

OPERATIONS SPECIFIC

DRILL FLOOR

Hazards

Contact with drilling fluids as well as lubricants, pipe dope, hydraulic oils, etc. by personnel on the drill floor is mostly skin contact which can be prolonged and repetitive due to the manual nature of the work involved. Contact may be through manual handling of unclean equipment surfaces, sprays, and spills from cleaning operations and high pressure washing. The health effects of a particular mud system vary depending on the mix of chemicals in the initial fluid and the degree it gets contaminated with production fluids. The more hazardous muds have higher percentages of aromatic hydrocarbons. Older oil-based mud systems used diesel as their main component and had higher percentages of aromatic hydrocarbons including benzene, toluene, ethyl benzene and xylene (BTEX). All drilling muds, even more modern drilling fluids, can become contaminated with hydrocarbons and hydrogen sulphide down hole; increasing their toxicity. Workers may be exposed to drilling fluids either by inhaling mists and vapors or by skin contact. Higher chances of exposure occur while:

- » pipe handling and
- » cleaning (See Appendix A for more detail).

In addition to the chemical hazards, the risk fire and explosion will increase with the flammability of the fluids used or produced and the risk of slips and falls increase when surfaces get covered in drilling mud or other fluids.

Access

Only allow access to the area by authorized staff that have been trained and equipped to work safely.

Equipment & Procedures

- » Select the least hazardous drilling mud system required to complete the work. Ensure it has:
 - a flash point of 610 C or higher (GS Flashpoints) and
 - few volatile and toxic components (selecting a water based fluid or hydrocarbon based one with an aniline point greater than 650 C will help ensure few aromatic hydrocarbons).
- » Consider the potential for drilling mud to be contaminated with production fluids. If the formation or reservoir has a history of producing hydrogen sulfide or natural gas condensates, small amounts of contamination can quickly produce high concentrations in air above unenclosed or unventilated mud pits and around shakers.
- » Maintain equipment regularly to eliminate leaks and clean spills promptly to reduce worker exposure to the mud.
- » An effective mud can, should be used when tripping wet pipe to contain fluids when joints are disconnected. Crews should be trained on proper use of the mud can.
- » A weighted pill should be used on trips to ensure the pipe pulls dry. An effective pipe stripper must also be used to wipe drilling fluid from the exterior of the pipe before it is pulled up through the table.
- » An adequate drip tray should be installed on top of the flow nipple to catch any fluid spills that leak through the rotary table and floor area.
- » The pipe racking area of the rig floor should be equipped with drip trays to collect fluid that drains out of the pipe, and return it to the mud system.
- » Eliminate all ignition sources from area.
- » Every effort should be made to reduce the generation of airborne mist by spray or splash discharges, etc.
- » If using flammable drilling fluids monitor mud operating temperature to ensure it stays 100 C below flash point of fluids used.
- » Ventilation fans should be used when necessary to prevent the buildup of hydrocarbon vapors in enclosed or semi-enclosed areas. Fan motors should be explosion-proof, and fan blades should be made of a non-sparking material.
- » The use of a high-pressure wash gun with oil should be kept to a minimum and only oils with a high flashpoint (GS Flashpoints) and minimum light end components should be used. Mineral oil is recommended. The use of diesel fuel as a washing fluid in pressure wash guns is not recommended.
- » Wash guns should be equipped with triggers to minimize air contamination and wasted fluids when wash guns are unattended.

Personal Protective Equipment

Respiratory Protective Equipment:

- » Self-Contained Breathing Air: To be used when H2S may exceed 10 ppm (GS H2S and GS Respiratory Protective Equipment).
- » NIOSH approved P-95 (or P-99 or P-100) with combination organic vapor cartridge required for oil based mud systems if observed oil mist is present.



CONTROLLING CHEMICAL HAZARDS

Guidance Sheet

Other Personal Protective Equipment:

- » Personal H2S Monitor: To be worn at all times (including truck drivers) (GS H2S Gas Monitors).
- » Fire Retardant Coveralls: To be worn at all times (GS Fire Resistant Clothing).
- » Chemical resistant gloves, clothing, boots and eye protection (goggles) are required if direct contact with drilling fluids that contain hydrocarbons (GS Skin Contact and GS Gloves).
- » Oil resistant slicker suits should be worn when tripping wet pipe.

Cleaning & Housekeeping

- » Keep all work areas neat and free from debris.
- » Clean up chemical spills promptly (GS Spill Response).

Information Training and Supervision

Employer responsibilities:

- » Gather and provide safety data sheets on the chemicals that will be present at the workplace
- » Use the Controlling Chemical Hazards Guideline to define the procedures and control approaches you need to follow to protect worker health and safety for the work you wish completed.

Supervisor responsibilities:

- » Ensure the availability of the required Guidance Sheets for proper chemical management.
- » Ensure the availability and use of appropriate protective equipment.
- » Complete and review with workers the chemical management process and the applicable Safety Data Sheets.
- » Review safe work procedures with workers before they start work.

Worker responsibilities:

- » Wear appropriate personal protective equipment.
- » Follow safe work procedures.
- » Ensure spills and leaks are quickly cleaned up.
- » Wash contaminated clothing before reuse.

PRECAUTIONS YOU SHOULD TAKE

- Ask your employer about the risks, what precautions to take and what to do in an emergency.
- Follow the safe working procedures laid down by your employer.
- Read and understand safety data sheets for all chemicals you will be working with.
- Use the personal protective equipment provided, i.e., respiratory protection and impervious clothing.
- Don't enter any area that may contain H2S before it has been tested.
- Report to your employer or safety representative any damaged or defective ventilation systems or protective equipment.

Appendix 1 Drill Floor potential exposure to chemicals (exerpt from IPIECA Drilling fluids and health risk management)

General influencing factors: ambient temperature; indoors or outdoors; space and layout of the work area; general or local exhaust ventilation; Health and safety culture of the workforce, e.g. PPE discipline.

Task	Purpose	Exposure duration	Type of exposure	Influencing factors
Pipe handling	<ul style="list-style-type: none"> ▪ Casing handling, tripping, making connections, completion strings 	<ul style="list-style-type: none"> ▪ Continuous during tripping operations 	<ul style="list-style-type: none"> ▪ Skin contact with contaminated surfaces or pipe dope ▪ Splashes ▪ Inhalation and skin contact from vapor/mist 	<ul style="list-style-type: none"> ▪ Characteristics of pipe dope ▪ Degree of automation of drill floor activities ▪ Fluid temperature
Cleaning	<ul style="list-style-type: none"> ▪ Removal of fluid contamination 	<ul style="list-style-type: none"> ▪ During operations, intermittent 	<ul style="list-style-type: none"> ▪ Splashes, skin contact with contaminated surfaces ▪ Inhalation of vapor/mist aerosol 	<ul style="list-style-type: none"> ▪ Type of cleaning equipment and agents used