

Generation of waste within the oil & gas sector

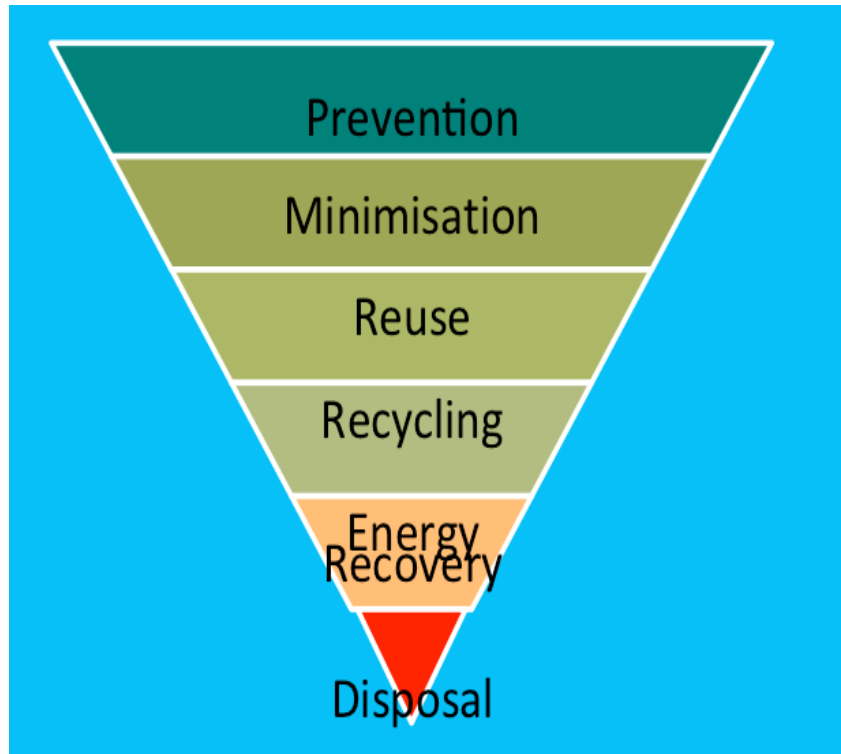
Module 2

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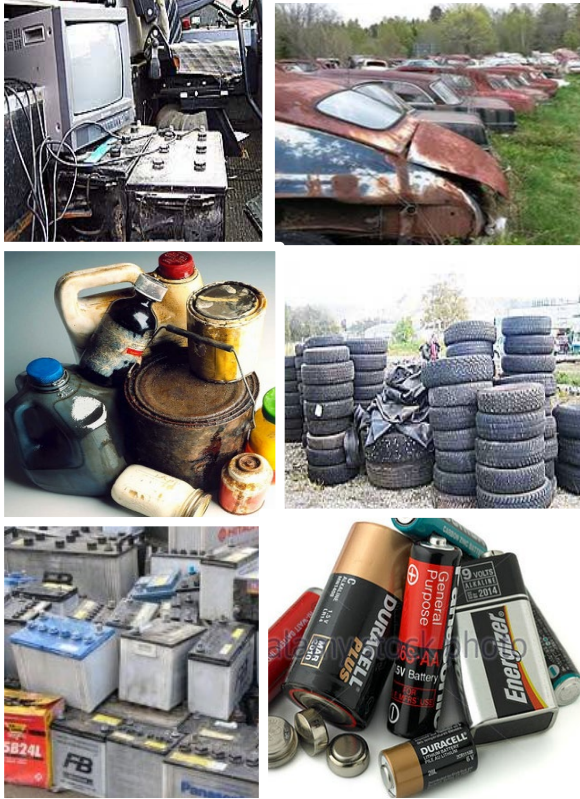
What is waste and why is it a concern?

Waste definition



- Waste means any substance, or object, which the holder discards, or intends, or is required, to discard.
- All forms of waste and their management have the potential to damage health and the environment.
- Waste generation must be minimised whilst re-use & recycling optimised – reducing the amount of waste for disposal.

Waste or not waste?



A material is not classified as a waste if:

- Further use of the material is certain
- A market, or demand, exists for such material
- The material fulfills the technical requirements for the specific purposes
- The use of the material is lawful and will not lead to overall adverse environmental or human health impacts

Definition of hazardous waste



- Hazardous waste is waste that poses substantial threats to public health or the environment.
- In all countries, the treatment, storage, transportation and disposal of hazardous waste should be strictly regulated and monitored.
- International oil companies should adhere to international standards irrespective of where they are operating.

Definition of hazardous waste



- Hazardous wastes can be divided into two major categories: characteristic wastes and listed wastes.
- Characteristic hazardous wastes are materials that are known or tested to exhibit one or more of the following four hazardous traits:
 - Ignitability
 - Reactivity
 - Corrosivity
 - Toxicity

Definition of hazardous waste



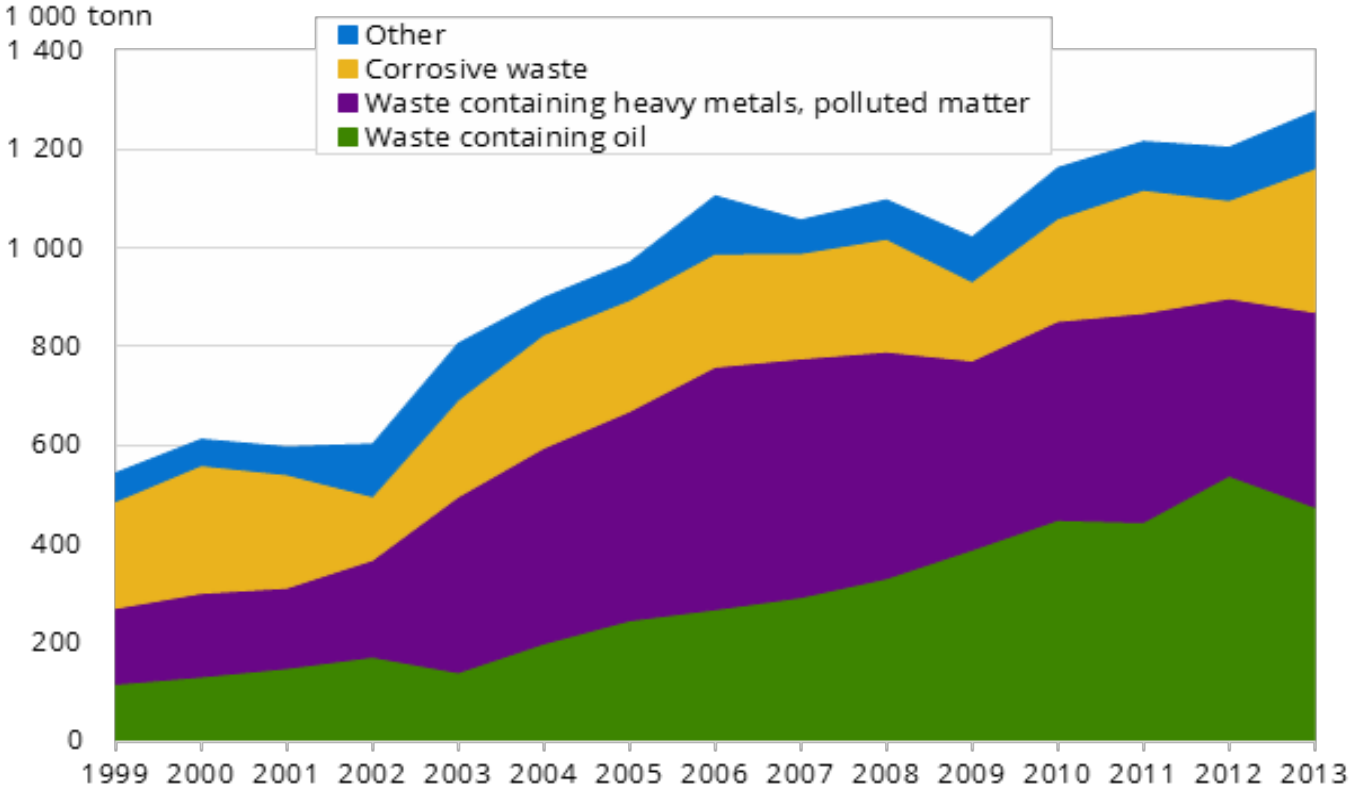
- Listed hazardous wastes are materials specifically listed by regulatory authorities as hazardous wastes which are from non-specific sources, specific sources, or discarded chemical products.
- These wastes may be found in different physical states such as gaseous, liquids, or solids.

Disposal of hazardous waste



- A hazardous waste cannot be disposed of by common means like other waste products.
- The physical and chemical state of a hazardous waste will determine the appropriate disposal option.

Treatment trends with hazardous wastes



Properties which make waste hazardous

- HP2 – Oxidising



- HP3 – Flammable



- HP4 – Irritant



- HP5 – Specific target organ toxicity (STOT)



- HP6 – Acute toxicity



- HP7 – Carcinogenic



- HP8 – Corrosive



- HP 11 – Mutagenic



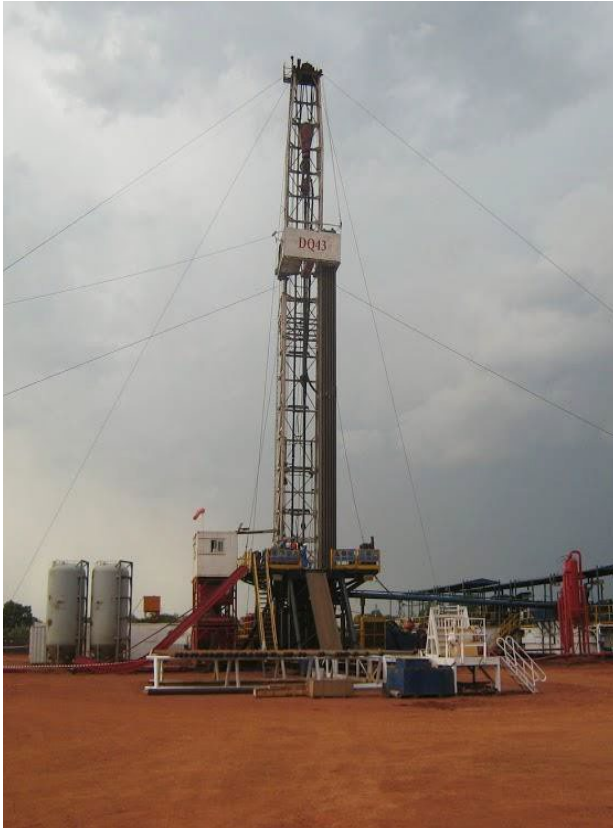
- HP 13 – Sensitising



- HP 14 – Ecotoxic



Management of hazardous waste



- Hazardous waste shall not be mixed with other waste
- Dilution in order to avoid requirements is forbidden
- Proper packaging, storage, labeling
- Hazardous waste shall ONLY be treated by licensed/authorised contractor and premises
- Delivering of hazardous waste shall be notified to the Environmental Authority

Wastes specific to oil & gas sector

Waste from drilling activities



Waste from drilling activities:

- Drilling waste (cuttings and mud)
- Produced water
- Oily waste (oil emulsion and oil contaminated water)
- Chemicals
- Radioactive waste (scales from pipelines and other equipment aggregates some of the radioactive substances)
- Drainage water
- Domestic water
- Sewage
- Solid waste

Impacts of different types of waste

Water-based drilling fluids (WBDF)



- The base fluid mainly comprises water
- But, also contains sea water, salts, clay
- WBDF are used in exploration wells, top-hole sections and in simple wells

WBDF effects when discharged



- Limited effects when discharged on land or in surface water due to low toxicity.
- Impacts would tend to be harmful rather than hazardous.
- But, should be contained in lined pits, along with cuttings, and treated due to high pH and high salt content.

Oil Based Drilling Fluids (OBDF)



- Oil is the base fluid
- Chemicals are added to cool, lubricate, move out cuttings
- OBDF is used in long, complicated wells (deviated wells, horizontal wells, complex geology)
- Are used in the reservoir zone

OBDF effects when discharged



- Severe effect if discharged on land or offshore
- Also be harmful to public health
- Both drilling fluids and cuttings must be taken to treatment plants to be reclaimed or destroyed

Produced water



Produced water is generated from the reservoir along with oil or gas – and contains several chemicals:

- Inorganic salts
- BTEX (benzene, toluene, ethylbenzene, xylene)
- Alkylphenols
- Organic acids
- PAH (poly aromatic hydrocarbons)
- Heavy metals
- Low-radioactive components
- Dispersed oil
- High temperature

Discharged of produced water



- Will potentially have long-term effects including hormone interfering, mutagenic, reprotoxic effects.
- Effects from discharged is very dependent on:
 - Quantity
 - Composition - oil & chemicals content
 - The receiving environment (land, surface water, streams or rivers, ground water)
- Estimated to be most important contribution to offshore pollution in the North Sea!

Emissions to air



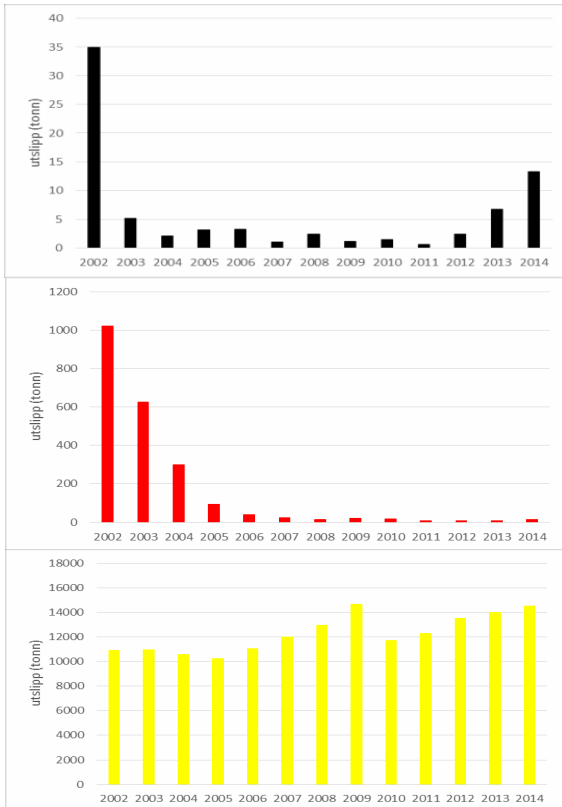
- CO₂ , NO_x and SO₂:
 - From energy production in gas turbines, generators and diesel engines
 - From flaring
 - From well testing
- VOC – volatile organic components:
 - From storing and offloading of oil by truck or vessel
 - From venting, leakages
- PAH and black carbon (soot):
 - From flaring and well testing
- Effects:
 - Climate change
 - Acid rain
 - Acidification of water

Gas flaring



- Flaring of associated gas is not necessary – but can be undertaken if for safety reasons
- Gas may be used directly for power generation
- Gas may be sold to local market (but pipelines and buyer necessary)
- Gas may be injected back into the well
- Avoiding flaring is the preferred option for environmental and cost perspectives

Generator reporting requirement



- Status of the activities
- Discharges and emissions
- Accidental discharges
- The use and discharges of chemicals
- Handling of waste

Decommissioning



- The operators' responsibility do not stop when the reservoir is exhausted
- Need to plan how to stop production and carry out decommissioning
- Carry out cleaning of facilities and pipelines, and surrounding areas, in an environmentally friendly manner
- Leave the area as it was found, or better!
- Carry out environmental monitoring after cessation

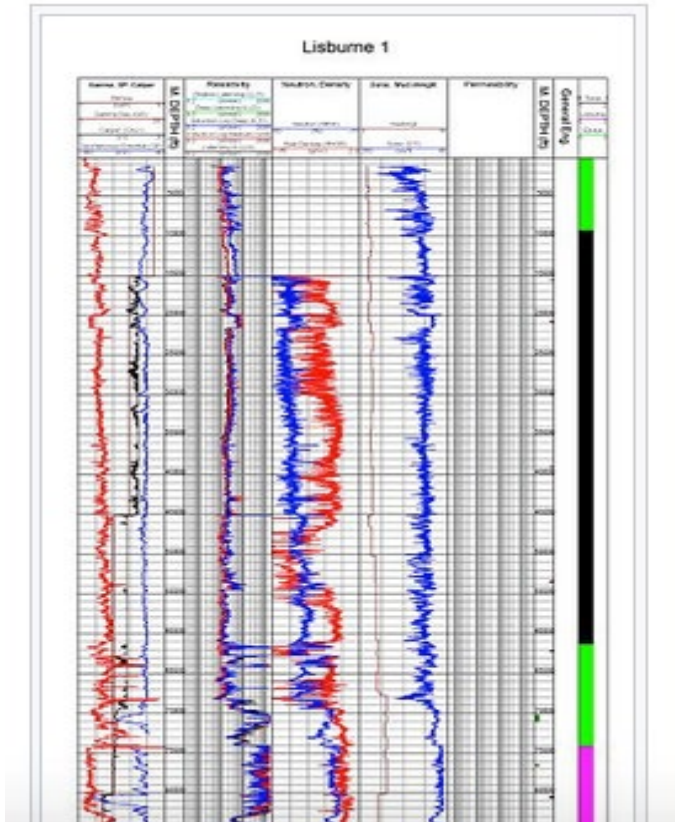
Radioactive materials within the oil & gas sector

Naturally Occurring Radioactive Materials (NORM)



- Cuttings from any well may contain Naturally Occurring Radioactive Materials (NORM) reflecting what is present in the soil/rock.
- Cuttings can, on occasions, set-off radiation alarms at disposal facilities due to elevated NORM levels.
- Common examples of NORM include uranium, thorium, potassium and radium.

Other uses of radioactive material



- Other uses of radioactive material includes well logging and evaluating the integrity of internal welds and seams in pipes and tanks.
- Such uses are unlikely to yield radioactive waste unless the tools get lost in the waste.
- They are extremely expensive, so very unlikely to occur.

Thank you



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