



The Safety Association for Canada's
Upstream Oil and Gas Industry

Controlling Invert Exposure



Agenda

- What is Invert?
- Health Effects
- Exposure Routes
- Where Could I be Exposed?
- Invert Controls
- Other Considerations



Photo Courtesy of NIOSH

What Is Invert?

- Invert is an oil-based drilling fluid that is a complex mixture of hydrocarbons (base oil), water and additives
- Invert is used, because it reduces the time to drill a well and the risk of wellbore problems
- Invert can present a variety of health and safety risks, such as:
 - Flash fire
 - Worker exposure to hydrocarbons



Health Effects

- Invert exposure can lead to a variety of acute health effects such as:
 - Irritation of eyes
 - Skin rashes and dermatitis
 - Headaches
 - Nausea



Health Effects

- Prolonged exposure can increase the risk of:
 - Pneumonia
 - Lung cancer
 - Liver damage
 - Blood disorders
 - Bone cancer



Exposure Routes

- Exposure is by way of three routes:
 - Inhalation
 - Typically exposure to oil mist; however, exposure to hydrocarbon vapour may be a concern
 - Skin Contact
 - Invert on the skin can lead to rashes and it can also be absorbed into your body and affect organs elsewhere
 - Invert on your fire retardant coveralls also decreases the chance of surviving a flash fire
 - Ingestion
 - Are designated eating areas and wash facilities available?



Where Could I Be Exposed?

- Work locations:
 - Shakers, mud tanks, centrifuges and drilling floor
- Work activities:
 - Catching cuttings samples, wash gun use, mud tank cleaning, and tripping pipe
- Work events:
 - Invert spills and well kicks



Invert Controls

- Substitution:
 - Use water-based and synthetic drilling fluids whenever feasible
 - Do not use diesel or base oil in wash guns
- Engineering controls:
 - A mud can
 - Drill pipe strippers
 - Pipe racking drip trays
 - Local exhaust ventilation on the shakers



Invert Controls

- Administrative controls
 - Flash point analysis to verify that:
 - Flash point is at least 10°C higher than either the anticipated flow line and ambient temperature
 - Flash point is equal to or above 61°C
 - Written programs to manage worker exposure
 - Written work procedures detailing:
 - Sample collection
 - Wash gun use and prohibition of the use of diesel in wash guns
 - Signage at mud tank and shaker work locations indicating that respiratory protection is required



Invert Controls

- Personal protective Equipment (PPE) Controls
 - Gloves:
 - Neoprene gloves are recommended
 - Coveralls:
 - Change coveralls if they become saturated with invert
 - Use fire retardant protective clothing (rain suits), preferably neoprene, when conducting tasks like tripping pipe and mud tank cleaning



Invert Controls

- Respiratory Protection:
 - Use at minimum a half mask with combination P100 and organic vapour (OV) cartridges when:
 - Catching samples
 - On the mud tanks during mud pumping
 - Using a wash gun to clean shaker screens
 - When in the vicinity of someone using a wash gun
 - Additional hazards may necessitate higher levels of protection



Other Considerations

- Lock-out of hazardous energy
 - Mud tank cleaning
 - Centrifuge and shale dryer clean-outs
- Confined space entry
 - Mud tank cleaning
 - Shale dryer clean-outs



How Might This Impact Us?

- Have we setup the workers for success in managing this hazard?
- How confident are we that these exposure risks are being managed?
- Do we have a plan to transition away from PPE controls?



Additional Information

- Enform, [Industry Recommended Practice 14: Non-Water Based Drilling Fluids](#)
- Enform, [Controlling Chemical Hazards Guideline](#)

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