



## Internal Dosimetry

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Advanced Mixed Waste Treatment Project

Approval:

*(Signature on file. See DCR-12761.)*

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10/29/13

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Date

<b>AMWTP MANAGEMENT PROCEDURE</b>		
MP-RS&C-6.19, Rev. 15	Issued: 10/29/13	Effective: 10/30/13
<b>Internal Dosimetry</b>		

**REVISION LOG**

Revision Number	Date Approved	Pages Affected	Description of Revision
0	TBD	All	Initial issue. DCR-2002-1253
1	9/30/02	All	DCR-1554
2	05/01/03	7, 8, A1, A3 and B2	Editorial changes and modifications to Bioassay frequencies.
3	03/03/04	4, 6, 7, 9, A1, A4, B1 and B2.	DCR-2654. Procedure updated to include corrections and requirements for AMWTF.
4	12/21/06	All	DCR-5613. Entire document rewrite to update procedure to meet MAR24091, apply new template and blue sheet changes.
5	08/29/07	Various	DCR-6002. Changes in Section 3, including a new table for Radiation Worker Annual Monitoring Plan. Other changes including new steps and wording in Appendix A and editorial changes per MP-DOCS-18.3.
6	11/16/09	Various	DCR-7185. Made clarifications concerning job specific air samples. Changed "CEDE" to "CED" in various locations throughout the document. Changed value in Note 1 preceding Step 3.3 per 10 CFR 835. Made editorial corrections per MP-DOCS-18.3. Performed periodic review.
7	06/23/10	Various	DCR-9292. Made changes to better implement 10 CFR 835 requirements.
8	11/15/10	Various	DCR-9628. Changes to address CAR 54018 to employ a more conservative approach to 10 CFR 835 requirements, added a new appendix for an example of a exit bioassay request letter.
9	03/24/11	Page 4	DCR-9973. Added note to allow waiving the submittal of the supplementary sample.
10	08/17/11	Page 12	DCR-10280. Added new substep 3.5.4.1.2 to clarify the entry pathways.



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## 1.0 PURPOSE/SCOPE

This management procedure implements the Advanced Mixed Waste Treatment Project (AMWTP) Internal Dosimetry Program. The program is designed to meet requirements identified in 10 CFR 835, Occupational Radiation Program, Subpart E, Monitoring of Individuals and Areas, for those portions that pertain to internal dosimetry. The foundations and justifications for the program’s design are described in EDF-0102, AMWTP Technical Basis for Internal Dosimetry.

The internal dosimetry program is applicable to all radiological activities conducted at the AMWTP with the potential for internal exposure. A detailed description of the processes, facilities, and nuclides pertaining to AMWTP may be found in RPT-DSA-02, Documented Safety Analysis. This procedure also pertains to AMWTP’s interface with the analysis laboratory and dose of record management functions provided by the Radiation Dosimetry Records (RDR) group managed by Department of Energy’s (DOE’s) Idaho Cleanup Project (ICP).

## 2.0 ROLES AND RESPONSIBILITIES

Performer	Responsibilities
Bioassay Participants	<ul style="list-style-type: none"> <li>• Submits requested sample per the guidance contained in Appendix A, Fecal Sample Instructions, OR Appendix B, Urine Sample Instructions, as appropriate.</li> </ul>
Internal Dosimetry Coordinator (IDC)	<ul style="list-style-type: none"> <li>• Unless otherwise specified, is responsible to the Radiological Controls Manager (RCM) to implement the requirements of this procedure in all AMWTP activities</li> <li>• Acts as the official point of contact for internal dosimetry functions</li> <li>• Selects appropriate bioassay method and nuclides to be monitored</li> <li>• Recommends worker restriction(s)</li> <li>• Maintains the internal dosimetry spreadsheets/database</li> <li>• Coordinates sampling activities including scheduling, kit distribution, kit collection, and transfer of the samples to the laboratory for analysis sampling.</li> </ul>

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Performer	Responsibilities
Radiological Controls Manager	<ul style="list-style-type: none"> <li>Coordinates assessments of the internal dosimetry program to ensure compliance with DOE requirements</li> <li>Ensures that RDR group maintains accreditation per DOE Laboratory Accreditation Program for Radiobioassay <b>(10 CFR 835.402[d])</b></li> <li>Provides the final approval of all positive bioassay intake assessment and dose evaluations.</li> </ul>
Radiological Controls Shift Supervisor (RCSS)	<ul style="list-style-type: none"> <li>Notifies IDC and RCM of potential intakes.</li> </ul>

### 3.0 PROCEDURE

#### 3.1 General

3.1.1 Information concerning employee radiation exposures shall be treated as Privacy Act Information. The information may be used by DOE and DOE contractor personnel and is for official use only. Reproduction of information for dissemination to unauthorized personnel is prohibited.

3.1.1.1 The following phrase (or equivalent) should be included on all dose history records:

“This document contains information that is subject to the Privacy Act of 1974 (5 USC, Section 552a) and is provided in accordance with the Act. Copying or dissemination, except as permitted or required by the Act, could result in criminal penalties.”

3.1.2 Bioassay monitoring measures shall be initiated if any of the following triggers are met:

- Facial contamination is detected that indicates a potential for internal contamination.
- Contamination is detected on the inside of respiratory protective equipment.

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- Detectable alpha or beta contamination on a nasal swab or oral sample.
- *Derived air concentration-hour* (DAC-hour; see def.) tracking indicating a cumulative total of greater than 20 DAC-hours in a year.
- A cut, wound, or break in the skin occurs in a contaminated area and evidence of contamination is found on the wound or the object causing the wound.
- There is other evidence suggesting that an intake of radioactive material has occurred.
- Contamination on protective clothing greater than 10,000 dpm/100 cm<sup>2</sup> α or 100,000 dpm/100 cm<sup>2</sup> β/γ, if no respiratory protection was in use.

**NOTE 1:** *The IDC may request other methods of bioassay monitoring on a case-by-case basis.*

**NOTE 2:** *The default method of bioassay monitoring at AMWTP is submission and analysis of a fecal type bioassay sample followed by submission of a supplemental fecal sample within 10 days for “at risk” workers. All sample submissions should be during non-work days (preferably the last day off before the next shift).*

3.1.3 The supplemental sample shall be held in reserve and analyzed in the event of analytical errors during laboratory processing or as a second sample if there is initial indication of a positive bioassay result.

**NOTE 1:** *Based on the probability of internal exposure and/or the analysis results of the initial sample, the IDC may waive the submittal of a supplemental sample.*

**NOTE 2:** *In-vivo analysis (i.e., wound, lung, and whole body counts) is available to AMWTP as a service from the RDR group.*

3.1.4 Workplace radiological surveys shall be conducted per MP-RS&C-6.22, Radiological Survey Program, to monitor for potential internal exposures to radioactive materials.

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3.1.5 Radiological Engineering shall perform DAC-hour tracking from job specific air samples per INST-RS&C-6.19.3, DAC-Hour Tracking, for the following:

- For airborne radioactivity samples with measured activity statistically greater than 0.02 DAC after the appropriate respiratory protection factor is applied
- Per the discretion of Radiological Engineering for samples with insufficient air volume.

3.1.6 The estimation of internal dose shall be based on bioassay data, rather than air concentration values, unless the following apply:

- Bioassay data are unavailable
- Bioassay data are inadequate
- Internal dose estimates based on air concentration values are demonstrated to be as or more accurate.

**(10 CFR 835.209[b])**

3.1.7 Bioassay participants shall submit requested sample per the guidance contained in Appendix A or Appendix B, as appropriate.

3.1.8 The RCM shall coordinate assessments of the internal dosimetry program to ensure compliance with DOE requirements.

3.1.9 The RCM shall ensure that a contract is maintained with a radiobioassay service provider that is accredited per DOE Laboratory Accreditation Program for Radiobioassay.

**(10 CFR 835.402[d])**

3.1.10 The RCM shall ensure Appendix A of EDF-0102 is complete prior to approving an intake assessment and dose evaluation.

3.1.11 The RCM shall provide the final approval of all positive bioassay intake assessment and dose evaluations.

3.1.12 The RCSS shall notify IDC and RCM of potential intakes.

3.1.13 Evaluation and trending of bioassay results shall be performed in accordance with the guidance found in EDF-0102.

**(10 CFR 835.401[a][5])**

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### 3.2 Nuclides of Concern at AMWTP

**NOTE 1:** *The following table summarizes the assumed source term at AMWTP per reference INEL-95/0412, Waste Description Information for Transuranically-Contaminated Wastes Stored at the INEL.*

**NOTE 2:**  $^{241}\text{Pu}$  is not monitored due to the following considerations:

- $^{241}\text{Pu}$  is a weak beta emitter and is not detectable by conventional means.
- $^{241}\text{Pu}$  beta minus decays to  $^{241}\text{Am}$ ; because the waste has been aged for greater than one half-life of  $^{241}\text{Pu}$ , an in-growth of  $^{241}\text{Am}$  should now be detectable for any substantial quantity of  $^{241}\text{Pu}$ .
- Conservative estimates have demonstrated that if a detectable quantity of  $^{241}\text{Am}$  was taken in an individual's body and twice the activity value of  $^{241}\text{Am}$  was assumed to be present as  $^{241}\text{Pu}$ , the resultant dose from  $^{241}\text{Pu}$  would be negligible compared to dose from the  $^{241}\text{Am}$ .

<i>Summary of AMWTP Primary Internal Exposure Nuclides and Ratios</i>		
<i>Radionuclide</i>	<i>Estimated Activity (Ci)</i>	<i>Percentage of Total Activity</i>
$^{241}\text{Am}$	1.22 E+05	24.7
$^{238}\text{Pu}$	1.16 E+05	23.5
$^{239}\text{Pu}$	6.87 E+04	13.9
$^{240}\text{Pu}$	1.59 E+04	3.2
$^{242}\text{Pu}$	1.04 E+00	0.0002
$^{241}\text{Pu}$	1.61 E+05	32.6
Others	1.09 E+04	2.2

**NOTE 3:** *Analysis for other nuclides may be specified by the IDC on a case-by-case basis.*

3.2.1 Bioassay analysis should monitor for the presence of  $^{241}\text{Am}$ ,  $^{238}\text{Pu}$ ,  $^{239}\text{Pu}$ , and  $^{240}\text{Pu}$ .

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### 3.3 Program Participants and Monitoring Requirements

**NOTE 1:** *The minimum detectable activity (MDA) for the fecal bioassay analysis processed and analyzed by the RDR group is better than or equal to  $2.7 \times 10^{-2}$  pCi/sample for  $^{239}\text{Pu}$ ,  $^{240}\text{Pu}$ , and  $^{241}\text{Am}$ . AMWTP's derived investigation level (DIL; see def.) for a fecal type radiobioassay collected 1 year after intake and analyzed for  $^{239}\text{Pu}$ ,  $^{240}\text{Pu}$ , or  $^{241}\text{Am}$  is  $5.4 \times 10^{-2}$  pCi/sample.*

**NOTE 2:** *Periodic detectable samples above the MDA but less than the DIL are anticipated for bioassay participants at AMWTP.*

**NOTE 3:** *Bioassay participants fall under two broad categories: (1) routine participants and (2) non-routine participants.*

3.3.1 The IDC shall maintain a working database of personnel participation category and status.

**NOTE:** *Work is planned at AMWTP such that it is not expected that any worker will be likely to meet the individual monitoring requirements stated in 10 CFR 835.402(c).*

3.3.2 For the purpose of monitoring individual exposures to internal radiation, internal dosimetry programs (including routine bioassay programs) shall be conducted for the following:

- Radiological workers who, under typical conditions, are likely to receive a committed effective dose of 100 mrem or more from all occupational radionuclide intakes in a year  
(10 CFR 835.402[c][1])
- Declared pregnant workers likely to receive an intake or intakes resulting in an equivalent dose to the embryo/fetus in excess of 50 mrem  
(10 CFR 835.402[c][2])
- Occupationally exposed minors who are likely to receive a dose in excess of 50 mrem from all radionuclide intakes in a year  
(10 CFR 835.402[c][3])
- Members of the public entering a controlled area likely to receive a dose in excess of 50 mrem from all radionuclide intakes in a year.  
(10 CFR 835.402[c][4])

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3.3.3 Routine participants shall include those individuals who are selected to be monitored at a regularly-specified interval.

3.3.3.1 Groups selected for routine monitoring may be specified.

3.3.4 Non-routine participants shall be subdivided into the following subcategories:

**NOTE:** *Other than base-line and special samples, a bioassay sample may serve to meet more than one non-routine category (e.g., a termination sample may also be used as a representative population sample).*

3.3.4.1 Base-line participants—Base-line fecal type samples shall be collected, prior to the individual entering a posted contamination area, high contamination area, or airborne radioactivity area, for all radiological workers and radiological control technicians (RCTs) that have previous experience with processes that involve the handling of transuranic materials.

**NOTE:** *The purpose of a representative population analysis is to demonstrate that a specific population, as a whole, is not receiving exposure to airborne transuranic nuclides.*

3.3.4.2 Representative population—A sample should be submitted for a percentage of specific populations that are selected to submit fecal type samples.

3.3.4.3 Change of status worker—A sample should be submitted for a worker who changes job scope or position (e.g., if an operations technician [OT] accepts a position in the TRU Programs department as a staff member, the individual should submit a sample to close out their involvement as an OT).

3.3.4.4 Concerned worker—With the permission of the RCM, a concerned worker may submit a bioassay for analysis.

**NOTE:** *An example of an exit bioassay request letter is provided in Appendix C.*

3.3.4.5 Termination—Bioassays will be collected as deemed necessary by Radiological Engineering.

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- 3.3.4.6 Declared pregnant worker—A sample shall be submitted for bioassay monitoring, as necessary, to meet the provisions of MP-RS&C-6.7, Radiation Protection to the Embryo and Fetus.
- 3.3.4.7 Special—A sample shall be submitted for a participant due to exceeding one of the triggers specified in Step 3.1.2. All special samples shall be processed with an “urgent” designation.
- 3.3.4.8 Follow-up—IDC shall specify follow-up samples, as necessary, to support dose assessments for those bioassays that indicate an internal exposure has been received.

**3.3.5 Radiation Worker Annual Monitoring Plan Table**

**NOTE:** *The table below is a summary from EDF-0102 of the radiological worker annual monitoring plan. The monitoring plan provides the guidance for workgroup participant section and scheduling.*

WORK GROUP	MONITORING PLAN
Routine Bioassay	EDF-0102 does not identify any group of workers who are expected to receive 100 mrem committed effective dose (CED) per year and therefore no groups are specified as requiring routine bioassay monitoring. ALARA job reviews may specify groups of workers to participate in a routine program; Radiological Engineering should maintain these groups of personnel within their working database.
Representative Participation Plan	The following plan indicates the sampling numbers of “at risk” workers is a minimum of 30% of the total “at risk” workers annually.
See EDF-0102	EDF-0102 lists the "at risk" workgroups, the sampling frequency, and number of participants needed to meet the minimum of 30% of the "at risk" workers annually.
Other Personnel	No global requirements for sampling. The Radiological Controls manager or Radiological Engineering may identify special cases within this group.
	<del>The following plan indicates the sampling numbers of “not at risk” workers.</del>
Not At Risk Personnel	Two individuals per quarter. This sampling is a result of a corrective action report (CAR 54018 and AI 55510).

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### 3.4 Work Restrictions

**NOTE:** *The purpose of work restrictions is to prevent exposure or potential exposure by preventing access to contamination areas and, if required, radiation areas.*

- 3.4.1 Work restrictions will be provided to the individual using Appendix D, Restricted Worker.
- 3.4.2 A copy of the signed restrictions letter will be maintained in the individual's dosimetry file, a second copy will be provided to the restricted individual's manager, and the individual will receive the original.
- 3.4.3 The Radiological Controls supervisors, Radiological Controls manager, restricted individual's manager and line manager, and the restricted individual will receive e-mail, verbal, or other notifications of the restrictions.
- 3.4.4 Work restrictions shall be imposed when a requested bioassay sample is event-based and associated with known airborne contamination.
  - 3.4.4.1 Work restrictions shall remain in place as long as the bioassay results are pending.
- 3.4.5 Work restrictions shall be imposed at the discretion of the IDC when the following occur:
  - A worker's exposure status is in question or unresolved due to an event
  - A worker is approaching an administrative dose limit
  - An employee has not complied with either a bioassay program schedule or a special requirement.

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### 3.5 Intake Investigations/Dose Evaluations

**NOTE 1:** *Individuals are notified of bioassay sample results whether the bioassay sample was detectable or non-detectable. The notification of a sample with detectable result includes notification to the individual that an intake investigation is being performed.*

**NOTE 2:** *The purpose of an intake investigation is to collect sufficient data to complete a dose evaluation.*

3.5.1 A quarterly management assessment shall be performed on the Internal Dosimetry Program verifying program compliance and that dose evaluations are being performed and reported in a timely manner.

3.5.2 A TrackWise action item must be created for positive bioassay cases to track and document analysis and reporting.

3.5.3 The IDC shall investigate all results from the contracted laboratory that are reported as positive (detectable).

3.5.3.1 The IDC shall report all positive bioassay results to the Environmental, Safety, and Health manager immediately upon receipt of results.

3.5.4 Dose evaluations shall be conducted using Integrated Modules for Bioassay Analysis (IMBA) Professional Plus software.

3.5.4.1 Determinations of the effective dose shall be made using the radiation and tissue weighting factor values provided in 10 CFR 835.

**(10 CFR 835.2[b])**

3.5.5 The IDC shall coordinate the collection and analysis of additional bioassay data, as necessary, to complete the intake investigation/dose evaluation.

3.5.5.1 If a preliminary dose estimate based on the default parameter listed in Section 3.5.6 indicates greater than or equal to 100 mrem CED, additional bioassay data shall be collected, as necessary, otherwise the dose evaluation shall be completed based on the information that is available.

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3.5.6 Intake investigations/dose evaluations should address the following parameters at a minimum:

**NOTE:** *When assessing and evaluating positive bioassay results, nuclides ratio assumptions are not assumed based on source term references. Investigation efforts to support event based assessment and evaluations should include field indicators and if possible characterization and analysis of pertinent materials to indicate true nuclide parameters.*

**3.5.6.1 Entry Pathway and Duration of Intake**

3.5.6.1.1 For preliminary evaluations and in the absence of contrary evidence, a chronic inhalation model shall be assumed.

3.5.6.1.2 Other models shall be selected based on documented information (e.g., acute inhalation, wound model, ingestion).

**3.5.6.2 Time of Intake**

**NOTE:** *An acute intake may be considered if evidence appears to be adequate. Multiple, documented evidence will be required. Examples of adequate evidence include air sample data, potential exposure environment, contamination surveys, coworker bioassay results, interviews, and work history reviews.*

3.5.6.2.1 For assuming a chronic intake, the start of the intake period should be the time of the last worker bioassay. In the absence of a previous bioassay, the start of employment should be used.

**3.5.6.3 Particle Size Distribution**

3.5.6.3.1 If the particle size distribution is not known and cannot be reasonably estimated, the particle size default given for the International Commission on Radiological Protection (ICRP) 66 Lung Model (i.e., 5 activity median aerodynamic diameter) shall be assumed.

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**3.5.6.4 Lung Solubility and Transportability**

3.5.6.4.1 If the lung solubility class is not known, and cannot be reasonably estimated, the solubility class default given for the ICRP 66 Lung Model (i.e., M-class) shall be assumed.

3.5.7 All dose assessments will receive a peer review by a qualified radiological engineer ensuring the assessment was adequate by verifying Appendix A of EDF-0102 is complete.

3.5.8 Results of the dose investigation/evaluation shall be sent to the RDR group for inclusion into the employee's dose record.

**(10 CFR 835.703[b])**

3.5.8.1 A copy of the dose investigation/evaluation shall be provided to the employee.

**3.6 Medical Intervention**

**NOTE 1:** *The recommendations contained in this section are based on the guidance provided in Section 5 of DOE-STD-1128-2008, Guide of Good Practices for Occupational Radiological Protection in Plutonium Facilities.*

**NOTE 2:** *DOE-STD-1128-2008 sets the trigger for nasal or mouth smears at 1,000 dpm; however, AMWTP uses the more conservative trigger of 500 dpm for nasal or mouth smears.*

3.6.1 AMWTP's site occupational medical director (SOMD) shall be immediately consulted for the following situations:

- Nasal or mouth smears greater than or equal to 500 dpm
- Facial contamination greater than or equal to 25,000 dpm
- Skin breaks or wounds greater than or equal to 100 dpm.

**(DOE-STD-1128-2008, Section 5.9)**

3.6.1.1 If AMWTP's SOMD is not available, efforts should be made to contact the on-call Idaho National Laboratory occupational medical physician via the Central Facilities Area duty nurse at 526-2356.

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**NOTE:** *The decision to administer treatment and the treatment protocol are solely the responsibilities of the physician in charge.*

3.6.2 Radiological Engineering advice to the physician should be consistent with the following:

- A. When the CED estimated intake is less than 2 rem, treatment is not generally recommended.
- B. When the CED estimated intake is between 2 rem and 20 rem, treatment should be considered. Under these situations, short term administration will usually be appropriate.
- C. When the CED estimated intake exceeds 20 rem, extended or protracted treatment is strongly recommended, except for poorly transported material in the lung.

(DOE-STD-1128-2008, Section 5.9)

#### 4.0 DEFINITIONS

**NOTE:** *An expanded list of definitions common to the Radiation Protection Program may be found in LST-RS&C-01-IM, Radiological Control Implementation Matrix.*

*Derived investigation level.* A value of a radiobioassay or air monitoring measurement that indicates an intake resulting in a dose exceeding an *investigation level* (see def.).

*Derived air concentration-hour.* The product of the concentration of radioactive material in air (expressed as a fraction or multiple of the DAC for each radionuclide) and the time of exposure to that radionuclide, in hours.

*Investigation level.* The value of CED from intake(s) of radioactive material by a worker at or above which, for regulatory purposes, is regarded as sufficiently important to justify further investigation. Per 5.4.4 of reference DOE-G 441.1-1C, Radiation Protection Programs Guide for use with Title 10, Code of Federal Regulations, Part 835, Occupational Radiation Protection, 0.1 rem CED is regarded as sufficiently important to justify further investigation.

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## 5.0 REFERENCES

- (1) 5 USC 552a, The Privacy Act of 1974
- (2) 10 CFR 835, Occupational Radiation Protection
- (3) 10 CFR 835, Subpart E, Monitoring of Individuals and Areas
- (4) 10 CFR 835.2[b], Definitions
- (5) 10 CFR 835.209[b], Concentrations of Radioactive Material in Air
- (6) 10 CFR 835.401[a][5], General Requirements
- (7) 10 CFR 835.402[d], Individual Monitoring
- (8) 10 CFR 835.703[b], Other Monitoring Records
- (9) DOE-G 441.1-1C, Radiation Protection Programs Guide for Use with Title 10, Code of Federal Regulations, Part 835, Occupational Radiation Protection
- (10) DOE-STD-1128-2008, Guide of Good Practices for Occupational Radiological Protection in Plutonium Facilities
- (11) EDF-0102, AMWTP Technical Basis for Internal Dosimetry
- (12) INEL-95/0412, Waste Description Information for Transuranically-Contaminated Wastes Stored at the INEL
- (13) INST-RS&C-6.19.3, DAC-Hour Tracking
- (14) LST-RS&C-01-IM, Radiological Control Implementation Matrix
- (15) MP-DOCS-18.2, Records Management
- (16) MP-RS&C-6.7, Radiation Protection to the Embryo and Fetus
- (17) MP-RS&C-6.22, Radiological Survey Program
- (18) RPT-DSA-02, Documented Safety Analysis

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## 6.0 RECORDS

Records generated by this procedure are classified in accordance with the table below and dispositioned in accordance with MP-DOCS-18.2, Records Management.

<b>Record Description</b>	<b>Classification</b>
MP-RS&C-6.19, Case File	Misc. Other Record/A16-1.2/Destroy 5 years after submittal or being superseded.
Sampling Records	Maintained by the ICP contractor per the interface agreement.

## 7.0 EXHIBITS

None

## 8.0 APPENDICES

Appendix A – Fecal Sample Instructions

Appendix B – Urine Sample Instructions

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**Appendix A –  
Fecal Sample Instructions**

**NOTE:** *The sample is to be provided at home while off shift to prevent possible contamination and the necessity of resampling. Ideally, the sample should be provided at least 3 days after the last work day.*

If you are currently taking anti-acid medication, this impacts the yield of the sample, possibly resulting in having to reject the analysis. Please notify the IDC or radiological engineer in order for this information to be passed on to the ICP internal dosimetry staff, where adjustments to the sample process can be made.

**NOTE:** *Fecal samples that are too small cannot be accurately analyzed. If your fecal sample is less than 40 grams (about the size of a Baby Ruth candy bar or 1.5 oz.) another sample will be requested.*

The fecal sample should be collected in the blue or white plastic bag provided inside the white collection container. Do not put any urine in the container. Do not put toilet paper in the container.

1. You have been requested to submit a ‘24-hour’ fecal sample. Analysis of fecal samples is a sensitive (and sometimes the only) way to detect the presence of insoluble materials (e.g., plutonium or uranium) in the lung. Bioassay sample kits are provided by the IDC.
2. In order for a reasonably accurate analysis to be performed, the sample must be representative of about 24 hours of clearance. It is much better to wait and collect a normal voiding than to produce a hurried small sample, which may not be representative of a normal voiding.
3. Collect the sample as follows:
  - A. Lift the toilet seat.
  - B. Place the collection container so that the edges of the plastic support frame rests on the rim of the bowl. The smaller end of the triangular support frame should be at the back with the longest side of the triangle frame towards the front of the toilet. Position the container so that it is in the center slightly towards the rear of the bowl.
  - C. Put the toilet seat down to hold the container in place.
  - D. Collect the sample.

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4. After obtaining the sample, twist the top of sample bag and fold it over. The sample is to be placed inside the plastic tub (white collection container). Snap the lid on the white container tightly. Remove the support frame by placing the collection container on a hard stable surface and snap one corner down. The support frame may then be thrown away.
5. Enter your name, S number, and date the sample was collected on the label provided on the container lid.

**NOTE:** *Personnel should not provide a social security number.*

6. Place the container in the Ziploc bag and seal the bag.
7. Sign the custody seal and place it over the midpoint of the closed opening of the Ziploc bag.
8. Place the sealed bag in the carrier box provided.
9. On the outside of the carrier box, write name, S number, and date of sample.

**NOTE:** *Samples must be returned in the carrier box only.*

10. To return the sample kit to the AMWTP, when entering the AMWTP site sign out the key for the bioassay freezer from the Accountability building (WMF-685). The bioassay freezer is in Room 111 on the east side of the Transuranic Storage Area - Retrieval Enclosure (TSR-RE) building (WMF-636).
11. Upon placing the sample container in the freezer, place the lock back and return the key to Accountability.
12. The radiological engineer will transfer the sample to ICP's in-vitro analysis laboratory for analysis.
13. Results of the analysis are sent by mail and email to AMWTP's IDC. Individuals are notified of bioassay sample results whether the bioassay sample was detectable or non-detectable. The notification of a sample with detectable result includes notification to the individual that an intake investigation is being performed.

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**Appendix B –  
Urine Sample Instructions**

**NOTE:** *Urine bioassay samples are only analyzed for radionuclides and not for illegal drugs.*

1. You have been requested to submit a "simulated 24-hour" urine sample. Urine bioassays are used to monitor for the presence of relatively soluble radioactive materials such as strontium, cesium, or some forms of plutonium. Obtain a bioassay sample kit from the IDC.
2. Please collect all urine voided ½ hour before retiring and ½hour after rising on two consecutive days.

**NOTE:** *Urine samples that are too small cannot be accurately analyzed. If the total urine sample is less than 500 mL (approximately 1/2 of a quart jar), another urine sample will be requested.*

3. The urine should be collected in jars provided by the bioassay kit, using one for each 24 hour period of collection.
4. Enter your name, S number, and date the sample was collected on the label provided on the lid of the jar(s).
5. Seal the jar(s) tightly after use and place the jar(s) into the provided sample box.

**NOTE:** *Personnel should not freeze the sample or allow it to freeze.*

6. Return the urine sample in the box to the AMWTP designated refrigerator and inform the IDC.

**NOTE:** *Samples waiting transfer to ICP In-Vitro Analytical Laboratory will only be stored in the designated refrigerator.*

7. IDC will transfer the sample to a representative of the ICP in-vitro analysis laboratory.
8. Sample analysis is performed by ICP RDR group. The analysis usually takes about 1-½ months.
9. Results of the analysis are reported to AMWTP's IDC by interoffice mail and by e-mail. Individuals are notified of bioassay sample results whether the bioassay sample was detectable or non-detectable. The notification of a sample with detectable result includes notification to the individual that an intake investigation is being performed.

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**Appendix C –  
Sample Exit Bioassay Request Letter**

Dear Sir or Madam:

The Advanced Mixed Waste Treatment Project (AMWTP) Radiological Engineering group requests you provide two (2) project exit bioassay samples. Sample boxes will be provided to you if you choose to participate. Contact any of the phone numbers or email addresses below to make arrangements for these samples. For your convenience, a pre-addressed envelope is enclosed for your response. Participation is voluntary.

If you do not wish to participate please, please check “NO” to the participation question on Page 2 of this notification. A lack of response will be interpreted as a refusal if a notice is not provided within 3 weeks of the notification date.

If you want to participate, contact anyone of the following:

(A list of Radiological Engineering and Radiological Management contact information is entered here.)

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Contact Information

Name (printed): \_\_\_\_\_

Phone Number: \_\_\_\_\_

Address: \_\_\_\_\_

---

I plan to participate  YES  NO

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

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**Appendix D –  
Restricted Worker**

Dear Sir or Madam:

The Advanced Mixed Waste Treatment Project (AMWTP) Radiological Engineering Group requests that you provide two (2) bioassay samples. Participation is not optional. Additional samples may be required. In addition the following restrictions are being imposed upon you:

Restricted from the following radiological areas or activities: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

These restrictions will remain in place until you receive a second form with a worker restriction removal date completed.

Restrictions removed on this date: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_