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POISON INFORMATION CENTRE

WATER JOC BRIEFING

Perspectives on toxicology related to the UPL-Ltd warehouse fire

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Warehouse products
Typical pesticide technical grade materials, hydrocarbon solvents, emulsifying agents, stabilizers, carriers, pigments, formulated pesticides & formulated foliar feeds

Organic substances, e.g	Organo-metallic substances, e.g.	Inorganic substances, e.g.
Insecticides	MSMA	Copper compounds
Fungicides	Mancozeb	Micro-elements
Herbicides	Other organics	Silica

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Substances selected for the purposes of monitoring dissipation, chemical degradation of substances of concern

- Organic substances
  - Insecticides
  - Fungicides
  - Herbicides
  - Volatile hydrocarbons
- PCBs, DBFs, dioxins
- Air
- Soil and sediments
- Surfaces
- Water
- Animal life
- Plants
- Human beings
- Inorganic substances
  - Copper, zinc, manganese
  - Micro-elements
  - Heavy metals**

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Selection criteria for substances selected for monitoring

- Toxicological parameters
- Acute and chronic plant toxicity
- Acute and chronic organism toxicity
- Acute and chronic human toxicity
- Bio-accumulation Bio-magnification
- Dissipation and degradation
- Physical chemical properties
- DT_{50} in soil and water
- pH sensitivity
- Photosensitivity

Monitoring concentrations of substances over time and correlating with physical toxicity tests on sensitive species

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	Beaches and sea water	Mussels	Oysters	Marine turtles
Immediate post-incident analysis	Arsenic at background levels, organic pesticides at low concentrations	Metals present; herbicides present, one sample >2 mg/kg (combined)	Copper & zinc very high, arsenic and manganese low; herbicides <0.45 mg/kg	Blood samples from 9 turtles showed no correlation with the spill event; no pesticides were detected, metals were higher in captive specimen and free roaming specimen than ones collected after spill event
November analysis	Arsenic at background levels, herbicides <0.06 mg/l (least concern level), no insecticides detected	Metals declined slightly; herbicides declined to <0.025 mg/kg (combined)	Copper, zinc & arsenic declined, manganese slightly elevated; herbicides <0.007 mg/kg	
Issues of concern at present	No concern as a result of the incident at present	Chronic human consumption risk due to persistent arsenic concentration	Oysters exceed food safety specifications for arsenic, copper & zinc	

The contribution of failing wastewater works to the marine environment is of grave concern. Metals such as copper, aluminium, zinc and manganese are continuously pollution the marine environment due to wastewater works failing and direct outfall of untreated sewerage to the ocean.
Scientists have issued warning about metal concentration in oysters long before the incident and thus authorities need to review the harvesting and consumption of oysters seriously, while mussel consumption may also be questionable albeit at a much lower risk level.

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	Estuary	Wetland	Ohlanga River	Tributary
Immediate post-incident analysis	Fish and invertebrates severely affected, pesticide residues at highly toxic levels	Vegetation damaged by herbicides, invertebrates severely affected	Some vegetation damaged, invertebrates severely affected	High concentrations of arsenic and organic pesticides
November analysis	Pesticide residues significantly reduced with only herbicides and metals detected; no insecticides detected	Pesticide residues still present in water and sediments albeit in lower concentrations; some life returning to the wetland	Additional die-off of vegetation due to rainwater flushing herbicides from higher up	Small pockets of hydrocarbon emulsion in embankment carries significant pesticide residues
Issues of concern at present	Possible flushes of pesticide residues from tributary, but rainfall dilutes significantly	Wetland acting as a sink for pesticide residues; trapping technology will be deployed soon	River health should recover soon, birds re-populating river, amphibians also observed	Need to remove the hydrocarbon emulsion or break it up with rapid freshwater flushes
Heavy rainfall over December contributed to the flushing of the system, dilution of the pesticide residues and dissipation/degradation of residues. Insecticides that are of more risk concern than herbicides are rapidly declining in concentration.				

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	Warehouse platform	Pollution control dam	Acute & chronic public health risks	Neighbourhood surfaces and open waters
Immediate post-incident analysis	Was highly contaminated and very high risk	Was at very high concentration and very high risk	About 35 reports of irritation and respiratory tract problems recorded	Traces of pesticides and atmospheric pollutants were detected, but none of critical risk; some fish and bird mortality immediately after event
November analysis	Concrete is in good state with low residue level, remainder of warehouse to be demolished soon (removes risk)	December analysis showed very low residues of herbicides and metals, with only a trace of one insecticide	No reports of acute or chronic public health issues, but awaiting outcomes of health risk assessment	No issues reported