

# **WHOP008 RADIATION MANAGEMENT PLAN**

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## **1. PURPOSE AND SCOPE**

The Radiation Management Plan (RMP) applies to all activities and services carried out by Investigator Resources, its contractors, subcontractors, and visitors South Australia.

This plan covers instances where projects are being drilled where knowledge of potential radiation are unknown (eg via historic data) and as such the relevant levels (or not) of any potential radiation are largely unknown.

Prior to use alignment with jurisdictional requirements may be needed.

This document aims to identify and mitigate harm through hazard identification, risk assessment, and control of all activities to maintain the highest WHS standard practicable.

### **1.1. Objectives and Targets**

The objectives of the RMP are to:

- Align operations with jurisdictional requirements and regulations. Where no jurisdictional code exists or is recognised as absent, IVR will consult with relevant industry specialists on acceptable processes to be applied;
- Assist with the identification and control of radiation risks;
- Outline the principles for managing health and safety risks associated with the handling, storage, transport and disposal of radioactive materials; and
- Ensure the health and safety of all personnel and site visitors.

## **2. RISK ASSESSMENT**

The risks associated with radiation can be extreme. Adequate risk assessment is crucial to defining the risks and required management controls for safe handling, containment, storage, transport and disposal of radioactive materials.

Investigator Resources requires its workers, contractors and sub-contractors to undertake a Risk Assessment for each task that has the potential to create exposure pathways to radiation.

Risk Assessments on radioactive materials must include:

- Assessment against all relevant jurisdictional legislation, requirements and regulations;
- An assessment of acceptable radiation dose limits in accordance with jurisdictional legislation and guidelines provided by the International Commission on Radiological Protection and the International Atomic Energy Agency;
- Potential exposure pathways; and
- All controls required to manage exposure to radiation.

### **3. SOURCES OF EXPOSURE AND EXPOSURE PATHWAYS**

Sources of radiation can potentially lead to human or environmental exposure; however, an 'exposure pathway' (or a means by which the radioactivity from the source reaches the person or the environment) must exist before the source of radiation becomes a hazard or risk.

It is usual to consider the following radiation exposure pathways:

- Irradiation by emitted energies and particles;
- Handling of drill core containing uranium;
- Movement of core trays;
- Inspection of drill core;
- Cutting of drill core; and
- Location of the core storage area.
- Inhalation of radon gas and/or its decay products:
- Core or samples stored in insufficiently ventilated locations.
- Inhalation of radionuclides in airborne dust:
- Working in dusty conditions without correct PPE;
- Poor PPE performance due to ill-fitting or lack of seal;
- Inhalation of dust produced through drilling where insufficient water is being used;
- Cutting of drill core where insufficient water is being used or spillages that have been allowed to dry to dust;
- Insufficient cleaning of contaminated area; and
- Poor core saw ventilation.
- Ingestion of radionuclides:
- Handling of drill core or samples containing uranium; and
- Failure to maintain levels of personal hygiene.

### **4. MANAGEMENT CONTROLS**

Management controls required for radioactive materials, include:

- Alignment of controls with jurisdictional requirements and regulations;
- Engaging competent personnel;
- Identifying radioactive materials;
- Assessing the risks pertaining to radioactive material during handling, storage, transport and disposal;
- Implementing a hierarchy of controls through elimination, substitution, engineering controls, administrative controls and the correct use of PPE; and
- Incorrect use or behaviour that retards or negates the effectiveness of PPE will result in personnel being immediately removed from site and disciplinary proceedings may be implemented.

Physical controls required for radiation exposure may be identified during a Risk Assessment, these may include but are not limited to:

- Monitoring of vehicles and equipment prior to entry onsite and on exit (refer to Section 5, Radiation Monitoring);
- Wash down area with suitable water capture facilities;

- Dedicated waste water treatment facility;
- Bunding;
- Ventilated core cutting facility; and
- Quarantining methods:
  - Dedicated washing facilities for work clothing; and
  - Boot washing/cleaning facilities at the entrance to office area and dining areas.

Communication of the risks associated with on-site handling and storage of radioactive materials shall be communicated via induction, toolbox and safety meetings, and signage as required.

#### **4.1. Drilling**

Where radioactive material is expected or encountered, drilling methods shall be altered as necessary to ensure:

- A safe method for the isolation and disposal of slurry, mud and contaminated water is implemented;
- Drill sites are kept clean and orderly;
- Spillages are cleaned up before they dry and become sources of dust; and
- Dry drilling is not undertaken without a Risk Assessment and approval from the Project Manager.

#### **4.2. Core Tray Check**

A system of measuring the radioactivity of drill core shall be implemented that includes the following:

- Measurement of gamma radiation emitted by drill core using a scintillometer or other approved device;
- Recording of reading (in counts per second (cps)) or ppm on tray to identify trays with elevated uranium concentrations.

#### **4.3. Drill Core Storage**

Identification of a suitable location for the storage of radioactive drill core and recording of the storage location into the Project / Site Risk Assessment Register.

The storage location must be:

- Isolated
- Secure;
- Located away from occupied or work areas; and
- Signposted if required.

The Site's Emergency Management Plan shall include response actions should an incident occur involving the spillage of radioactive materials or equipment (e.g. core trays containing radioactive materials falling over). All response actions shall be compliant with jurisdictional legislation, regulations and codes of practice.

#### **4.4. Core Cutting**

A suitable procedure shall be implemented for core cutting (or splitting).

The procedure must include:

- A requirement for all radioactive core to be cut using water to suppress dust;
- A requirement for personnel cutting core or within the vicinity of core cutting to use respiratory protection (half face disposable dust masks), sealed goggles and ear-muffs as a minimum.

#### **4.5. Waste Water**

A jurisdictionally compliant system shall be implemented that adequately manages the risks associated with waste water that has been in contact with radioactive material. This shall include:

- Containment, treatment and disposal;
- Water from core cutting; and
- Surface water / run-off from the core farm.

#### **4.6. Hygiene**

Project / site management plans are required to include the following conditions should radiation be expected or identified.

- No beards or facial hair that interferes or negates the use of PPE dust and other mask types;
- Personnel must wash their face and hands prior to eating or smoking;
- Work clothing shall be washed when dirty or exposed to radiation exposure pathway;
- Washing of exposed clothing shall be undertaken separate to washing of non-exposed clothing;
- Dining or food preparation areas must be kept free of contamination; and
- Boots shall be clean of mud prior to leaving any area / activity with identified radiation.

#### **4.7. Use of Radioactive Sources On-Site**

Geophysical instruments and equipment may contain radioactive material. Any item brought to site containing radioactive material is required to be entered into the Project / Site Risk Assessment Register and managed in accordance with relevant jurisdictional legislation, regulations and standards.

Additionally, site management systems shall ensure:

- Equipment is only used by a licensed operator;
- Use of equipment sources must be formally logged; and
- While not in use, equipment is securely stored.

#### **4.8. Decontamination of Machinery and Equipment**

To prevent radioactive material being inadvertently transported offsite or to non-radioactive areas of the site, a system shall be established whereby machinery and equipment is adequately decontaminated prior to leaving site and at regular intervals. Where decontamination is inadequate the machinery and equipment will not be allowed to leave site.

#### **4.9. Transportation**

Safe methods for the transportation of any radioactive material shall be determined based on the appropriate jurisdictional codes and the Risk assessment undertaken for the material. The transportation method shall apply to transportation on public roadways and the work site.

All radioactive materials must be appropriately packaged and secured for transit in accordance with jurisdictional legislation, IAEA and UN regulations and guidelines as appropriate.

A method of tracking radioactive materials in transit must be established that is compliant with jurisdictional legislation, IAEA and UN regulations and guidelines.

The Site's Emergency Management Plan shall include response actions should a vehicle incident occur while transporting radioactive materials or equipment. All response actions shall be compliant with jurisdictional legislation, regulations and codes of practice.

#### **4.10. Disposal of Radioactive Waste Materials**

Disposal methods for radioactive waste materials, including any returned pulps and samples shall be established following an adequate Risk Assessment.

All disposal methods shall be compliant with jurisdictional legislation, regulations and standards.

### **5. RADIATION MONITORING**

Radiation monitoring is required to determine the effectiveness of the implemented radiation controls and to monitor radiation exposure of workers, the public and the environment where required.

The type, location, frequency and method of monitoring required at the project site is to be determined from the Project / Site Risk Assessment, and may include:

- Alpha / gamma surveys and monitoring;
- Dust monitoring;
- Radon decay air monitoring; and
- Surface contamination monitoring.

Monitoring results shall be suitably and regularly analysed and reported in accordance with jurisdictional requirements, ensuring any identified trends are investigated and mitigated.

### **6. TRAINING AND COMPETENCY**

Ensure all personnel are aware of the nature of the radiation and radioactive materials to which they may be exposed and the means of assessing and controlling their exposures. Where jurisdictional regulations require formal training and certification this must be implemented prior to commencement of work.

A radiation induction, where required, shall include:

- What radiation is;
- Exposure pathways;
- Health effects;
- Regulatory requirements;
- Control measures; and
- Site radiation rules and procedures.

## **7. INCIDENTS**

Incidents involving radiation are required to be reported immediately to the Project Manager and escalated to the Managing Director of Investigator Resources immediately thereafter.

## **8. PERFORMANCE MEASUREMENT, MONITORING AND REPORTING**

The following records shall be produced and maintained if radiation is identified as a hazard at any site:

- Radiation monitoring data and information (location, type, equipment used, date, time, calibration data);
- Dose Assessment / Baseline Monitoring information;
- Site Emergency Plan for hazardous substances;
- Radiation licences, where required;
- Locations of storage of radioactive materials on site;
- Inventories for radioactive materials;
- Tracking records for transport of radioactive materials;
- Health Monitoring, if required; and
- Incidents / controls / corrective actions taken.

## **9. REFERENCES**

Investigator Resources Ltd – Hazard Management Plan  
Investigator Resources Ltd - Safety and Health Management Plan  
Investigator Resources Ltd - Occupational Exposure Management Plan