

BOOK REVIEW

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Review of: *Nuclear Forensic Analysis*

REFERENCE: Moody KJ, Hutcheon ID, Grant PM. *Nuclear forensic analysis*. Boca Raton: CRC Press; 2005.

This book by three of the leading authorities in the field outlines a critically important area of forensic science in the modern world. While many of the government laboratories have carried out extensive work in the past on the detection and attribution of radioactive materials, the work was primarily engaged with national security at the nation states' level, and not with individuals or small groups. The authors provide a comprehensive outline of the field with practical information presented in 25 chapters. This is not a book filled with theory, but critical information has been gathered and put in one place for readers wanting to know more about the forensic applications of nuclear science.

As stated in Chapter 1, the goal of nuclear forensics is to answer the following questions: What is the material? Where did it come from? How did it get to where it was interdicted? Who did it? The authors then lay out the information to answer these questions. Chapters 1–4 of the book treat in detail the basics of nuclear chemistry, the history of the Cold War nuclear materials production complexes, and the commercial nuclear power sector. These chapters provide a compendium of information that is focused on the substantive knowledge in the field.

Chapter 5 contains an overview of the construction of nuclear weapons and the components used. Chapter 6 is entitled "Chronometry" and illustrates how forensic information about the purity and history of nuclear materials can be derived from a knowledge of nuclear decay chains and radiochemical purification processes. Chapter 7 highlights the fact that much information can be obtained from tiny amounts of material if the correct radiochemical procedures are used. Chapters 8 reviews basic methods for investigating collateral evidence that may be associated with nuclear materials such as chemical explosives, hairs and fibers, inks and papers, and other sources of forensic information. Chapters 9–12 deal with collection of samples and their processing for radio-

chemical and chemical analyses. Chapters 13 and 14 provide information about the recognition of extraordinary nuclear (radioactive) forensic samples and the construction of a generic kit for sampling these materials. Chapter 15 gives an update on field identification of radioactive samples and the instrumentation necessary to detect these materials. Chapter 16 provides a brief review of modern instrumental techniques for examining nuclear forensic samples covering radiation counting systems, microscopy, x-ray methods, organic analysis methods, and isotope mass spectroscopy.

Chapter 17 reviews estimates of the types and amounts of nuclear materials produced since the dawn of the nuclear age. Again, the emphasis of this chapter is on practical information that can help in identifying categories and sources of nuclear materials. Chapters 18 and 19 contain information about the sources of nuclear materials and route attribution that focuses on pathways that were used before the material was interdicted. The remaining chapters of the book highlight case studies ranging from nuclear hoaxes to a counterforensic study of a nuclear materials production plant.

This book should be in the library of every forensic laboratory. While most laboratories may never encounter nuclear materials, this book contains valuable information about the nature of these materials. Forensic scientists should pay special attention to the chapters outlining how to detect radioactive materials and to preserve the samples for nuclear and traditional forensic analysis. The book makes it very clear that the sophisticated analyses and interpretation of these samples require highly sophisticated instrumentation and nuclear chemistry expertise that may only be available in national laboratories. However, first responders will have the responsibility of detecting and preserving radioactive samples for nuclear forensic analysis, and this book provides valuable information to help in this task.

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