SKM 4353 Safety in Petroleum Engineering

Chapter 3: Hazard Identification

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Definitions

- **Hazard**: A source or situation with potential harm in terms of human injury or ill-health, damage to property, damage to environment or a combination of these.
- **Risk**: A combination of the likelihood of an occurrence of hazardous event with specific period/ circumstances and the severity of injury/damage of property, environment or any combination of these caused by the event.

Where can we find hazards?

- Man = human behaviour, unsafe acts
- Machinery = installation, layout and design
- Materials = chemicals and gases in workplace
- Method = the way people carry out their work
- Media = workplace condition (air quality, ventilation, lighting, noise etc.)

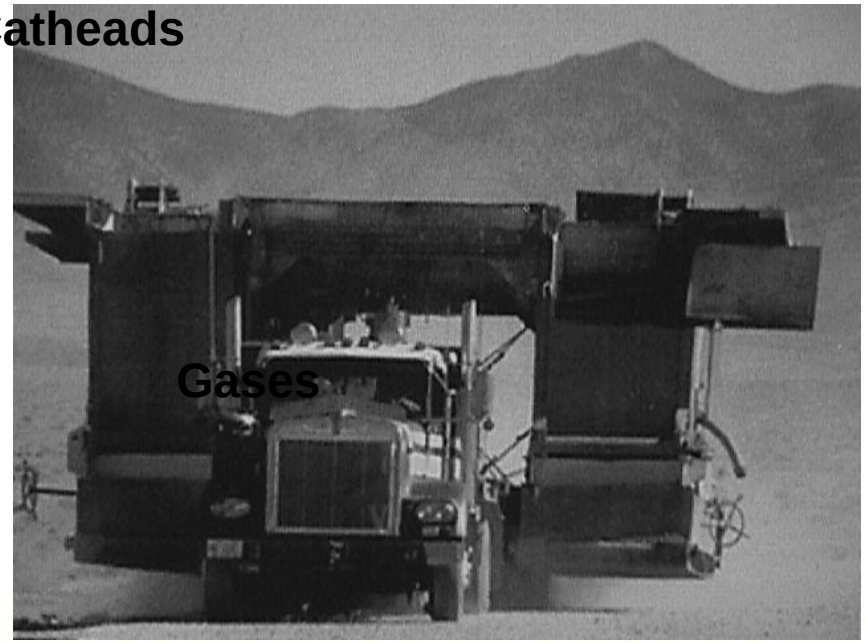
Classification of hazards

- Physical
  - Mechanical (struck by, pinched, stabbed, fall)
  - Electrical (improper socket, exposed wires)
- Biological (exposed to virus, bacteria, fungus)
- Chemical (exposed to toxic and corrosive chemicals)
- Ergonomics (repetitive work)
- Psychological (stress)

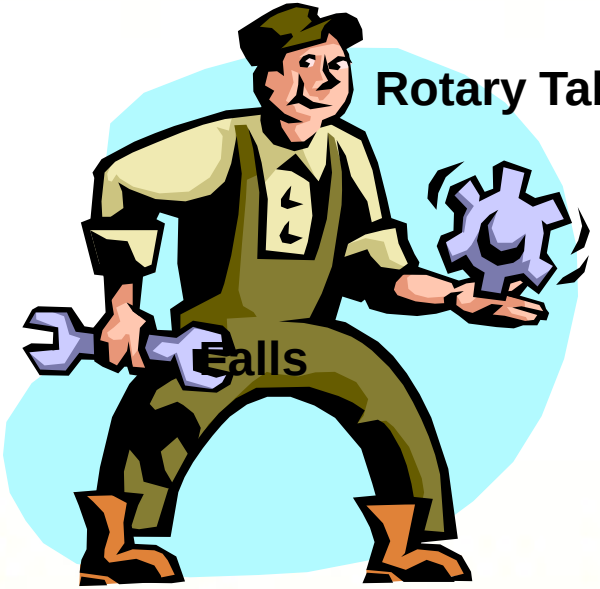
UNIQUE HAZARDS TO THE OIL AND GAS INDUSTRY

Poor Machine Guarding

Catheads



Gases



Rotary Tables

Falls

Slipping

High Pressure Hoses

Tripping

Recognition of Hazards

- Identify unsafe acts and conditions
- Determine the corrective actions
- Implement corrective actions

Information gathering

- Area map
- Site plan; own (and neighbour)
- Process flowcharts
- Inventory of materials (raw materials, product, wastes)
- Toxicology and other Health & Safety data
- Legislation and code of practice
- Others??? (discuss)

Information gathering (also includes)

- Standards & guidelines
- Published information
- Monitoring data
- Information from designers and manufacturers
- Reports (accident investigation, audits etc.)
- Comments from employees, public and government agencies (DOSH)

Classifying of Work Activities

- Geographical areas within/outside the premises
- Stages in a production process
- Stages in provision of a service
- Define tasks (e.g. drilling, well completion)
- Identify working group (divers, welders etc.)
- Land use; previous property use, future use

Methods of Identifying Hazards

- Review of documents and publications
- Inspection and observation at the workplace
- Measurement of the atmosphere, monitoring the environment or medical surveillance of workers
- Hazard analysis (JSA, HAZOP, What-If Analysis, etc.)

Document Review

a) Report of accidents, accident investigation and audits
b) Info from publications
c) Regulations and Codes of Practice
d) Statistics
e) Handbooks
f) CSDS and MSDS

Inspections and Observations

a) Types of inspections
b) Documentation – checklist & worksheet
c) Activities
d) Inspection outcomes
e) Ensure follow-up on action

Site preparation

Potential hazards

- Damaging buried pipeline and cables
- Unpredictable weather changes
- Irritant and toxic plant
- Uneven ground – bulldozer roll over

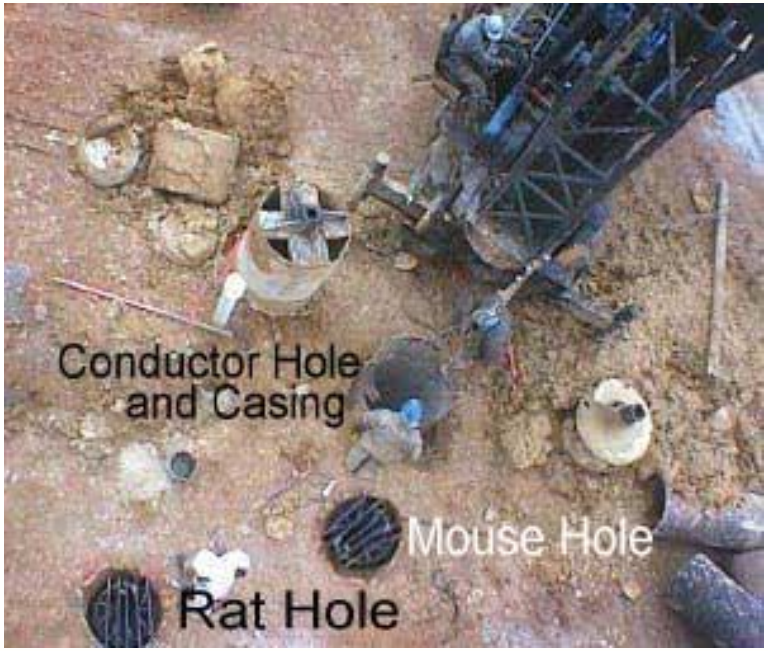
Potential solutions

- Perform a site line location survey
- Plan for hazards due to weather changes
- Teach employees about available first aid treatment

Conductor hole, rat hole & mouse hole

Potential hazards

- Being struck by hoisting line or suspended drill or casing.
- Falling or stepping into uncovered rat hole or mouse hole



Potential solutions

- Wear Personal Protective Equipment: hard hats, safety glasses, safety toe boots, and work gloves.
- Keep employees away if they are not working at this job.
- Cover the hole until it is lined with casing or other material during rigging-up

Transporting equipment to the site

Potential hazards

- At a newly prepared drill site, the soils may not be compacted sufficiently to support the incoming load.
- The load may not be secured properly, causing it to shift or the tie-downs to fail.

Potential solutions

- Drive slowly; always being cautious of shifting weight.
- Loads should be tied down with proper devices and inspected before and during transport.

HAZOP- Example on Well Logging

Deviation	Causes	Consequences	Existing provisions	Actions, questions or recommendation
Too much exposure to radioactive	Exceed the recommended working hours	Develop cancer	Wearing appropriate PPE	Keep non-essential workers away from the source
Unexpected high pressure release	Trapped pressure when opening the tool housing	Injury	Check the line pressure	Report any abnormality or damage
Wireline speed is too fast	Defects in wireline, cable head or socket	Being struck by wireline due to line failure	Inspection of wireline and parts prior to running	Keep non-essential workers away. Operate the wireline at a safe speed.

Assignment

- Do your own Job Safety Analysis (JSA) for Drilling, Well Completion, Well Logging, Production, Workovers and Abandonment.
- Make sure you have the potential hazards and potential solutions for each offshore/onshore activities.

References

- NIOSH Malaysia Training Module
- Wikipedia: *Hazard Identification*, retrieved on 2012.