibited reduced performance due to the deposition of cement dust in muscle cells sarcoplasm and are probably associated with the changes in muscle structure (Meo, Azeem, Ghori, and Subhan, 2002).

Risk Management

Health and Safety risk analysis / Audit / assessment

Risk analysis/Audit attempts to understand events and activities that bring risk to human health or the environment (Gurjar & Mohan, 2002). The purpose of Health and Safety Audit is to ensure that health and safety law are complied with and that systems are put in place to prevent accidents. A health and safety audit provides you with independent information on the efficiency, effectiveness and reliability of the total Health and Safety Management System and useful in drawing up an action plan for corrective action. Risk assessment is an essential part of effective health and safety management and involves five stages. In risk assessment the levels of danger to which workers are exposed is assessed (Health and Safety Executive, 2009). This involves: Step 1 Identify hazards, Step 2 Identify people at risk, Step 3 Evaluate, remove, reduce and protect from risk, Step 4 Record, plans, inform, instruct and train and Step 5 Review

Purpose of Risk Assessment/ Management

Risk Assessment offers a comprehensive guidance towards its management improvement on health, safety and environmental issues. The objective of safety audit/assessment is to Verify compliance with established standards (regulations, internal policies and industry wide standards of practice), Identify deviation from designed and planned operating and maintenance procedure and standards and Identify conditions or operating procedures that could lead to an accident and significant losses to life or property. Corrective actions to hazards found during risk assessment are categorised into three forms thus:

(a) Risks may be reduced by primary prevention actions that decrease early causes of illness
(b) by secondary prevention actions after a person has clearly measured clinical signs or symptoms recognized as risk factors
(c) Tertiary prevention reduces the negative impact of an already established disease by restoring function and reducing disease-related complications (http://en.wikipedia.org/wiki/Prevention_(medical))

METHODS

The method adopted in this study was personal observation of the facilities in the market and interview of the workers. The items of occupational health and safety were observed and the areas of deficiency / failures were identified purposely to recommend remedies to the problematic areas.
In risk assessment the levels of danger to which workers are exposed is assessed (Health and Safety Executive, 2009). This is stock taking, the following objectives were pursued

i. Identification of hazards
ii. Identification of people at risk
iii. Evaluation of the level of risk to people at risk,
iv. Recommendation of remedial action to remove, reduce and protect from risk

RESULT

Table 1 Summary of Hazards Spotted

<table>
<thead>
<tr>
<th>1. Physical Hazards:</th>
<th>i. Vehicular accident</th>
<th>Fire Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Hazardous Substances:</td>
<td>i. Dust (Cement Particles)</td>
<td>Chemical</td>
</tr>
<tr>
<td>4. Psychological Hazards:</td>
<td>i. Long working Hours</td>
<td></td>
</tr>
<tr>
<td>5. Ergonomic Hazards:</td>
<td>i. Repetitive work</td>
<td>Lifting</td>
</tr>
</tbody>
</table>

1. Physical Hazards

Vehicle: There are several vehicles that come to this depot (market) this includes the Lorries that bring cement from the factory to supply the dealers, medium and light vehicles that are used to convey cement from the depot to various location by those that purchase cement from the depot. The hazards spotted in this case was that there was not parking space specifically provided for the vehicles to park and the road has no shoulder, therefore, the vehicles park to cover part of the road leaving a very tiny part of the road for the vehicles of other road users to struggle to pass. There is the risk of accident.

Fire Hazards: fire can spark off from cigarette butt, electrical wiring, and fire from women frying Kose and Massa which are local delicacy for sale to people. The area is very clumsy, with the risk of class A fire from the cement package and B and C from the vehicles that are packed as a result of petrol/diesel and the metal/paint of the vehicles. Invariable, since the place has electrical installation, it has risk of claim E fire.

2. Hazardous Substances

Dust (Cement Particles): Cement gives off dusty particles a lot, most especially during loading and off loading. This poses a serious health hazard to the people within the immediate environment, most especially, those that work there because most of them do not use nose mask.

Chemical: Cement is a chemical compound that is injurious to health. The accumulated cement dust contain the cement chemical, when this react with the human system is detrimental to the health of the one concerned

3. Work Environment

Poor Ventilation: The store has no window or any mechanical means of ventilation. Therefore, the dust has no way of going out the store quickly. The sales clerks sit at the entrance of this store and the entrance is the only escape means for the cement dust. This poses danger to all operatives; the sales clerk and the loaders.

Bad Lighting: Since there are no windows in the store, the only source of natural lighting is the entrance opening, this is grossly inadequate. The PHCN source of supply is most of the time not available and there was no electricity generating set to supply electricity, the store is somehow badly lighted and dark. This can affect the sight of the workers that stay for long period of the day working in those stores.

Hot Working Place: Due to the heat given off by the cement and the inadequate ventilation, the store is
hot. This is not a conclusive environmental condition for man to work.

4. Psychological Hazards

**Long working Hours:** The minimum working hours for the operatives is ten hours, that is, there are occasion as they work from 6pm or even 7pm. This is long enough to stress up the operatives.

5. Ergonomic Hazards

**Repetitive work:** The work here is repetitive, the same work is done over and over again, the clerk write receipts and count money and the loader do this continuously repetitively.

**Lifting:** The major and the only work of the loader are to lift and drop the bag of cement either to load or off load.

All those that are concerned with the transaction of business at this depot and those using the road that passed in front of the market are at risk of one form of hazard or the other, and their risk is at various levels depending on their function, duration of exposure and attitude. Specifically;

- Sales clerk are at risk of dust, long hours of work, poor ventilation
- Operatives are at risk of dust, long hours of work, poor ventilation
- Customers that come to purchase
- Other road users along Ran gate end of Ran road
- Other members of the public within the immediate environment

<table>
<thead>
<tr>
<th>Person at risk</th>
<th>Risk to persons</th>
<th>Severity of Risk to the people</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales clerk</td>
<td>1. risk of dust¹,</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>2. long hours of work²,</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>3. poor ventilation³,</td>
<td>Low</td>
</tr>
<tr>
<td>Operatives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customers that come to purchase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road users along Ran road</td>
<td>4. vehicular accident⁴</td>
<td>Non</td>
</tr>
<tr>
<td>General public in the environment</td>
<td>5. fire accident⁵</td>
<td>Non</td>
</tr>
</tbody>
</table>

Table 2 Summary of Those at Risk and the Severity of Risk to Each Stakeholder

Table 3 Health and safety management practice in the market

Appropriate management arrangements are in place;
Adequate risk control systems exist, are implemented and are consistent
with the hazard profile of the organisation;
Appropriate workplace precautions are in place;
Legal compliance is being met;
The system complies with approved codes of practice and other guidance;
Company Health and Safety Policy is being complied with;
There is a positive safety culture;
Statutory training requirements are being met;

CONCLUSION AND RECOMMENDATION TO SOLVE HAZARD AND RISK PROBLEM

In view the hazards of noted in the market, it is advisable that the stake holders work together to adopt technical preventive measures such as adequately ventilated work areas and workers should wear appropriate personal protective equipment protect the operatives from danger of contaminants. Workers should be provide with and made to wear alkali resistant gloves, long sleeves and pants to reduce skin exposure to cement dust. Wear safety glasses with side shields to protect the eyes or if it’s very dusty, goggles. They should not wear contact lenses and to avoid inhaling of dust, wear respiratory protection (nose mask). Workers must wash your hands and face before eating (State Compensation Insurance Fund, 2000-2010). It is very important that cement workers undergo pre-employment and periodic medical surveillance tests. These measures would help to identify susceptible workers in due time and improve the technical preventive measures that will decrease the risk of occupational hazards to the people.

Off-loading from the trailers that bring cement from the factory should be done during off-peak periods such as in the evening or very early in the morning. At this time it will be possible for the lorry to park off the road completely because the buyers and others have not come to park at the only small space available for parking. Office space should be provided for the sales clerk separate from the dust infested store. Windows should be made big enough to allow adequate lighting into the workplace. High level window with burglary proof should be created to provide ventilation and it can be supported with air extractor to provide adequate ventilation.

A better work arrangement such as increase in the number of sales clerk to allow for break within the work hours or shift if possible to reduce work stress and of washing facilities to remove contamination immediately should be provide. The women frying should be relocated far enough to avoid possible fire accident from their fire.
REFERENCES


OHSAS (2007). "Risk is a combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that can be caused by the event or exposure(s)"


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