Queensland Health

Forensic and Scientific Services

Emergency Response and Radiation Hazards

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Queensland Health acknowledges the Traditional Custodians of the land on which we work. We pay our respect to the Aboriginal and Torres Strait Islander Elders past, present and emerging.

The burden of disease for Aboriginal and/or Torres Strait Islander women is two times higher than for non-Indigenous women. Improving health outcomes in Aboriginal and/or Torres Strait Islander people begins before birth and carries into adulthood.

About me

- Analytical and Environmental Radiochemist
 - o QLD Health
 - Radiation Nuclear Science division
 - \circ Coopers Plains campus
 - \circ Team of 10 chemists and physicists
- Scientific Officer, Scientific 2 team QLD Fire and Emergency Response
 MOU with QLD Health
 - $_{\odot}$ 24/7 Backup on-call team
 - \circ Roster 1 week per month, on-call shifts
 - 4 QLD Health chemists (3 Organic chemists, 1 Radiation chemist, 2 Organic chemists in training)



Radiation Emergency Response – General Structure



State/Territory Agencies

State/ Territory	Public Health Coordination	Radiation Regulation	Emergency Response	
QLD	QLD Health	Radiation Health QLD	QLD Fire and Emergency Services (QFES)	
NSW	NSW Health	Radiation Control and Licensing	NSW SES	
		Authority (RCLA)		
WA	WA Health	Radiological Council/ Radiation Health	WA SES	
SA	SA Health	Radiation Protection Branch, EPA SA	SA SES	
VIC	Health Vic	Radiation Safety, VIC	VIC SES	
TAS	Department of Health (TAS)	Radiation Protection Unit, EPA TAS	TAS SES	
NT	NT Health	Radiation Protection Branch, NT	NT Emergency Service (NTES)	
ACT	ACT Health	Radiation Safety, Health Protection	ACT SES	
*SES = State Emergency Service, EPA = Environmental Protection Authority				

QFES Communications and Functional Delegation

Incident Controller

- 1. Planning
- 2. Public Information
- 3. Operations
- 4. Logistics
- 5. Safety Advisor Scientific Branch Radiation Health
- Universal approach: 'all hazards all agencies'
- Unity of Command



Comms system: AIIMS Awareness

Australasian Inter-Service Incident Management System

- · Integrate personnel, equipment and communication into a common structure
- Provide clear delegation of responsibilities
- Establish a control structure
- Support existing command structures



Emergency Team Management by Objectives

- SMART Framework (Specific, Measurable, Achievable, Relevant, Time-Framed)
- Span of Control
 0 1:5
- Influential factors:
 - Complexity of resources to manage
 - Geographic locations
 - $_{\odot}$ Existing communication channels



Estimating Risk

How significant is the risk to:

- Emergency service personnel
- Community
- Property
- Critical systems / infrastructure
- Environment
- What is the nature of the problem?
- Where is the incident located?
- What is the product/material?
- What is the container?
- · Is there any documentation?
- What is the environment?



Assessment and Planning

Primary sources

- Placards, emergency information panels (EIP), signs
- Container labels
- HB76 Dangerous Goods Initial emergency response guidebook
- Chemdata / Hazmat Action Guide

Secondary sources

- Transport documents
- Fixed site documents
- SDS
- Other sources such as ERDSS or company developed docs

Incident Planning Action After incident assessment, plan:

- Response objectives
- Strategies and tactics
- Approaches to be adopted
- Safety considerations
- Hazard/risk assessments
- Aim is to render incident safe

Response Action Plan

- Rescue (Fire department)
- Containment / zones of operation
 Cold, warm, hot zones
- Identification of material
 Liquid, solid, gas ect
- Prevention of secondary contamination

 Prevent spread
- Stabilisation of incident (rendering it safe)

 Confining and containing any spills
- Objectives expressed as RECEO (fire dept approach)
- · Aim is to render incident safe

Radiation will likely be a secondary hazard

- Use Rotem R-200 in contamination mode
- Measure the local background with the probe, away from any known radiation

 RG10 (big), background approx. 0.7 0.9 cps
 RG12 (small), background approx. 0.4 0.5 cps
 - Background readings are variable use higher reading
- Contamination indicated when meter reading is 2 times background

 RG10, in general, about >1.8 cps
 RG12, in general, about >1.0 cps

Setting up Zones with the Rotem R-200 in Survey Mode

- Background is usually 0.1 µSv/hr
- Cold-Warm Zone boundary 2.5 µSv/hr
- At this boundary, need to be there 100 hrs to get ¼ of the annual public dose
- Warm-Hot Zone Boundary 100 µSv/hr
- At this boundary, need to be there for 2.5 hrs to get ¼ of the annual public dose
- Set Rotem R-200 Survey Mode Alarms at
 Dose Alarm 100 µSv
 - \circ Dose Rate Alarm 2.0 $\mu Sv/hr$



Decontamination Operations

- Use the Rotem R-200 in contamination mode
- Follow decon monitoring procedures
- Always confirm sites of higher readings
- If the reading is greater than 2 times the background, send someone to decon
- Indicate where they should concentrate efforts
- If the radiation is over the whole body, consider the possibility of recent medical treatments or probe contamination



Plan for bad and accept when it's good

Pre-Entry Planning



Monitoring/Sample Planning

Identify locations for monitoring /	How much is present/expected		
sampling	Where is it located (floor, containers, drums, pallets?)		
Identify the	Determine physical state		
for sampling	Prioritise if more than one sample		
	Consider spare sampling equipment	Mistakes	
		Extra samples	
Select and	Basket, drop sheet, waste bag, biobottle/overpack		
	Task bags for equipment + spares		
prepare	3 Layers of containment		
appropriate	Photography, chain of custody, labels/barcodes		
equipment	Equipment should have point guides		
	Make sampling point guides	Select and prepare sample task bags	

Document Tasks / Risks – One single laminated piece of paper

Front Page

Task and resource

Order of priority each task

Photograph each sample taken

Always observe for hazards

Check list prior to entry

Back Page	Draw map
U	Aim
	Hazards
	Where to sample
	Calculations
-	

Operational Issues

Risk Assessment

Mitigation/control strategies

Effective Equipment

- Expected vs unusual readings
- Is it intrinsically safe?
- ·What might affect the instrument working correctly/failing

What is to be sampled and for what purpose

• State of material (solid, liquid, gas) and quantity (bulk or trace)

• Fit for purpose – evidentiary requirements

Effective pre-planning and tasking

- Minimise time in hot zone
- Prioritise tasks
- ·Ensure risks are mitigated
- •Ensure necessary resources are available to etnry team

Public Engagement and Trust

- Preferred communication medium for each generation
- How to build trust and confidence so members of the public will follow instructions in a radiation emergency
- Communication with hospitals and health professionals about how to triage patients with exposure or contamination
- General feel from members of the public that this situation could not possibly happen in Australia, so if it does, there may not be an immediate response from the public due to disbelief
- Multipurpose hall constructed for possible CBRN incidents.

Public Perception – Taylor, M. et al (2011)

The public and a radiological or nuclear emergency event: threat perception, preparedness, and anticipated response

FINDINGS FROM A PRELIMINARY STUDY IN SYDNEY, AUSTRALIA.

By Mel Taylor, Wendy Joung, Barbara Griffin, David Hill, Robert Chisari, Beryl Hesketh, and Beverley Raphael.





FIGURE 3. Confidence in the ability of the listed organisations or groups to respond to an R/N emergency event, listed in order of mean confidence levels. Mean confidence was calculated using the 5-point response scale; 1=not at all, 2=a little, 3=moderately, 4=very, 5=extremely.



Public Perception – Taylor, M. et al (2011)





FIGURE 6. Likelihood of turning to the listed forms of media for credible information in the event of a radiological or nuclear incident. Mean likelihood of use was calculated using the 5-point respon scale; 1-not at all, 2-a little, 3-moderately, 4-every, 5-extremely.



The public and a radiological or nuclear emergency event: threat perception, preparedness, and anticipated response

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Key Implications

The general public thinks that CBRN terrorism is unlikely to occur in Australia and does not appear to be highly concerned that they or their loved ones would be affected by it.

Low levels of threat perception to CBRNE terrorism events (low probability and low vulnerability) are likely to result in poor awareness, vigilance, and preparedness to respond to such events, and this will also create challenges for community engagement in this area.

General emergency preparedness is low. The public will require clear and timely guidance on what to do in the event of an R/N emergency event. Good crisis communication from a trusted source will reduce uncertainty, fear and misinformation, and will encourage a more consistent and manageable public response.

The public has high levels of trust and confidence in First Responder groups to respond to an R/N event. Communication from these sources is likely to be trusted the most widely by the public.

In the event of an R/N emergency there would be very high demands on communication services. Lack of contact and reassurance that loved ones are safe is likely to be a major source of distress, and may result in increased anxiety and possible crowd management issues; such as anger, frustration and lack of compliance, e.g. leaving the scene, avoiding screening or processing.

The public is most likely to go to the ABC and online news/internet for credible information in the event of an R/N emergency, therefore these would be the best media to use for broadcasting information and guidance information post-event.

CBRN Responder



Operations

- Real time Tracking of Who, what, when, where, with what equipment.
- Geo-located photo log
- Real-time data sharing with partner agency

Key Policies for Success

Use Regularly

- Drills
- Small calls
- Class Assignments
- Trips

Key Policies for Success

Naming Convention For Events

LANC YYYYMMDD Name

LANC 20211222 Main Street

- Determine best organizational structure(s)
 - Ensure individuals in place to take ownership of critical aspects
- Coordinate and establish critical settings and partnerships
 - Partnerships
 Assessment
 - Thresholds
- Learn and stay proficient with features
 - MapGIS Overlays
 - Resources
- Keep up on organization management to be prepared for incidents
 Equipment
 - Equipment
 Personnel

Overview of Adoption

- Emergency Response (Drills/Exercises)
- Instrument Inventory and Calibration
- EcoGammas (real time monitoring)
- Procedure Library
- Decommissioning Activities



Lab Analysis Capabilities

• Complete overhaul of RadResponder's lab analysis capabilities - Completed in early 2020

Development of the Network

- Collaboration between RadResponder and DOE Consequence Management (FRMAC)
- Enhancements also reflect feedback from state/local users
- Includes a new Lab Portal view for laboratories
- More information can be found in the

Key Policies for Success

Equipment Naming / Labeling





Future training exercise? National exercises?



References

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Acknowledgments

- Queensland Fire and Emergency Services, Research and Scientific Branch Entire team
- FSS Scientific 2 Team / Organic Chemistry, QLD Health
- Radiation Nuclear Science, QLD Health Entire team
- Radiation Health, QLD Health Simon Critchley
- ARPANSA Callum, Michelle, Blake and Marcus

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