


Confirming an Alarm Condition on a Radiation Detection System



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Introduction



When the alarm is activated on a radiation detection system it *may* not be because of the presence of radioactive material in the load.

There are three types of alarm conditions:

- Positive
- False-Positive and
- False

Positive Alarms

Definition of a Positive Alarm:

When a radiation detection system has alarmed as a result of the presence of radioactive material in a load.

The radioactive material will cause a change in the measured radiation level above an alarm threshold setting.

Confirmation of a Positive Alarm:



Solution:

- 1st: Pass the material through the radiation detection system at least 3 times to confirm that the alarm is Positive.
- 2nd: Use a sensitive portable radiation detector to locate the increased radiation level on the outside of the load.

1st Check the material 3 times



Move the material forwards, then backwards then forwards through the detection system.

2nd Use a sensitive portable detector

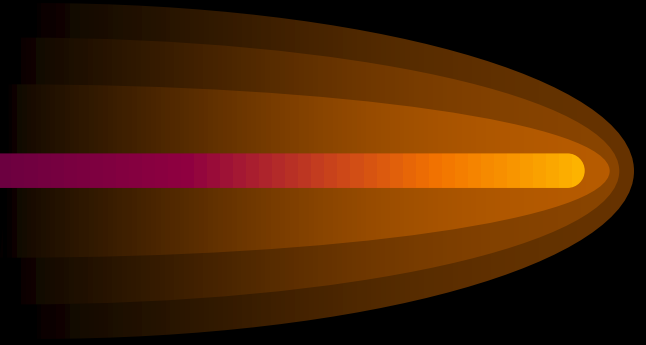


Check the material for an increase over background radiation with a sensitive portable radiation detector.

False Alarm

Definition of a False Alarm:

When a radiation detection system has alarmed and the cause of the alarm can not be identified.



Confirmation of a False Alarm:



It is extremely difficult to identify a true false alarm. Once an alarm occurs it usually doesn't repeat itself unless there is a system malfunction.

- Can occur at anytime.
- Can be caused by an Electronic/Electrical problem.
- Can be caused by a software error.

False-Positive Alarms

Definition of a False-Positive Alarm:

When a radiation detection system has alarmed as a result of an increase in measured radiation caused by radiation from an external source. There are many examples that can be given, the following are most common:

- Non Destructive Testing (NDT); Radiography (X-Raying)*
- Medical Treatment*
- Uneven Loading and Vehicle Geometry*

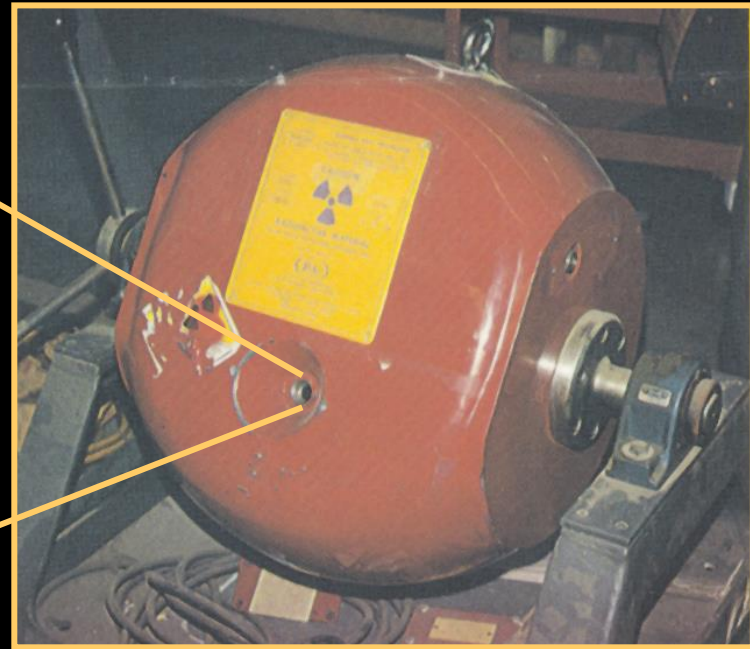
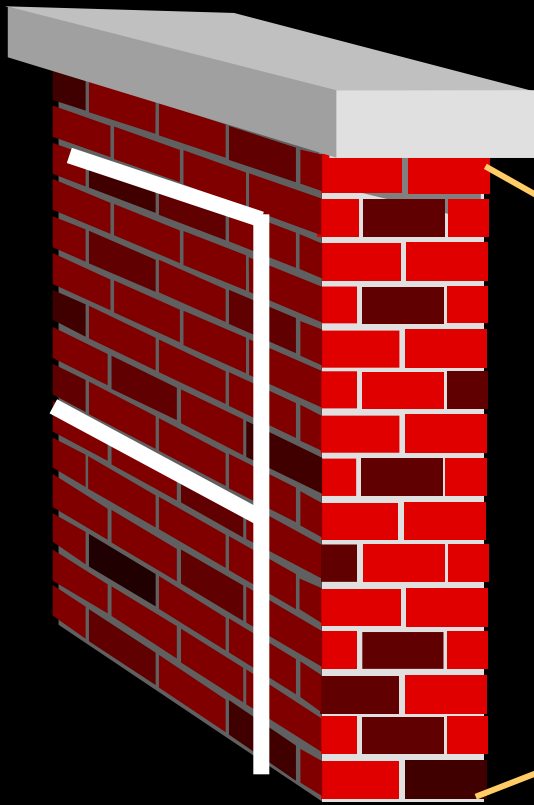
Radiography & Non Destructive Testing Alarms



These types of alarm conditions are caused by Sealed Radioactive sources. Either the radioactive source capsule is removed from the safety shield or a small opening in the housing is opened for the radiation to escape.

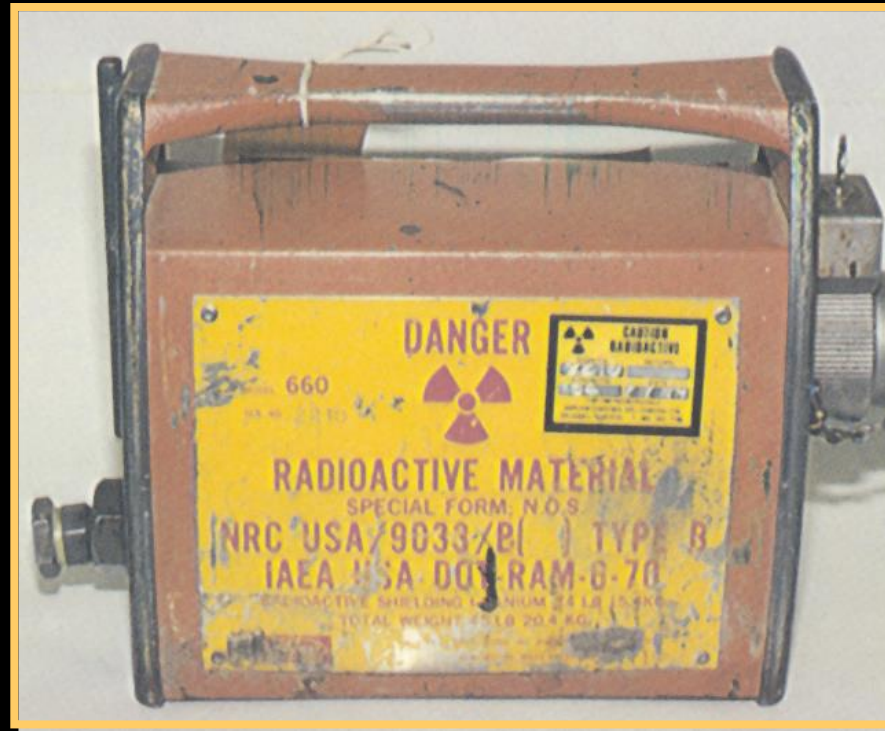
- Can occur at anytime.
- Emits a very large field of radiation.
- Can cause an alarm from more than a mile away.
- Measured levels can be very high.

Non Destructive Testing (NDT)



Radioactive sources are used for testing materials.

Radiography (X-Raying)



Radiography is used extensively in the metals fabrication industry.

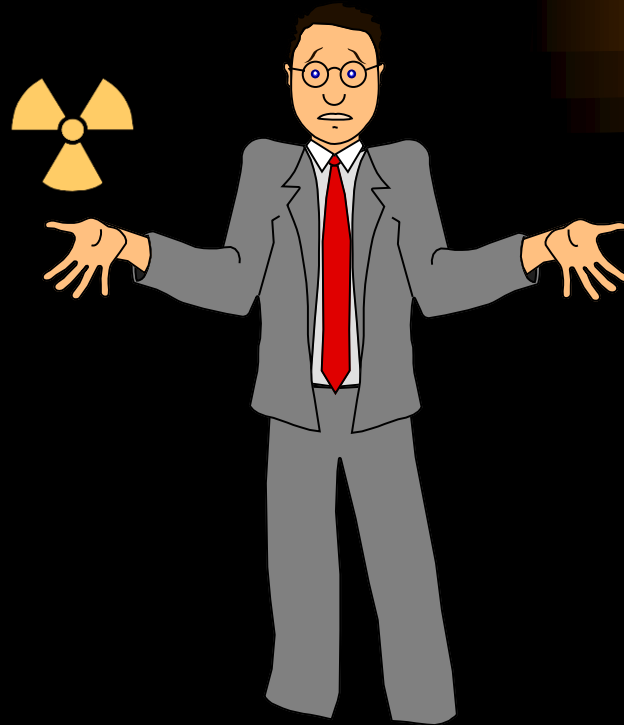
Identification of Radiography & Non Destructive Testing Alarms



Solution:

1. Locate the source with a portable detector.
2. Contact the local regulatory body to see who may be using a source in the local area (2 mile radius).
3. Inform the source user of the alarm situation.
4. Ask that the source be repositioned and then test it.
5. Ask the user to use a shield (i.e. lead apron, steel plate, vehicle).
6. Ask that you be informed when the source will be used.

Medical Treatment



People that have been administered radioactive material for medical reasons (i.e. thyroid cancer, x-raying of the intestinal track).

Identification of Medical Treatment Alarms



- Can occur at anytime.
- Emit a very large field of radiation.
- Can cause an alarm from more than 100 feet away.
- Measured levels can be very high.
- Can be identified by a Portable Radiation Detector.

Solution:

Move the individual away from the detection system until there is no increase in the measured radiation level.

Uneven Loading & Vehicle Geometry Alarms



Definition of an Uneven loading and Vehicle Geometry Alarm Condition:

When a radiation detection system alarms because of the changes in measured radiation levels caused by vehicle and/or material density changes.

Uneven Loading Example:



Variation in Load Density

Vehicle Geometry Example:



Variation in Vehicle Geometry

Uneven loading & Vehicle Geometry

Example :



Variation in Load and Vehicle Geometry

Dealing with False/Positive Alarms



False/Positive alarms have cost scrap dealers tens of thousands in return freight and material handling costs.

Solution:

1. Ensure loads leaving the facility are evenly loaded.
2. Compare alarm information with the vehicle geometry.
3. Check the entire load with a portable radiation detector for an increase in measured radiation levels.
4. Pass the vehicle through the radiation detector again but turn the vehicle 180°.
5. In the event of a load rejection ask that the buyer of your material to perform points 2-4 to confirm the alarm.

In Conclusion...



Your personnel must be educated about radiation detection system alarm conditions in order to optimize its detection capability and avoid load rejections.