



# 5 – Developing a Search Plan



## Search and Secure Workshop



# Objectives

The objective of this section is to demonstrate an effective method for developing a list of orphan sources and the sites where these sources are most likely located.

We will discuss:

- Assessing the potential problem
- Developing a list of missing sources and search sites
  - Site history
  - Verified inventory
- Search planning

## 5.1 – Assessing the Problem





# IAEA Code of Conduct



CODE OF CONDUCT ON  
THE SAFETY AND SECURITY OF  
RADIOACTIVE SOURCES

放射源安全和保安行为准则

CODE DE CONDUITE SUR  
LA SÛRETÉ ET LA SÉCURITÉ  
DES SOURCES RADIOACTIVES

КОДЕКС ПОВЕДЕНИЯ ПО  
ОБЕСПЕЧЕНИЮ БЕЗОПАСНОСТИ И  
СОХРАННОСТИ РАДИОАКТИВНЫХ  
ИСТОЧНИКОВ

CÓDIGO DE CONDUCTA REVISADO  
SOBRE SEGURIDAD TECNOLÓGICA  
Y FÍSICA DE LAS FUENTES  
RADIACTIVAS

مدونة قواعد السلوك بشأن أمان المصادر  
المشعة وأمنها



**“Every State should have in place an effective national legislative and regulatory system of control over the management and protection of radioactive sources that includes national strategies for gaining or regaining control over orphan sources.”**



# SEE IAEA TECDOC 1388

## *for...*



- Description of the methodology for developing a national strategy to regain control over orphan sources; and
- Description of the methodology for searching for sources.

**IAEA TECDOC 1388**

**Strengthening control over radioactive sources in authorized use and regaining control over orphan sources**

**National Strategies**





# Orphan Source Indicators

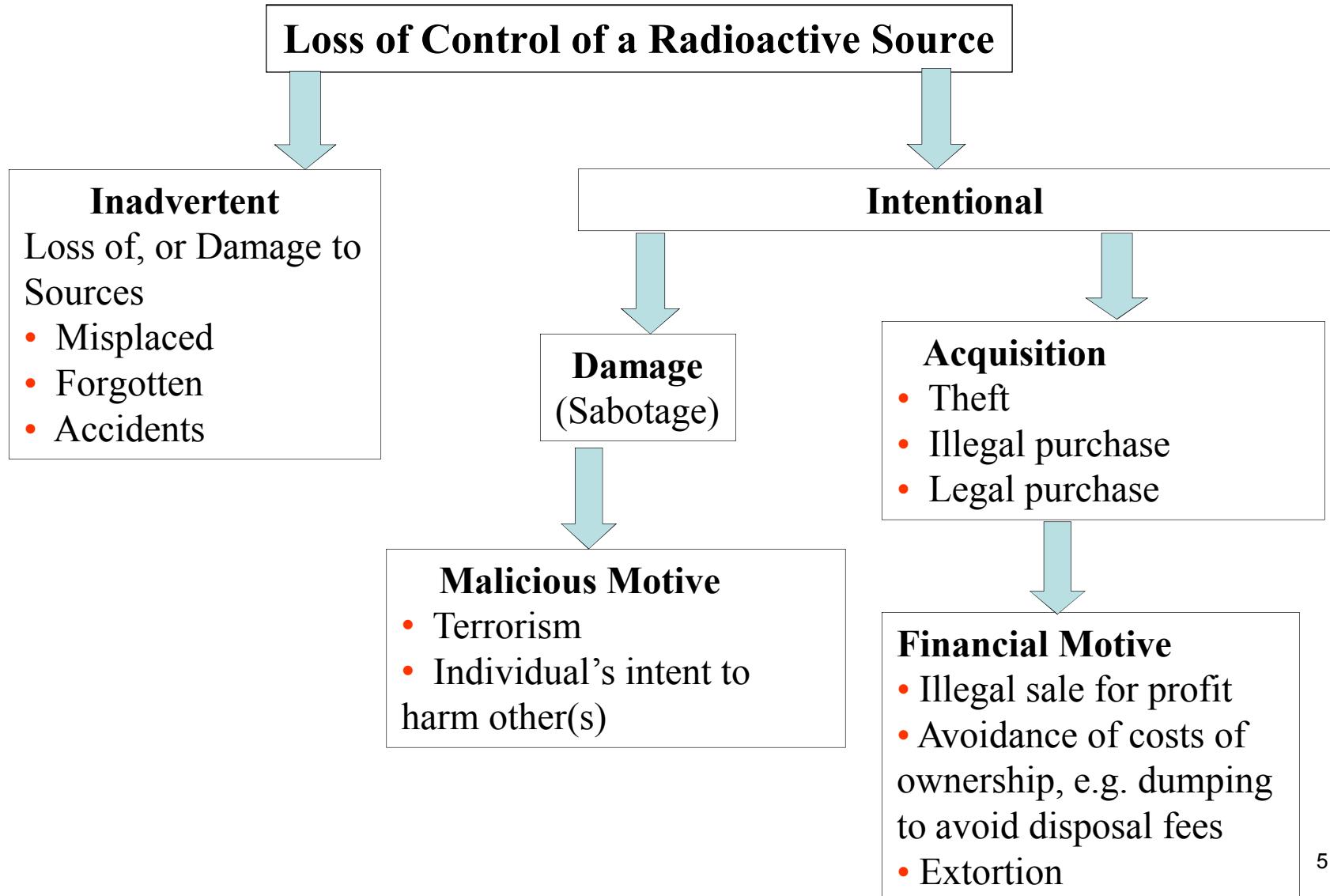


- Sources missing during a physical inventory
- Company shuts down un-expectantly without transferring responsibility for sources they owned
- Media report of a lost or stolen source
- Burglary report for an area with stored sources
- Physician diagnosis of radiation related symptoms or injuries (nausea, vomiting, open sores and skin burns)





# Loss of Control of a Radioactive Source





# Assessment Activities

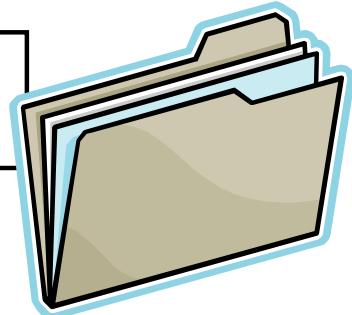
- Two separate administrative activities:
  - Site Histories
  - Verified Inventories
- Site History
  - Establishes list of all sites that used or are using radioactive materials
  - Records site activities and types of sources used
  - Lists the disposition of sources for inactive sites
- Verified Inventory (done for all site histories)
  - Identifies sources that are uncontrolled or missing from inactive sites
  - Verifies the location and status of sources at existing sites
    - Known
    - Previously unknown
  - Used to update the regulatory database

## 5.2 – Developing a Site History



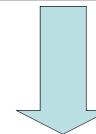


# Administrative Records Search

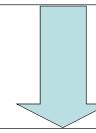


## Gather inventory records and compare

- Identify gaps in data



## Establish a possible list of orphan sources



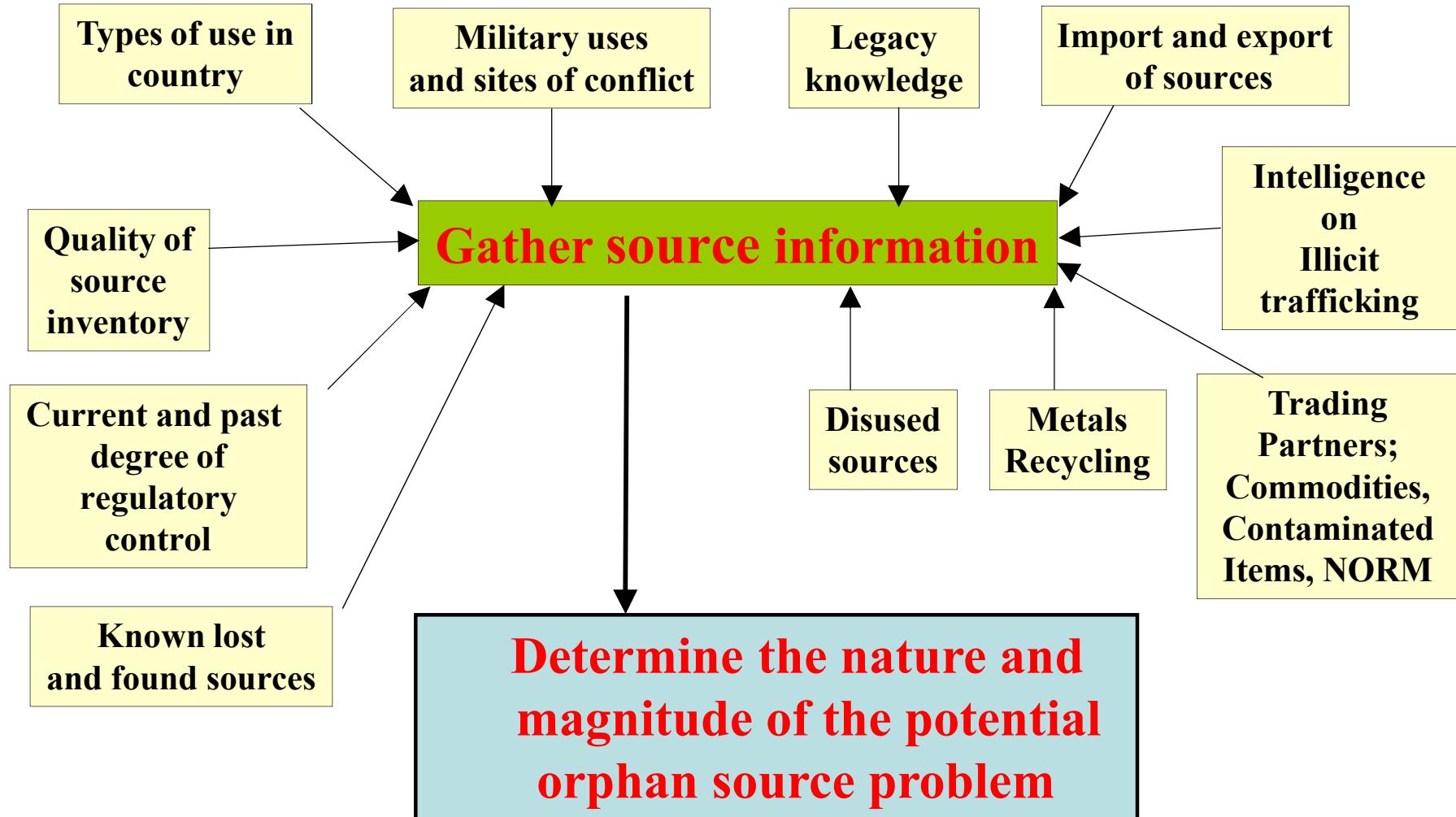
## Prioritize the list based on:

- Degree of immediate hazard (source category and population density in the area, etc.)
- Ability to retrieve
- Resources available

**This will determine the nature and magnitude of the orphan source problem**



# Assessment of the Potential Problem

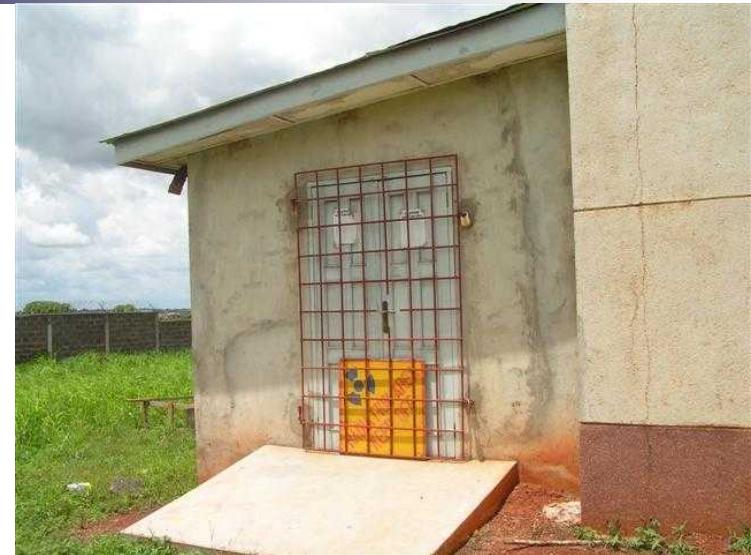




# Typical Facilities with Sealed Sources



- **Medical Facilities**
  - Oncology clinics or hospitals
  - Diagnostic clinics
  - Research facilities
  - Veterinary clinics or hospitals
- **Industrial Facilities**
  - Sterilization plants
  - Radiography companies
  - Oil or gas companies
  - Manufacturing (paper, food, tobacco, plastic, cement, etc.)
  - Mining operations
  - Military bases
- **Research Facilities**
  - Radiobiology and radiochemistry laboratories
  - Universities with research laboratories using radioactive materials





# Discussion Groups



- Individuals who formerly held radioactive material licenses
- Workers at the facility
- Relatives and neighbors of deceased workers
- People living in the vicinity of the site
- Well-known scientists or researchers who use radioactive materials
- Retirees
- Former regulatory authority employees



# Missing Records

- Consider public advertisements (radio, television or newspaper ads) with pictures.
- Make specific mailings to known industries that likely have radioactive sources
  - Factories
  - Industries
  - Instrument calibration facilities
  - Research facilities
  - Universities



## 5.3 – Developing a Verified Inventory



# Verified Inventory

- Documents the physical status of all sealed sources in a country
  - Orphan, currently being used, disused
  - Protected or unprotected
- Conducted for all site histories as part of the orphan source assessment
  - Determines orphan sources
  - Updates database (RAIS available)
- Used periodically (2-3 years) after the orphan source assessment to keep databases updated
- Sources must be visually observed!





# Initiating the Verified Inventory

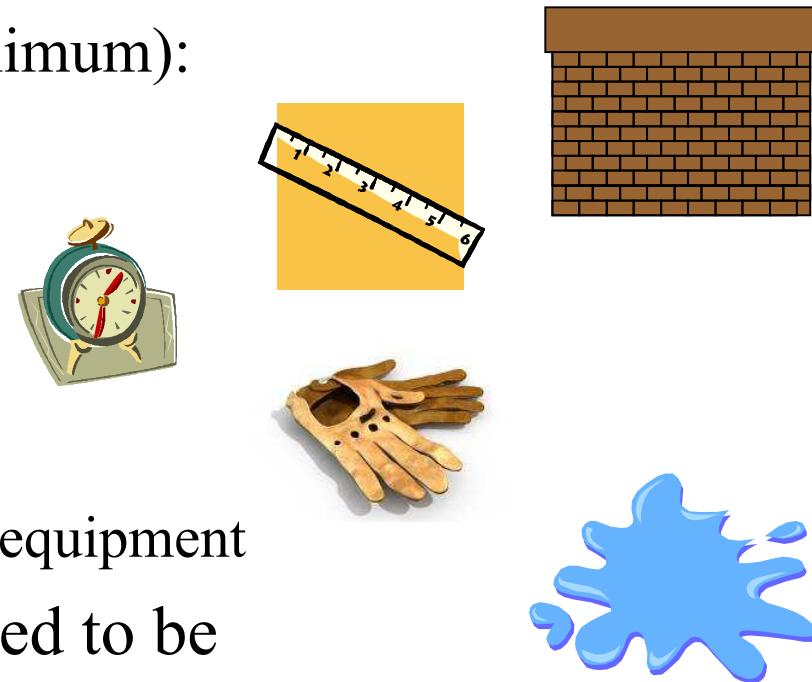


- Contact the facility owner or the current property owner
- Provide advance notice
- Phone call or letter
- Inform him/her about the planned inspection



# Inspectors

- Only trained inspectors should be sent to conduct the inventory!
- Training should include (at a minimum):
  - Basic radiation protection
    - Time
    - Distance
    - Shielding
  - Contamination control
  - Operation of radiation detection equipment
- All sources should be considered to be breached (leaking) until proven otherwise.





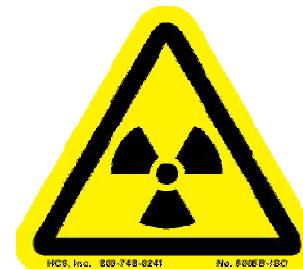
# Site Visit

- Take radiation detection equipment!
- Determine who the owner is.
- Ask to see all the sources on your list.
- For each source on your list:
  - Evaluate its physical condition;
  - Determine if it is properly labeled;
  - Take a photograph;
  - Determine the dose rate at 1 m; and,
  - Determine if emergency action should be taken.



# Site Visit (cont.)

- **Always** ask if the people know about any other sealed sources on the property.
- Show them the **trefoil** symbol and ask them about objects with this symbol.





# Update Database Records

- Unique source information
  - Identification number
  - Manufacturer
  - Model and serial number
- Location
- Radiological Information
  - Isotope and activity
  - Dose rate 1 m from source
  - Spectrum
- Source Status
  - Active use
  - Disused
  - Vulnerable
  - Condition (intact or leaking)
  - Missing (orphan)



## 5.4 – Search Planning





# Search Team Roles



- There are two main components of the Search Team:
  - Planning Committee
  - Search Unit
- The Planning Committee is responsible for providing the preliminary framework for the searches to commence.
- Suggested Planning Committee Membership
  - Regulatory Authorities
  - Search Team Manager
  - Safety Officer / Health Physicist
  - Instrumentation Specialist
  - Communication Officer (if necessary)
- Search Unit (discussed in Lecture 14)





# Planning Committee

## Responsibilities



- Obtains authorization for searches and source movements
- Identifies and evaluates information and sources related to potential search sites
- Develops list of search sites from available information
- Addresses storage / disposal options for orphan sources
- Identifies or develops procedures to be followed for conditioning, securing and transporting radioactive sources
- Identifies budget and equipment needs
- Establishes schedule for searching sites
- Determines search unit membership and communication
- Develops a final overall project summary



**IAEA  
Category 1, 2  
and 3 sources  
should have  
TOP priority!**

