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Standard Specification for Nuclear Facility Transient Worker Records¹

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INTRODUCTION

There is a high degree of concern in the nuclear industry regarding the ability of present records keeping practices to adequately monitor the cumulative radiation doses of individual transient workers. This concern arises from the fact that the transient worker moves rapidly among the nuclear facilities, in some cases working at as many as four or more facilities within one calendar quarter. The accurate monitoring of a transient worker's cumulative radiation dose depends, in part, on the individual worker's ability (and willingness) to provide a correct record of his occupational radiation exposure. At nuclear facilities licensed by the U.S. Nuclear Regulatory Commission (NRC), these data presently are supplied by the worker on forms NRC-4 and NRC-5. Similar procedures are followed at other nuclear facilities (see **Note 1**). Accurate occupational radiation exposure data are required to ensure that the radiation doses that an individual transient worker will receive are within regulatory limits.

Another problem confronting the owners of nuclear facilities is how to in-process large numbers of temporary workers efficiently. These workers may be required for such activities as the decontamination and decommissioning of a nuclear facility, the annual refueling of a nuclear power plant, or a major special modification to an operating nuclear facility. In-processing involves determining a worker's occupational radiation exposure history, security clearance, health status, ability to wear and use respiratory protective equipment, and training and qualification for work in controlled areas. In-processing is the responsibility of the licensee, and depends on the cooperation of the worker and the worker's present and past employers and other past contracting licensees.

In-processing is complicated by the fact that different facilities keep the required information on different forms in varying degrees of detail. In-processing one worker often can take several days and result in a loss of productive time as well as increased staffing costs for the facility operator.

One possible solution to these problems is a cooperative effort within the nuclear industry to develop a common or central data base that can be accessed to obtain pertinent historical data on a worker. A central record keeping system (CRS) is envisioned for this purpose. Such a system could help reduce in-processing time for temporary workers.

However, some degree of standardization is necessary before a centralized record keeping system is possible. This specification standardizes the necessary content of transient worker records.

1. Scope

1.1 This specification covers the required content and provides retention requirements for records needed for in-processing of nuclear facility transient workers.

1.2 This specification applies to records to be used for in-processing only.

1.3 This specification is not intended to cover specific skills records (such as equipment operating licenses, ASME inspection qualifications, or welding certifications).

1.4 This specification does not reduce any regulatory requirement for records retention at a licensed nuclear facility.

NOTE 1—Nuclear facilities operated by the U.S. Department of Energy (DOE) are not licensed by the U.S. Nuclear Regulatory Commission (NRC), nor are other nuclear facilities that may come under the control of the U.S. Department of Defense (DOD) or individual agreement states. The references in this specification to licensee, the U.S. NRC Regulatory Guides, and Title 10 of the U.S. Code of Federal Regulations are to imply appropriate alternative nomenclature with respect to DOE, DOD, or agreement state nuclear facilities. This distinction does not alter the

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required content of records needed for in-processing of nuclear facility transient workers.

NOTE 2—This specification does not define the form of the required worker records (such as a passport or central computerized record keeping system).

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

E1168 Guide for Radiological Protection Training for Nuclear Facility Workers

2.2 ANSI Standards:

ANSI N13.6 American National Standard Practice for Occupational Radiation Exposure Records Systems³

2.3 Nuclear Regulatory Commission Documents:

Regulatory Guide 8.7, Instructions for Recording and Reporting Occupational Radiation Exposure Data⁴

Regulatory Guide 8.15, Acceptable Programs for Respiratory Protection⁴

NUREG/CR-0041, Manual of Respiratory Protection Against Airborne Radioactive Materials⁴

2.4 CFR Documents:

Notices, Instructions, and Reports to Workers; Inspections, 10CFR, Part 19⁴

Standards for Protection Against Radiation, 10CFR, Part 20⁴

2.5 American Nuclear Insurers Documents:

ANI/MAELU Information Bulletin 80-1A, Nuclear Liability Insurance Records Retention⁵

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *absorbed dose (D)*, *n*—for purposes of records maintained in accordance with this specification, absorbed dose is the energy absorbed per unit mass at a specific place in a material.

3.1.1.1 *Discussion*—The SI unit of absorbed dose is the gray (Gy), equal to 1 J/kg (10,000 ergs/g). The traditional unit of absorbed dose is the rad. One Gy = 100 rad. As used in this specification, “absorbed dose” stands for the absorbed dose in soft tissue.

3.1.2 *committed dose equivalent (CDE)*, *n*—dose equivalent to organs or tissues of reference that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.

3.1.3 *committed effective dose equivalent (CEDE)*, *n*—the sum of the committed dose equivalents to various tissues in the body, each multiplied by its weighting factor. It does *not* include contributions from external dose.

3.1.4 *controlled area*, *n*—an area of a nuclear facility encompassed by physical barriers to which access is controlled.

3.1.4.1 *Discussion*—This definition is equivalent to the *restricted area* definition for NRC and Agreement State Licensees. It is not the same as the *controlled area* definition with which NRC and Agreement State Licensees are familiar.

3.1.5 *deep dose equivalent (DDE)*, *n*—dose equivalent delivered to tissue at a depth of 1.0 cm or more from the surface.

3.1.6 *dose equivalent (H)*, *n*—the product of *D*, *Q*, and *N*, at the point of interest in tissue, where *D* is the absorbed dose, *Q* is the quality factor, and *N* is the product of any other modifying factors.

3.1.6.1 *Discussion*—The SI unit of dose equivalent is the sievert (equal to 1 J/kg). The traditional unit of dose equivalent is the rem. One Sv = 100 rem.

3.1.7 *employer*, *n*—a person or concern that employs persons for wages or salary. Note that a worker may have more than one employer at a given time.

3.1.8 *estimated dose*, *n*—dose data supplied by the licensee to the worker prior to the determination of the official record dose (see section 10CFR Part 19 or equivalent).

3.1.8.1 *Discussion*—Estimated doses are provided at the worker’s request and generally when the worker is terminating a work assignment involving radiation exposure at a licensee’s facility.

3.1.9 *external dose equivalent*, *n*—dose equivalent due to radiation sources located outside the body.

3.1.10 *extremity*, *n*—hands and arms below the elbow or feet and legs below the knee (see 3.1.23).

3.1.11 *extremity dose*, *n*—the external (shallow/deep) dose to the extremities.

3.1.12 *eye dose equivalent*, *n*—dose equivalent to the lens of the eye from external radiation sources is taken as the dose equivalent at a tissue depth of 0.3 cm (300 mg/cm²).

3.1.13 *in-processing*, *n*—the determination, prior to starting work, of a worker’s previous occupational radiation exposure history, security clearance, health status, ability to wear and use respiratory and other personal protective equipment, and training and qualification for work in controlled areas.

3.1.14 *nuclear facility*, *n*—a facility whose operations involve (or involved) radioactive materials in such form and quantity that a nuclear hazard potentially exists (or existed) to the employees and the general public. Included are facilities that are (or were) used to produce, process, or store radioactive materials (see Note 1). Some examples are: nuclear reactor (power or research), fuel fabrication plant, fuel reprocessing plant, uranium or thorium mill, UF₆ production plant, radiochemical laboratory, and radioactive waste disposal site.

3.1.15 *occupational radiation exposure*, *n*—radiation exposure resulting from, and received in, the course of an individual’s employment.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org..

⁴ Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

⁵ Available from American Nuclear Insurers, 95 Glasterburg Boulevard, Suite 300, Glasterburg, CT 06033-453.

3.1.16 *official record dose, n*—dose data supplied by the licensee to the worker and the NRC in accordance with 10CFR20.2206 (or equivalent).

3.1.17 *radiation, n*—in the context of this specification, “radiation” refers to ionizing radiation. Ionizing radiation is any electromagnetic or particulate radiation capable of producing ions, directly or indirectly, by interaction with matter.

3.1.18 *radiation exposure, n*—in the context of this specification, “exposure” refers very broadly to the act or state of being irradiated by ionizing radiation.

3.1.19 *shallow dose equivalent (SDE), n*—dose equivalent delivered to the skin or an extremity at a tissue depth of 0.007 cm (7 mg/cm²) averaged over an area of 1 square centimeter.

3.1.19.1 *Discussion*—DOE reporting requirements in 10 CFR 835.205 include provisions for assessing nonuniform exposures of the skin from X-rays, beta radiation, or radioactive materials on the skin, or a combination thereof. This assessment addresses affected skin areas of: ≥ 100 cm², < 100 cm² but ≥ 10 cm², and < 10 cm² with provisions for recording each.

3.1.20 *total effective dose equivalent (TEDE), n*—the sum of the deep dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

3.1.21 *transient worker, n*—a worker who has work assignments at two or more different nuclear facilities within one calendar year. This may or may not involve a change in employer.

3.1.22 *vital area, n*—an area of a nuclear facility that contains any equipment, system, or device, the failure or destruction of which could directly or indirectly endanger public health and safety by exposure to radiation.

3.1.23 *whole body dose, n*—includes the external deep dose to the head and trunk, active blood-forming organs, including gonads, and the elbows and arms above the elbow, or the knees and legs above the knee.

3.1.23.1 *Discussion*—The NRC (10CFR20.1003) includes the knees and elbows with the extremities.

4. Significance and Use

4.1 The standardization of nuclear facility transient worker records will provide the individual transient worker with a greater assurance that the radiation doses that may be received are within regulatory limits.

4.2 This specification establishes a fixed content for nuclear facility transient worker records. Standardizing the content of these records will facilitate interfacing with industry-wide record keeping systems, such as the Nuclear Energy Institute (NEI) Personnel Data System (PADS).

4.3 The standardization of nuclear facility transient worker records will reduce the time required for in-processing of these workers.

5. Content of Nuclear Facility Transient Worker Records—

5.1 The following format for recording dates to facilitate entry into electronic information systems is recommended: DDAAAYYYY (day—2 digits; month—3 alphabetic; year—4 digits).

5.2 Worker Identification Data Element:

5.2.1 Name—last, first, and middle initial, as applicable.

5.2.2 Identification code (such as a social security number or passport number).

5.2.3 Date of birth.

5.2.4 Permanent address.

5.2.5 Verification that the data contained in the worker’s record have been reviewed by the worker and are complete to the best of the worker’s knowledge as of the verification date.

5.2.6 Date of verification.

5.3 Occupational External Radiation Exposure Data Elements:

5.3.1 Current calendar year occupational external radiation exposure data element shall include the following information for each employer during the current calendar year (see **Note 3**):

5.3.1.1 Name of employer,

5.3.1.2 Address of employer,

5.3.1.3 Period of exposure (from - to),

5.3.1.4 Name and address of nuclear facility for the period of exposure (see **5.3.1.3**),

5.3.1.5 Deep dose equivalent for the period of exposure (see **5.3.1.3**),

5.3.1.6 Shallow dose equivalent for the skin of the whole body for the period of exposure (see **5.3.1.3** and **3.1.19**),

5.3.1.7 Shallow dose equivalent for the skin of the extremity receiving the maximum dose for the period of exposure (see **5.3.1.3**, **3.1.19**, and **3.1.23**),

5.3.1.8 Eye dose equivalent to the lens of the eye for the period of exposure (see **5.3.1.3**), and

5.3.1.9 Total effective dose equivalent for the period of exposure (see **5.3.1.3**).

5.3.1.10 For each of the doses identified in **5.3.1.5 – 5.3.1.9**, specify whether the entry is an official record dose or an estimated dose.

5.3.2 At the end of the current calendar year the whole body dose information will be transferred to the lifetime radiation exposure history data element (see **5.5**).

NOTE 3—The amount of worker external radiation exposure data that is kept on file at a nuclear facility greatly exceeds that required by data element **5.3.1** (for example, radiation type, dosimeter type, or dosimeter location on the body (see ANSI N13.6)). This level of detail is not, however, required for records to be used for in-processing of transient workers.

5.4 Occupational Internal Radiation Exposure Data Element: