

Reduction of Unintentionally Produced Persistent Organic Pollutants (UPOPs) emissions by improving waste management practices at landfills

Common waste streams and their impact on POPs/UPOPs at landfill

GEF Project ID: 5558 – Component 2 - Development and Implementation of a Sustainable Management Mechanism for POPs in the Caribbean



Common waste streams, and their impact on POPs/UPOPs generation in landfills

Note: source of all images presented below: RWA, 2019.

1. Municipal Solid / Mixed Household Waste

Impact on POPs / UPOPs at landfill

PVC, white paper, plastics in electrical and electronic equipment present potential sources of UPOPs when combusted (which is common in many Caribbean landfills). Bulky items (furniture and carpets, etc.) present potential POPs source as well as UPOPs if combusted.



2. Industrial, Commercial and Institutional

Impact on POPs / UPOPs at landfill

Waste potentially has materials containing POPs or includes PVC, white paper, plastics in electrical and electronic equipment, furniture and textiles that either contain POPs or release UPOPs during combustion. Low flash point commercial and industrial chemicals pose fire risk on sites. Bulky items such as mattresses which could contain brominated flame retardants may be burnt by informal sector to recover metals, generating UPOPs in the process.



3. Construction and Demolition Waste

Impact on POPs / UPOPs at landfill

PVC pipe, window frames etc. and treated lumber all produce UPOPs when combusted. Polystyrene insulations, old carpets, paints and adhesives all potentially contain POPs or produce UPOPs when combusted.

Construction waste can also represent a good source of inert rubble and similar material for use as landfill cover to minimise risk of fires on site.



4. Parks and Gardens (green) waste

Impact on POPs / UPOPs at landfill

Contributes significantly to landfill gas and leachate generation that can expedite leaching of POPs from other wastes. Green waste also represents fuel source for landfill fires producing UPOPs. Hard to compact causing many issues on landfill cell.



5. Recyclable Packaging

Impact on POPs / UPOPs at landfill

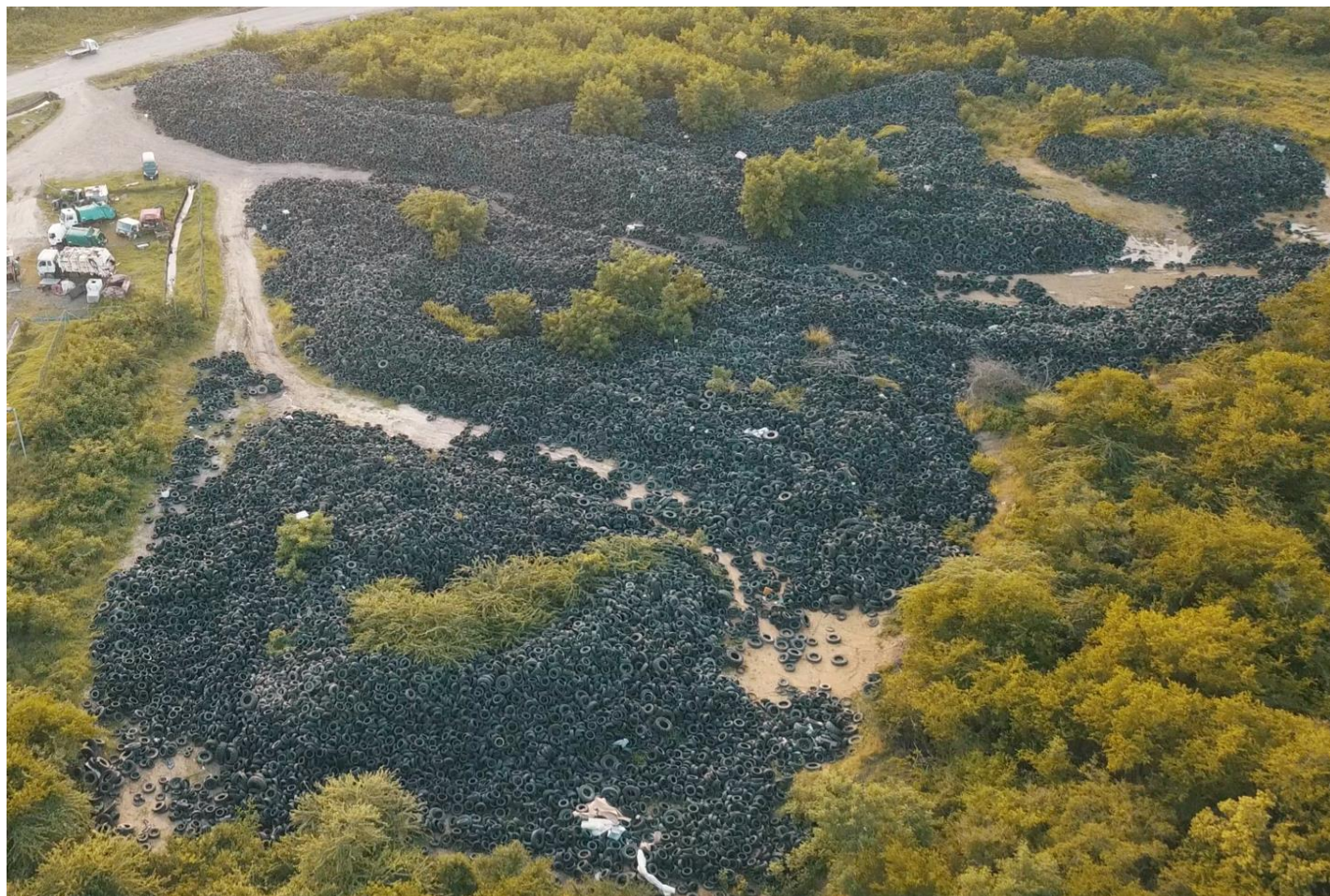
PVC and other prime UPOPs materials are not included in recyclables. Plastic packaging, paper and cardboard represent significant fuel source in landfill fires and their diversion can have a positive impact on UPOPs reduction.

Recycling of some materials may be profitable, depending on market and enabling environment.



6. Tyres

| | Impact on POPs / UPOPs at landfill |
|--|---|
| | <p>Major fuel and risk. Organohalogen compounds that are released as tyres decay or when openly burnt (along with dioxins and Furans from chloride content)</p> <p>May be used for road construction on landfill, using 'mechanical concrete' method (see 'Recovery waste tyres' section)</p> |



7. End-of-Life Vehicles (ELV)

Impact on POPs / UPOPs at landfill

Contains flame retardants such as decabromodiphenyl ether (decaBDE) and other brominated flame retardants in textiles and foams used in upholstery/textiles and artificial leather for seat covers and interior lining, as well as added to hard plastics, electronic parts, cable casings, shrink plastics, adhesives, tapes, etc.; Open burning of ELVs or electrical components would lead to releases of PCDD/ PCDF, Polycyclic aromatic hydrocarbon, Hydrogen chloride, etc.



8. Waste Electrical and Electronic Equipment

Impact on POPs / UPOPs at landfill

Contain cadmium, nickel, zinc (Zn), mercury, organic solvents and BFRs in plastic housings of WEEE and circuit boards to prevent flammability may consist of tetra bromo bisphenol A, Polybrominated diphenyl ethers (PBDEs) and polybrominated biphenyl (PBB). The open burning of plastic coatings from electric cable and wiring releases PCDD/ PCDF, Polycyclic aromatic hydrocarbon, Hydrogen chloride, heavy metals, Carbon



8. Waste Electrical and Electronic Equipment

| Estimated Generation / year | Current management practice | Impact on POPs / UPOPs at landfill |
|--|--|--|
| <p>Unknown</p> <p>112t SBRC 2014</p> <p>240t private export</p> | <p>Limited recovery and export</p> <p>White goods stockpiled beside Landfill</p> <p>Rest comingled in Landfill</p> | <p>Contain cadmium, nickel, zinc (Zn), mercury, organic solvents and BFRs in plastic housings of WEEE and circuit boards to prevent flammability may consist of tetra bromo bisphenol A, Polybrominated diphenyl ethers (PBDEs) and polybrominated biphenyl (PBB). The open burning of plastic coatings from electric cable and wiring releases PCDD/ PCDF, Polycyclic aromatic hydrocarbon, Hydrogen chloride, heavy metals, black carbon</p> |



9. Used Lead Acid Batteries (ULABs)

Impact on POPs / UPOPs at landfill

The most significant pathway for POPs/UPOPs release from ULABs is combustion of plastic casing releasing sulphur dioxide, dioxins and dibenzofurans.

The main hazardous components arising from a typical ULAB are sulphuric acid and lead/lead compounds occurring in about 15% and 70% respectively
ULABs are usually exported for recycling.



10. Agricultural pesticide residues and used containers

Impact on POPs / UPOPs at landfill

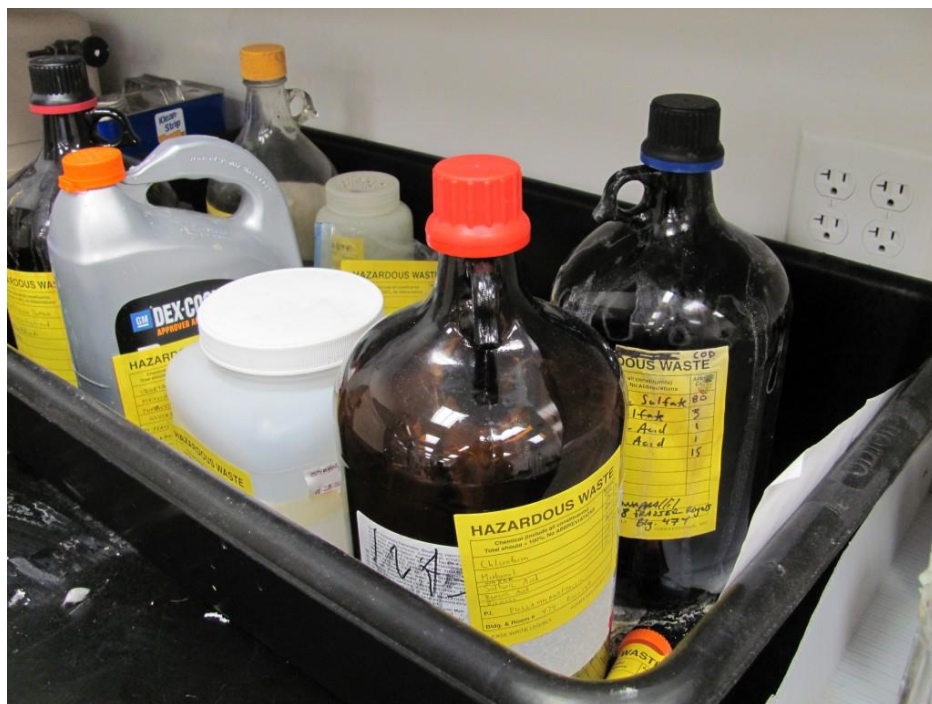
Empty containers of pesticides with residues inside are considered as hazardous. The presence of chlorine in organic form in the empty containers may lead to thermal formation of PCDD/ PCDF if burned. Burning Diophen Bags on farms is also a major source of dioxins/furans.



11. Laboratory Chemicals (hazardous)

Impact on POPs / UPOPs at landfill

Chlorinated organic solvents and expired chemicals classified as POPs and oxidising, or other reactive chemicals and / or low flash point chemicals disposed to landfill that result in spontaneous combustion contribute to the combustion of other wastes resulting in production UPOPs.



12. Hazardous wastes from industry and manufacturing

| | Impact on POPs / UPOPs at landfill |
|--|---|
| | <p>May contain POPs or generate chemical reactions which lead to combustion and subsequent generation of UPOPs from landfills.</p> <p>Waste from paint manufacturing is often disposed of in liquid pits, a common practice in many Caribbean landfills. As the raw materials contain Pigments (such as Titanium dioxide Iron oxides etc. depending on colour desired), Solvents (such as Hydrocarbon compounds Ketone compounds, Alcohol, Water), Alkyd (such as Acrylic Resins, Vinyl) Additives (such as Talc, Clay, Silicates), the wastes arising from this activity is likely to contain Volatile Organic compounds with a mixture of the hazardous components present in the raw materials .</p> |



13. Oils & petroleum Contaminated Waste

Impact on POPs / UPOPs at landfill

Used oil contain heavy metals incl. antimony, chromium, nickel, cadmium, and copper. Presence of copper and chromium are known to catalyse PCDD/PCDF formation.

HFO sludge is typically similar in general composition to the HFO used and is expected to contain significant levels of hazardous materials.

Presence of residual oil in the used oil filters are considered as potentially hazardous and low flash point present a fire risk on landfill site.



14. Medical Waste

Impact on POPs / UPOPs at landfill

PFOAS and PFOA-related compounds from medical textiles and medical devices, mercury from thermometers and sphygmomanometers, dioxins and furans generated from open burning of medical waste.

