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**SM-40.407, RADIOLOGICAL CONTROLS MANUAL: RADIOLOGICAL RECORDS, JULY 13, 2012, JAMES BARNES**

**DOCUMENT CHANGE SUMMARY** – This document replaces issue dated January 16, 2004. It references SOP C-401.

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## **APPLICABILITY**

This procedure applies to radiological activities conducted at the Boeing Santa Susana Field Laboratory (SSFL) campus (“Boeing - SSFL”).

The terms “shall,” “should,” “may,” etc. indicate procedural requirements or suggestions for good practices. These terms are intended to convey meanings typically used in quality assurance or standards documents (e.g., ANSI).

- “Shall” in this procedure denotes a mandatory requirement.
- “Should” denotes a recommended practice, but which is not required. “Should” is used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required.
- “May” denotes an option. “May” indicates a course of action permissible within the limits of the procedure.

This procedure implements the requirements of SOP C-401, *Radiation Safety Program*. This procedure is intended to provide additional guidance to the requirements of the SOP. Stipulations of this procedure are to be interpreted in light of the SOP C-401 requirements.

Note that DOE dosimetry terminology has been changed. This procedure utilizes the *revised* terminology. SOP C-401, Table 8 describes terminology equivalency.

## **PART 1 Requirements**

### **721 Purpose**

This chapter contains the prescribed practices for preparing and retaining radiologically related records. Radiological control records are needed to demonstrate the effectiveness of the overall program. The work force and management are required to use records to document radiological safety afforded to personnel on-site. Records of radiological programs may be required to support worker health studies and future disputes or claims. Therefore, these records *should* be high quality, readily retrievable and managed for the prescribed retention period. Consideration *should* be given to cross-referencing related records to aid retrievability. Records **shall** be handled such that personal privacy is protected.

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## **Records Management Program**

1. In general, all pertinent program documentation **shall** be retained in accordance with applicable corporate policy for record retention. Notwithstanding this, records **shall** be retained until permission to dispose of them is granted by the cognizant regulatory agency.

The procedure provides further guidance of requirements of the following Boeing procedures and guides:

- a. Boeing PRO-251, *Records and Information Management Program*<sup>1</sup>,

The records affected by this requirement are categorized below. These categories are intended to be broad descriptions, and are not intended to define specific records to be retained.

### A. Documentation

- Radiological Policy Statements
- Radiological Control Procedures
- Radiological Work Procedures
- ALARA Records
- Use Authorizations
- Controlled Work Permits
- Financial Assurance for Decontamination and Decommissioning

### B. Exposure Records

- External Dose
  - Dosimetry results
  - Records of investigations resulting in the assignment of calculated radiation doses (including records of data and calculation assumptions and methodologies)
  - Radiation dose estimates from special studies (including records of data and calculation assumptions and methodologies)
- Internal Dose
  - Bioassay data
  - Bioassay data interpretation
  - Whole body counter records
  - Internal exposure estimates from special programs
- Non-Boeing Exposures
  - Radiation exposure received during prior employment
  - Exposure received at other installations during current employment
  - Records of simultaneous employment at another firm

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<sup>1</sup> References to <http://records.web.boeing.com/mrrs.cfm>

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- Internal and External Dosimetry Policies and Procedures (including Bases Documents)
  - C. Training Records
    - Personnel Training (course records and individual records)
  - D. Results of Medical Monitoring Program
  - E. Monitoring and Surveys
    - Radiological instrumentation test, repair and calibration records
    - Radiological survey results
    - Area monitoring dosimetry results
    - Accountability and leak test records for sealed sources
    - Records for release of material to Controlled Areas
  - F. Audits and Inspections
    - Quality assurance records
    - Radiological incident and occurrence reports (and critique reports, if applicable)
    - Radiological performance indicators and assessments
    - Radiological safety analysis and evaluation reports
    - Reports of loss of radioactive material.
2. Where radiological services (for example, dosimetry and laboratory analyses) are purchased, there *should* be a clear agreement regarding records responsibility during performance of the service.
- Boeing--SSFL *should* obtain documentation of the vendor processes to the extent that it would document the program if the work were being performed directly by Boeing personnel. Categories of documents would include a copy of the pertinent procedures, a copy of the vendor's QA processes for the services, records of the results (including the raw data analyses, where appropriate), and any other category of document deemed suitable for retention.
3. Records that are scheduled for disposal or transfer of custody shall first be reviewed by Corporate Legal, who shall determine if the disposal or transfer is permitted under applicable laws or regulations.
4. The Privacy Act of 1974 contains requirements to protect the privacy of individual records.

## **722 Recordkeeping Standards**

1. Radiological control records shall be accurate and legible. The records should include the following:
- A. Identification of the facility, specific location, function and process
  - B. Signature or other identifying code of the preparer and date
  - C. Legible entries in black or blue ink

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- D. Corrections identified by a single line-out, initialed and dated
  - E. Second reviewer's signature to ensure review and proper completion of forms. In general, reviews may be performed by a different technician than the individual who performed the survey. In cases where the documents will be incorporated into official business communications, a review *should* be performed by the Radiation Safety Officer or the Manager, Radiation Safety.
2. [DELETED]
  3. Radiological control records *should* not include:
    - A. Opaque substances for corrections
    - B. Shorthand or other nonstandardized terms, unless the term or symbol is defined on the same page of the document.
  4. Similar procedural standards *should* be established for computerized records.

## **PART 2 Employee Records**

### **723 Employment History**

1. Records detailing an employee's pre-Boeing radiation exposure history and the associated radiation dose **shall** be maintained.
2. Documentation of all occupational doses received during the **current year**, except for doses resulting from planned special exposures or emergency exposures conducted in compliance with applicable regulations, **shall** be obtained. If complete records documenting previous occupational dose during the year cannot be obtained, a written estimate signed by the individual may be accepted.
  - Each individual issued primary dosimetry (TLD, OSL, etc.), shall submit a signed statement indicating the occupational dose received for the current year, and indicating any employers and locations where occupational dose was received (both in the current and previous years).
  - For individuals who are not expected to exceed, nor have exceeded, 100 mrem in the current year, a written estimate of their current year's dose will satisfy this requirement.
  - For unescorted Radiation Workers, or for individuals who are expected to exceed or have exceeded 100 mrem in the current year, a reasonable effort **shall** be made to obtain records of prior exposure. If the records cannot be obtained, a written estimate may be accepted in lieu of the records. Documentation that demonstrates the attempt to obtain records *should* be retained, along with any records of dose obtained by the inquiry.

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3. Where practical, the association between the radiation dose and job function *should* be preserved for trending purposes and future worker health studies.

#### **724 Personnel Radiological Records**

1. Radiation dose records **shall** be maintained for all contractor, subcontractor and Federal employees who are enrolled in the personnel dosimetry program at Boeing--SSFL facilities.
2. Radiation dose records **shall** contain information sufficient to identify each person, including social security (required) and employee number (Radiation Safety permanent badge number).
3. Routine and special records related to radiation doses **shall** be retained for each person monitored. This **shall** include records of zero dose. Procedures, data and supporting information needed to reconfirm a person's dose at a later date *should* be maintained.
4. External dose records **shall** include
  - a. Extremity, skin, eye and whole body dose results measured with personnel dosimeters, including all multiple dosimeter badging results.
  - b. Doses received during Planned Special Exposures, unplanned exposures exceeding the monitoring thresholds of SM-40.405, Article 511, and authorized emergency doses.

In addition, these records *should* include:

- c. Evaluations resulting from anomalous dose results such as unexpected high or low doses.
  - d. Dose reconstructions from lost or damaged dosimeters, or for unbadged workers working in radiological areas.
  - e. Evaluations of non-uniform radiation doses.
6. Internal dose records **shall** include the following:
  - a. Whole body and lung counting results (including chest wall thickness measurements where applicable)
  - b. Results of urine, fecal and specimen analyses

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- c. Documentation of dose assessments, if such assessments are required or performed.  
When a dose assessment is performed, the following information should be provided:
    - The identity of radionuclides (or the radionuclides assumed to be present for purposes of evaluation);
    - The Committed Dose Equivalent (CDE) or Committed Equivalent Dose to any organ or tissue of concern; and,
    - The Committed Effective Dose Equivalent (CEDE) or Committed Effective Dose.
  - d. Doses received during Planned Special Exposures, unplanned exposures exceeding the monitoring thresholds of SM-40.405, Article 511, and authorized emergency doses.
7. When external and internal doses are summed for Total Effective Dose (Total Effective Dose Equivalent) determinations, the following information **shall** be provided:
    - For any organ or tissue assigned an internal dose during the year, the sum of the equivalent dose to the whole body (deep dose equivalent) from external exposures and the committed equivalent dose (committed dose equivalent) to that organ or tissue;
    - The Total Effective Dose Equivalent for the year; and
    - The Cumulative total Effective Dose (Total Effective Dose Equivalent) for the year.
  8. Counseling of persons about radiological concerns *should* be documented and this documentation retained. It is desirable that the counseled person sign the documentation to acknowledge participation, but the individual is **not required** to do so.
  9. Records of authorization to exceed Administrative Control Levels **shall** be retained.

## **725 Other Personnel Radiological Records**

1. The complete records of radiological incidents and occurrences involving personnel dose **shall** be retained.
2. Records of employee radiological safety concerns that have been formally investigated and documented *should* be maintained.
3. The declaration of pregnancy of a declared pregnant worker, and records of the equivalent dose (dose equivalent) to the embryo/fetus **shall** be retained.

## **726 Medical Records**

1. Pre-employment medical records, if available, and reports of periodic medical examinations *should* be maintained.
2. Physical examination reports and fit testing results for respirator use *should* be maintained for respirator users.

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3. Medical evaluations and treatment performed in support of the radiological program *should* be documented.
4. Maintenance of records of non-occupational radiation doses, such as therapeutic or large amounts of diagnostic radiation doses for medical purposes, is encouraged. Where practical, maintenance of records of pre-employment non-occupational radiation doses is encouraged.

### **727 Radiological Training and Qualification Records**

1. Personnel training records **shall** be controlled and retained. Training shall be documented in accordance with the Boeing training program.
2. Records **shall** be retained for the following types of training:
  - A. General employee radiological training
  - B. Radiological Worker training
  - C. Periodic retraining
  - D. Respiratory protection training
  - E. Training of radiological control personnel
  - F. Instructor training
  - G. Qualifications for special tests or operations
  - H. Orientation and training of visitors
  - I. Training of emergency response personnel.
  - J. Special instructions to females, their supervisors and coworkers concerning prenatal radiation dose, acknowledged by the worker's signature.
3. The following instructional materials *should* be maintained:
  - A. Course name, with revision and approval date.
  - B. Instructor's manuals, course content, or lesson plans containing topical outlines.
  - C. Video and audio instructional materials, including the dates and lessons for which they were used.
  - D. Handouts or other materials retained with the master copy of the course.

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- E. Job-specific training documents, such as instrument use, radiological procedures, Radiological Work Permit special training requirements, pre-job briefings and mock-up training.
- 4. Documentation of training and qualification received at another DOE location need not be duplicated. Such records *should* be provided to the person's home office for retention.

### **PART 3 Escorted Personnel (“Visitors”)**

#### **731 Record Requirements**

For escorted personnel (“visitors”) entering an area where radiation monitoring is required, the following records **shall** be maintained:

- 1. Documentation of completion of Radiological Orientation
- 2. Radiation dose records, including zero dose.

#### **732 Reports**

Dose reports **shall** be provided to those visitors who request a report, in accordance with Article 781.

### **PART 4 Radiological Control Procedures**

#### **741 Coordination of Program Documentation and Radiological Data**

Records of the Radiological Control Program are described in Article 712. The records *should* be maintained in a such a way as to permit correlation of the documents with supporting information. For example, procedures for performing radiation surveys *should* be identifiably linked with the survey results. Completed Controlled Work Permits *should* be maintained in such a manner as to permit correlation to working procedures and documents.

#### **742 ALARA Records**

Records of As-Low-As-Reasonably-Achievable (ALARA) plans and goals **shall** be maintained to demonstrate the adequacy of the ALARA Program. These records *should* include the minutes of the Radiation Safety Committee and other committees where radiological safety issues are formally discussed.

#### **743 Quality Assurance Records**

Records of quality assurance reviews and audits developed for Radiological Control functions **shall** be retained to ensure that sufficient records are specified, prepared, reviewed, approved and maintained to accurately reflect completed work. DOE Order 414.1 provides additional information regarding quality assurance records. This reference provides the basis for record retention of these record types.

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## **PART 5 Radiological Surveys**

### **751 Requirements**

Radiological Control Programs require the performance of radiation, airborne radioactivity and contamination surveys to determine existing conditions in a given location.

1. Maps with sufficient detail to permit identification of original survey and sampling locations *should* be maintained.
2. Records *should* contain sufficient detail to be meaningful even after the originator is no longer available.
3. Radiological surveys *should* be recorded on appropriate standard forms and include the following common elements:
  - A. Date, time and purpose of the survey.
  - B. General and specific location of the survey.
  - C. Name and signature of the surveyor and analyst.
  - D. Pertinent information needed to interpret the survey results.
  - E. Reference to a specific Controlled Work Permit or Procedure, if the survey is performed to support the permit or activities described in a procedure.
  - F. Make, model, and serial number of survey instruments used, along with the calibration expiration date of the instrument.

### **752 Radiation Surveys**

In addition to the elements provided in Article 751, records of radiation surveys **shall** include, at a minimum, the following information:

1. Instrument model and serial number.
2. Results of the measurements of area dose rates.

### **753 Airborne Radioactivity**

In addition to the elements provided in Article 751, records of airborne radioactivity **shall** include, at a minimum, the following information:

1. Model and serial number of the sampler and laboratory counting instrument; locations of fixed samplers may be used as identifiers where model and serial numbers are not available.

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2. Air concentrations in general airborne areas and breathing zones.
3. Supporting parameters, including collection efficiency, flow rate, duration of sampling, correction factors and filter medium.

#### **754 Contamination Surveys**

In addition to the elements required by Article 751, records of contamination surveys **shall** include, at a minimum, the following information:

1. Model and serial number of counting equipment.
2. Contamination levels (using appropriate units) and supporting parameters including counting efficiency, counting time, correction factors, type of radiation and whether the contamination was fixed or removable.
3. Location of areas found to contain hot particles or high concentrations of localized contamination.
4. Follow-up survey results for decontamination processes cross-referenced to the original survey.

#### **755 Procedure Changes**

Changes in equipment, techniques, and procedures used for monitoring shall be documented.

### **PART 6 Instrumentation and Calibration Records**

#### **761 Calibration and Operational Checks**

1. Records of calibration and periodic operational checks<sup>2</sup> of fixed, portable and laboratory radiation measuring equipment **shall** be maintained and include frequencies, method, dates, personnel, training and traceability of calibration sources to National Institute of Science and Technology or other acceptable standards.
2. Calibration records *should* be maintained for the following equipment:
  - A. Portable survey instruments
  - B. Bioassay measurement equipment
  - C. Laboratory, counting room and fixed radiation measuring equipment
  - D. Process and effluent monitors and sampling equipment
  - E. Radiation area monitors

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<sup>2</sup> This does NOT include routine functional testing of portable survey instruments in the field.

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- F. Portal monitors and other personnel contamination monitors
  - G. Pocket and electronic dosimeters
  - H. Air sampling equipment
  - I. Tool and waste monitoring equipment
  - J. Protective clothing and equipment monitors.
3. Maintenance histories, including the nature of any defects and corrective actions taken, and calibration results for each instrument *should* be created and retained.

#### **762 Special Calibration Records**

- 1. Records of additional tests and checks of instrumentation used in conjunction with a suspected overexposure, questionable indication or unusual occurrence *should* be retained.
- 2. In addition, records of special instrument calibrations and modifications made in accordance with SM40-010, Section 1.2, **shall** be retained.

### **PART 7 Records Management**

#### **771 Media**

- 1. A combination of media may be used for a comprehensive records system.
- 2. For records that have long-term retention requirements and are stored on media subject to degradation or obsolescence, the records system **shall** provide for conversion to a more stable medium.
- 3. All records **shall** be stored in a manner that ensures their integrity, retrievability and security.

#### **772 [DELETED]**

#### **773 Computerization of Records**

- 1. Records may be transferred to magnetic storage media provided certain precautions are taken to ensure that the information is maintained in a retrievable configuration.
- 2. Controls for the use and handling of magnetic storage media *should* include the following:
  - A. A master index of documents on the magnetic storage medium

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- B. A program to ensure back-up and retrievability of information
  - C. Quality control during data entry and analysis
  - D. An index identifying software applications used in conjunction with the data
  - E. Software validation and verification
  - F. Periodic quality audits of software
  - G. Prevention of unauthorized manipulation of data
  - H. Assurance that previously stored information is retrievable and useable after system modifications.
3. Optical disks may be used to archive records if the optical disks satisfy the following:
- A. A reliable system to prevent overwriting or erasure of records
  - B. Software and user controls consistent with Article 773.3
  - C. Manufacturer recommendations relating to software control, disk life expectancy, environmental storage conditions and maintenance incorporated into policies and procedures
  - D. Quality controls on the copying and imaging processes consistent with Article 772.

#### **774 Retention**

- 1. A formal record retention system **shall** be utilized for the tracking and retention of stored records.
- 2. Once a record has been created, reviewed and signed by appropriate supervision, the record is considered complete and **shall** not be modified. Subsequent errors identified in a completed record may be corrected by creating a supplemental record that includes traceability for the correction.
- 3. The original records are the property of Boeing--SSFL and are subject to Boeing--SSFL business practices for this record type. Custody of original records shall not be transferred to another individual or entity without the concurrence of the Manager, Radiation Safety.

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### **775 Physical Protection of Records**

1. Methods for protecting documents *should* include vaults, file rooms with fixed fire suppression, fire rated cabinets, duplicate storage, or combinations of these.
2. Storage arrangements *should* address physical damage that could be caused by temperature extremes, moisture, infestation, electromagnetic fields, excessive light, stacking, theft and vandalism.
3. Records *should*, as a minimum, be protected from:
  - A. Exposure to fire, equivalent to an Underwriters Laboratories' 1.5-hour (or greater) fire resistance rating
  - B. Exposure to water damage caused by a "once every 100-year" severity flood
  - C. Exposure to windstorm velocities of "once every 100-year" severity.

## **PART 8 Radiological Reporting**

### **781 Reports to Individuals**

1. Personnel who are monitored by the personnel dosimetry program **shall** be provided their radiation dose on an annual basis on request. This requirement does not apply to visitors covered by Article 732.
2. Upon request, a person **shall** be provided detailed information concerning his radiation exposure.
3. Upon request, a person **shall** receive a written record of radiation dose, within 30 days of the time the information is requested, or 30 days of the time that the exposure has been determined, whichever is later.
4. Upon request, terminating employees or contractors no longer having access to Boeing--SSFL property, **shall** be provided a report, within 90 days of the last day of employment, that summarizes radiation dose for the total period of employment at Boeing--SSFL. If requested, a report of estimated dose, based upon the information at hand at the time of termination, **shall** be provided to the requesting individual at the time of termination.
5. [DELETED]
6. When a report to an agency is required because of a specific regulatory requirement for occurrence reporting, the involved individual(s) **shall** be provided with a report of his or her exposure data included therein. Such a report shall be transmitted at a time not later than the transmittal to the regulatory agency.

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**782 Annual Radiation Report**

1. 10 CFR 835 and CCR Title 17 provides reporting requirements for an "Annual Radiation Dose Summary." This report includes internal and external radiation dose results for monitored DOE and DOE contractor employees, and for monitored visitors.
2. [DELETED]
3. For regulatory agency reporting purposes, integrated dose (film badge or TLD results) should be apportioned between DOE and NRC/State activities based upon ratios of pocket dosimeter exposures for each facility, or upon another apportioning scheme deemed appropriate by the Radiation Safety Officer.

**BUSINESS/QUALITY RECORDS**

<b>Record Type</b>	<b>Record Identification</b>	<b>Retention Code</b>	<b>Quality Record Location</b>
B	As-Low-As-Reasonably-Achievable (ALARA) Records	SHE0136	N/A
B	Use Authorizations	SHE0136	N/A
B	Controlled Work Permits	SHE0136	N/A
B	Financial Assurance for Decontamination and Decommissioning	SHE0136	N/A
B	Exposure Records	SHE0136	N/A
B	Training Records	SHE0136	N/A
B	Results of Medical Monitoring Program	SHE0136	N/A
B	Monitoring and Surveys	SHE0136	N/A
B	Audit and Inspection Records	SHE0136	N/A
B	Employee Records	SHE0136	N/A
B	Personnel Radiological Records	SHE0136	N/A
B	Radiological Surveys	SHE0136	N/A
B	Employee Medical Records	SHE0136	N/A