

Armed Forces Radiobiology Research Institute Biodosimetry Worksheet

(Medical Record of Radiation Dose, Contamination, and Acute Radiation Sickness Response)

Reporting Authority (person(s) creating this page of the report)

Last name: _____ First name: _____ Country of origin: _____
 Unit: _____ Phone: _____ Fax: _____ Email: _____
 Location: _____ Date (yymmdd): _____ Time: _____

Casualty

Last name: _____ First name: _____ Rank: _____
 Country of origin: _____ Parent unit: _____ Parent unit location: _____
 Parent unit phone: _____ Unit e-mail: _____ Unit fax: _____ Casualty location: _____

History of presenting injury (conventional and/or radiation): _____

History of previous radiation exposure: _____

Past medical history (general): _____

Medical countermeasures (e.g., antiemetics, transfusion), specify: _____

Administered (where, when, route): _____

Exposure conditions

Date of exposure (yymmdd): _____ Exposure location: _____ Time of exposure: _____
 Weather conditions (at time of exposure): _____

Exposure results

Describe incident: _____

External exposure overview

Body exposure: Total Partial Uncertain
 Shielding confounder: Yes No

Contamination overview

External contamination: Yes No
 Internal contamination: Yes No
 Contaminated wound: Yes No

If wound(s) are radiation contaminated, please provide details here: _____

Biodosimetric assays overview

	Sampling date, time yymmdd (time)	Estimated time post-exposure (h)	Dose (Gy)	Reference radiation quality and dose rate (Gy/min)
Time onset of vomiting:	_____	_____	_____	_____
Lymphocyte counts or depletion kinetics:	_____	_____	_____	_____
Urine bioassay:	_____	_____	_____	_____
Cytogenetic biodosimetry:	_____	_____	_____	_____
Other:	_____	_____	_____	_____

ARS response category overview (maximum grading 0-4; see pages 4 through 6 for guidance)

N: _____ C: _____ G: _____ H: _____ = RC: _____ days after radiation exposure: _____

Contamination: Dose Assessment (person(s) creating this page of the report)

Last name: _____ First name: _____ Unit: _____

Phone: _____ Fax: _____ E-mail: _____ Country: _____

Date dose assessed (yymmdd): _____ Time dose assessed: _____ Place: _____

Contamination: external/internal

Substance trademark (if applicable): _____ Solid: Yes No

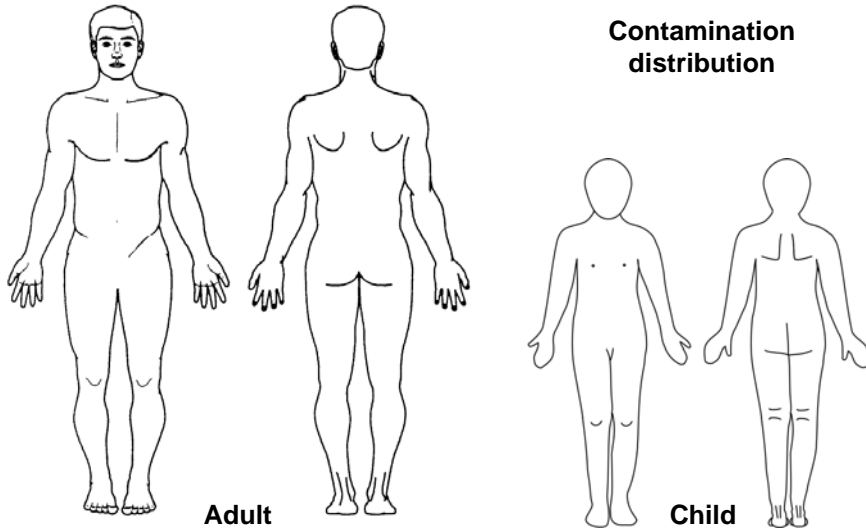
Particulate (P): Yes No Gaseous (G): Yes No

Liquid (L): Yes No Aerosol (L/G): Yes No

Radionuclide(s): _____ Aerosol (P/G): Yes No

Activity (Bq): _____ Chemical compound(s): _____

Comments:



Route of intake (in case of internal contamination)

Inhalation: Yes No Ingestion: Yes No Other: Yes No

Cutaneous: Yes No Injection: Yes No If yes, specify: _____

Contamination assessment

Contamination measurement: _____ Detection device: _____

Counts per minute: _____ Estimated activity: _____

Decontamination measures: _____ Residual contamination: _____

Measures taken to prevent uptake: _____

Measures taken to increase excretion: _____

Measures taken to minimize re-absorption: _____

External Exposure: Dose Assessment (person(s) creating this page of the report)

Last name: _____ First name: _____ Unit: _____

Phone: _____ Fax: _____ E-mail: _____ Country of origin: _____

Date dose assessed (yymmdd): _____ Time dose assessed: _____ Place: _____

Nature of exposure: radiation source

Alpha (α): Yes No Beta (β): Yes No Neutron (n): Yes No

Gamma (γ): Yes No X-ray (x): Yes No Mixed (n/ γ): Yes No

Dose rate (at distance measured from): _____ Distance to source: _____

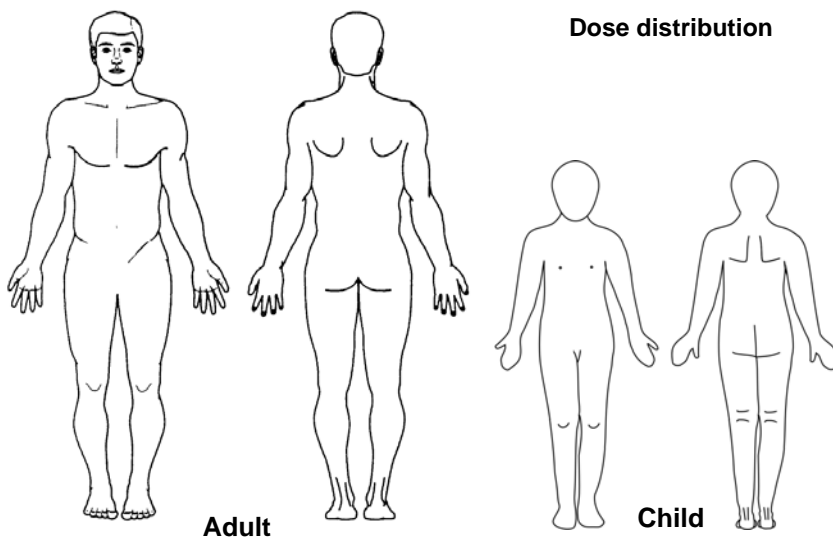
Activity of source (if known): _____ Duration of exposure: _____

Confounding factors used in dose reconstruction (e.g., shielding): Yes No

Type of dosimeter (if applicable): _____ Body location of dosimeter: _____

Facility where dosimeter was read: _____ Dosimeter reading: _____

Biological dosimetry type and facility where performed (if applicable): _____



Comments:

Blood chemistry analysis	First	Second	Third	Fourth
Data collected (yymmdd):	_____	_____	_____	_____
Time collected:	_____	_____	_____	_____
Data analyzed (yymmdd):	_____	_____	_____	_____
Time analyzed:	_____	_____	_____	_____
Serum amylase (U/L): (reference value: 21-160 U/L)	_____	_____	_____	_____
Serum C-reactive protein (mg/L): (reference value: ~1 mg/L)	_____	_____	_____	_____
Other:	_____	_____	_____	_____

ARS Responses Assessment: (person(s) creating this page of the report)

Last name: _____ First name: _____ Unit: _____ Country of origin: _____
 Phone: _____ Fax: _____ E-mail: _____ Place: _____

Signs and Symptoms

Date assessed (yymmdd): _____
 Time assessed: _____

Neurovascular system Degree of severity 1 (mild) to 4 (severe); none=0; see page 6 for degrees of severity

Nausea: _____
 Vomiting: _____
 Headache: _____
 Anorexia: _____
 Fever: _____
 Hypotension: _____
 Tachycardia: _____
 Neurological deficits: _____
 Cognitive deficits: _____
 Fatigue/weakness: _____
 Maximum grading N: _____

Cutaneous system Degree of severity 1 (mild) to 4 (severe); none=0; see page 6 for degrees of severity

Erythema: _____
 Pruritis (itching): _____
 Edema: _____
 Bullae (blisters): _____
 Desquamation: _____
 Ulcer or necrosis: _____
 Hair loss: _____
 Onycholysis: _____
 Maximum grading C: _____

Gastrointestinal system Degree of severity 1 (mild) to 4 (severe); none=0; see page 6 for degrees of severity

Diarrhea: Frequency: _____
 Consistency: _____
 Melena (bloody stools): _____
 Abdominal cramps or pain: _____
 Maximum grading G: _____

Hematopoietic system Blood cell counts and degree of severity (see page 6 for degrees of severity)

(C=cell count; D=ARS degree)

	C	D	C	D	C	D	C	D	C	D	C	D	C	D
Lymphocytes (× 10 ⁹ /liter):	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Granulocytes (× 10 ⁹ /liter):	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Neutrophils (× 10 ⁹ /liter):	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Platelets (× 10 ⁹ /liter):	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Blood loss:	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Infection:	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Maximum grading H:	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Response category (RC) =	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Days after exposure:	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

ARS Responses Assessment (continued from page 4)

Date format: yymmdd (time)	Onset (date/time)	Duration (hours)	Comments:
Nausea:	_____	_____	
Vomiting:	_____	_____	
Headache:	_____	_____	
Anorexia:	_____	_____	
Fever:	_____	_____	
Hypotension:	_____	_____	
Tachycardia:	_____	_____	
Neurological deficits:	_____	_____	
Cognitive deficits:	_____	_____	
Fatigue/weakness:	_____	_____	
Maximum grading N:	_____	_____	
Erythema:	_____	_____	
Pruritis (itching):	_____	_____	
Edema:	_____	_____	
Bullae (blisters):	_____	_____	
Desquamation:	_____	_____	
Ulcer or necrosis:	_____	_____	
Hair loss:	_____	_____	
Onycholysis:	_____	_____	
Maximum grading C:	_____	_____	
Diarrhea: Frequency:	_____	_____	
Consistency:	_____	_____	
Melena (bloody stools):	_____	_____	
Cramps or pain:	_____	_____	
Maximum grading G:	_____	_____	
Lymphopenia:	_____	_____	
Granulopenia:	_____	_____	
Neutropenia:	_____	_____	
Thrombopenia:	_____	_____	
Blood loss:	_____	_____	
Infection:	_____	_____	
Maximum grading H:	_____	_____	

Adapted from:

- 1.NATO Standardization Agreement (STANAG 2474). Determination and Recording of Ionizing Radiation Exposure for Medical Purposes. Appendix 1, 2003.
- 2.Fliedner TM, Friesecke I, Beyrer K, eds. Medical Management of Radiation Accidents: Manual on the Acute Radiation Syndrome.Oxford: British Institute of Radiology; 2001. p. 1 -66.
- 3.Gorin N-C, Fliedner TM, Gourmelon P, *et al.* Consensus conference on European preparedness for haematological and other medical management of mass radiation accidents. Ann Hematol. 2006;85(10):671 -679.
- 4.Radiation Event Medical Management (REMM). Guidance on Diagnosis & Treatment for Health Care Providers. Accessed 24 Oct 2007, from <http://www.remm.nlm.gov/ars.htm>.
- 5.Waselenko JK, MacVittie TJ, Blakely WF, *et al.* Medical management of the acute radiation syndrome: recommendations of the Strategic National Stockpile Radiation Working Group. Ann Int Med. 2004;140:1037 -1051.

APPENDIX

Grading System for Response of Neurovascular, Gastrointestinal, Cutaneous, and Hematopoietic Systems

Symptom	Degree 1	Degree 2	Degree 3	Degree 4
Neurovascular system				
Nausea:	Mild	Moderate	Intense	Excruciating
Vomiting:	Occasional (one per d)	Intermittent (2–5 times per d)	Persistent (6–10 times per d)	Refractory (> 10 times per d)
Headache:	Minimal	Moderate	Intense	Excruciating
Anorexia:	Able to eat & drink	Intake decreased	Intake minimal	Parenteral nutrition
Fever:	< 38°C	38–40°C	> 40°C for < 24 h	> 40°C for > 24 h
Hypotension:	Heart rate >100 beats/m; blood pressure > 100/70 mm Hg	Blood pressure < 100/70 mm Hg	Blood pressure < 90/60 mm Hg: transient	Blood pressure < 80/? mm Hg; persistent
Neurological deficits:	Barely detectable	Easily detectable	Prominent	Life-threatening, loss of consciousness
Cognitive deficits:	Minor loss	Moderate loss	Major impairment	Complete impairment
Fatigue/weakness:	Able to work	Interferes with work or normal activity	Needs assistance for self care	Prevents daily activities
Cutaneous system				
Erythema:	Minimal, transient	Moderate (< 10% body surface area)	Marked (10–40% body surface area)	Severe (> 40% body surface area)
Pruritis (itching):	Sensation of itching	Slight and intermittent pain	Moderate and persistent pain	Severe and persistent pain
Edema:	Persistent, asymptomatic	Symptomatic, tension	Secondary dysfunction	Total dysfunction
Blistering:	Rare, sterile fluid	Rare, hemorrhage	Bullae, sterile fluid	Bullae, hemorrhage
Desquamation:	Absent	Patchy dry	Patchy moist	Confluent moist
Ulcer or necrosis:	Epidermal only	Dermal	Subcutaneous	Muscle/bone involvement
Hair loss:	Thinning, not striking	Patch, visible	Complete, reversible	Complete, irreversible
Onycholysis:	Absent	Partial	Partial	Complete
Gastrointestinal system				
Diarrhea:				
Frequency, stools/d:	2–3	4–6	7–9	≥ 10; refractory diarrhea
Consistency:	Bulky	Loose	Very loose	Watery
Melena (bloody stools):	Occult	Intermittent	Persistent	Persistent; large amount
Abdominal cramps/pain:	Minimal	Moderate	Intense	Excruciating
Hematopoietic system				
Lymphocyte changes: (reference value, 1.4–3.5 × 10 ⁹ cells/L)	1–2d: ≥ 1.5	1–2d: 1–1.5	1–2d: 0.5–1	1–2d: < 0.5
	3–7d: ≥ 1	3–7d: 0.5–1	3–7d: 0.1–0.5	3–7d: < 0.1
Granulocyte changes: (reference value, 4–9 × 10 ⁹ cells/L)	1–2d: ≥ 2	1–2d: 4–6; mild	1–2d: 6–10; moderate	1–2d: > 10; marked
	3–7d: ≥ 2	3–7d: > 2	3–7d: > 5	3–7d: > 5
Thrombocyte (platelets) changes: (reference value, 140–400 × 10 ⁹ cells/L)	1–2d: ≥ 100	1–2d: 50–100	1–2d: 50–100	1–2d: 50–100
	3–7d: ≥ 100	3–7d: 50–100	3–7d: 20–50	3–7d: < 20
Blood loss:	Petechiae, easy bruising, normal hemoglobin level	Mild blood loss with < 10% decrease in hemoglobin level	Gross blood loss with 10%–20% decrease in hemoglobin level	Spontaneous bleeding or blood loss with > 20% decrease in hemoglobin level
Infection:	Local, no antibiotic therapy required	Local; only local antibiotic therapy required	Systemic; p.o. antibiotic treatment sufficient	Sepsis; i.v. antibiotics necessary