

# 1. Executive Summary

The purpose of this Report is to provide guidance for investigating radiological incidents. A radiological incident is an abnormal occurrence or sequence of occurrences that may adversely affect the health and safety of workers or members of the public. It can cause property or environmental damage, interrupt program activities, and result in noncompliance with regulations. It is important that radiological incidents be properly investigated to establish the cause(s), contributing factors, and consequences so that corrective measures can be implemented. Although the primary focus of this Report is the investigation of radiological incidents, it also briefly covers the initial response since the investigation of a radiological incident begins with the initial responders.

This Report provides guidance on the responsibilities, general principles, techniques, and process for conducting an incident investigation. This guidance is sufficient for investigating relatively minor incidents. For more serious or complex incidents it is recommended that investigators also have formal training in the more rigorous levels of cause analysis. This training should be commensurate with the seriousness and complexity of the incident.

Radiological incidents can occur wherever radioactive material is handled, stored, used or transported or where radiation-generating equipment is operated. Most radiological incidents have minor consequences and many of these minor incidents may not require an investigation. Radiological incidents that have (or potentially have) a significant adverse impact on the health and safety of workers or members of the public, or adversely impact the environment, should be investigated. In addition, regulatory agencies require that radiological incidents be investigated if regulatory limits are exceeded. The extent and rigor of an incident investigation should be tailored to the severity and complexity of the incident.

This Report provides guidance for individuals who have the responsibility for investigating a radiological incident. Specifically, it provides information and guidance on the following topics:

- definition of a radiological incident, description of the investigation process, and the purposes of an incident investigation;
- determination of whether the incident warrants an investigation;

- responsibilities for conducting or participating in incident investigations, including upper management, line management, the radiation safety committee, radiation safety program personnel including the radiation safety program manager or radiation safety officer (RSO), and workers;
- initial response to the incident, including the procedures for controlling the incident scene to prevent loss of information, recovering any physical items that may have been removed, and gathering information related to the incident;
- coordination of facility recovery activities and the incident investigation;
- appointment of an individual or an incident investigation team (IIT) to perform the incident investigation, including recommendations for the training and qualifications of investigators and the use of consultants and specialists in conducting the investigation;
- conduct of the incident investigation, including the initial team meeting, interviewing facility representatives and personnel involved in the incident, and collecting physical evidence;
- performance of the cause analysis, including which type of cause analysis to perform (*i.e.*, direct cause, apparent cause, or root cause);
- use of various cause analysis techniques including barrier analysis, task analysis, work change analysis, events and causal factors (ECF) charting, process analysis, and human performance analysis;
- identification of the cause(s) of the incident;
- determination of the consequences of the incident including radiation doses to workers, patients, and members of the public, releases of radioactivity to the environment, property damage, and interruption of program activities;
- development of a corrective-action plan;
- preparation of the investigation report including legal considerations, and
- follow-up actions, including scheduling corrective actions, reviewing, tracking, and trending the effectiveness of corrective actions, and lessons-learned distribution.