



NCRP REPORTS

NCRP was chartered by the U.S. Congress in 1964 as the National Council on Radiation Protection and Measurements.

The Charter of the Council (Public Law 88-376) states its objectives as follows:

“To: collect, analyze, develop and disseminate in the public interest information and recommendations about (a) protection against radiation (referred to herein as radiation protection) and (b) radiation measurements, quantities and units, particularly those concerned with radiation protection; provide a means by which organizations concerned with the scientific and related aspects of radiation protection and of radiation quantities, units and measurements may cooperate for effective utilization of their combined resources, and to stimulate the work of such organizations; develop basic concepts about radiation quantities, units and measurements, about the application of these concepts, and about radiation protection; cooperate with the International Commission on Radiological Protection, the Federal Radiation Council, the International Commission on Radiation Units and Measurements, and other national and international organizations, governmental and private, concerned with radiation quantities, units and measurements and with radiation protection.”

"This article contains the titles and summaries of various NCRP reports"

Approaches for Integrating Information from Radiation Biology and Epidemiology to Enhance Low-Dose Health Risk Assessment (2020)



Executive Summary

The overall aim of this Report is to provide input for the development of biologically based dose-response models for radiation-induced cancers and circulatory disease that use an adverse outcome pathways and key-events approach for providing parameters for these models. These mechanistic data can be integrated with the most recent epidemiologic data to develop overall dose response curves for radiation-induced adverse health outcomes. This integration of the findings from radiation biology and epidemiology will enhance the risk assessment process by reducing uncertainties in estimated risk following exposure to low doses and low dose rates of ionizing radiation.

Purchase a copy of NCRP Report No. 186:

<https://ncrponline.org/shop/reports/report-no-186-approaches-for-integrating-information-from-radiation-biology-and-epidemiology-to-enhance-low-dose-health-risk-assessment-2020/>

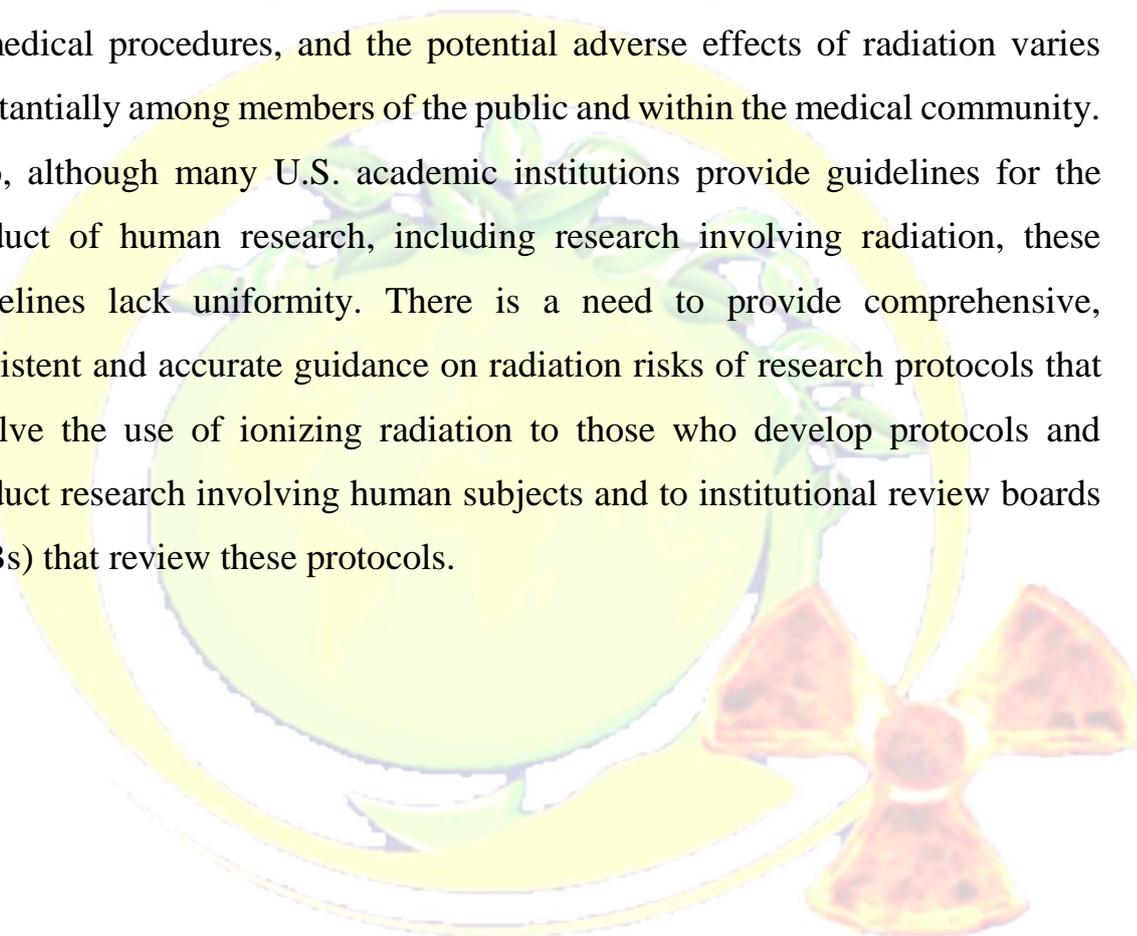
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Evaluating and Communicating Radiation Risks for Studies Involving Human Subjects: Guidance for Researchers and Institutional Review Boards (2020)



Executive Summary

The extent of knowledge about ionizing radiation in general, radiation involved in medical procedures, and the potential adverse effects of radiation varies substantially among members of the public and within the medical community. Also, although many U.S. academic institutions provide guidelines for the conduct of human research, including research involving radiation, these guidelines lack uniformity. There is a need to provide comprehensive, consistent and accurate guidance on radiation risks of research protocols that involve the use of ionizing radiation to those who develop protocols and conduct research involving human subjects and to institutional review boards (IRBs) that review these protocols.



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<https://ncrponline.org/shop/reports/report-no-185-evaluating-and-communicating-radiation-risks-for-studies-involving-human-subjects-guidance-for-researchers-and-institutional-review-boards-2020/>

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Report No. 184

Medical Radiation Exposure of Patients in the United States (2019)



Executive Summary

This Report is an update of NCRP Report No. 160, Ionizing Radiation Exposure of the Population of the United States, Section 4 (Medical Exposure of Patients) (2009). This Report evaluates average individual effective dose and collective effective doses from medical exposures for the 2016 timeframe. The Report pays particular attention to those procedures that contribute the largest share and provides information on nominal effective dose values that individual patients may experience from a specific examination. It is very important to note that these effective dose values should not be used as an indication of acceptability or to estimate individual cancer risk from a certain radiation procedure, but rather used as a metric to broadly compare the magnitude of potential stochastic effects to populations from different radiation sources. This Report does not quantify associated health risks nor discuss potential medical benefits. The Report also does not specify any actions that should be taken in light of these latest data. These subjects were outside the scope of the charge to NCRP. The Report is aimed at medical professionals, patients, regulators, and those involved in radiation protection. It provides indices for comparison among radiation sources and at different time periods.

Purchase a copy of NCRP Report No. 184:

<https://ncrponline.org/shop/reports/report-no-184-medical-radiation-exposure-of-patients-in-the-united-states-2019/>

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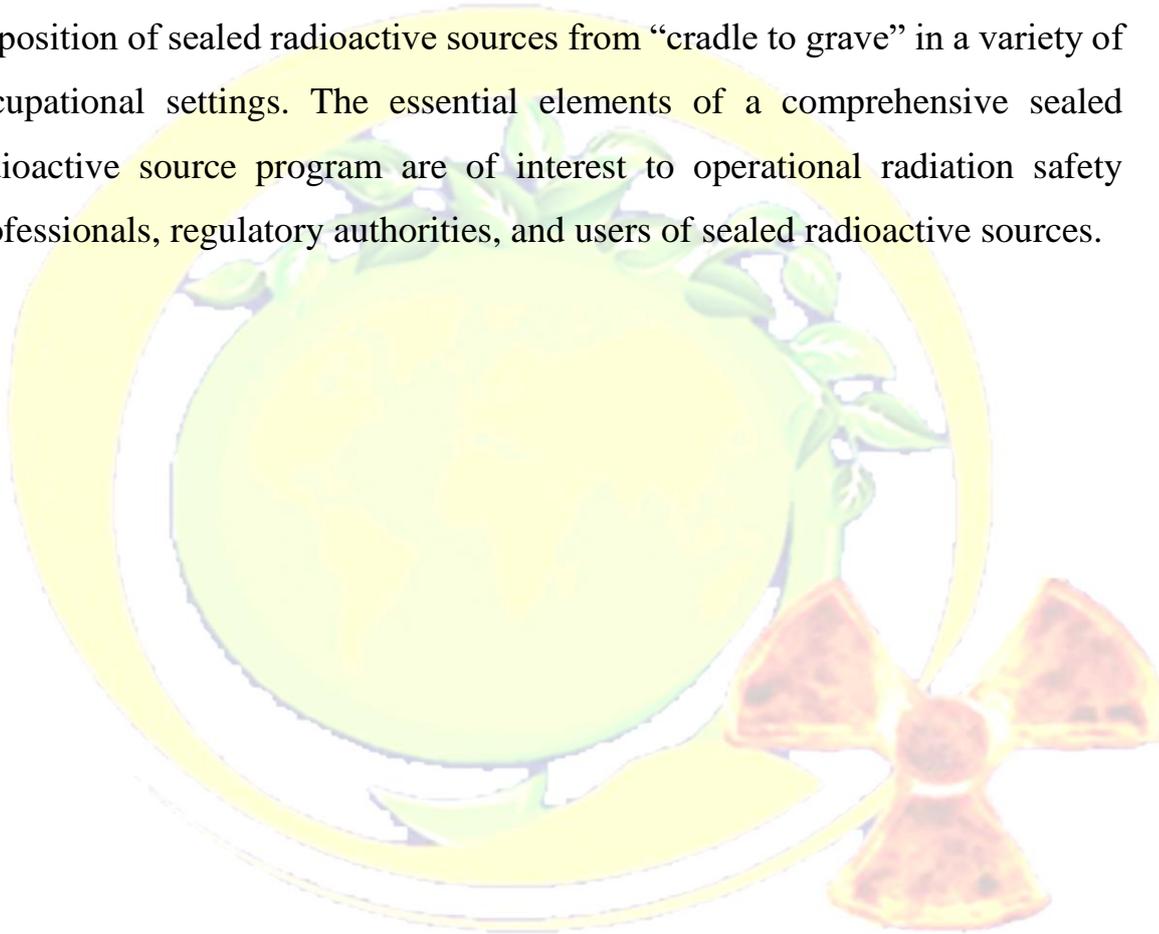
Report No. 182

Radiation Safety of Sealed Radioactive Sources (2019)



Executive Summary

This Report provides information on the safe design, acquisition, use and disposition of sealed radioactive sources from “cradle to grave” in a variety of occupational settings. The essential elements of a comprehensive sealed radioactive source program are of interest to operational radiation safety professionals, regulatory authorities, and users of sealed radioactive sources.



Purchase a copy of NCRP Report No. 182:

<https://ncrponline.org/shop/reports/report-no-182-radiation-safety-of-sealedradioactive-sources-2019/>

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Executive Summary

This Report draws on an evaluation by specialists in microdosimetry, deoxyribonucleic acid (DNA) damage, cellular radiobiology, animal studies, and human epidemiology of the available evidence in those fields of study relevant to estimation of the relative effectiveness of lower-energy photons and electrons in inducing cancer in humans. For each specialty area (line of evidence), probability density functions (PDFs) are derived for the biological effectiveness observed for the endpoints studied in each line of evidence for defined lower-energy groups. Using these PDFs and evaluation of the relevance of the data from each line of evidence to the risk of cancer in humans, an evaluation is then made of the relative effectiveness of the defined lower-energy groups of photons or electrons (compared with higher-energy photons or electrons) in inducing cancer in humans.

Purchase a copy of NCRP Report No. 181:

<https://ncrponline.org/shop/reports/report-no-181-evaluation-of-the-relative-effectiveness-of-low-energy-photons-and-electrons-in-inducing-cancer-in-humans-2018/>

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Executive Summary

Since NCRP Report No. 116 was published in 1993, there have been advances in knowledge regarding the biological effects of ionizing radiation, particularly relating to cancer. In addition, health effects other than cancer such as cardiovascular disease and cataracts are emerging as potentially important concerns. A discussion of established ethical principles and their application to radiation protection had not been introduced in NCRP Report No. 116. In 2007, the International Commission on Radiological Protection (ICRP) published revised recommendations for its system of radiological protection (ICRP Publication 103). Subsequently an important ICRP report on tissue reactions (also called deterministic effects), including early and late effects (ICRP Publication 118), was published in 2012. While the goals for radiation protection in the United States are the same as those for the international community, there are some differences in the specific approaches taken to achieve these goals. NCRP radiation protection principles for exposure of humans are now expressed as: justification, optimization of protection, and numeric protection criteria (for management of dose to an individual). When there is a numeric protection criterion for a specific exposure situation, the first objective is to meet that protection criterion, then optimization of protection should be applied. These differences are discussed in this Report.

Purchase a copy of NCRP Report No. 180:

<https://ncrponline.org/shop/reports/report-no-180-management-of-exposure-to-ionizing-radiation-radiation-protection-guidance-for-the-united-states-2018-2018/>

Learn more about NCRP: <http://ncrponline.org/>

Report No. 179

Guidance for Emergency Response Dosimetry (2017)



Executive Summary

National Council on Radiation Protection and Measurements (NCRP) Report No. 179, *Guidance for Emergency Response Dosimetry*, complements three previous NCRP publications that provide advice on planning responses to radiological or nuclear terrorism incidents. The Report provides guidance on the accrual and control of radiation dose in the emergency phase of a radiological or nuclear incident and answers three questions: – With minimal dosimetry resources, how do responders make decisions to control the total dose and associated risk? – How are doses assigned to responders when not every responder is issued a dosimeter before exposure occurs? – What is the regulatory framework for responders who are not trained as radiation workers? The Report guidance bridges the gap between trained and equipped emergency workers and the remainder community of responders. Emergency workers are defined as those workers who would be called to assist with the response to a radiological or nuclear incident, acknowledging that most emergency workers have jobs that do not routinely expose them to radiation significantly greater than background levels. Emergency workers are not traditional radiation workers (i.e., those whose occupations involve exposure to radiation and who are part of an occupational radiation dose monitoring and protection program).

Purchase a copy of NCRP Report No. 179:

<https://ncrponline.org/shop/reports/report-no-179-guidance-for-emergency-response-dosimetry-2017/>

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Deriving Organ Doses and Their Uncertainty for Epidemiologic Studies (with a Focus on the One Million U.S. Workers and Veterans Study of Low-Dose Radiation Health Effects) (2018)

Executive Summary

The purpose of this Report is to provide guidance in the derivation of organ doses and their associated uncertainty for epidemiologic studies in general, but with a focus on the populations that make up the One Million U.S. Workers and Veterans Study of Low-Dose radiation Health Effects (MWS) coordinated by the National Council on Radiation Protection and Measurements (NCRP). The study populations include atomic veterans, U.S. Department of Energy workers, nuclear power plant workers, medical radiation workers, and industrial radiographers. Organ doses from exposure to all the relevant external and internal sources for a given population are being derived.

Purchase a copy of NCRP Report No. 178:

<https://ncrponline.org/shop/reports/report-no-178-deriving-organ-doses-and-their-uncertainty-for-epidemiologic-studies/>

Learn more about NCRP: <http://ncrponline.org/>

Report No. 176

Radiation Safety Aspects of Nanotechnology (2017)



Executive Summary

National Council on Radiation Protection and Measurements (NCRP) Report No. 176, Radiation Safety Aspects of Nanotechnology, is intended primarily for operational health physicists, radiation safety officers, and internal dosimetrists who are responsible for establishing and implementing radiation safety programs involving nanotechnology. Nanotechnology is the understanding, engineering, control and use of matter at the nanoscale (i.e., dimensions between ~1 and 100 nm) where unique material phenomena enable novel applications. The Report also provides useful information for workers, managers, and regulators who are either working directly with or have other responsibilities related to work with radioactive nanomaterials or the use of radiation in nanotechnology.

Purchase a copy of NCRP Report No. 176:

<https://ncrponline.org/shop/reports/report-no-176-radiation-safety-aspects-of-nanotechnology-2017/>

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Executive Summary

In 2008 the U.S. Department of Homeland Security (DHS) published Protective Action Guides (PAGs) for radiological dispersal devices (RDDs) and improvised nuclear devices (INDs). Guidance was offered to protect members of the public in the early, intermediate and late phases of response to terrorist attacks with radiological devices. The optimization (of radiation protection) process was recommended for late-phase recovery in circumstances of widespread contamination with radioactive material. The purpose of this Report is to provide guidance on optimizing decision making for late-phase recovery from a major RDD or IND incident. In light of the March 2011 Fukushima Dai-ichi Nuclear Power Plant (NPP) accident, the scope was expanded to include nuclear accidents.

Purchase a copy of NCRP Report No. 175:

<https://ncrponline.org/shop/reports/report-no-175-decision-making-for-late-phase-recovery-from-major-nuclear-or-radiological-incidents-2014/>

Learn more about NCRP: <http://ncrponline.org/>

Report No. 174

Preconception and Prenatal Radiation Exposure: Health Effects and Protective Guidance (2013)



Executive Summary

NCRP Report No. 174, Preconception and Prenatal Radiation Exposure: Health Effects and Protective Guidance, updates and expands the National Council on Radiation Protection and Measurements (NCRP) Report No. 54, Medical Radiation Exposure of Pregnant and Potentially Pregnant Women (1977). Scientific knowledge has increased and public concerns have changed in the 36 y since NCRP Report No. 54 was published. The scope of NCRP Report No. 174 covers both ionizing radiation sources and specific nonionizing sources [i.e., magnetic-resonance imaging (MRI), ultrasound imaging, and radiofrequency (RF) fields].

Purchase a copy of NCRP Report No. 174:

<https://ncrponline.org/shop/reports/report-no-174-preconception-and-prenatal-radiation-exposure-health-effects-and-protective-guidance-2013/>

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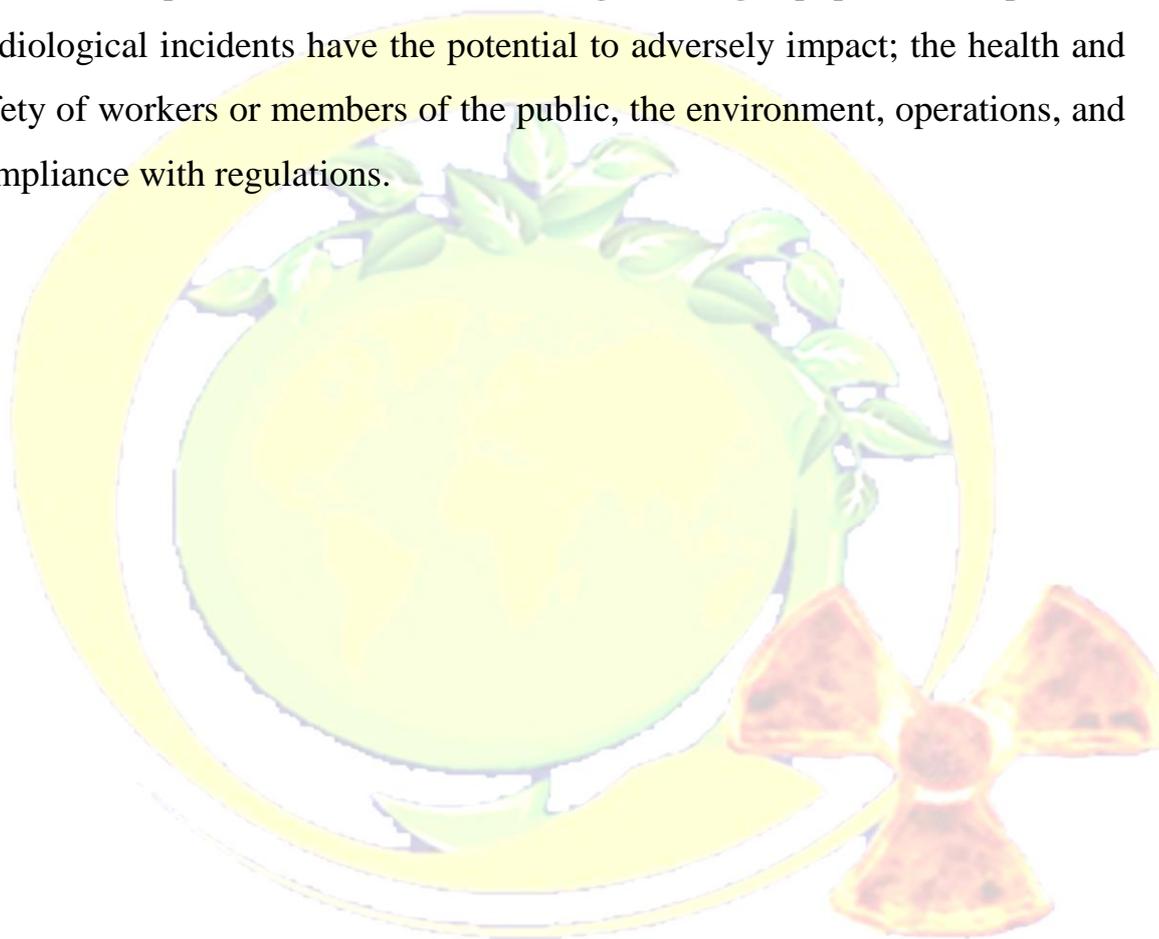
Report No. 173

Investigation of Radiological Incidents (2012)



Executive Summary

The purpose of this Report is to provide guidance for investigating radiological incidents that can occur wherever radioactive materials are handled, stored, used or transported, or where radiation generating equipment is operated. Radiological incidents have the potential to adversely impact; the health and safety of workers or members of the public, the environment, operations, and compliance with regulations.



Purchase a copy of NCRP Report No. 173:

<https://ncrponline.org/shop/reports/report-no-173-investigation-of-radiological-incidents-2012/>

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Executive Summary

Diagnostic reference levels (DRLs) are used in medical imaging to indicate whether the patient radiation dose or amount of administered activity from a specific procedure are unusually high or low for that procedure. DRLs are the first step in the optimization process to manage patient dose commensurate with the medical purpose of the procedure. Achievable dose is an optimization goal, based on survey data, and typically defined as the median value (50th percentile) of the dose distribution of standard techniques and technologies in widespread use. The overarching goal is to obtain image quality consistent with the clinical objective, while avoiding unnecessary radiation. Too low an exposure, however, is also to be avoided if it results in an inadequate image.

Purchase a copy of NCRP Report No. 172:

<https://ncrponline.org/shop/reports/report-no-172-reference-levels-and-achievable-doses-in-medical-and-dental-imaging-recommendations-for-the-united-states-2012/>

Learn more about NCRP: <http://ncrponline.org/>

Executive Summary

Uncertainty is a measure of the lack of sureness or confidence in the results of measurements, the predictions of models or the conclusions of investigations. Uncertainty can arise from random (stochastic) variability or from the absence of relevant information or knowledge. Uncertainty analysis has become increasingly sophisticated and new methods are being developed and becoming available. The issue of uncertainty in estimation of radiation-induced risks of cancer, noncancer diseases, and heritable genetic effects analyzed in this Report is of great importance in evaluating the effects of ionizing radiation on human health, in decisions involving the safe use of ionizing radiation, in addressing public controversy and in the calculation of the probability of disease causation (assigned share) used in evaluating claims for compensation of workers who developed cancer after being exposed to radiation.

Purchase a copy of NCRP Report No. 171:

<https://ncrponline.org/shop/reports/report-no-171-uncertainties-in-the-estimation-of-radiation-risks-and-probability-of-disease-causation/>

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Executive Summary

Advances in cancer therapy, early detection of cancer, and supportive care have contributed to steady gains in the five year relative survival rate for all cancers considered together, reaching 66.1 % between 1999 to 2006. These successes are associated with a tripling of the number of cancer survivors in the United States since 1971, and the numbers are growing by 2 % each year. As of 2007, there were ~12 million men and women in the United States with a history of cancer, representing 3.5 % of the population. Radiation remains a cornerstone of successful cancer treatment, with 50 % of all patients estimated to have received radiation therapy for the management of their cancer. For many patients, the gains in survival have come at the price of serious treatment-associated late effects.

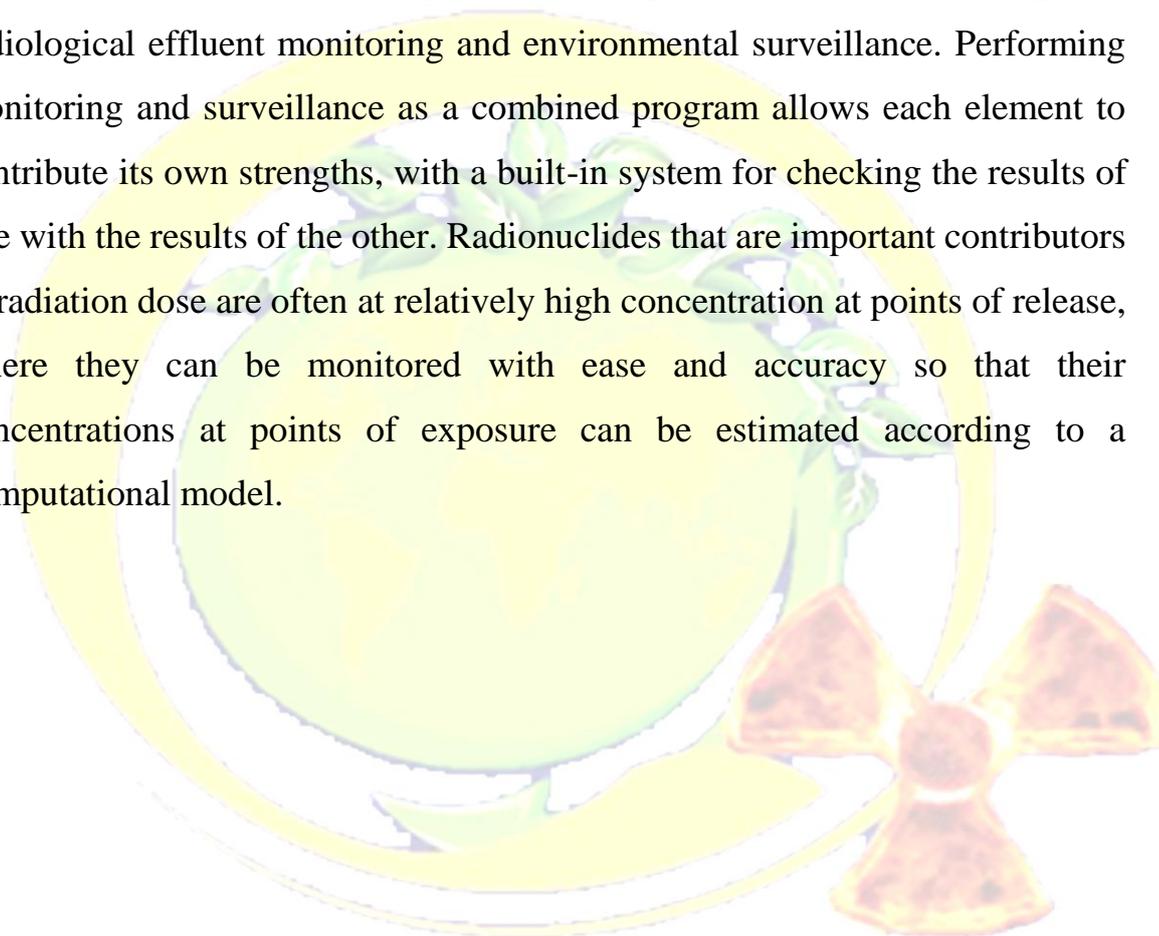
Purchase a copy of NCRP Report No. 170:

<https://ncrponline.org/shop/reports/report-no-170-second-primary-cancers-and-cardiovascular-disease-after-radiation-therapy/>

Learn more about NCRP: <http://ncrponline.org/>

Executive Summary

This Report is intended to support the design and operation of integrated radiological effluent monitoring and environmental surveillance. Performing monitoring and surveillance as a combined program allows each element to contribute its own strengths, with a built-in system for checking the results of one with the results of the other. Radionuclides that are important contributors to radiation dose are often at relatively high concentration at points of release, where they can be monitored with ease and accuracy so that their concentrations at points of exposure can be estimated according to a computational model.



Purchase a copy of NCRP Report No. 169:

<https://ncrponline.org/shop/reports/report-no-169-design-of-effective-radiological-effluent-monitoring-and-environmental-surveillance-programs/>

Learn more about NCRP: <http://ncrponline.org/>

Executive Summary

This Report is focused on the use of fluoroscopic systems as a tool for guiding diagnostic and therapeutic procedures because higher radiation doses (compared to conventional radiography and fluoroscopy) are received regularly from some types of FGI procedures and occasionally from many other types of FGI procedures. Other medical applications of fluoroscopy (e.g., examination of the gastrointestinal system, guiding open surgical procedures) are outside the scope of this Report. Computed-tomography-guided interventional (CTGI) procedures are not discussed in detail due to continuing changes in the technology driven by the evolution of multi-slice computed tomography (CT) detectors. However, the principles presented in this Report are generally applicable to these domains. Most of the recommendations contained in this Report should be applied in all settings where fluoroscopic guidance is used. Within the context of radiation dose management, the goal of this Report is to supply information that helps optimize patient outcomes without compromising worker safety. However, radiation is not the only risk to which patients and workers are exposed. In many cases, radiation is a minor component of overall risk. In these situations, too great a focus on radiation safety (e.g., the use of unnecessarily thick lead aprons) may reduce the overall safety of patients or workers.

Purchase a copy of NCRP Report No. 168:

<https://ncrponline.org/shop/reports/report-no-168-radiation-dose-management-for-fluoroscopically-guided-interventional-medical-procedures/>

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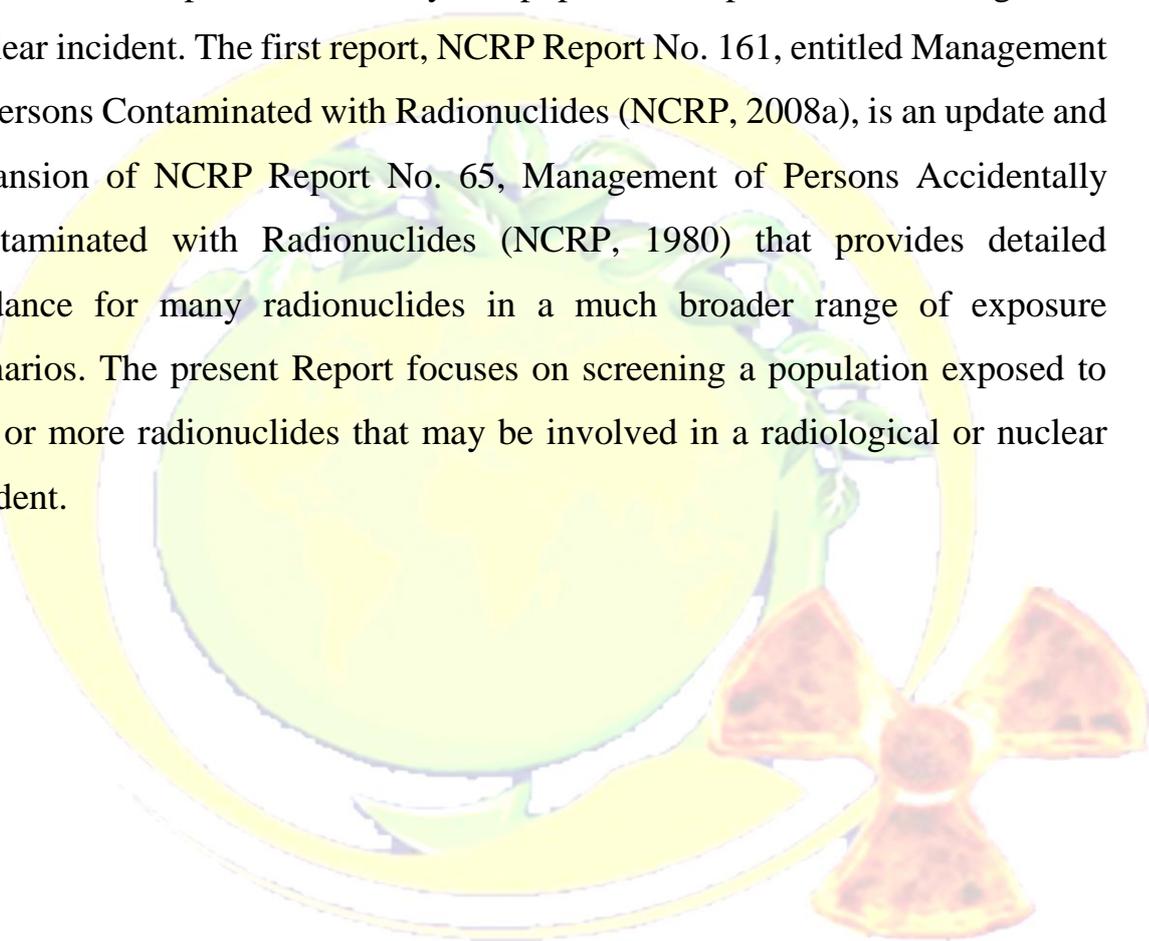
Report No. 166

Population Monitoring and Radionuclide Decorporation Following a Radiological or Nuclear Incident (2010)



Executive Summary

This Report is the second of two reports by the National Council on Radiation Protection and Measurements (NCRP) that focus on measurement of radionuclides deposited internally in a population exposed in a radiological or nuclear incident. The first report, NCRP Report No. 161, entitled Management of Persons Contaminated with Radionuclides (NCRP, 2008a), is an update and expansion of NCRP Report No. 65, Management of Persons Accidentally Contaminated with Radionuclides (NCRP, 1980) that provides detailed guidance for many radionuclides in a much broader range of exposure scenarios. The present Report focuses on screening a population exposed to one or more radionuclides that may be involved in a radiological or nuclear incident.



Purchase a copy of NCRP Report No. 166:

<https://ncrponline.org/shop/reports/report-no-166-population-monitoring-and-radionuclide-decorporation-following-a-radiological-or-nuclear-incident/>

Learn more about NCRP: <http://ncrponline.org/>

Report No. 165

Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers (2010)



Executive Summary

NCRP Report No. 165, *Responding to Radiological or Nuclear Terrorism Incidents: A Guide for Decision Makers*, provides the most comprehensive summary to date of recommendations and key decision points for planners preparing responses to radiological or nuclear terrorism incidents. It is unique because it considers both forms of terrorism within one publication while accounting for their fundamental differences. It is not uncommon for radiological or nuclear terrorism incident planning preparations to be broadly addressed together in a single radiation-specific hazard response publication. The potential consequences of nuclear terrorism are radically different from those of radiological terrorism and therefore the planning and preparation must take into account these differences.

Purchase a copy of NCRP Report No. 165:

<https://ncrponline.org/shop/reports/report-no-165-responding-to-a-radiological-or-nuclear-terrorism-incident-a-guide-for-decision-makers/>

Learn more about NCRP: <http://ncrponline.org/>

Report No. 164

Uncertainties in Internal Radiation Dose Assessment (2009)



Executive Summary

The objective of this Report is to review the current state-of-knowledge of uncertainties in internal dose assessments, including uncertainties in the measurements that are used to perform these assessments. In a previously published report (NCRP, 2007), the current state-of-knowledge of uncertainties in external radiation measurements and dosimetry was reviewed. The scope of this Report is limited to internal radiation exposure. It is intended to be used primarily by radiation dosimetrists, including health physicists, radiation protection professionals, and medical physicists who need to evaluate of the uncertainties in estimates of absorbed doses. The scope of application ranges from the improvement of routine dosimetry procedures to the reconstruction of individual doses in epidemiological studies to treatment planning for therapeutic nuclear medicine.

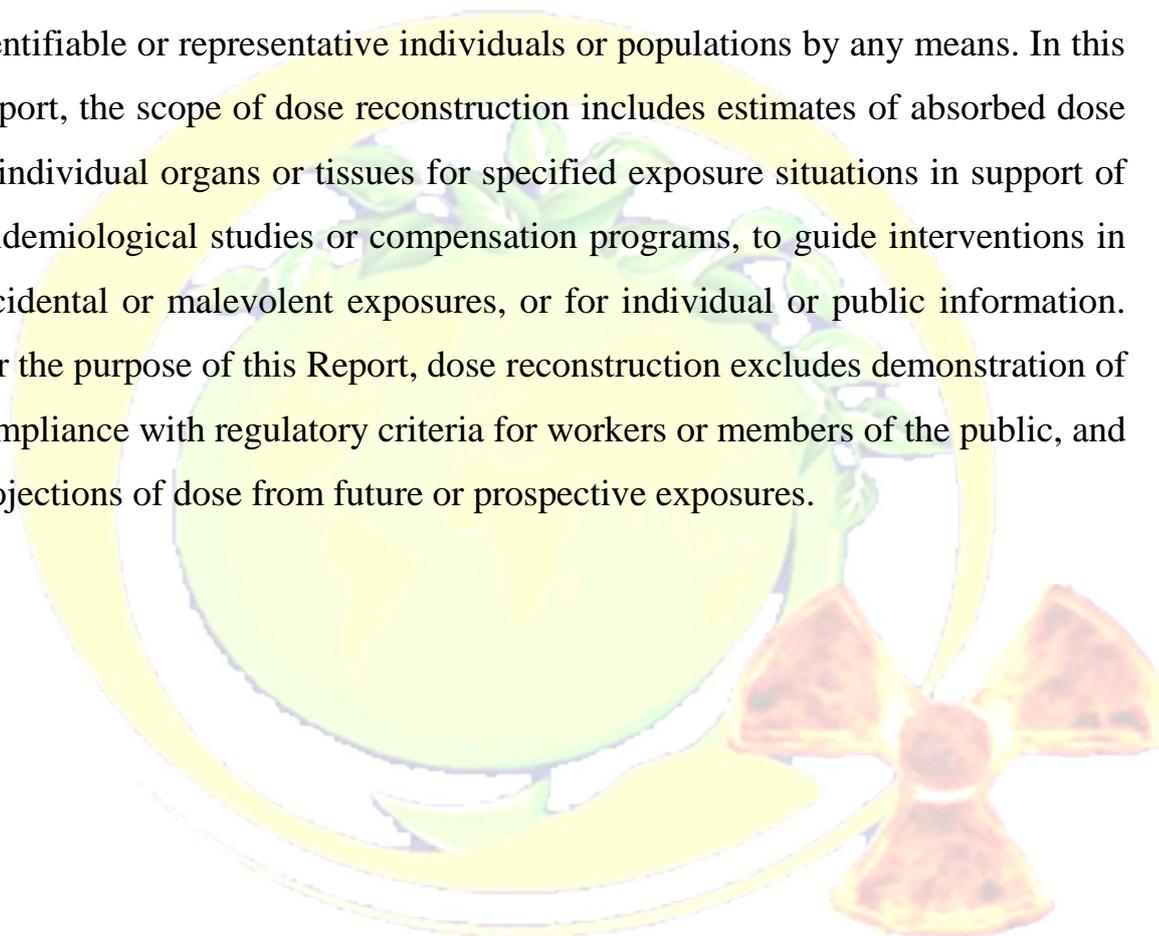
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Executive Summary

Radiation dose reconstruction is the retrospective assessment of dose to identifiable or representative individuals or populations by any means. In this Report, the scope of dose reconstruction includes estimates of absorbed dose to individual organs or tissues for specified exposure situations in support of epidemiological studies or compensation programs, to guide interventions in accidental or malevolent exposures, or for individual or public information. For the purpose of this Report, dose reconstruction excludes demonstration of compliance with regulatory criteria for workers or members of the public, and projections of dose from future or prospective exposures.



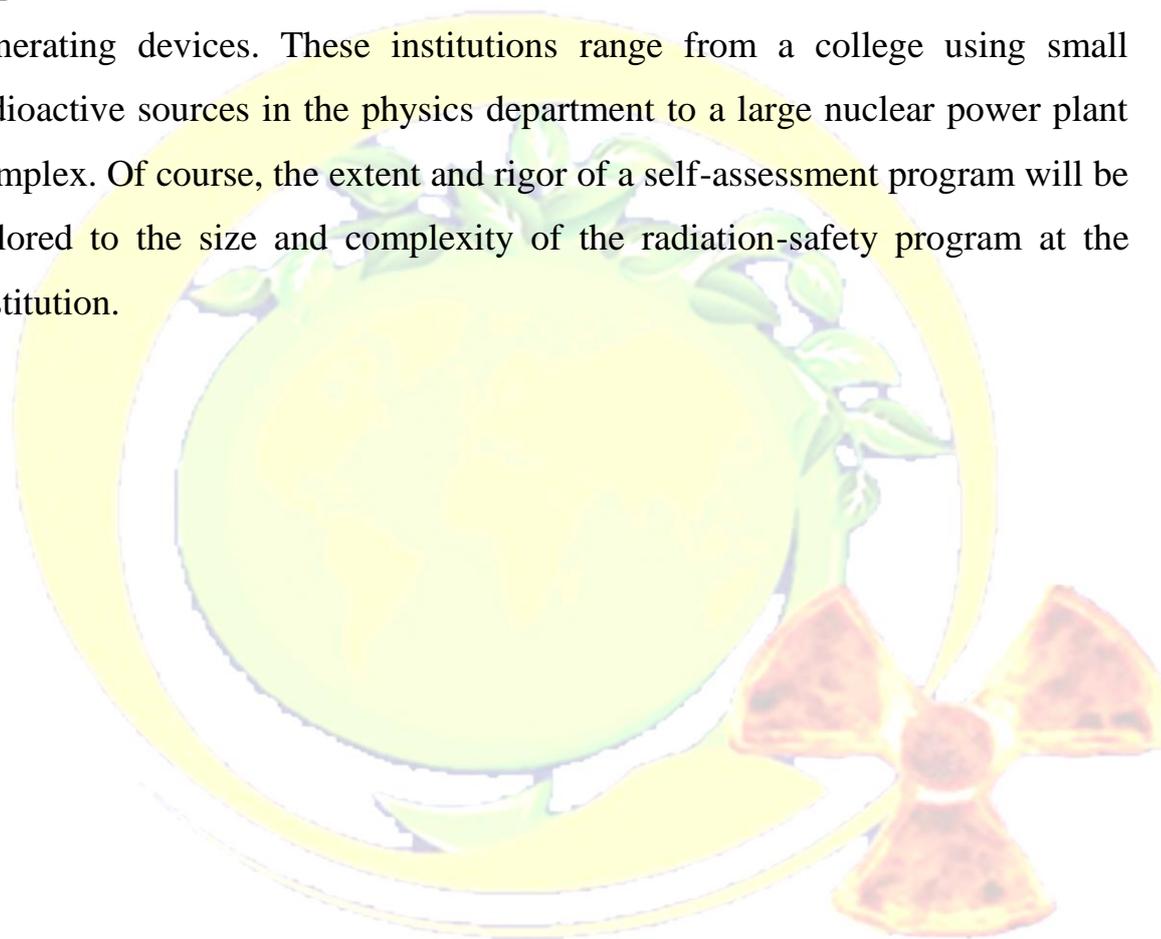
Purchase a copy of NCRP Report No. 163:

<https://ncrponline.org/shop/reports/report-no-163-radiation-dose-reconstruction-principles-and-practices/>

Learn more about NCRP: <http://ncrponline.org/>

Executive Summary

The purpose of this Report is to provide guidance for performing self assessments of radiation-safety programs. The self-assessment process is important for all institutions that use radioactive material or radiation-generating devices. These institutions range from a college using small radioactive sources in the physics department to a large nuclear power plant complex. Of course, the extent and rigor of a self-assessment program will be tailored to the size and complexity of the radiation-safety program at the institution.



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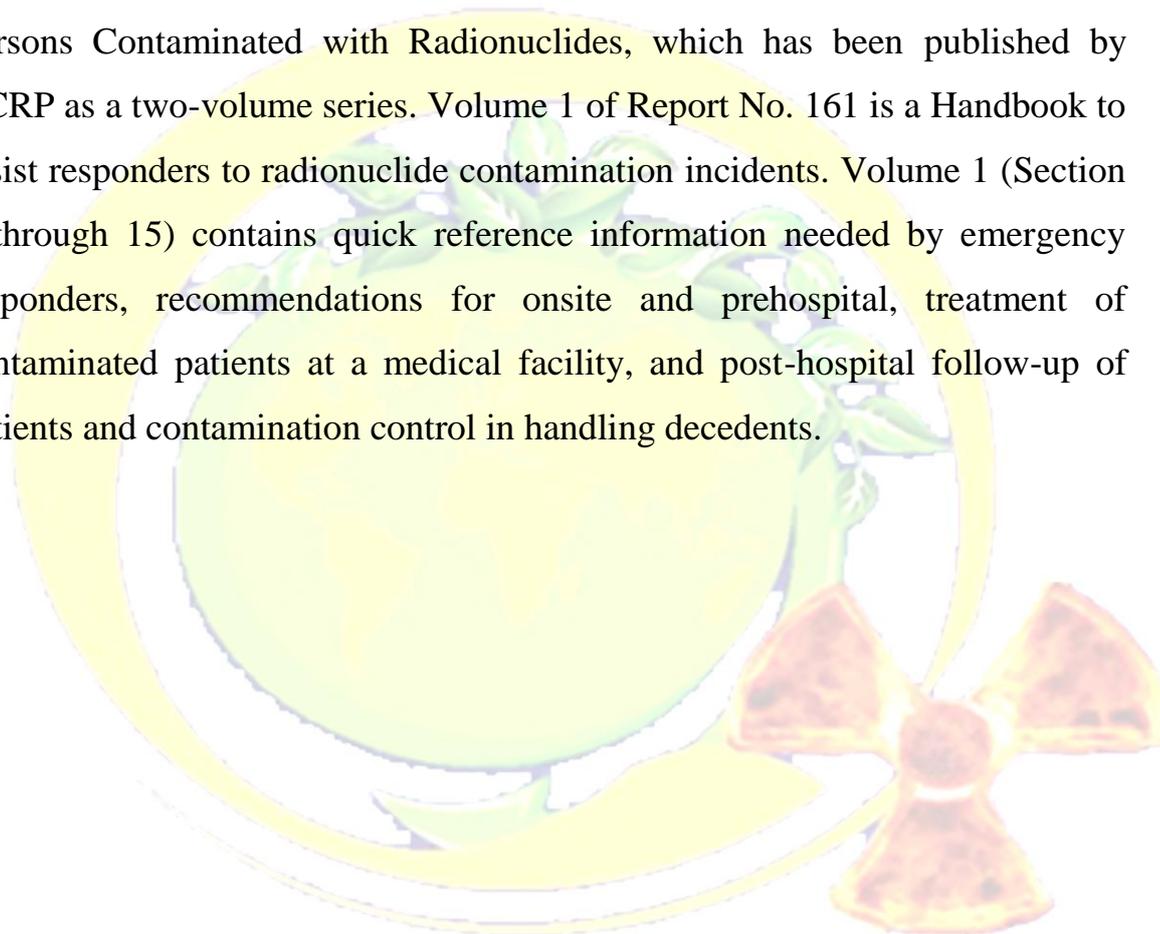
Report No. 161 II

Management of Persons Contaminated With Radionuclides: Scientific and Technical Bases (2008)



Executive Summary

This publication is the second part of Report No. 161 on Management of Persons Contaminated with Radionuclides, which has been published by NCRP as a two-volume series. Volume 1 of Report No. 161 is a Handbook to assist responders to radionuclide contamination incidents. Volume 1 (Section 1 through 15) contains quick reference information needed by emergency responders, recommendations for onsite and prehospital, treatment of contaminated patients at a medical facility, and post-hospital follow-up of patients and contamination control in handling decedents.



Purchase a copy of NCRP Report No. 161 II:

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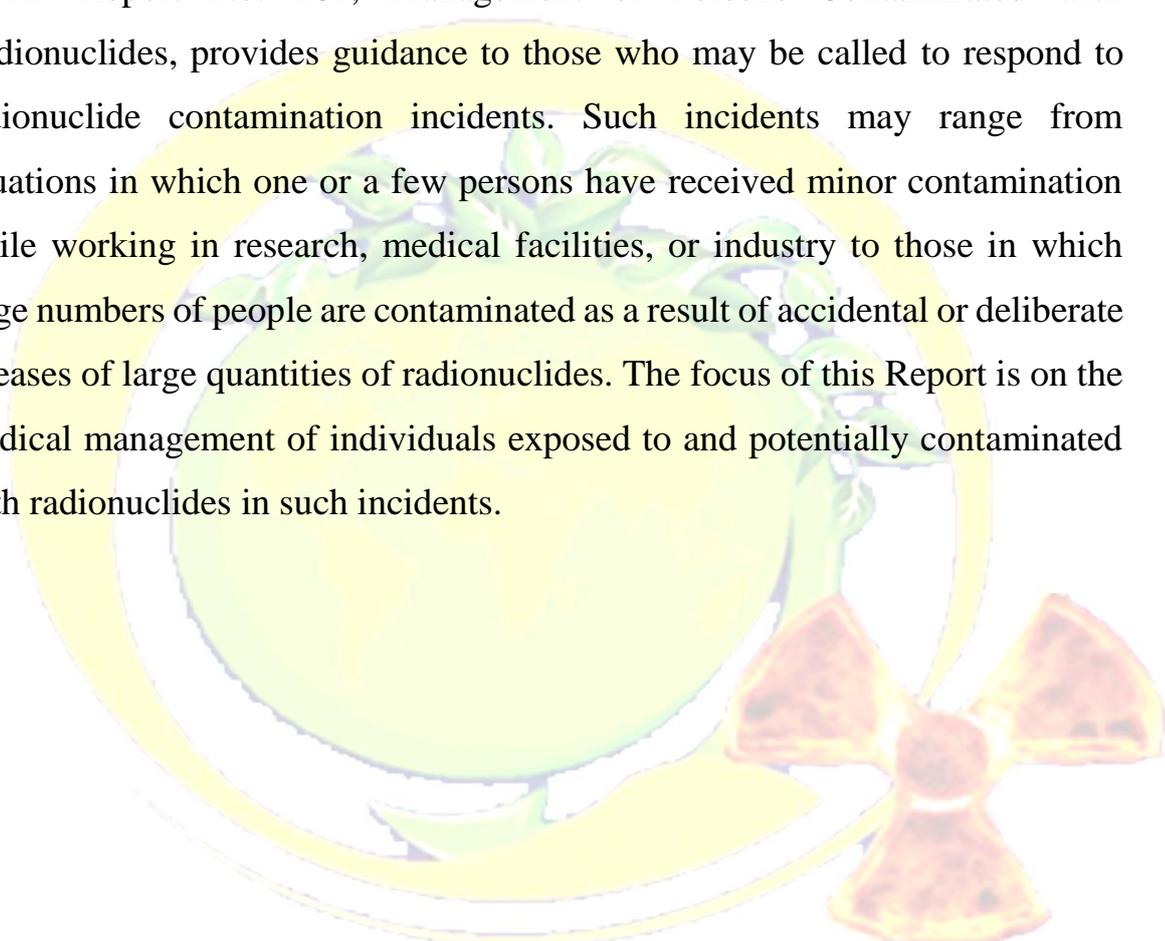
Report No. 161 I

Management of Persons Contaminated With Radionuclides (2008)



Executive Summary

NCRP Report No. 161, Management of Persons Contaminated with Radionuclides, provides guidance to those who may be called to respond to radionuclide contamination incidents. Such incidents may range from situations in which one or a few persons have received minor contamination while working in research, medical facilities, or industry to those in which large numbers of people are contaminated as a result of accidental or deliberate releases of large quantities of radionuclides. The focus of this Report is on the medical management of individuals exposed to and potentially contaminated with radionuclides in such incidents.



Purchase a copy of NCRP Report No. 161 I:

<https://ncrponline.org/shop/reports/report-no-161-i-management-of-persons-contaminated-with-radionuclides-handbook/>

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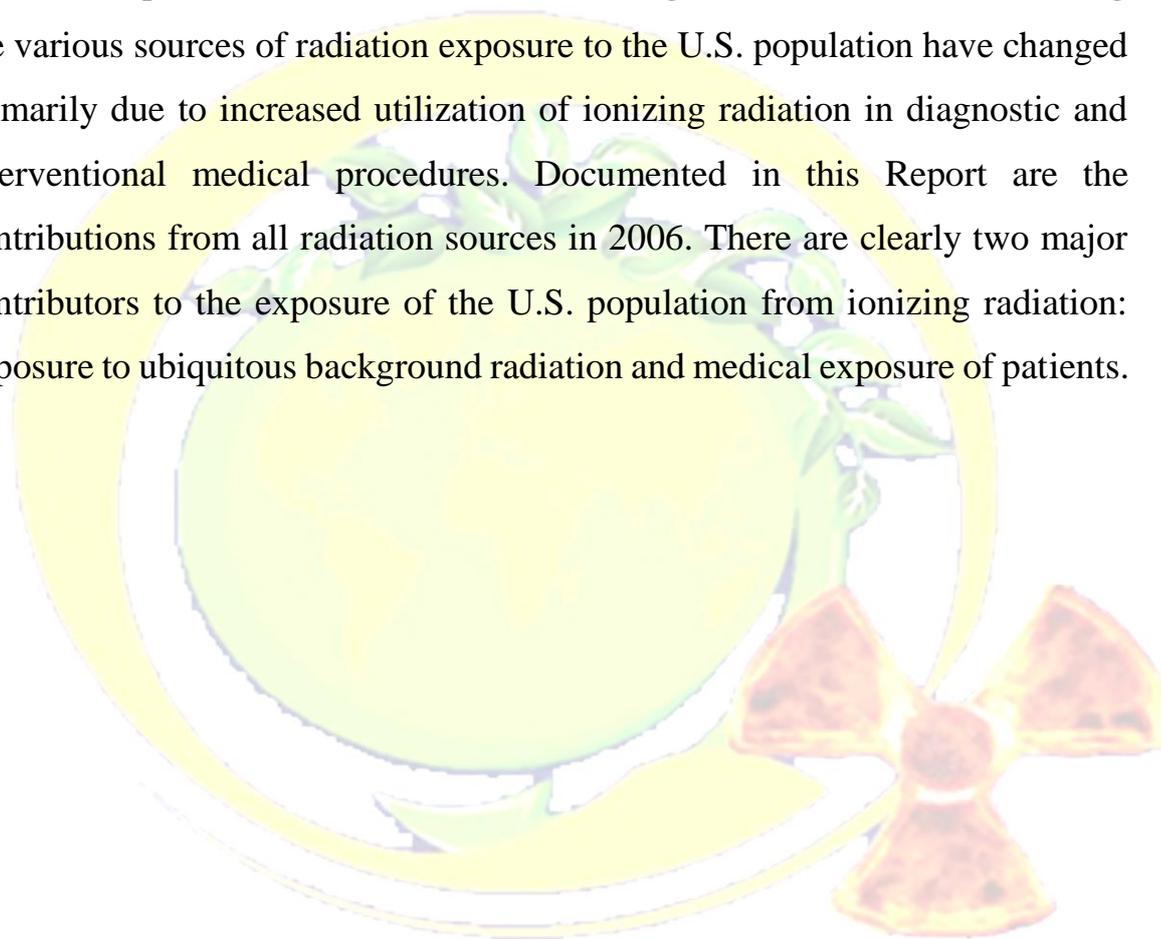
Report No. 160

Ionizing Radiation Exposure of the Population of the United States (2009)



Executive Summary

Detailed information on the exposure of the U.S. population to ionizing radiation, based on evaluations made in the early 1980s, was presented by NCRP in Report No. 93. Since that time, the magnitude and distribution among the various sources of radiation exposure to the U.S. population have changed primarily due to increased utilization of ionizing radiation in diagnostic and interventional medical procedures. Documented in this Report are the contributions from all radiation sources in 2006. There are clearly two major contributors to the exposure of the U.S. population from ionizing radiation: exposure to ubiquitous background radiation and medical exposure of patients.



Purchase a copy of NCRP Report No. 160:

<https://ncrponline.org/shop/reports/report-no-160-ionizing-radiation-exposure-of-the-population-of-the-united-states/>

Learn more about NCRP: <http://ncrponline.org/>

Report No. 159

Risk to the Thyroid from Ionizing Radiation (2008)



Executive Summary

Report No. 159, Risk to the Thyroid from Ionizing Radiation, is an update of NCRP Report No. 80, Induction of Thyroid Cancer by Ionizing Radiation, first published in 1985 and reprinted in 1987. This Report is intended to be comprehensive and to serve as an authoritative reference on risks to the thyroid from ionizing radiation and other relevant topics. The conclusions of NCRP Report No. 159 differ significantly from those of the earlier NCRP Report No. 80. Major sources of new data have been published since 1985 that have resulted in a reevaluation of the risk models for thyroid cancer following radiation exposure. In addition, studies of the large population who were exposed when they were children and adolescents to radioiodines released as a result of the Chernobyl nuclear reactor accident have begun to provide further insight into the effectiveness of radioiodines in causing thyroid cancer.

Purchase a copy of NCRP Report No. 159:

<https://ncrponline.org/shop/reports/report-no-159-risk-to-the-thyroid-from-ionizing-radiation/>

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Report No. 158

Uncertainties in the Measurement and Dosimetry of External Radiation (2007)



Executive Summary

The objective of this Report is to review the current state-of-knowledge of uncertainties in external radiation measurements and dosimetry, and in the conversion coefficients used to relate such measurements to absorbed dose in the human body. The scope of this Report is limited to external radiation exposure only. The emphasis is on uncertainty in the types of measurements used both currently and in the past for the most common occupational and environmental exposure scenarios. Although the Report does not focus directly on medical diagnostic and treatment dosimetry, some of the concepts discussed should be useful for assessing the uncertainty in measurements in this area. The focus is on the uncertainties in measurements of beta, gamma and neutron radiation from sources external to the body and the conversion of the measured quantities to organ absorbed dose.

Purchase a copy of NCRP Report No. 158:

<https://ncrponline.org/shop/reports/report-no-158-uncertainties-in-the-measurement-and-dosimetry-of-external-radiation/>

Learn more about NCRP: <http://ncrponline.org/>

Report No. 157

Radiation Protection in Educational Institutions (2007)



Executive Summary

The purpose of this Report is to provide guidance for the safe use of ionizing- and nonionizing-radiation sources in educational institutions, including both teaching and research activities. Brief explanations of the terms radiation, ionizing radiation, and nonionizing radiation are given in the Glossary. To take advantage of the benefits of using radiation sources in these activities, it is necessary to provide radiation safety controls commensurate with the potential hazard. Since the sources of radiation used in many educational institutions usually produce only low radiation levels, the potential hazard to faculty, staff and students is usually correspondingly low when simple basic precautions are followed. This Report is intended primarily for those institutions that do not need a full-time radiation safety professional because the uses and radiation levels of the sources are limited. In these instances, an individual with limited expertise in radiation safety (e.g., a professor, teacher, researcher, or general safety staff member) could assume the responsibility for implementing the radiation safety program. Usually, this individual is called the radiation safety officer (RSO). This individual may have other safety responsibilities in addition to radiation safety. Full-time RSOs may also find this Report helpful.

Purchase a copy of NCRP Report No. 157:

<https://ncrponline.org/shop/reports/report-no-157-radiation-protection-in-educational-institutions-2007/>

Learn more about NCRP: <http://ncrponline.org/>

Report No. 156

Development of a Biokinetic Model for Radionuclide-Contaminated Wounds for Their Assessment, Dosimetry and Treatment (2006)



Executive Summary

The scientific literature contains case reports on >2,100 wounds contaminated with radionuclides. The vast majority of these reported wounds have occurred in the proximal and distal phalanges of workers in facilities that process plutonium. Since 1990 the use of depleted uranium (DU) in military munitions has resulted in combat wounds with DU shrapnel. In addition to contaminated wounds arising in industrial and military situations, medical use of radioactive material as a radiographic contrast agent has resulted in the development of granulomas at injection sites, a type of foreign-body reaction complicated by the radiation delivered to the site. Although numerous biokinetic and dosimetric models for intakes of radionuclides by inhalation and ingestion have been published, a comparable consensus model for intake via contaminated wounds has not, even though the total amount of activity associated with a contaminated wound is typically much larger than that associated with worker exposures via inhalation or ingestion. Thus, in the mid-1990s NCRP in collaboration with the International Commission on Radiological Protection established a scientific committee tasked with developing such a wound model. NCRP Report No. 156 presents a comprehensive review and in some cases, reanalysis of animal data relating to the biokinetic behavior of radionuclides in wounds.

Purchase a copy of NCRP Report No. 156:

<https://ncrponline.org/shop/reports/report-no-156-development-of-a-biokinetic-model-for-radionuclide-contaminated-wounds-for-their-assessment-dosimetry-and-treatment-2006/>

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Report No. 155

Management of Radionuclide Therapy Patients (2006)



Executive Summary

NCRP Report No. 155, Management of Radionuclide Therapy Patients, is intended for use by a wide readership including physicians, medical physicists, health physicists, administrators, nurses, other professional and medical staff, and patients. The approaches originally suggested in NCRP Report No. 37, Precautions in the Management of Patients Who Have Received Therapeutic Amounts of Radionuclides (1970), are incorporated and updated. This Report makes recommendations on explaining risks from therapeutic procedures and obtaining adequate, informed patient consent; dose limits for members of the patient's family; patient confinement in a hospital or skilled-care facility; and patient records including the radionuclide and activity used, the treating physician, and contact information.

Purchase a copy of NCRP Report No. 155:

<https://ncrponline.org/shop/reports/report-no-155-management-of-radionuclide-therapy-patients-2006/>

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Report No. 152

Performance Assessment of Near-Surface Facilities for Disposal of Low-Level Radioactive Waste (2005)



Executive Summary

The search for solutions to the challenges posed by the need for long-term disposal and isolation of low-level radioactive waste has been long and complex. The Low-Level Radioactive Waste Policy Act, passed in 1980 and amended in 1985, specified that the disposal of most low-level waste not generated at U.S. Department of Energy sites is the responsibility of states or State Compacts. A critical factor in the process of determining acceptable disposal practices for low-level waste at any site is a demonstration of compliance with regulatory performance objectives. NCRP was asked to evaluate current approaches to performance assessment for near-surface disposal facilities for low-level radioactive waste, and Scientific Committee 87-3 was established to prepare a report on this subject. This Report provides a review of concepts underlying performance assessments of near-surface disposal facilities for low-level radioactive waste and approaches to conducting such assessments.

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<https://ncrponline.org/shop/reports/report-no-152-performance-assessment-of-near-surface-facilities-for-disposal-of-low-level-radioactive-waste-2005/>

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Report No. 151

Structural Shielding Design and Evaluation for Megavoltage X- and Gamma-Ray Radiotherapy Facilities (2005)



Executive Summary

The purpose of radiation shielding is to limit radiation exposures to members of the public and employees to an acceptable level. This Report presents recommendations and technical information related to the design and installation of structural shielding for megavoltage x- and gamma-ray radiotherapy facilities. This information supersedes the recommendations in NCRP Report No. 49 (NCRP, 1976) pertaining to such medical radiotherapy facilities. Since the publication of NCRP Report No. 49, many facilities have been designed for accelerating voltages greater than the 10 MV maximum that was covered in that report. Hence recent designs have had to refer to NCRP Report No. 51 (NCRP, 1977) and NCRP Report No. 79 (NCRP, 1984) in order to account for the higher accelerating voltages and the concomitant production of neutrons. In addition, the use of barriers constructed with composite materials has become commonplace. This Report includes the necessary information for these higher accelerating voltages as well as a discussion of the various factors to be considered in the selection of appropriate shielding materials and in the calculation and evaluation of barrier thicknesses (Sections 1 through 6).

Purchase a copy of NCRP Report No. 151:

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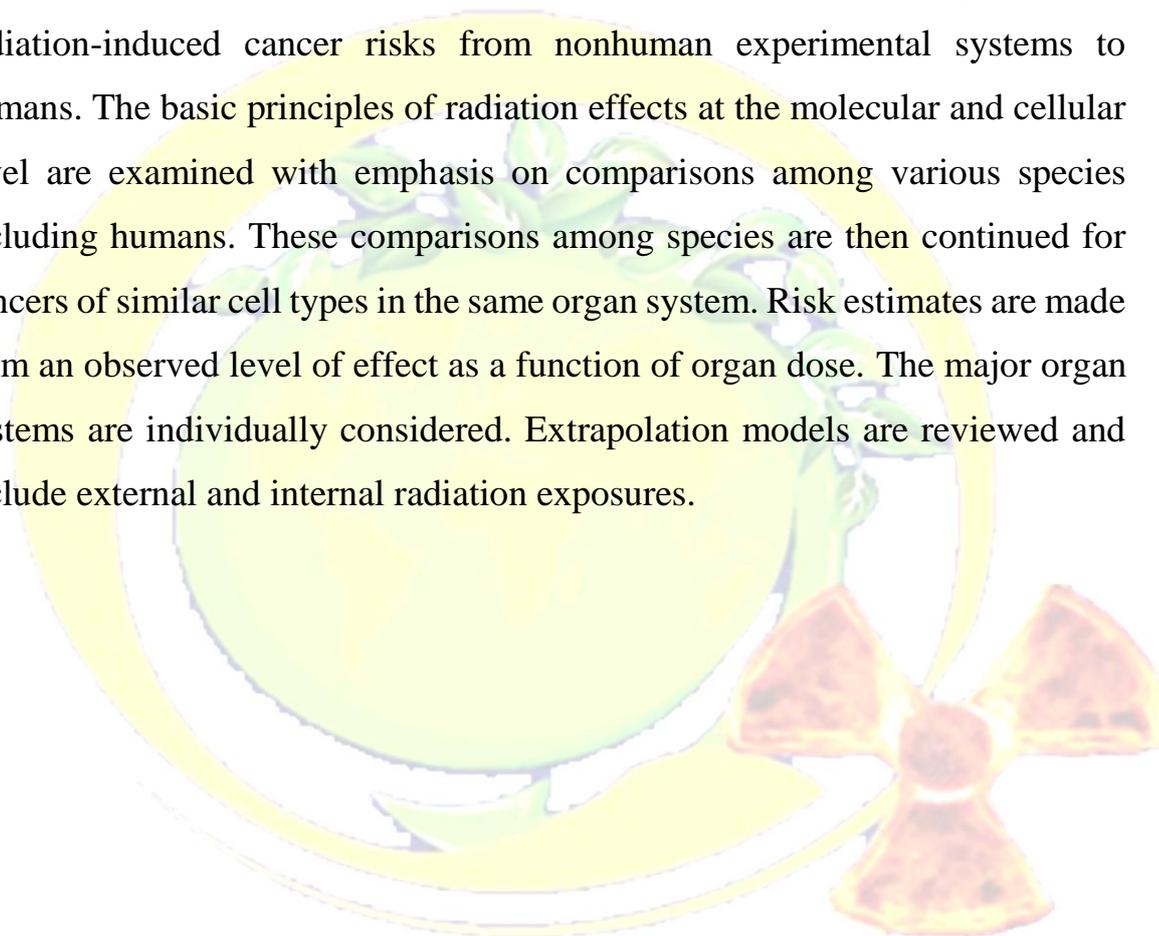
Report No. 150

Extrapolation of Radiation-Induced Cancer Risks from Nonhuman Experimental Systems to Humans (2005)



Executive Summary

This Report reviews the scientific issues associated with the extrapolation of radiation-induced cancer risks from nonhuman experimental systems to humans. The basic principles of radiation effects at the molecular and cellular level are examined with emphasis on comparisons among various species including humans. These comparisons among species are then continued for cancers of similar cell types in the same organ system. Risk estimates are made from an observed level of effect as a function of organ dose. The major organ systems are individually considered. Extrapolation models are reviewed and include external and internal radiation exposures.



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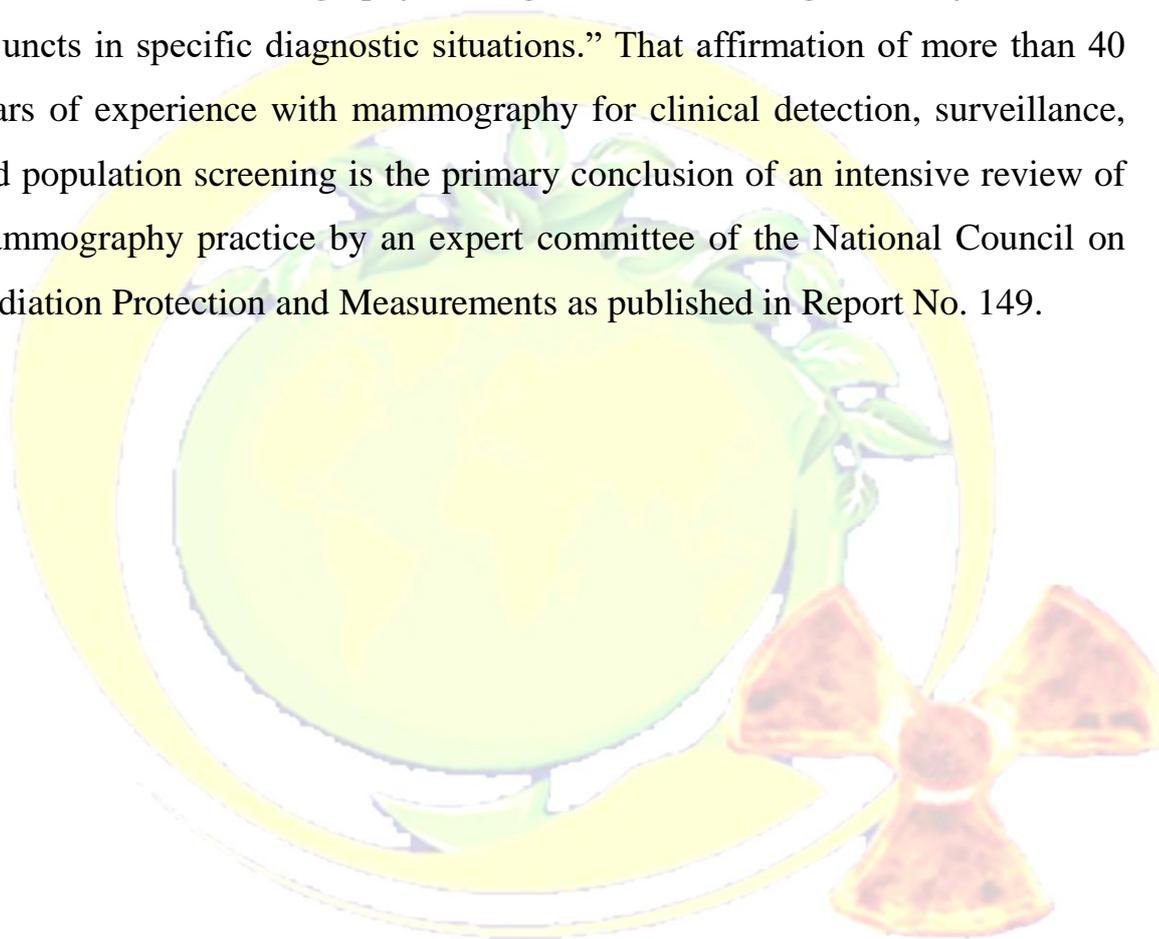
Report No. 149

A Guide to Mammography and Other Breast Imaging Procedures (2004)



Executive Summary

“Mammography, in conjunction with physical examination, is the method of choice for early detection of breast cancer. Other methods should not be substituted for mammography in diagnosis or screening, but may be useful adjuncts in specific diagnostic situations.” That affirmation of more than 40 years of experience with mammography for clinical detection, surveillance, and population screening is the primary conclusion of an intensive review of mammography practice by an expert committee of the National Council on Radiation Protection and Measurements as published in Report No. 149.



Purchase a copy of NCRP Report No. 149:

<https://ncrponline.org/shop/reports/report-no-149-a-guide-to-mammography-and-other-breast-imaging-procedures-2004/>

Learn more about NCRP: <http://ncrponline.org/>

Report No. 148

Radiation Protection in Veterinary Medicine (2004)



Executive Summary

Report No. 148 is concerned with the protection of individuals who may be exposed to radiation emitted by x-ray equipment and both sealed and unsealed radioactive sources in the practice of veterinary medicine. To the extent that the animal patient exposure is reduced, there is usually a proportional decrease in the occupational exposure to personnel. The Report provides guidance for the development of an effective radiation safety program and recommendations for the design of radiological facilities and for the use of radiographic, fluoroscopic and therapeutic equipment in veterinary medicine. Included are recommendations for the use of radiopharmaceuticals in diagnosis and therapy, and for the use of lasers and ultrasonic equipment. Although x-ray machines are widely used in veterinary medicine, the workload, and thus the potential exposure of both the practitioner and the technical assistants is, on the average, low. However, because practices such as restraining animals and holding film cassettes introduce risks of unnecessary exposure of staff, special attention is given in this Report to proper practices.

Purchase a copy of NCRP Report No. 148:

<https://ncrponline.org/shop/reports/report-no-148-radiation-protection-in-veterinary-medicine-2004/>

Learn more about NCRP: <http://ncrponline.org/>

Executive Summary

Report No. 147 (2004) presents recommendations and technical information related to the design and installation of structural shielding for facilities that use x rays for medical imaging. The purpose of structural shielding is to limit radiation exposure to employees and members of the public. The information supersedes the recommendations that address such facilities in NCRP Report No. 49, Structural Shielding Design and Evaluation for Medical Use of X Rays and Gamma Rays of Energies Up to 10 MeV, which was issued in September 1976. NCRP Report No. 147 includes a discussion of the various factors to be considered in the selection of appropriate shielding materials and in the calculation of barrier thicknesses. The Report presents the fundamentals of radiation shielding, discusses shielding design goals for controlled and uncontrolled areas in or near x-ray imaging facilities and defines the relationship of these goals to the NCRP effective dose limits for radiation workers and members of the public. The Report includes a detailed discussion of the recommended shielding design methodology for x-ray imaging facilities and provides an extensive collection of shielding data and sample shielding calculations for various types of x-ray imaging facilities. The Report is mainly intended for those individuals who specialize in radiation protection. However, it will also be of interest to architects, hospital administrators and related professionals concerned with the planning of new facilities that use x rays for medical imaging. View the latest Book Review of this Report.

Purchase a copy of NCRP Report No. 147:

<https://ncrponline.org/shop/reports/report-no-147-structural-shielding-design-for-medical-x-ray-imaging-facilities-2004/>

Learn more about NCRP: <http://ncrponline.org/>

Report No. 146

Approaches to Risk Management in Remediation of Radioactively Contaminated Sites (2004)



Executive Summary

Report No. 146 (2004) identifies and analyzes current guidance and practices used by the U.S. Nuclear Regulatory Commission (NRC) under the License Termination Rule (LTR) and the Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly known as Superfund) and the National Oil and Hazardous Substances Pollution Contingency Plan in the remediation of radioactively contaminated sites. The Report identifies, analyzes and summarizes the significant differences and commonalities in current practices of NRC and EPA, and future implications of current practices as they relate to issues of public perception, uncertainty, measurability, and estimation of radiation dose and risk. The Report discusses the importance of involving state regulators and the public in establishing goals for the decontamination of radioactively contaminated sites. Since Superfund applies to contamination by both radioactive materials and chemicals, EPA's risk management approach uses cancer risk rather than dose, and this leads to some challenges in comparing the two agencies' approaches. NCRP believes that the seven conclusions set out in Report No. 146 capture the themes that delineate similarities and differences in regulatory approaches to remediation and decommissioning at radioactively contaminated sites used by the two agencies.

Purchase a copy of NCRP Report No. 146:

<https://ncrponline.org/shop/reports/report-no-146-approaches-to-risk-management-in-remediation-of-radioactively-contaminated-sites-2004/>

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Report No. 144

Radiation Protection for Particle Accelerator Facilities (2003)



Executive Summary

Report No. 144 (2003) is a substantial revision and expansion of NCRP Report No. 51, published in 1977 and entitled, Radiation Protection Design Guidelines for 0.1-100 MeV Particle Accelerator Facilities. NCRP Report No. 51 was one of the first comprehensive treatments of accelerator radiological-protection concerns. The Report revises and expands on the earlier report and includes new information on source intensities, shielding, dosimetry, and the environmental aspects of particle accelerator operation. It is primarily concerned with radiological safety aspects that are special to the operation of particle accelerators having energies above about 5 MeV up to the highest energies available, while not neglecting low-energy neutron generators. The purpose of this Report is to provide design guidelines for radiation protection, and to identify those aspects of radiological safety that are of major, or even unique, importance to the operation of particle accelerator installations and to suggest methods by which safe operation may be achieved. The Report is written from an engineering physics viewpoint and is intended to be useful to those engaged in the design and operation of accelerators, particularly in smaller institutions and organizations that do not have a large radiological-protection staff.

Purchase a copy of NCRP Report No. 144:

<https://ncrponline.org/shop/reports/report-no-144-radiation-protection-for-particle-accelerator-facilities-2003/>

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Report No. 143

Management Techniques to Minimize Off-Site Disposal of Low-Level Radioactive Waste (2003)



Executive Summary

Report No. 143 (2003) details the Council's views on management techniques to minimize off-site disposal of low-level radioactive waste. Public concern and increased cost of the disposal of low-level radioactive waste (LLRW) have led to a need to address the minimization of these wastes particularly as they pertain to research laboratories and other small users of radioactive materials. The information in this Report will prove valuable not only to the generator of this waste but to those organizations responsible for licensing and regulation. Since risks associated with waste are related to the concentration of the hazardous material, the quantity and form of the waste, and the potential for dispersion in the environment, the generator's first priority should be the partial or total elimination of the source of the waste stream. Furthermore, waste that cannot be eliminated should be recycled in an environmentally safe manner. Next, waste that cannot be eliminated or recycled should, when feasible, be treated to reduce its hazards and to reduce the volume of the wastes. The final step is that of selecting a disposal method consistent with protection of the public health and the environment which is in compliance with federal and state laws and regulations.

Purchase a copy of NCRP Report No. 143:

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Report No. 140

Exposure Criteria for Medical Diagnostic Ultrasound (2002)



Executive Summary

Report No. 140 (2002) details the Council's current views on exposure criteria for medical diagnostic ultrasound. The Report is 574 pages consisting of 14 sections, four appendices, a glossary, a listing of symbols used in the Report, and 67 pages of references. The titles of the 14 sections are: (1) Executive Summary, 4 pages, (2) Introduction, 11 pages, (3) Nonthermal Mechanisms for Bioeffects in the absence of cavitation, 34 pages, (4) Noninertial Cavitation; Gas-Body Activation, 57 pages, (5) Nonlinear Bubble Responses; Inertial Cavitation, 35 pages, (6) Bioeffects of Noninertial Cavitation Involving Free and Stabilized Gas Bodies in Non-Mammalian Systems, 25 pages, (7) Bioeffects of Inertial Cavitation In Vitro, 42 pages, (8) Bioeffects of Acoustic Cavitation in Mammalian Tissues, 27 pages, (9) Models for Exposure Estimation in Human Beings, 37 pages, (10) Employed and Needed Sound Pressure Waveforms, 38 pages, (11) Temperature Elevation and Its Biological Effects, 57 pages, (12) Epidemiology of Ultrasound Exposure, 25 pages, (13) Summary and Conclusions, 25 pages, and (14) Recommendations, 5 pages.

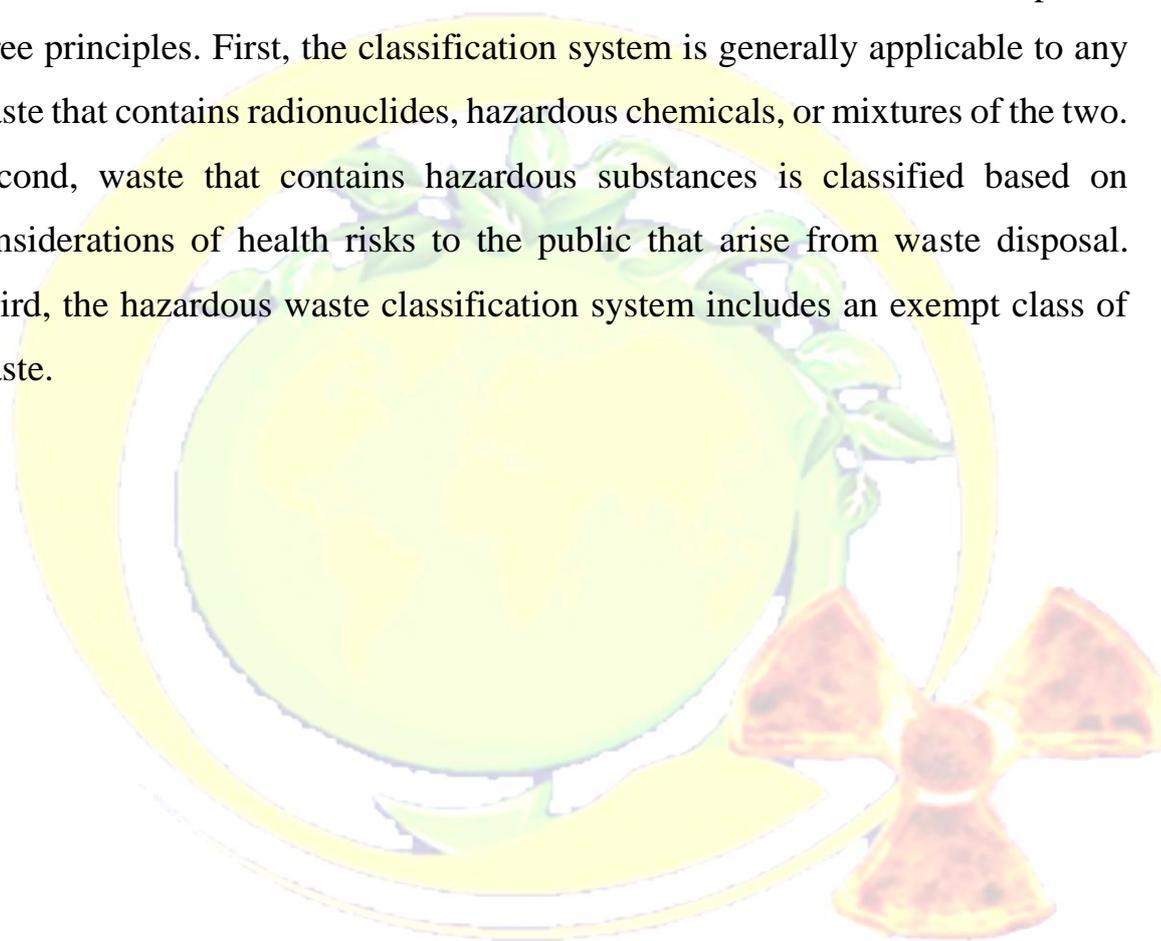
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Executive Summary

Report No. 139 (2002) presents the Council's recommendations on a new system for classifying waste that contains hazardous substances, either radionuclides or hazardous chemicals. NCRP's recommendations incorporate three principles. First, the classification system is generally applicable to any waste that contains radionuclides, hazardous chemicals, or mixtures of the two. Second, waste that contains hazardous substances is classified based on considerations of health risks to the public that arise from waste disposal. Third, the hazardous waste classification system includes an exempt class of waste.



Purchase a copy of NCRP Report No. 139:

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Report No. 136

Evaluation of the Linear-Nonthreshold Dose-Response Model for Ionizing Radiation (2001)



Executive Summary

Report No. 136 (2001) presents an evaluation of the existing data on the dose-response relationships and current understanding of the health effects of low doses of ionizing radiation. This reevaluation was carried out by Scientific Committee 1-6, which was charged to reassess the weight of scientific evidence for and against the linear-nonthreshold dose-response model, without reference to associated policy implications. The evaluation was prompted by the need to reassess the common use, for radiation protection purposes, of the linear-nonthreshold dose-response hypothesis in the light of new experimental and epidemiological findings, including growing evidence of adaptive responses to small doses of radiation which may enhance the capacity of cells to withstand the effects of further radiation exposure, and new evidence concerning the possible nature of neoplastic initiation.

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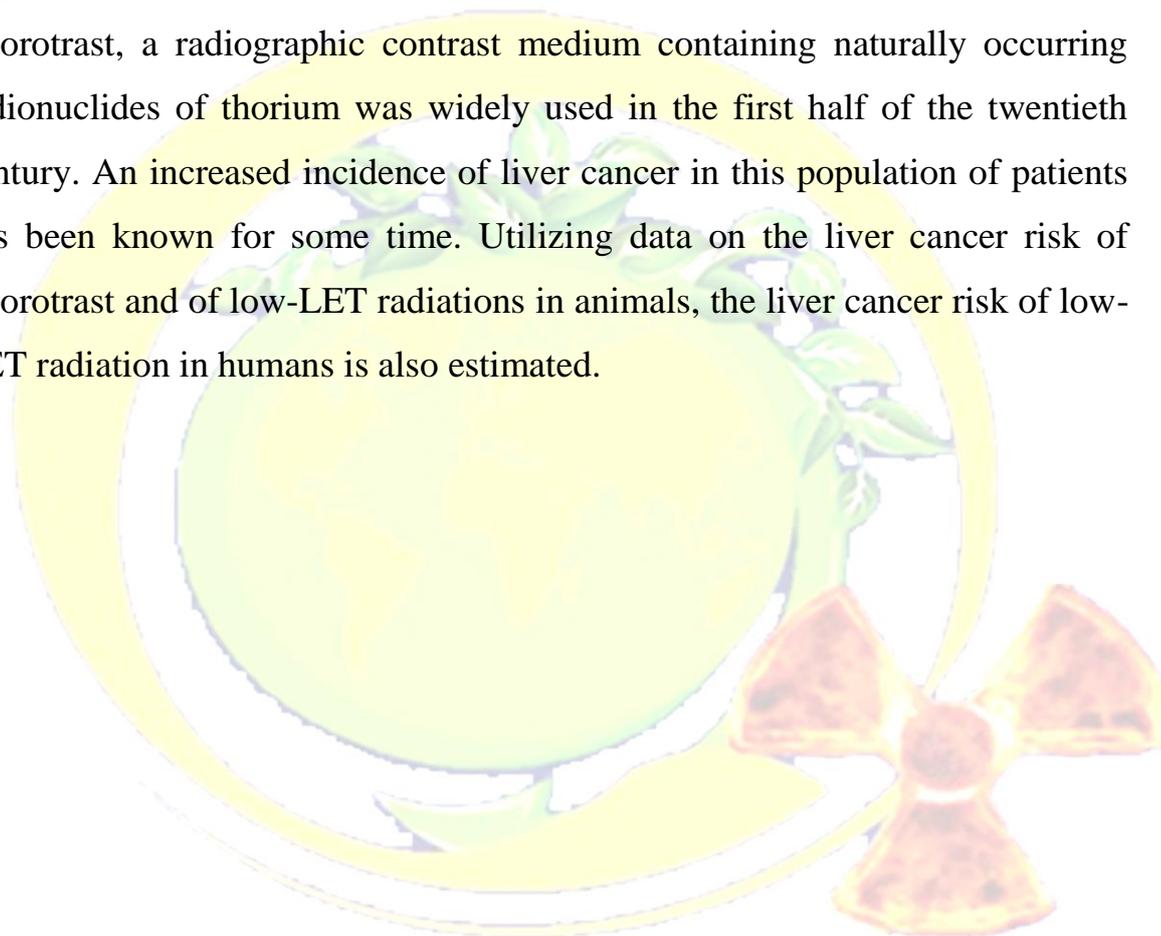
Report No. 135

Liver Cancer Risk from Internally-Deposited Radionuclides (2001)



Executive Summary

Report No. 135 (2001) updates the liver cancer risk of Thorotrast in humans. Thorotrast, a radiographic contrast medium containing naturally occurring radionuclides of thorium was widely used in the first half of the twentieth century. An increased incidence of liver cancer in this population of patients has been known for some time. Utilizing data on the liver cancer risk of Thorotrast and of low-LET radiations in animals, the liver cancer risk of low-LET radiation in humans is also estimated.



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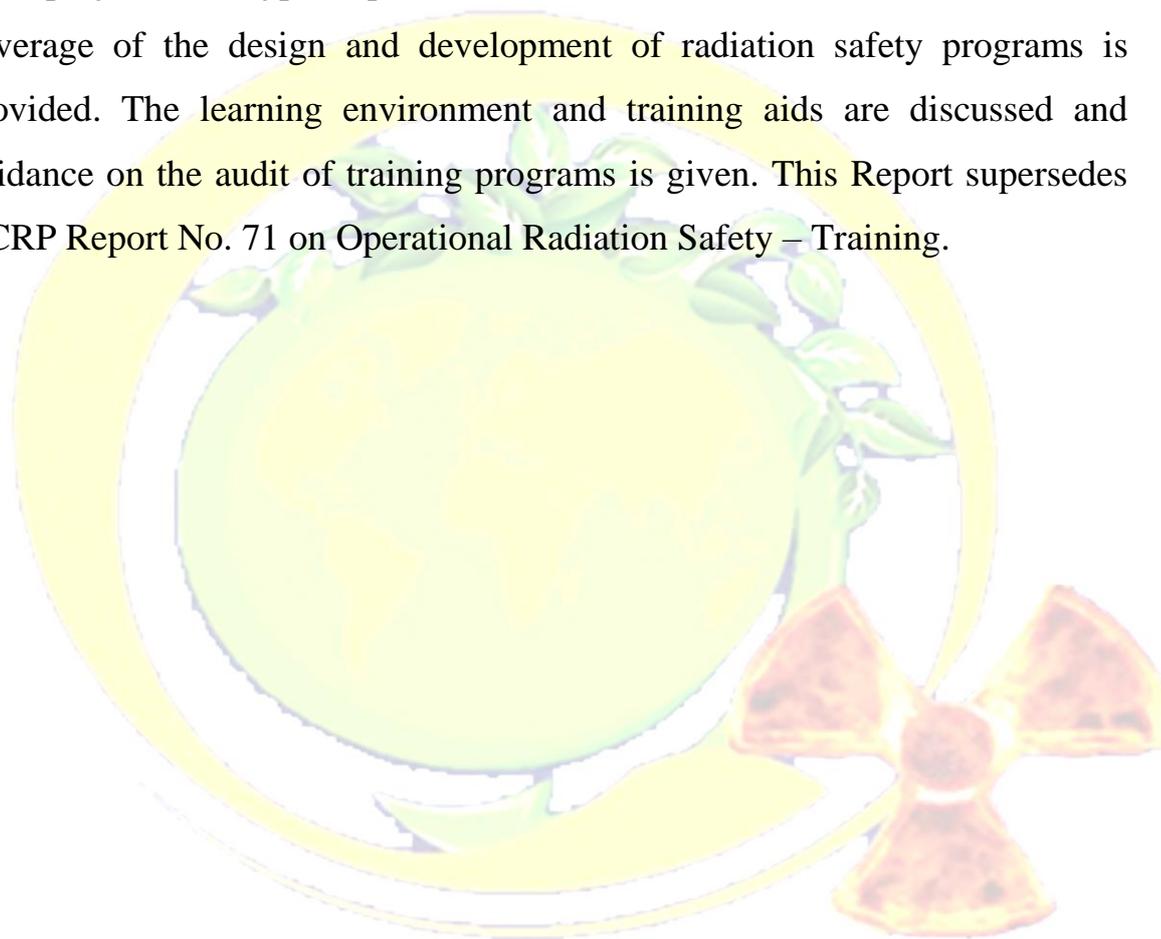
Report No. 134

Operational Radiation Safety Training (2000)



Executive Summary

This Report emphasizes management's responsibility in training employees, and presents criteria for identifying training requirements for different groups of employees. The type of personnel to be trained is treated and an extensive coverage of the design and development of radiation safety programs is provided. The learning environment and training aids are discussed and guidance on the audit of training programs is given. This Report supersedes NCRP Report No. 71 on Operational Radiation Safety – Training.



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Report No. 133



Radiation Protection for Procedures Performed Outside the Radiology Department (2000)

Executive Summary

Report No. 133 (2000) is an 81 page document with five sections, two appendices, a glossary, and references. Section 1 introduces sources of occupational radiation exposure and compares occupational exposures in medicine with other sources of occupational exposure. Section 2 describes radiologic medical procedures that are often performed outside the radiology department and categorizes the procedures according to their potential for occupational exposure. Section 3 addresses conditions that affect potential occupational exposure such as time, distance, shielding, and orientation of radiation source, patient and operator. Section 4 addresses medical personnel monitoring and Section 5 briefly addresses the responsibility of management to provide safe conditions for both employees and patients. Appendix A provides information on the philosophy of radiation protection and the biological effects of medical x rays. Appendix B describes the x-ray imaging process for various imaging devices. This Report is intended for the use of clinical staff who conduct medical procedures, radiation protection staff, and those responsible for developing relevant employee education and training programs.

Purchase a copy of NCRP Report No. 133:

<https://ncrponline.org/shop/reports/report-no-133-radiation-protection-for-procedures-performed-outside-the-radiology-department-2000/>

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