



# REGULATORY GUIDE

Technical Lead  
T. Brock

## REGULATORY GUIDE 8.7

(Draft was issued as DG-8030, dated August 2015)

# INSTRUCTIONS FOR RECORDING AND REPORTING OCCUPATIONAL RADIATION DOSE DATA

## A. INTRODUCTION

### Purpose

This regulatory guide (RG) describes methods and procedures that the staff of the U.S. Nuclear Regulatory Commission (NRC) considers acceptable for the preparation, retention, and reporting of records of occupational radiation doses. In addition, this RG provides information how the dose data should be prepared, retained, recorded, and reported to NRC using the updated versions of NRC Form 4, “Cumulative Occupational Dose History” (Ref. 1), and NRC Form 5, “Occupational Dose Record for a Monitoring Period” (Ref. 2).

### Applicability

This RG applies to all NRC licensees (reactor and non-reactor) subject to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 20, “Standards for Protection Against Radiation” (Ref. 3).

### Applicable Regulations

- 10 CFR Part 19, “Notices, Instructions and Reports to Workers: Inspection and Investigations” (Ref. 4), Section 19.13, “Notifications and reports to individuals,” requires each licensee to provide dose information to workers as shown in records maintained by the licensee pursuant to NRC regulations.
- 10 CFR 20.1003, “Definitions,” defines the terms “exposure,” “monitoring,” “occupational dose,” “planned special exposure,” and “total effective dose equivalent” (TEDE).
- 10 CFR 20.1007, “Communications,” provides methods of submitting required information to NRC.
- 10 CFR 20.1201, “Occupational dose limits for adults,” requires licensees to control the occupational doses to individual adults to certain prescribed dose limits.

---

Written suggestions regarding this guide or development of new guides may be submitted through the NRC’s public Web site under the Regulatory Guides document collection of the NRC Library at <http://www.nrc.gov/reading-rm/doc-collections/reg-guides/contactus.html>.

Electronic copies of this regulatory guide, previous versions of this guide, and other recently issued guides are available through the NRC’s public Web site under the Regulatory Guides document collection of the NRC Library at <http://www.nrc.gov/reading-rm/doc-collections/>. The regulatory guide is also available through the NRC’s Agencywide Documents Access and Management System (ADAMS) at <http://www.nrc.gov/reading-rm/adams.html>, under ADAMS Accession No. ML16054A170. The regulatory analysis may be found in ADAMS under Accession No. ML15169A219 and the staff responses to the public comments on DG-8030 may be found under ADAMS Accession No. ML16060A392.

---

- 10 CFR 20.1206, “Planned special exposures,” authorizes licensees to allow an adult worker to receive doses that are in addition to and accounted for separately from the doses received under the 10 CFR 20.1201 occupational dose limits, and prescribes the requirements the licensees must meet in allowing for such additional doses.
- 10 CFR 20.1502, “Conditions requiring individual monitoring of external and internal occupational dose,” requires that licensees supply and require the use of individual monitoring devices by those individuals that the licensee has determined will likely receive occupational doses exceeding those thresholds identified in 10 CFR 20.1502.
- 10 CFR 20.2104, “Determination of prior occupational dose,” requires licensees to determine the dose in the current monitoring year for all persons who require monitoring under 10 CFR 20.1502. In addition, 10 CFR 20.2104(b) requires that, before permitting an individual to participate in a planned special exposure, licensees shall determine the internal and external doses from all previous planned special exposures and all doses in excess of the limits (including doses received during accidents and emergencies) received during the lifetime of the individual. Under 10 CFR 20.2104(d), licensees are required to record the exposure history of each individual on an NRC Form 4 or its equivalent.
- 10 CFR 20.2106, “Records of individual monitoring results,” requires licensees to maintain records of doses received by all individuals for whom monitoring is required under 10 CFR 20.1502, and records of doses received during planned special exposures, accidents, and emergency conditions. Licensees shall make entries of the required records at least annually. Licensees shall maintain the required records on an NRC Form 5 or its equivalent.
- 10 CFR 20.2206, “Reports of individual monitoring,” requires certain categories of licensees to submit to the NRC an annual report of the results of individual monitoring carried out by the licensee for each individual for whom monitoring was required by 10 CFR 20.1502 during that year. Licensees are required to record these annual reports on an NRC Form 5 or its equivalent.

### **Related Guidance**

- Regulatory Guide 8.34, “Monitoring Criteria and Methods To Calculate Occupational Radiation Doses” (Ref. 5), provides guidance in monitoring an individual’s occupational radiation dose.

### **Purpose of Regulatory Guides**

The NRC issues RGs to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency’s regulations, to explain techniques that the staff uses in evaluating specific problems or postulated accidents, and to provide guidance to applicants. RGs are not substitutes for regulations and compliance with RGs is not required. Methods and solutions that differ from those set forth in RGs will be deemed acceptable if they provide a basis for the findings required for the issuance or continuance of a permit or license by the Commission.

**Paperwork Reduction Act**

This RG contains and references information collections covered by 10 CFR Part 20, which is subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). These information collections were approved by the Office of Management and Budget (OMB), control number 3150-0014. The information collections for NRC Forms 4 and 5 were approved by OMB, control numbers 3150-0005 and 3150-0006, respectively.

**Public Protection Notification**

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

## B. DISCUSSION

### Reason for Revision

This revision of RG 8.7 (Revision 3) addresses changes since Revision 2 was issued in November 2005. The regulations in 10 CFR 20.1003 and 10 CFR 50.2 regarding the definition of the “total effective dose equivalent” (TEDE) were revised and became effective on January 3, 2008 (72 FR 68043, December 4, 2007). TEDE is defined as the sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures). As a result of the revised definition of TEDE, the NRC staff now uses the additional acronym EDEX for the “effective dose equivalent” (for external exposures) and this term was included in the revised NRC Forms 4 and 5 that were updated in 2015. Appendix A to this RG, “Format for Electronic Submittal of Dose Data,” includes the new term “EDEX.”

Revision 3 also streamlines the format of the RG by removing Appendices A and B (sample Forms 4 and 5, respectively) and re-lettering Appendix C to Appendix A. NRC Forms 4 and 5 are available electronically and can be found on the Radiation Exposure Information and Reporting System (REIRS) Web site at <http://www.reirs.com>. Also, NRC Forms 4 and 5 they are available through the NRC Library on the NRC’s public Web site at <http://www.nrc.gov/reading-rm/doc-collections> (under “Document Collections” and select “Forms”). In addition, Forms 4 and 5 are located in the NRC’s Agencywide Documents Access and management System (ADAMS) under Accession number ML13083A005 and ML13083A017, respectively.

### Background

On December 4, 2007, the NRC published a *Federal Register* notice (72 FR 68043) (Ref. 6) that made changes to 10 CFR 19.13, which provides for notifications and reports to individuals who are required to use individual monitoring devices in accordance with 10 CFR 20.1502; to 10 CFR 20.1201(c), which concerns the measurement of external exposure by either deep-dose equivalent (DDE) or EDEX; and to the definition of TEDE in 10 CFR 20.1003 and 10 CFR 50.2 (Ref. 7). Previously, the definition of the TEDE was the sum of the deep dose equivalent (DDE), to account for external exposure, and the committed effective dose equivalent (CEDE), to account for internal exposure. In accordance with the December 4, 2007 rulemaking, the 10 CFR 20.1003 definition of TEDE was redefined as the sum of the EDEX (for external exposures) and the CEDE (for internal exposures); essentially, the December 4, 2007 rulemaking replaced the DDE with the EDEX.

Old definition:           TEDE = DDE + CEDE

New definition:         TEDE = EDEX + CEDE

The revised TEDE definition also affected the format of NRC Forms 4 and 5 because the EDEX is now a quantity to be recorded when monitoring external dose. Therefore, Revision 3 discusses the updated Forms 4 and 5, which incorporate the EDEX quantity, and provides instructions on the summation of the EDEX and CEDE to determine the TEDE. Although <sup>10</sup>CFR 20.1003 does not contain an abbreviation for the effective dose equivalent (for external exposures), the acronym EDEX is now used by NRC staff to denote this term.

Also, the term “total organ dose equivalent” (TODE) is also included in the 2015 updated forms to denote the sum of the deep-dose equivalent (DDE) and the committed dose equivalent (CDE) to the organ receiving the highest dose, to be consistent with the regulations described in

10 CFR 20.2106(a)(6).<sup>1</sup> Although this regulation does not include the acronym TODE, the acronym is used by NRC staff to denote “total organ dose equivalent.”

### **Harmonization with International Standards**

The NRC has a goal of harmonizing its guidance with international standards, to the extent practical. The International Commission on Radiological Protection (ICRP) and the International Atomic Energy Agency (IAEA) have established a series of safety guides and standards constituting a high level of safety for protecting people and the environment and addressing good practices in most aspects of radiation protection, including:

- International Commission on Radiological Protection (ICRP) Publication 30, “Limits for Intakes of Radionuclides by Workers” (Ref. 8); and
- ICRP Publication 68, “Dose Coefficients for Intakes of Radionuclides by Workers” (Ref. 9).

The NRC encourages licensees to consult the international documents listed above and implement the applicable good practices they contain that are consistent with NRC regulations. It should be noted, however, that some of the recommendations issued by these international organizations do not meet or may conflict with the requirements specified in the NRC’s regulations. In such cases, the NRC’s requirements take precedence.

---

<sup>1</sup> NRC staff interprets the phrase “committed dose to the organ” in 10 CFR 20.2106(a)(6) to mean the committed dose equivalent (CDE), as defined in 10 CFR 20.1003.

## C. STAFF REGULATORY GUIDANCE

### 1. Determining the Need to Monitor

Licensees are required under 10 CFR 20.1502 to monitor exposures to radiation and radioactive materials at levels sufficient to demonstrate compliance with the occupational dose limits of 10 CFR Part 20. According to 10 CFR 20.1502, as a minimum, monitoring is required if an adult is likely to receive, in one year<sup>2</sup> from radiation sources external to the body, a dose in excess of 10 percent of the limits in 10 CFR 20.1201(a), or the specific limits for minors and declared pregnant women in 10 CFR 20.1502(a)(2)-(3), or individuals entering a high or very high radiation area.

The licensee should evaluate the dose that such individuals are likely to receive before allowing them to receive the dose. The licensee need not perform a dose evaluation for every individual; evaluations can be performed for employees with similar job functions or work areas. Regulatory Guide 8.34, “Monitoring Criteria and Methods To Calculate Occupational Radiation Doses,” provides further guidance in determining the need to monitor an individual’s occupational radiation dose.

#### *1.1 Subsequent and Prior Employment*

If the prospective evaluation shows that an individual is not likely to receive in a year a dose that exceeds the criteria in 10 CFR 20.1502,<sup>3</sup> then monitoring is not required, and the recordkeeping requiring in 10 CFR 20.2106 and the reporting requirements in 10 CFR 20.2206 are not applicable. However, for the individual that already has received greater than the dose criteria in 10 CFR 20.1502 from prior employment in the current monitoring year, monitoring of any additional radiation exposure is required by subsequent employers.

For individuals who received a dose that was not required to be monitored at other facilities in the current year, the previous dose need not be considered in this prospective evaluation. When determining whether an individual is likely to exceed the dose criteria in 10 CFR 20.1502 (therefore requiring monitoring) the licensee need not speculate on the amount of radiation dose the individual may receive at another, future, employer within the current monitoring year. The licensee, however, must consider the dose that could be received by the individual at the licensee’s facility during the current monitoring year, and in the case of an individual who also received prior occupational dose at another licensee’s facility during the current monitoring year, the amount of that prior occupational dose must also be considered. Thus, if the individual already has received greater than the dose criteria in 10 CFR 20.1502 from prior employment in the current monitoring year, monitoring of any additional radiation exposure is required by subsequent employers.

If the licensee determines that monitoring is not required and a subsequent evaluation shows that the individual exceeded (or will exceed) the monitoring limit threshold, the licensee should estimate, record, and report the dose received when monitoring was not provided. These estimates can be based on

---

<sup>2</sup> A “year” as used in this guide will be interpreted as defined in 10 CFR 20.1003, namely “...the period of time beginning in January used to determine compliance with the provisions of this part.”

<sup>3</sup> As used in this regulatory guide, the phrases “a dose that exceeds the criteria” and “monitoring limit threshold” also includes those individuals covered under 10 CFR 20.1502(a)(4), namely, those individuals entering a high or very high radiation area.

any combination of work location radiation monitoring or survey results, monitoring results of individuals in similar work situations, or other estimates to produce a “best estimate” of the actual dose received.

Licensees should enter “NR” for “not required” in the blocks on NRC Forms 4 and 5 to indicate the areas for which monitoring was not required. Where monitoring was provided but the dose was not measurable, the licensee should enter “ND” for “not detectable.”

### *1.2 If Monitoring Is Required*

If the prospective evaluation shows that an individual is likely to receive in a year a dose that exceeds the monitoring criteria set forth in 10 CFR 20.1502, then the licensee must perform monitoring.<sup>4</sup> In addition, 10 CFR 20.2106(a) and 20.2206(b), respectively, require recording and reporting of the monitoring results, regardless of the actual dose received (even if the actual dose received is less than the dose limits for which monitoring is required).

### *1.3 Documentation of Prior Doses*

For those individuals for whom monitoring is required (i.e., individuals who receive, or are likely to receive, an occupational dose requiring monitoring under 10 CFR 20.1502), the licensee shall determine the individual’s dose received during the current monitoring year as required by 10 CFR 20.2104(a). In addition, before permitting an individual to participate in a planned special exposure, 10 CFR 20.2104(b) requires licensees to determine the internal and external doses from all previously planned special exposures and all doses in excess of the limits (including doses received during accidents and emergencies) received during the lifetime of the individual.

In order to comply with 10 CFR 20.2104(a) and (b), the licensee may accept as a record of the occupational dose that the individual received during the current year, a written signed statement from the individual or from the individual’s most recent employer, that discloses the nature and the amount of any occupational dose that the individual may have received during the current year (10 CFR 20.2104(c)(1)) on a completed Form 5 or equivalent. The licensee may also obtain reports of the individual’s dose equivalent from the individual’s most recent or current employer, if not employed by the licensee, by telephone, telegram, electronic media, or letter (10 CFR 20.2104(c)(3)). The licensee shall request a written verification of the dose data received by such methods if the authenticity of the transmitted report cannot be established.

NRC Forms 4 and 5 are revised periodically, and require OMB review and approval. Licensees are not required to, and should not, revise, retrospectively, historical dose records to reflect the content or format of the currently approved versions of the forms. NRC Forms 4 and 5, termination letters, or reports that document the results of monitoring performed before implementation of the 1991 revision of 10 CFR Part 20, may be used without recalculating doses, according to the requirements of the 1991 revision of 10 CFR Part 20. For the purpose of assessing doses prior to 1981, whole body doses, in rem, as reported in the old NRC Forms 4 and 5 (from 1981 or earlier) can be considered equivalent to TEDE.

### *1.4 Obtaining Records of Prior Doses for Persons Participating in Planned Special Exposures*

In order to comply with 10 CFR 20.2104(b), the licensees may accept as a records of cumulative radiation dose, an up-to-date NRC Form 4, or equivalent, signed by the individual and countersigned by an appropriate official of the most recent or current employer, if not employed by the licensee (10 CFR 20.2104(c)(2)).

---

<sup>4</sup> Under 10 CFR 20.1502(a), licensees are also required to supply and require the use of individual monitoring devices.

NRC Forms 4 and 5 are revised periodically, and require OMB review and approval. Licensees are not required to, and should not, revise, retrospectively, historical dose records to reflect the content or format of the currently approved versions of the forms. NRC Forms 4 and 5, termination letters, or reports that document the results of monitoring performed before implementation of the 1991 revision of 10 CFR Part 20, may be used without recalculating doses, according to the requirements of the 1991 revision of 10 CFR Part 20. For the purpose of assessing doses prior to 1981, whole body doses, in rem, as reported in the old NRC Forms 4 and 5 (from 1981 or earlier) can be considered equivalent to TEDE.

If the monitored individual has any periods of exposure (throughout his or her life) that have not been monitored and documented, the individual is not permitted to participate in a planned special exposure. Regulatory Guide 8.35, "Planned Special Exposures" (Ref. 10), provides further guidance on planning and controlling planned special exposures. Acceptable documentation of prior exposure is similar to that required to document current year exposure. The licensee may ask the NRC to provide a report of the monitored individual's exposure history, by submitting a request via the NRC's Radiation Exposure Information and Reporting System (REIRS) for Radiation Workers (a secure Web site) at <http://www.reirs.com>. Alternatively, the licensee may send a request signed by the monitored individual to the following point of contact:

REIRS Project Manager  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Each request should contain the Social Security number (or other unique identifier) of the monitored individual authorizing release of the information and the name and address of the person or licensee to whom the report should be sent. The NRC's REIRS database contains copies of all licensee exposure records submitted to the NRC. However, the database contains only reports submitted by the seven classes of licensees that are required under 10 CFR 20.2206 to submit an annual report of the results of individual monitoring in accordance with 10 CFR 20.1502. Any missing monitoring periods should be obtained directly from licensees or other non-NRC-licensed facilities (e.g., U.S. Department of Energy or U.S. Department of Defense facilities).

#### *1.5 Use of ID Types Other Than Social Security Number*

Doses to individuals who do not have a Social Security number, such as citizens of foreign countries, and individuals who are either unwilling or unable to provide (cannot locate or do not want to disclose) a Social Security number, should be reported using another unique identifier. It is important to record the type of identification in the data block labeled "ID Type," which follows the "Identification Number" data block on NRC Forms 4 and 5. The instructions on the back of these forms define all valid ID types. Licensees should insert the appropriate code (listed below) in the blank labeled "ID Type."

ID TYPE	CODE
U.S. Social Security Number	SSN
Passport Number	PPN
Canadian Social Insurance Number	CSI
Work Permit Number	WPN
INDEX Identification Number	IND
PADS Identification Number	PAD
Other	OTH

The use of licensee-generated identification numbers should be avoided whenever possible.

## 2. Recording Maintaining and Reporting of Monitoring Results for Individuals for Whom Monitoring Is Required

### 2.1 *Recording and Maintaining Dose Data*

The regulations in 10 CFR 20.2106 require licensees to maintain records of doses received by all individuals for whom monitoring was required pursuant to 10 CFR 20.1502, and records of doses received during planned special exposures, accidents, and emergency conditions. Licensees should maintain dose records on NRC Form 5, in accordance with the instructions for NRC Form 5, or in clear and legible records containing all the information required by NRC Form 5.

### 2.2 *Multiple Badges*

Multiple badges refers to the common practice of using more than one personal dosimeter to measure a person's dose. According to 10 CFR 20.1201(c), the EDEX must be the DDE measured at the part of the body receiving the highest exposure. In uniform radiation fields, the exposure over the various parts of the body is sufficiently uniform that placing one dosimeter on the chest area is sufficient to comply with regulatory requirements and to provide a good estimate of the dose received. EDEX is then equal to the reading of that single dosimeter. In non-uniform radiation fields, different parts of the body will receive different levels of radiation exposure. If it is known which part of the body will receive the highest exposure then one dosimeter placed at that location will satisfy monitoring requirements, and EDEX will be equal to the reading of that dosimeter. However, if the location of highest exposure is not known, multiple dosimeters are used in order to find that location. In such cases, EDEX is equal to the highest reading dosimeter. A variation on the use of multiple dosimeters is described in Regulatory Guide 8.40. The guide describes several methods by which one or more dosimeters may be placed on specified locations on the body, and a simple algorithm is used to combine the readings of these dosimeters to get a direct estimate of the effective dose equivalent. In that case, the EDEX will be the estimated dose determined using the appropriate algorithm. This approach is expected to provide a more accurate (i.e., less conservative) estimate of EDEX than by measuring the highest DDE, but it is also more complex and must be used with caution and close attention to the placement of the dosimetry.

### 2.3 Dose Calculations for CDE and TODE to the Maximally Exposed Organ

As required by 10 CFR 20.2106(a)(6), licensees shall record, when applicable, the TODE, which is the sum of the DDE and the CDE to the organ receiving the highest dose (the maximally exposed organ) when monitoring is required by 10 CFR 20.1502.<sup>5</sup> If internal monitoring required by 10 CFR 20.1502(b) for adults demonstrates that the annual CEDE is being kept below 1 rem (10 millisieverts (mSv)),<sup>6</sup> the CDE is not required to be monitored (calculated) separately, as long as the annual maximum DDE is also kept below 5 rem (50 mSv). This is because the CEDE and DDE monitoring is sufficient to demonstrate that the TODE limit has not been exceeded. In this case, the licensee may record “NC” for “not calculated” in items 16 and 18 on NRC Forms 4 and 5.

However, if during the course of the year, the CEDE to date for the year exceeds 1 rem (10 mSv) or the individual receives an external exposure in excess of 5 rem (50 mSv) DDE, the licensee is required to calculate, record, and report the CDE and TODE to the maximally exposed organ. RG 8.34 provides added guidance on calculating CDE and TODE.

### 2.4 Dose to the Embryo/Fetus

A declared pregnant worker is an occupational worker who has voluntarily informed her employer (in writing) of her pregnancy and the estimated month and year of conception. In such instances, the licensee shall record the dose to the embryo/fetus for the entire pregnancy per 10 CFR 20.2106(e); however, the dose to the embryo/fetus need not be recorded on NRC Forms 4 or 5. Multiple records are not required in the case of multiple births (twins, triplets, etc.). Licensees shall maintain the records of dose to an embryo/fetus with the records of dose to the declared pregnant woman. Licensees are required to record any dose measured to demonstrate compliance with 10 CFR 20.1208, “Dose Equivalent to an Embryo/Fetus.”

Licensees should be sensitive to the issue of personal privacy with regard to the dose to the embryo/fetus. If requested by the monitored woman, a letter report may be provided to subsequent licensees to document prior embryo/fetus dose. Regulatory Guide 8.36, “Radiation Dose to the Embryo/Fetus” (Ref. 12), provides further guidance on assessing the dose to the embryo/fetus.

### 2.5 Preferred Units

The preferred unit of dose is the “rem.” The preferred unit for intakes is the microcurie ( $\mu\text{Ci}$ ). The licensee may record quantities in SI units in parentheses following each of the preferred units.

---

5 NRC regulation, 10 CFR 20.1502(b), requires that licensees monitor the occupational intake of radioactive material by an individual and assess the CEDE for adults likely to receive an intake in excess of 10 percent of the applicable annual limit on intake. There are additional requirements for minors and declared pregnant women. Section 20.1502(b) does not require assessing CDE. However, 10 CFR 20.1502 does require the licensee to provide monitoring sufficient to demonstrate compliance with the occupational dose limits, including the limit on the sum of the DDE and the CDE in 10 CFR 20.1201(a)(1)(ii).

6 The value of 1 rem (10 mSv) is based on the most limiting tissue weighting factor (i.e., the weighting factor for the thyroid tissue is 0.03; therefore, 1 rem (10 mSv) divided by thyroid weighting factor of 0.03 results in a CDE of 33.3 rem (333 mSv). A CDE value of 33.3 rem (333 mSv), when added to an assumed 5 rem (50 mSv) DDE value, is less than the CDE limit of 50 rem (500 mSv).

## 2.6 *Round-Off of Doses*

Licensees should round doses to the nearest 0.001 rem (0.01 mSv) on NRC Forms 4 and 5. Therefore, a calculated or computer-generated dose of “0.006192” should be entered as “0.006 rem,” and a value of “0.000291” should be entered as “0 rem.”

## 2.7 *Reporting Dose Data to the NRC*

As required by 10 CFR 20.2206(c), designated licensees shall submit reports of monitoring for the previous year to the NRC on or before April 30 of each year. As directed by 10 CFR 20.2206(b), licensees shall use “Form NRC 5 or electronic media containing all the information required by Form NRC 5.” NRC Form 5 provides instructions and other information pertinent to each item.

As stated in 10 CFR 20.2206(c), licensees shall submit their reports to the REIRS Project Manager or alternatively, via the REIRS Web site at <http://www.reirs.com>.

Licensees who choose to submit their reports to the REIRS Project Manager may use the following methods, as stated in 10 CFR 20.1007:

- by mail to U.S. Nuclear Regulatory Commission, Washington DC 20555-0001,
- by hand delivery to:

U.S. Nuclear Regulatory Commission  
11555 Rockville Pike  
Rockville, Maryland, 20895

- or where practicable, by electronic submission, for example via Electronic Information Exchange or CD-ROM.

Note: The use of CD-ROM is not the preferable method for submitting data to the NRC since the NRC staff has experienced frequent damaging of the CD-ROMs during mailing distribution which made these devices inoperable for retrieving stored information.

### 2.7.1 *Electronic Submission of Dose Data for Groups or Individuals*

Licensees (especially those with a large number of monitored individuals) are encouraged to record and report these data electronically as manual entry of individual data in the REIRS Web site can introduce errors.

Appendix A to this guide provides guidance for reporting radiation dose data to the NRC in an electronic, machine-readable format.

## D. IMPLEMENTATION

The purpose of this section is to provide information on how applicants and licensees<sup>7</sup> may use this guide and information regarding the NRC's plans for using this regulatory guide.

### Use by Applicants and Licensees

Applicants and licensees may voluntarily use the guidance in this document to demonstrate compliance with the underlying NRC regulations. Methods or solutions that differ from those described or referenced in this regulatory guide may be deemed acceptable if they provide sufficient basis and information for the NRC staff to verify that the proposed alternative demonstrates compliance with the appropriate NRC regulations.

Licensees may use the information in this regulatory guide for actions that do not require NRC review and approval. Licensees may use the information in this regulatory guide or applicable parts to resolve regulatory or inspection issues.

### Use by NRC Staff

The NRC staff does not intend or approve any imposition of the guidance in this regulatory guide. The NRC staff does not expect any existing licensee to use or commit to using the guidance in this regulatory guide, unless the licensee makes a change to its licensing basis. The NRC staff does not expect or plan to request licensees to voluntarily adopt this regulatory guide to resolve a generic regulatory issue. The NRC staff does not expect or plan to initiate NRC regulatory action that would require the use of this regulatory guide. Examples of such unplanned NRC regulatory actions include issuance of an order, generic communication, or rule requiring the use of this regulatory guide.

The staff may discuss with licensees various actions consistent with staff positions in this regulatory guide, as one acceptable means of meeting the underlying NRC regulatory requirement. However, unless this regulatory guide is part of the licensing basis for a facility, the staff may not represent to the licensee that the licensee's failure to comply with the positions in this regulatory guide constitutes a violation.

If an existing licensee voluntarily seeks a license amendment or change and (1) the NRC staff's consideration of the request involves a regulatory issue directly relevant to this regulatory guide, and (2) the specific subject matter of this regulatory guide is an essential consideration in the staff's determination of the acceptability of the licensee's request, then the staff may request that the licensee either follow the guidance in this regulatory guide or provide an equivalent alternative process that demonstrates compliance with the underlying NRC regulatory requirements.

---

<sup>7</sup>

In this section, "licensees" refer to holders of, and "applicants" refer to applicants for: (1) operating licenses for nuclear power and non-power reactors under 10 CFR Part 50; (2) combined licenses under 10 CFR Part 52; (3) standard design approvals and standard design certifications under 10 CFR Part 52; (4) licenses issued under 10 CFR Part 70 authorizing the possession or use of SNM in a quantity greater than 350 grams of contained uranium-235, uranium-233, or plutonium or any combination thereof; and (5) specific licenses issued under 10 CFR Part 72.

## REFERENCES<sup>8</sup>

1. U.S. Nuclear Regulatory Commission (NRC) Form 4, “Cumulative Occupational Dose History,” Washington, DC.
2. NRC Form 5, “Occupational Dose Record for a Monitoring Period,” Washington, DC.
3. *U.S. Code of Federal Regulations* (CFR), “Standards for Protection against Radiation,” Part 20, Chapter I, Title 10, “Energy” (10 CFR Part 20), Washington, DC.
4. CFR, “Notices, Instructions and Reports to Workers: Inspection and Investigations,” Part 19, Chapter I, Title 10, “Energy” (10 CFR Part 19) Washington, DC.
5. NRC, Regulatory Guide (RG) 8.34, “Monitoring Criteria and Methods To Calculate Occupational Radiation Doses,” Washington, DC.
6. NRC, “Occupational Dose Records, Labeling Containers, and the Total Effective Dose Equivalent,” *Federal Register*, Vol. 72, No. 232, December 4, 2007, pp. 68043–68059 (72 FR 68043).
7. CFR, “Domestic Licensing of Production and Utilization Facilities,” Part 50, Chapter I, Title 10, “Energy” (10 CFR Part 50), Washington, DC.
8. International Commission on Radiological Protection (ICRP), “Limits for Intakes of Radionuclides by Workers,” ICRP Publication 30 (Part 1), Ann. ICRP 2(3-4), 1979.<sup>9</sup>
9. ICRP, “Dose Coefficients for Intakes of Radionuclides by Workers,” ICRP Publication 68, Ann. ICRP 24(4), 1994.
10. NRC, RG 8.35, “Planned Special Exposures,” Washington, DC.
11. NRC, RG 8.40, “Methods for Measuring Effective Dose Equivalent from External Exposure,” Washington, DC.
12. NRC, RG 8.36, “Radiation Dose to the Embryo/Fetus,” Washington, DC.

---

8 Publicly available NRC-published documents are available online through the NRC Library on the NRC’s public Web site at <http://www.nrc.gov/reading-rm/doc-collections/>. The documents can also be viewed online or printed for a fee in the NRC’s Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD; the mailing address is USNRC PDR, Washington, DC 20555; telephone 301-415-4737 or (800) 397-4209; fax (301) 415-3548; and e-mail [pdr.resource@nrc.gov](mailto:pdr.resource@nrc.gov).

9 Copies of the International Commission on Radiological Protection (ICRP) publications may be obtained through their Web site: <http://www.icrp.org/>; 280 Slater Street, Ottawa, Ontario K1P 5S9, CANADA; Tel: +1(613) 947-9750 Fax: +1(613) 944-1920.

## APPENDIX A

### FORMAT FOR ELECTRONIC SUBMITTAL OF DOSE DATA

#### Introduction

This appendix outlines a means by which licensees may satisfy the requirement to record the exposure history of each individual, set forth in 10 CFR 20.2104, "Determination of Prior Occupational Dose," and the annual reporting requirements of 10 CFR 20.2206, "Reports of Individual Monitoring." Where practicable, for satisfying the 10 CFR 20.2206 annual reporting requirement, the U.S. Nuclear Regulatory Commission (NRC) prefers to have licensees submit an electronic file via the Radiation Exposure Information and Reporting System (REIRS) for Radiation Workers (a secure Web site) at <http://www.reirs.com>. Regardless of submittal method, licensees who have their exposure records in an electronic format are encouraged to submit electronic files. This is especially important for those licensees who have a large number of monitored individuals, because manual data entry is inefficient and can introduce an additional source of error.

#### Media Requirements

If the secure Web site submittal process is not used, other data submission formats may also be acceptable. Upon request, the NRC REIRS project manager will provide additional guidance to licensees in order for them to submit records on electronic media.

#### Transmittal Letters

Licensees should submit a transmittal letter containing information that will minimize processing time and help resolve possible discrepancies. Each letter should contain the following information (as a minimum):

- File name                      descriptive name of the file(s),
- Date created                    date each file was created,
- Operating system                operating system and version used to generate the data file,
- Contact                          name and telephone number of the cognizant point of contact,
- Other instructions              comments or explanation regarding the data format, or other important information regarding the data file,
- Signature and date              dated signature of the licensee's authorized representative responsible for the data, and
- Other information               Licensees are encouraged to include additional information, such as a change in operational status, radiation protection, or monitoring practices that may affect occupational radiation exposure and may be useful to the NRC in evaluating or assessing the annual submittal.

## **Expected Data**

Each licensee is expected to submit at least one NRC Form 5 for each monitored individual at the given facility for each monitoring year. Licensees may also submit an NRC Form 5 for planned special exposures for individuals, if planned special exposures were authorized. Licensees should include the primary license number on each submitted NRC Form 5 to ensure that the records are assigned to the proper facility.

## **File Structure**

The file structure consists of a header record, which provides information about the source of the data file, followed by NRC Form 5 dose records and supporting NRC Form 5 intake records. Where applicable, the file may also include one or more NRC Form 5 comment records to explain special exposure calculations or exposures in excess of regulatory limits. Each record contains only American Standard Code for Information Interchange or Extended Binary Coded Decimal Interchange Code printable characters and is terminated with a carriage return and a line feed. All empty space in a field is padded with spaces.

## Header Record

The header record occurs only once at the top of each file to identify the source of the data.

Field	Width	Start Col.	End Col.	Description
Primary_License	13	1	13	Primary NRC license number
Version	10	15	24	Version of Regulatory Guide 8.7 in effect at the time of this submittal, formatted as "RG8.7Rev3"
Preparation_Date	8	26	33	Date the record was written to the data file, formatted as "YYYYMMDD"
Licensee_Name	72	35	106	Name of NRC licensee
Contact	72	108	179	Name of person to contact for further information about this data file
Phone_Number	14	181	194	Contact's phone number
Other_License_1	13	196	208	Other related NRC license number
Other_License_2	13	210	222	Other related NRC license number
Other_License_3	13	224	236	Other related NRC license number
Other_License_4	13	238	250	Other related NRC license number
Other_License_5	13	252	264	Other related NRC license number
Other_License_6	13	266	278	Other related NRC license number
Other_License_7	13	280	292	Other related NRC license number
Other_License_8	13	294	306	Other related NRC license number
Other_License_9	13	308	320	Other related NRC license number
Other_License_10	13	322	334	Other related NRC license number

## NRC Form 5 Dose Record

The data file contains one dose record for each NRC Form 5 being reported. Each dose record may be followed by zero or more NRC Form 5 intake records.

Field	Width	Start Col.	End Col.	Description
Employee_ID	12	1	12	SSN, PPN, CSI, WPN, PAD, or OTH (IDs should have no punctuation.)
ID_Type	3	14	16	“SSN,” “PPN,” “CSI,” “WPN,” “PAD,” or “OTH”
Primary_License	13	18	30	Primary NRC license number
Preparation_Date	8	32	39	Date the record was written to the data file, formatted as “YYYYMMDD”
Record_Type	1	41	41	“D” = DOSE
First_Name	25	43	67	Employee’s full first name (no nicknames)
Middle_Initial	1	69	69	Employee’s middle initial
Last_Name	25	71	95	Employee’s last name (Titles such as “Jr” should be separated from the last name by a space, without any punctuation.)
Sex	1	97	97	Employee’s sex “M” = Male and “F” = Female
Birth_Date	8	99	106	Employee’s date of birth, formatted as “YYYYMMDD”
Monitoring_Start	8	108	115	Date monitoring began, formatted as “YYYYMMDD” (This typically is January 1 of the monitoring year for everyone except new hires.)
Monitoring_End	8	117	124	Date monitoring ended, formatted as “YYYYMMDD” (This typically is December 31 of the monitoring year for everyone except terminations.)
Report_Type	1	126	126	“R” = Record, or “E” = Estimate
Exposure_Type	1	128	128	“R” = Routine, or “P” = PSE
EDEX	8	130	137	Effective dose equivalent from external sources for the entire monitoring period in rem, formatted as “999.999”
DDE	8	139	146	Deep dose equivalent for the entire monitoring period in rem, formatted as “999.999”
LDE	8	148	155	Eye dose equivalent to the lens of the eye in rem, formatted as “999.999”
SDE_WB	8	157	164	Shallow dose equivalent, whole body in rem, formatted as “999.999”
SDE_ME	8	166	173	Shallow dose equivalent, max extremity in rem, formatted as “999.999”
CEDE	8	175	182	Committed effective dose equivalent in rem, formatted as “999.999”
CDE	8	184	191	Committed dose equivalent, formatted as “999.999”
TEDE	8	193	200	Total effective dose equivalent, formatted as “999.999.” The sum of EDEX and CEDE.
TODE	8	202	209	Total organ dose equivalent, maximally exposed organ, formatted as “999.999.” The sum of DDE and CDE.

## Form 5 Intake Record

The data file should include an intake record for each intake on the NRC Form 5 being reported.

Field	Width	Start Col.	End Col.	Description
Employee ID	12	1	12	SSN, PPN, CSI, WPN, PAD, or OTH (IDs should have no punctuation.)
ID_Type	3	14	16	“SSN,” “PPN,” “CSI,” “WPN,” “PAD,” or “OTH”
Primary_License	13	18	30	Primary NRC license number
Preparation_Date	8	32	39	This is the date from the parent <b>NRC Form 5 Dose Record</b> , formatted as “YYYYMMDD”
Record_Type	1	41	41	“I” = Intake
Radionuclide	9	43	51	Radionuclide abbreviation with the hyphen (e.g., U-234)
Class	1	53	53	Enter the pulmonary clearance class designator for inhalation mode. “D,” “Y,” “W,” “V,” “F,” “M,” “S,” or “O” for Other. If the intake mode is not inhalation, enter the abbreviation for the intake mode here, as well as in the Mode column.
Mode	1	55	55	“H” = Inhalation, “B” = Absorption, “J” = Injection, or “G” = Ingestion
Intake	10	57	66	The amount of $\mu\text{Ci}$ for the radionuclide (This can be expressed in scientific notation using the format “+9.999E+99” or as a decimal number of fewer than 9 digits.)

## Form 5 Comment Record

The data file only includes this record type when comments are necessary to explain special exposure calculations or overexposures.

Field	Width	Start Col.	End Col.	Description
Employee_ID	12	1	12	SSN, PPN, CSI, WPN, PAD, or OTH (IDs should have no punctuation.)
ID_Type	3	14	16	“SSN,” “PPN,” “CSI,” “WPN,” “PAD,” or “OTH”
Primary_License	13	18	30	Primary NRC license number
Preparation_Date	8	32	39	This is the date from the parent <b>NRC Form 5 Dose Record</b> , formatted as “YYYYMMDD”
Record_Type	1	41	41	“C” = Comment
Comment	240	43	282	Explanatory comment (when needed)