Radiation Checklist - Deliberate or Accidental Releases

1. Has a Major Emergency been declared?

If yes, the following would have been alerted through the MEM Framework/HSE CMT

- Director/s of Public Health
- HSE Chief Emergency Management Officer/s
- Assistant National Director of Public Health
- EPA Office of Radiological Protection
- National Focal Point for Radio-Nuclear Hazards

2. Incident Details

- Location
- Date and time of event
- Population affected: places/groups – where/who?
- If airborne release: wind direction (expressed as blowing from….)
- What level of radiation?

3. Health Protection Measures

- **Follow advice from the National Emergency Plan for Nuclear Accidents (NEPNA)**

Advice may include 'No need to take precautions/protection'. If an extended or dispersed hazard is suspected, the default public health message is to shelter in place **'Go In, Stay In, Tune In'**.

- **Reduce radiation exposure**

Remember: Time, Distance, Shielding. Minimise time near source, maximise distance from source, shield people from the source. 'No hands to mouth' if contamination is suspected. Stable Iodine tablets only protect against radioactive iodine intake – only likely to be necessary for operating nuclear reactors, therefore not likely to be required in Ireland.

- **Contamination of skin/clothing**
    - If there are concerns about people who have gone home with radioactive contamination on skin/clothing they should be advised to place clothes in a sealed plastic bag, seal in a second bag and take a shower as normal to remove most external contamination.
    - External exposure to ionising radiation does not generally result in those exposed becoming a secondary source of radiation, apart from contaminated skin and clothing. Where a radiation source is ingested or inhaled an exposed person may be a source depending on the type of radiation.
- **Personal Protective Equipment (PPE)**

PPE needed depends on type of work to be undertaken. Emergency services should have their own equipment and consult their occupational health service. PPE should only be used by trained personnel. Normal infection control measures (disposable gloves, aprons and

masks depending on circumstances) should prevent personal contamination and intake. PPE does not protect against external beta/gamma radiation.

4. Health Effects of Radiation

- Radiation exposure pathways
    - External - from direct contact with or proximity to radioactive material or other radiation source (e.g. X-ray generator)
    - Internal - from radioactive material entering the body through inhalation, ingestion or wound contamination
- Radiation types
    - Alpha - internal hazard only, stopped by a sheet of paper
    - Beta - external and internal hazard, stopped by thin sheet of plastic
    - Gamma - external and internal hazard, shielded by dense material
- Risks from radiation exposure

Radiation is carcinogenic – in general, there is a fatal cancer risk of 1 in 20,000 (0.005%) per millisievert (mSv) of 'effective dose' with no lower threshold. Effective dose is a measure of radiation-induced harm. It takes into account exposure of different body tissues to different types of radiation. Natural radiation exposure is typically a few millisieverts (4.037 millisievert (mSv) in 2014) every year. Whole body doses less than 0.5 sievert are unlikely to cause symptoms. Partial body exposure may occur and lead to reduced or localised effects (e.g. skin damage, burns, ulcers).

High whole body radiation exposures delivered rapidly effects in dose ranges			
Less than 1 sievert ***Usually asymptomatic***	**1-8 sievert** ***Haematopoietic syndrome***	**6-20 sievert** ***Gastrointestinal syndrome***	**More than 20 sievert** ***CNS/CVsyndrome***
• Symptoms mild or absent • Episodic nausea, vomiting in first 48 hours in 1-10% • Mildly depressed WBC at 2-4 weeks • No foetal effects if effective dose less than 100 mSv • Counselling needed if	• Anorexia, nausea, vomiting, fatigue: 1-4 hours after exposure, timing and severity dose related • Latent period: 2 days -4 weeks • Bone marrow depression: leucopenia – infection; low platelets –	• Early nausea, vomiting, diarrhoea, anorexia, fatigue • Latent period: hours – 1 week • Severe gastrointestinal symptoms (fever, abdominal pain, cramps, watery diarrhoea, haemorrhage, electrolyte imbalance,	• Almost immediate projectile vomiting, explosive bloody diarrhoea, headache, collapse, confusion, loss of consciousness, agitation, burning sensation on skin • May be lucid interval (hours) • Neurological and cardiovascular

pregnant and effective dose more than 100 mSV	bleeding, bruising • Serial lymphocyte counts in first 48 hours predict severity • 3-4 sievert: hair loss at 2-3 weeks • $LD_{50/60}$ is around 4.5 sievert without treatment	dehydration) coupled with bone marrow depression • LD_{100} is about 10 sievert, death usually within 2 weeks	symptoms predominate: convulsions, coma, hypotension, shock • Death within 2-3 days

(Taken from HPA Card 1: Radiation; Deliberate or Accidental Releases
Immediate Action and Guidance for Public Health Professionals August 2010)
http://webarchive.nationalarchives.gov.uk/20140714084352/http:/www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1244023917613

Assessing Radiation Exposure

- High exposures (over 100 mSv) can be assessed by biodosimetry (chromosomal aberration, blood cell counts etc)
- There are two designated medical centres for treatment of radiation induced injuries; EDs in St. Vincent's University Hospital Dublin and Cork University Hospital
- Doses from intakes can be assessed through direct body measurement (gamma emitters) or analysis of excreta coupled with bioassay
- Dose can often be assessed from modelled or measured environmental conditions