

Nuclear Forensics – Maintaining chain of custody of evidence during a nuclear or radiological emergency

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www.jrc.ec.europa.eu



*Serving society
Stimulating innovation
Supporting legislation*

Nuclear Forensics addresses scientific analysis of nuclear or other radioactive material, or of other evidence that is contaminated with radioactive material in the context of **legal proceedings**

Provide hints, investigative leads or information related to:

- Incident
- Material
 - Hazard
 - Origin
 - Last legal owner
- Perpetrator
- Device

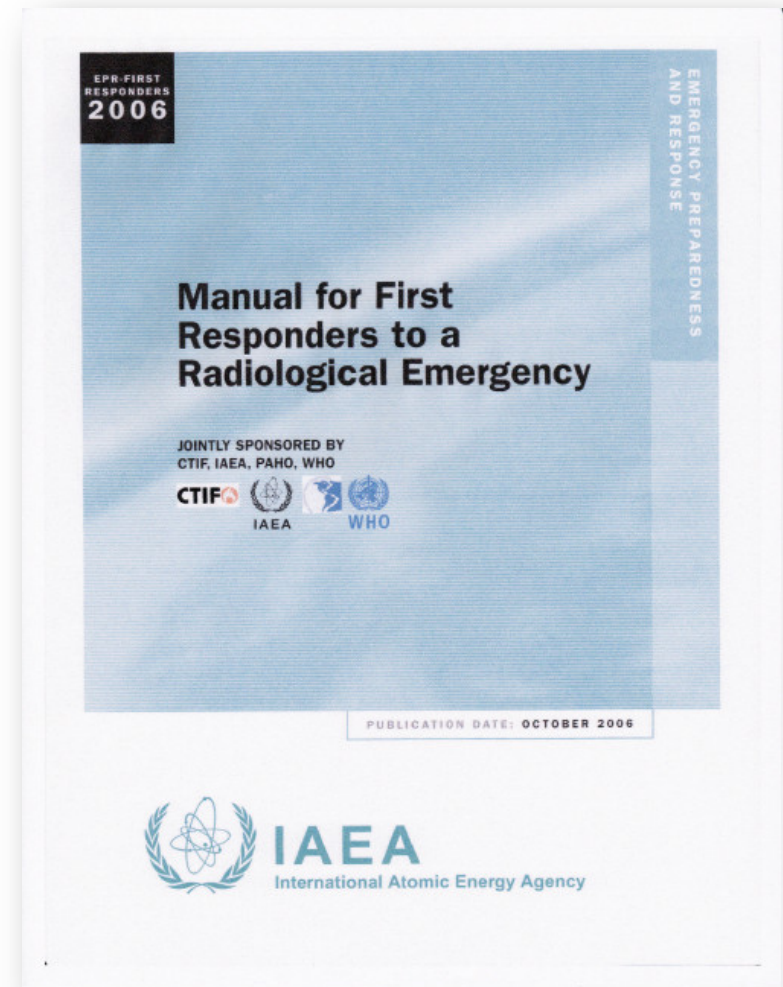


What is special?

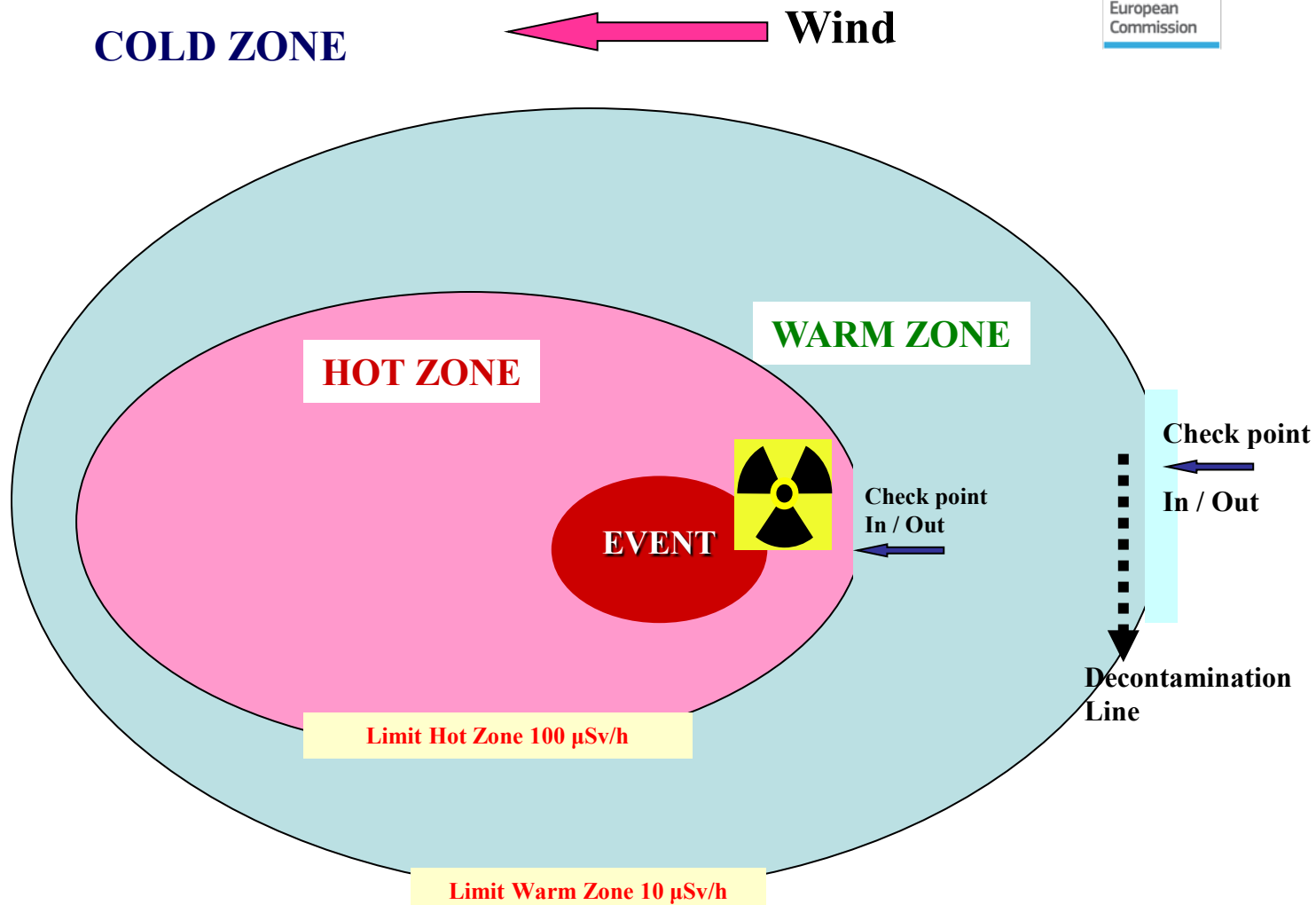


Radiological Emergency

- Various actors on site
 - Aligning priorities and procedures
-
- Protection of general public
 - Protection of first responders
 - Collection of evidence
 - Clean-up operations



What is special?



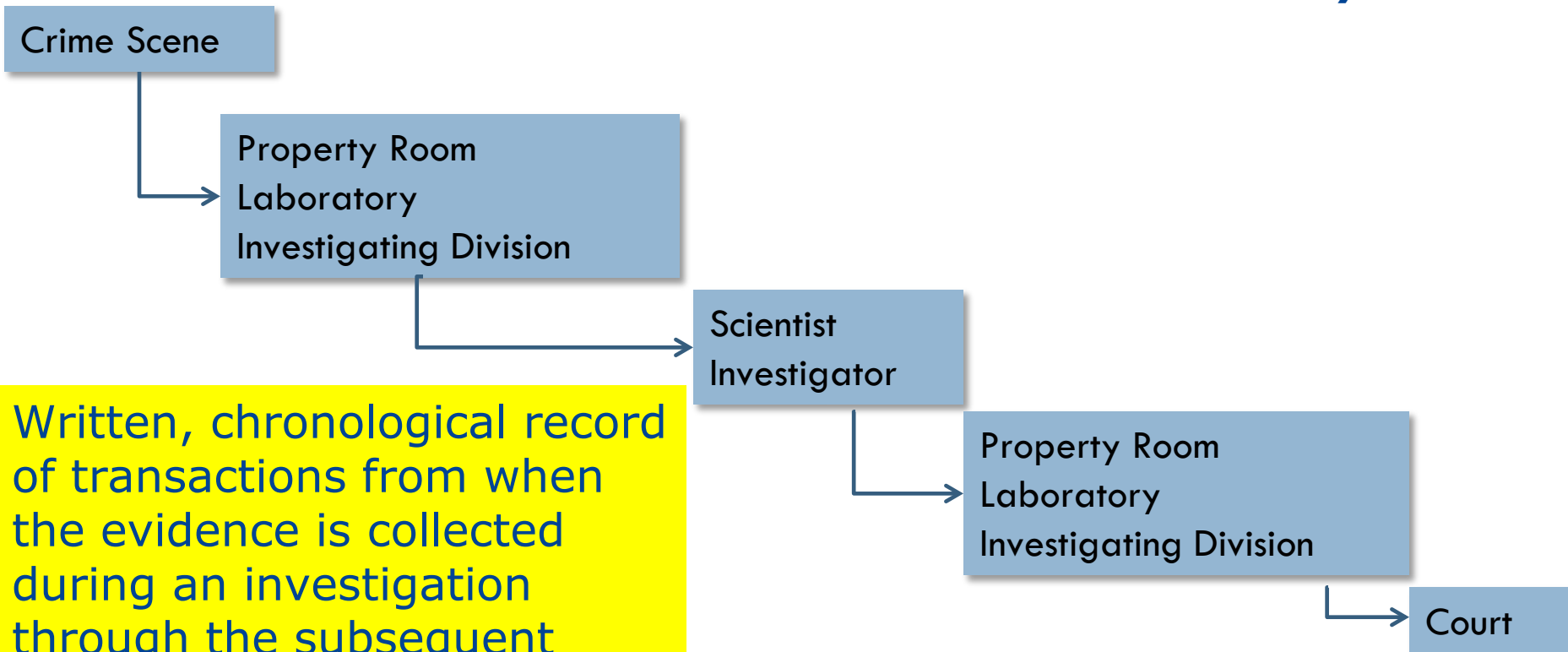
Notional Hot / Warm / Cold Zones (consistent with the terminology of IAEA's Manual for First Responders to a Radiological Emergency (EPR-First Responders, IAEA, 2006))

What is Chain of Custody?



“The order of places where, and the persons with whom, physical evidence was located from the time it was collected to its submission at trial.”

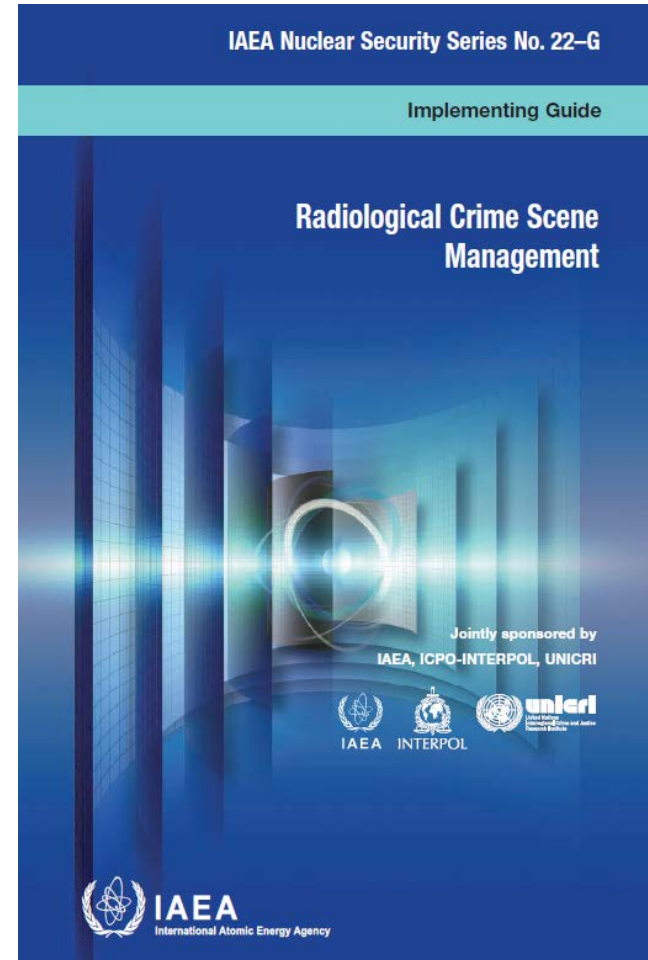
Webster's New World Law Dictionary © 2006



Written, chronological record of transactions from when the evidence is collected during an investigation through the subsequent adjudication.

Start of Chain of Custody

- At crime scene when evidence is collected
- Sometimes for hazmat, in cold zone (after decon)
- Documented with:
 - Photographs before collection, with and without a scale
 - Evidence Recovery Log
 - Package labeling



EVIDENCE RECOVERY LOG PAGE _____ OF _____

GENERAL INFORMATION		PERSONNEL <i>(Include Initials)</i>	
DATE _____		_____	
CASE ID _____		_____	
LOCATION _____		_____	
PREPARER/ASSISTANTS _____		_____	
_____		_____	

ITEM #	DESCRIPTION	WHERE FOUND	RECOVERED BY	MARKING	PACKAGING	MISC.

Maintaining Chain of Custody



Ensure physical evidence is controlled at any point in time and not subject to

- Tampering
- Loss
- Confusion
- "Contamination"

FD-1004
6-13-2006

FEDERAL BUREAU OF INVESTIGATION
EVIDENCE CHAIN-OF-CUSTODY

Evidence Type: <input type="checkbox"/> General <input type="checkbox"/> Drug <input type="checkbox"/> Valuable		
Special Handling Instructions	Initial Receipt	Date and Time
<input type="checkbox"/> Batteries <input type="checkbox"/> Biohazard <input type="checkbox"/> Computer <input type="checkbox"/> FGJ <input type="checkbox"/> Firearms <input type="checkbox"/> HAZMAT <input type="checkbox"/> Latents <input type="checkbox"/> Refrigerate <input type="checkbox"/> Requires Charging <input type="checkbox"/> Other _____ <input type="checkbox"/> None	Signature: _____ Printed Name: _____ <input type="checkbox"/> Collected at Scene <input type="checkbox"/> Recovered <input type="checkbox"/> Seized <input type="checkbox"/> Contributed	
Relinquished Custody	Accepted Custody	Date and Time
Signature: _____	Signature: _____	
Printed Name: _____	Printed Name: _____	
Reason: _____	Reason: _____	
Relinquished Custody	Accepted Custody	Date and Time
Signature: _____	Signature: _____	
Printed Name: _____	Printed Name: _____	
Reason: _____	Reason: _____	
Relinquished Custody	Accepted Custody	Date and Time
Signature: _____	Signature: _____	
Printed Name: _____	Printed Name: _____	
Reason: _____	Reason: _____	
Relinquished Custody	Accepted Custody	Date and Time
Signature: _____	Signature: _____	
Printed Name: _____	Printed Name: _____	
Reason: _____	Reason: _____	
Relinquished Custody	Accepted Custody	Date and Time
Signature: _____	Signature: _____	
Printed Name: _____	Printed Name: _____	
Reason: _____	Reason: _____	

Firearms Certification:
 Printed Name: _____ Signature: _____ Date: _____
 Case ID: _____ IB: _____ Barcode: _____

Maintaining Chain of Custody



- Classical forensic evidence (not contaminated)
- Radioactively contaminated classical forensic evidence
- Nuclear or other radioactive material (Nuclear forensic evidence)

- Clear and unique labeling of every piece of evidence
- Nuclear Forensic Laboratories need to understand the concept of CoC and implement proper protocols

A yellow rectangular form with a black radiation warning symbol at the top right. The form is titled "Caution Radioactive Material" and contains two sections: "Caution Radioactive Material" and "Survey Information".

Caution Radioactive Material

Item Number: _____
Description: _____
Location: _____
File Number: _____
Date: _____
Collector 1: _____
Collector 2: _____

Survey Information

Dose Rate (30cm): _____
Dose Rate (contact): _____
Wipe Test (dpm): _____
Suspect Material: _____
Surveyor: _____
Org/Unit: _____
Survey Date: _____
Survey Time: _____

Maintaining Chain of Custody



Example

"Glowing Tulip" Exercise of the GICNT (Global Initiative to Combat Nuclear Terrorism)

- Interagency
- International cooperation

Handling and analysis in nuclear forensic laboratory



Chain of Custody Form		
The item(s) described below were obtained as evidence by the undersigned during an official investigation of the : (name of school, district, or entity)		
Rotterdam Harbor		
Description of Item:		
Radioactive substance from interior of the porcelain figures		
Obtained from: (title, name, location, phone number)		
Carton box with porcelain figures (20140303001-004)		
Name of investigator:		Date Obtained:
Ronald Overwater		March 3 rd 2014
Case Number:	Item Number:	
20140303001	20140303001-005	

Temporary disposition of item (s): (where stored)		
National Institute for Public Health and the Environment (RIVM)		
Released by:	Received by:	Date (dd/MM/yyyy):
	Ronald Overwater	03/03/2014

Temporary disposition of item (s): (where stored)		
Institute for Transuranium Elements (ITU) Front Office		
Released by:	Received by:	Date (dd/MM/yyyy):
Ronald Overwater	Merte Bucher	10/04/2014

Temporary disposition of item (s): (where stored)		
Institute for Transuranium Elements (ITU) Laboratory		
Released by:	Received by:	Date (dd/MM/yyyy):
Merte Bucher	Erich Hrnccek	11/04/2014

Temporary disposition of item (s): (where stored)		
Institute for Transuranium Elements (ITU) Front Office		
Released by:	Received by:	Date (dd/MM/yyyy):
Erich Hrnccek	Merte Bucher	05/11/2014

Temporary disposition of item (s): (where stored)		
Central Organization for Radioactive Waste (COVRA)		
Released by:	Received by:	Date (dd/MM/yyyy):
Merte Bucher	Phillip Gloedvol	06/11/2014

Maintaining Chain of Custody



Example

Every subsample taken

- For analysis
- To another laboratory
- Into another person's responsibility

Needs to be documented

- CoC form
- Photography



EUROPEAN COMMISSION
JOINT RESEARCH CENTRE
Institute for Transuranium Elements (Karlsruhe)
Nuclear Safeguards and Forensics

Sample reception protocol.

SAMPLE ID: *item 018b*

Main sample:

Sub sample(s): *—*

Amount (g): *0,12 g*

HAND OVER BY:

Analyst's name: *E. Hrncsek*

Signature: *[Handwritten Signature]*

Location: *A128*

Date and time: *14.4.2014 10:16*

RECEIVED BY:

Analyst's name: *J. Zsigrai*

Signature: *Zsigrai*

Location:

A018

ANALYSIS TECHNIQUE(S):

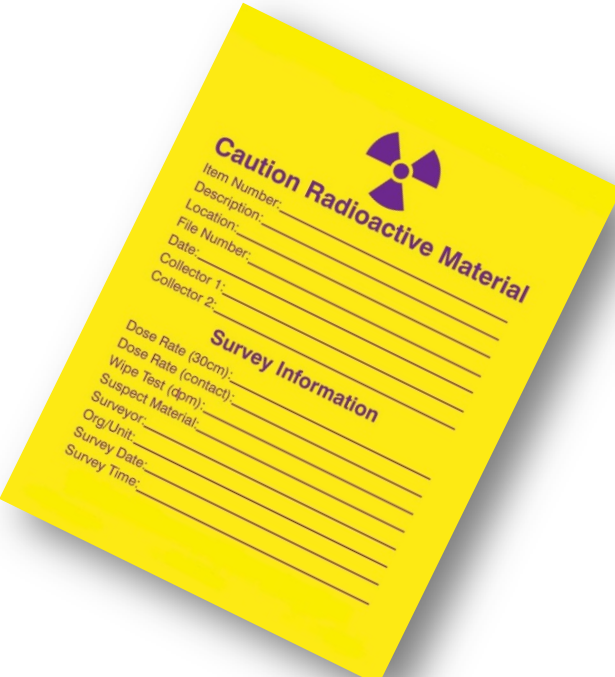
High resolution gamma spectrometry.

Postfach 2340, D-76125 Karlsruhe - Germany - Nuclear Safeguards and Forensics Department
Telephone: direct line (+49-7247)951-545, switchboard 951-0, Fax: 951-99545

Internet: E-mail: Klaus.Mayer@ec.europa.eu

Chain of Custody

- Ensures control of the evidence "cradle" (incident site) to "grave" (courtroom)
- Important for admissibility of evidence in court
- Universally applicable concept (with national particularities)
- Consistent with sample management procedures



Caution Radioactive Material

Item Number: _____
Description: _____
Location: _____
File Number: _____
Date: _____
Collector 1: _____
Collector 2: _____

Survey Information

Dose Rate (30cm): _____
Dose Rate (contact): _____
Wipe Test (dpm): _____
Suspect Material: _____
Surveyor: _____
Org/Unit: _____
Survey Date: _____
Survey Time: _____

Thank you for your attention



EVIDENCE

Submitting Agency _____

Date Collected _____ Time _____

Item # _____ Case # _____

Collected By _____

Description of Evidence _____

Location Where Collected _____

Type of Offense _____

CHAIN OF CUSTODY

Rec. From _____ Date _____ By _____

Rec. From _____ Date _____ Time _____ By _____

Rec. From _____ Date _____ Time _____ By _____

Rec. From _____ Date _____ Time _____ By _____

Thanks to Benjamin Garrett (retired from FBI)