DEFENSE THREAT REDUCTION AGENCY

NUCLEAR TEST PERSONNEL REVIEW PROGRAM

RADIATION DOSE ASSESSMENT

STANDARD OPERATING PROCEDURE

RA05 – Expedited Processing of Radiation Dose Assessments for NTPR Hiroshima and Nagasaki Veterans

Revision 2.1

Key to SOP ID Codes

RA (Radiation Assessment - SOP)
ED (External Dose - Standard Methods)
ID (Internal Dose - Standard Methods)
UA (Uncertainty Analysis - Standard Methods)

Revision Control

Revision	Revision Description	Revision Date	Authorization Official
1.0	Original Version	6/1/2015	Daniel N. Mannis
1.1	Minor text edits, Section 5.8 removed the requirement to compare Full RDA doses to the EPG dose values, Section 5.6 added the option for a consult or detailed Full RDA, removed reference to DTRA-TR-15-044 as it is not in publication yet – replaced with NTPR-TM-14-02, and removed references not used in this procedure.	6/23/2015	Daniel N. Mannis
2.0	Updated the doses in Table A1-1 to reflect weathering effects; clarified further evaluation actions, primarily in Sections 3.3 and 5.5, and Figure 1; deleted previous Section 5.5; replaced all references to NTPR-TM-14-02 with DTRA-TR-15-044; other text edits to improve clarity, consistency, and to correct minor errors.	2/8/2016	Daniel N. Mannis
2.1	Minor changes to some rounded doses in Table A1-1; split Table A1-1 into three tables; clarifications to the text in Sections 5.5.1 and 5.7; other minor editorial changes.	4/18/2017	Lee A. Alleman

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Standard Operating Procedure

RA05 – Expedited Processing of Radiation Dose Assessments for NTPR Hiroshima and Nagasaki Veterans

1. Purpose and Summary

This standard operating procedure (SOP) describes the roles, responsibilities, and methodology for processing Department of Defense (DOD) Defense Threat Reduction Agency (DTRA) Nuclear Test Personnel Review (NTPR) radiation dose assessments (RDAs). These assessments are performed in response to requests from the U.S. Department of Veterans Affairs (VA) on behalf of NTPR Hiroshima and Nagasaki (H&N) veterans. In particular, the SOP provides specific criteria and detailed actions to accomplish expedited processing of the majority of H&N cases received by DTRA. Expedited processing involves assignment of upper-bound group-based estimated radiation doses to veterans with qualifying potential radiation exposure scenarios. Expedited processing of H&N RDAs supports more timely response to VA requests and more timely decision-making for veterans' claims than if individual-specific, full RDAs were performed for every case. For H&N cases not qualifying for expedited processing under the criteria in this SOP, direction is provided for conducting full RDAs for those cases, including reference to appropriate DTRA NTPR SOPs. Finally, requirements and procedures for data and records management, and associated quality assurance (QA) activities are provided for completion of case processing.

This SOP is written for qualified NTPR researchers, DTRA analysts, RDA analysts, and QA auditors who process and evaluate H&N veteran cases received from the VA, and for managers who oversee the entire dose assessment process. The SOP conforms with procedures, methods, quality standards of assessment products, and established NTPR policies and guidelines.

2. Scope

This SOP applies to all radiation dose assessments for H&N participants, defined as veterans with qualifying exposure scenarios resulting from participation as World War II (WWII) Prisoners of War (POW) in Japan, or as members of the post-WWII occupation forces that moved in or around Hiroshima and Nagasaki, Japan. All H&N participant cases are initially evaluated for eligibility for expedited processing, and qualifying cases are processed according to the detailed methodology described herein. The doses to be assigned under expedited processing described in this SOP are well below the doses that would result in service connection for a claimant. Cases that do not initially qualify for expedited processing under the criteria in this SOP require more individualized dose assessment as discussed in this SOP. The SOP is applicable primarily to cases involving cancers of one or more internal organs or skin, but is also applicable to non-cancerous conditions.

The expedited processing methodology addresses all aspects of radiation dose determination to satisfy the requirements of Title 38, Code of Federal Regulations, Part 3, § 3.309 *Disease subject to presumptive service connection* and § 3.311 *Claims based on exposure to ionizing radiation*. The methodology described in this SOP assures that radiation dose assessments provide full consideration of benefit of the doubt as implemented in response to DTRA's guidance for assuring consistency with Department of Veterans Affairs requirements in 38 CFR 3.102 (VA, 1985).

3. Responsibilities

3.1 NTPR Researcher

The NTPR researcher is responsible for conducting the initial case review. The NTPR Researcher completes the input fields of the DTRA Decision Summary Sheet (DSS) that provide historical and dose-related information from the Nuclear Test Review Information System (NuTRIS) database. The NTPR researcher shall also summarize veteran's comments with clarifications and responses based on historical and dose-related information from records and document any special considerations in the DSS.

3.2 DTRA NTPR Program Manager/Radiation Dose Analyst

The DTRA NTPR Program Manager or designee in the position of DTRA NTPR radiation dose analyst (DTRA analyst) performs the majority of tasks required to assign Expedited Processing (EP) doses, including:

- reviewing veteran-provided, historical, NTPR-developed, and other radiation-related information pertinent to the veteran's potential exposure;
- determining the need for additional, veteran-specific information;
- determining the applicability of the EP dose assignments to an individual veteran's case;
- determining the need for, and if necessary, providing or requesting further evaluation of a case to determine the applicability of the EP dose assignments;
- documenting the radiation dose assignment evaluation and decision-making process in the DTRA DSS and/or the VA response letter;
- assigning EP doses, if applicable, and documenting the assignment in the DTRA DSS and/or VA response letter; and
- reviewing the results of QA auditor reviews, as applicable.

3.3 Radiation Dose Assessment Analyst

At the request of the DTRA analyst, the RDA analyst provides consultative discussions during any further evaluation of a case by the DTRA analyst, to assist in determining the

applicability of the EP dose assignment. In addition, the RDA analyst may be requested to perform a full RDA in accordance with SOP RA01 (DTRA, 2017).

3.4 Quality Assurance Auditor

The quality assurance auditor (QA auditor), with the assistance of a QA reviewer as requested, performs and documents independent quality assurance/quality control (QA/QC) reviews of the decision-making process and the resulting dose assignment as documented in the DTRA DSS and/or RDA documentation to assure that they are clear, complete, and prepared in accordance with NTPR policies and procedures. The QA auditor documents the results of the review on a QA/QC Review Report for Decision Summary Sheet.

4. Definitions

DOD	Department of Defense
Dose component	Potential contributors to total organ dose, including: ▪ neutron dose; ▪ initial gamma dose; ▪ external gamma dose from residual radiation; ▪ external dose from other sources (e.g., check sources, calibration sources); ▪ internal alpha dose; and/or ▪ internal beta-plus-gamma dose.
DSS	Decision summary sheet (DTRA, 2017, SOP RA02, Attachment 4), an electronic NuTRIS database report documenting key information and results of the DTRA NTPR dose assignment process, including: ▪ historical veteran participation and dose-related information from the NuTRIS database; ▪ a summary of veteran comments with DTRA NTPR clarifications and responses based on historical and dose-related information from records; ▪ documentation of the DTRA NTPR evaluation and decision-making process for dose assignment; and ▪ the assigned doses.
DTRA	Defense Threat Reduction Agency
EP	Expedited processing.
EPG	Expedited processing group as documented in McKenzie-Carter and Egbert (2015).
EPG Dose	Expedited processing group dose, the estimated upper-bound dose value for external gamma, internal alpha, and internal beta plus gamma radiation.
Full RDA	An RDA developed by an RDA analyst that uses veteran-specific dose parameter values to estimate doses and upper-bound doses in

	accordance with SOP RA01. A full RDA is performed for cases that are excluded from expedited processing.
Further evaluation	Case file evaluation beyond the initial review by the DTRA analyst. Further evaluation of an H&N case may include: ▪ an additional documented DTRA analyst review, supplemented with a consultation with an RDA analyst as needed, or ▪ a full RDA prepared in accordance with SOP RA01 (DTRA, 2017).
H&N	Hiroshima and Nagasaki, locations included in the NTPR program for selected World War II POWs and post-World War II occupation forces during specified time periods.
LD	Limiting dose, radiation dose values taken from McKenzie-Carter and Egbert (2015)
NIOSH-IREP	National Institute of Occupational Safety and Health Interactive RadioEpidemiological Program, a computer code used to calculate the probability that a cancer was caused by a radiation dose.
NTPR	Nuclear Test Personnel Review
NTS	Nevada Test Site, a site of U.S. atmospheric nuclear weapons testing.
NuTRIS	Nuclear Test Review Information System, a computer database of veteran information and assigned doses and upper-bounds.
POW	Prisoner of war; a veteran held as a prisoner by the Japanese during World War II.
PPG	Pacific Proving Ground, a site of U.S. atmospheric nuclear weapons testing.
PM	Program manager
QA	Quality assurance
QC	Quality control
RDA	Radiation dose assessment (see “Full RDA” above)
SOP	Standard Operating Procedure
Surrogate organ	An NTPR standard organ used for dose calculations as a substitute organ when no published dose conversion factors are available for the requested disease or medical condition.
Target organ	The biological organ or tissue that is associated with the specific medical condition for which a radiation dose determination has been requested by the VA.
TOD	Total organ dose, the total of all external and internal dose components for a target organ.
VA	U.S. Department of Veterans Affairs
VBDR	Veterans’ Advisory Board on Dose Reconstruction
XP	Expedited processing methodology as documented in SOP RA02 (DTRA, 2017).

5. Procedure: Detailed Activity/Task Description

The methodology for expedited processing of qualified NTPR H&N cases described in this SOP utilizes the expedited processing group (EPG) upper-bound doses documented in McKenzie-Carter and Egbert (2015). These EPG upper-bound doses were developed for three broadly-defined groups of exposed individuals: participants of the occupation of Hiroshima, participants of the occupation of Nagasaki, and former POWs in Japan. The EPG doses are not intended to be representations of doses actually received by an H&N veteran. However, the EPG doses bound the actual doses received by any individual included in the EPGs.

The major SOP activities are shown in the process overview diagram (Figure 1). The responsible NTPR personnel and more detailed activities are described in the narrative below.

5.1 Initial Case File Review by NTPR Researcher

The decision to expedite or otherwise respond to a VA claim inquiry starts with review by the NTPR researcher of the program participant's identified diseases and the request and receipt of required records and other information in accordance with the *NTPR Program Support SOP* (DTRA, 2015).

The NTPR researcher reviews case file information that may include, but is not limited to:

- veteran-provided information, including comments, identification of unusual exposure conditions, and answers to follow-up questions regarding the exposure;
- VA-furnished information, particularly the diseases or target organs for which the doses are requested;
- other historical veteran- and operation-specific information; and
- previously-determined veteran-, cohort-, and/or operation-specific radiation doses.

5.2 Identification of Standard Organ

The NTPR researcher uses the VA dose request, which specifies the target organ, tissue or disease, to identify the corresponding NTPR standard organ. This is done using SOP RA02, Attachment 2 (DTRA, 2017). The identified NTPR standard organ is either the same as the target organ, or in the case where the target organ or disease is not an NTPR standard organ, it is a surrogate organ for the specified target organ, tissue, or disease. The NTPR researcher documents the identified standard organ in Part 2 of the DSS.

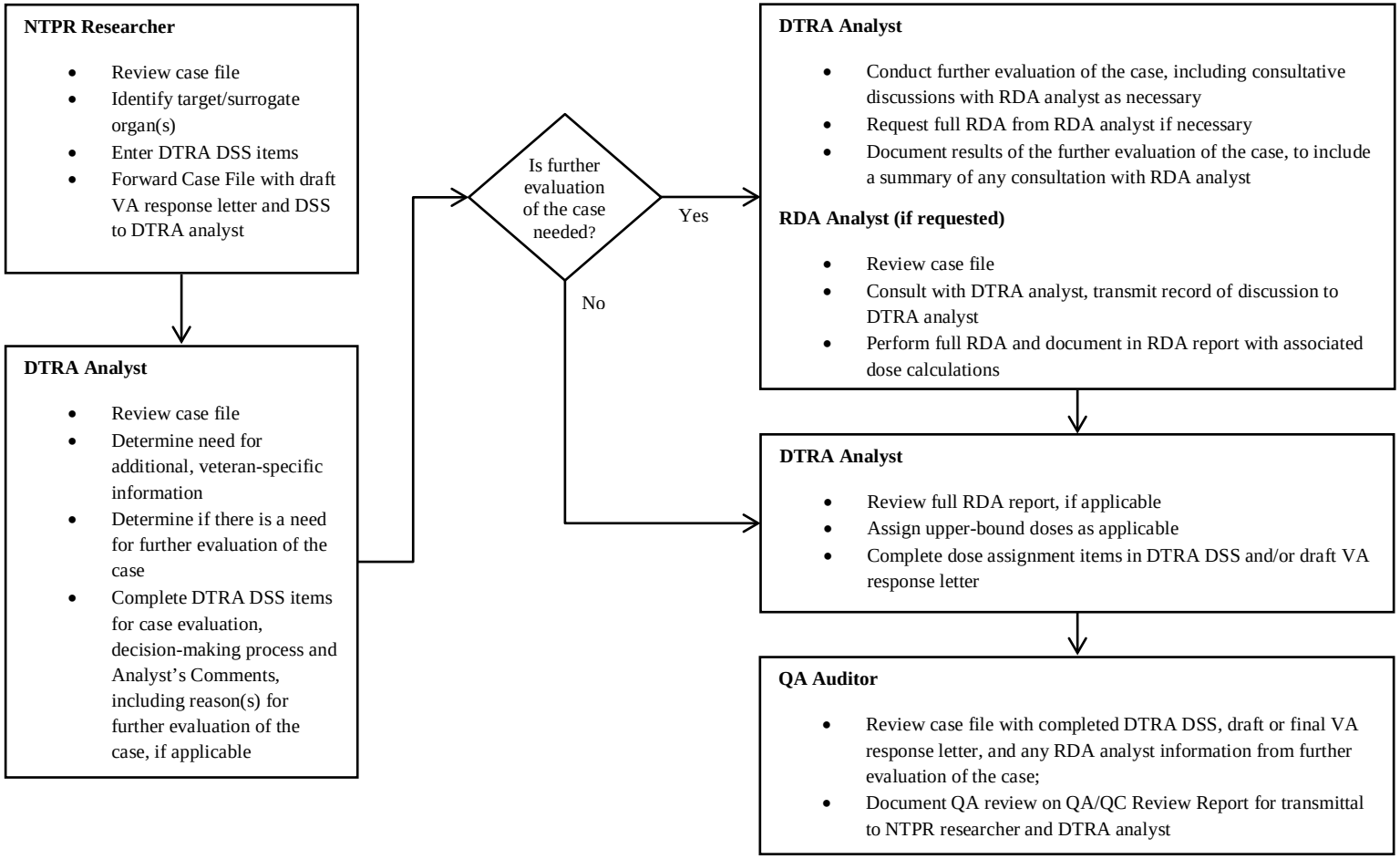

Figure 1. H&N Dose Assessment Process Overview

5.3 Decision Summary Sheet Documentation by NTPR Researcher

Following initial case review, the NTPR researcher completes Part 1 of the DTRA DSS shown in SOP RA02 (DTRA, 2017), Attachment 4. In completing Part 1, the NTPR researcher summarizes veteran comments, particularly those that might pertain to, or that the veteran might expect to pertain to, potential radiation exposure. The NTPR researcher clarifies or responds to issues raised by the veteran when pertinent historical information is available to do so.

The NTPR researcher also completes applicable items on Part 2 of the DSS, and identifies the EPG doses corresponding to the target organ reported in Table A1-1 and Table A1-2 (Attachment 1 of this SOP).

The NTPR researcher prepares a draft response letter for reporting NTPR assigned doses to the VA. For VA dose requests that are for a specific disease instead of a physical location or organ, such as chronic lymphocytic leukemia (CLL), the requested disease should be indicated in the draft VA response letter.

The NTPR researcher then forwards the case file, including the DTRA DSS and the draft VA response letter, to the DTRA analyst for evaluation and dose assignment.

5.4 DTRA Analyst Case File Review

The DTRA analyst reviews available case file information, including Part 1 and completed portions of Part 2 of the DTRA DSS. During this review, the DTRA analyst:

- reviews the case file, including as applicable the NTPR researcher-summarized information, veteran comments, and clarifications and responses to the veteran's comments that are documented in the DSS;
- verifies that the NTPR standard organ is correctly identified and, if necessary, requests an expert medical opinion. If there is a question regarding the applicable standard organ or the radiogenicity of a medical condition, the DTRA analyst should seek a medical opinion from a qualified physician knowledgeable in radiogenic illnesses;
- determines the applicable EPG(s); and
- determines the need for and, if needed, requests additional veteran-specific information.

Following review and any subsequent actions as identified below, the DTRA analyst completes the remaining items in Part 2 of the DSS to include the Dose Decision, Analyst Comments, External and Internal Organ dose assignments, and the required approval. For VA dose requests that are for a specific disease instead of a physical location or organ, such as CLL, the Standard Organ from SOP RA02, Attachment 2 (DTRA, 2017), should be used for the Internal Organ(s) on Part 2 of the DSS.

5.5 Identifying the Need for Further Evaluation of the Case

During review of the case file, the DTRA analyst determines whether the applicable EPG Total Organ Dose (TOD) can be assigned, or if the case requires further evaluation in order to assign the appropriate dose components. The case requires further evaluation if it involves any of the following:

- the applicable EPG Total Organ Dose (TOD) is greater than the corresponding Limiting Dose (LD), as identified in Table A1-3;
- the veteran was permanently assigned to RadSafe duties, or
- the veteran incurred unique exposures not consistent with the associated EPG scenario and parameter assumptions in McKenzie-Carter and Egbert (2015) that could have resulted in higher doses,

Note that cases involving one-time or occasional contact with or handling of a potentially-contaminated item do not necessarily require any further evaluation. For example, some veterans have claimed that they picked up small items from one of the cities and carried them around or kept them as souvenirs, or that they climbed onto potentially contaminated structures; these cases have been previously evaluated with the conclusion that potential doses are below the EPG doses contained herein.

When further evaluation of a veteran's case is required in order to determine the appropriate dose components, it will involve additional review by a DTRA analyst, and/or a full RDA. These actions are described in the following subsections.

5.5.1 DTRA Analyst Additional Review

A DTRA analyst may be required to conduct a more detailed review of available information in order to determine the appropriate dose assignment. Typically this more detailed review is used to determine if the veteran's specific exposure scenario clearly indicates that the EPG TOD is bounding to the veteran's actual TOD, or if there is a need to perform a full RDA due to indications of potential exposure beyond the conditions that define the applicable EPG.

The DTRA analyst may request informal consultation with an RDA analyst during this additional review. This consultation will normally consist of only brief discussions and possibly minimal calculations or data evaluation, in order for the DTRA analyst to be able to determine if the EPG doses are adequate to assign or if a full RDA is required. If the RDA analyst is consulted during the review, the RDA analyst transmits a brief communication to the DTRA analyst to document the consultation.

If, after additional review, the DTRA analyst determines that EPG doses are adequate to assign (the veteran's actual TOD is less than both the EPG dose and the LD), the DTRA analyst documents a brief summary of the review in Part 2 of the DTRA DSS. All pertinent results of the DTRA analyst review are documented in the Analyst Comments

of the DTRA DSS. If the EPG doses cannot be assigned, the case is excluded from expedited processing and the case is referred to an RDA analyst for a full RDA.

5.5.2 Full Radiation Dose Assessment

When the DTRA analyst determines that the case is excluded from expedited processing, a full RDA is conducted by an RDA analyst. A full RDA addresses all radiation dose components using detailed assumptions and calculations and is performed and documented in accordance with SOP RA01 (DTRA, 2017). This requirement will typically be limited to cases excluded from expedited processing based on the doses listed in Attachment 1 or where the veteran claims an unusual radiation exposure scenario that is inconsistent with the generic NTPR default assumptions used for Hiroshima, Nagasaki or POW dose assessments.

If a full RDA is required, the DTRA analyst documents the reason(s) for the full RDA requirement in Part 2 of the DSS. The RDA analyst transmits the completed RDA report and accompanying calculations to the DTRA analyst for review and inclusion in the case file.

5.6 Assigning Default Expedited Processing Group Dose Components

If the participant is not excluded from Expedited Processing per Section 5.5, the DTRA analyst performs dose assignment using the following guidance unless otherwise documented in the Analyst Comments of the DSS.

- For cases with only H&N participation, the DTRA analyst assigns the applicable EPG dose components for the requested organ(s), disease, and/or skin sites. These H&N EPG doses are reported in Table A1-1 and Table A1-2 (Attachment 1 of this SOP). If the case involves multiple H&N participations, the EPG TODs from each of the participations are compared and the higher value is assigned for each medical condition.
- For cases with both H&N participation and PPG and/or NTS participation, the DTRA analyst follows the guidance in SOP RA02 (DTRA, 2017).
- For cases involving benign thyroid nodular disease, the DTRA analyst assigns the dose components for the thyroid for this disease. This assignment is supported by expert medical opinion indicating that radiation doses from 25–36 rem would be unlikely to change the probability of causation for benign thyroid nodular disease from “unlikely” to “as likely as not” (Reeves, 2012).

5.7 Assigning Dose Components from a full Radiation Dose Assessment

If a full RDA has been completed, the DTRA analyst performs dose assignment using the following guidance unless otherwise documented in the Analyst Comments of the DSS.

- For cases with only H&N participation, the DTRA analyst assigns all dose components from the RDA for the veteran's H&N participation. If the case involves multiple H&N participations, the RDA must include all periods of participation.
- For cases with both H&N participation and PPG and/or NTS participation, the DTRA analyst assigns all H&N RDA dose components for the veteran's H&N participation, and then follows the guidance in SOP RA02 (DTRA, 2017).

5.8 Completion of Decision Summary Sheet

For dose assignments not requiring a full RDA, the DTRA analyst completes applicable sections of Part 2 of the DSS using researcher-documented information from Part 1, veteran-provided information, and other relevant information from the case file. In Part 2, (Justification), the DTRA analyst documents the reference document (typically this or another RDA SOP) that is the basis for the decision. In Analyst Comments, the DTRA analyst documents any specific EPGs used in the decision-making and additional exposure scenarios that are consistent with historical records, different than those of the comparable EPG, and that could potentially result in radiation doses greater than those of the EPG. The DTRA analyst determines and documents whether any such additional exposure scenarios could increase the veteran's radiation total dose above the EPG TOD. The DTRA analyst also summarizes the rationale used for the dose assignment, pertinent historical and dose information, and veteran comments and applicable responses in the Analyst Comments section. If further evaluation of the case results in a dose assignment other than the EPG doses, the DTRA analyst documents the dose assignment in Part 2 of the DSS.

5.9 Quality Assurance Auditor Review

The QA auditor reviews the case file and documents the performance of the quality review of the decision-making process, the DTRA DSS, the draft VA response letter, RDA analyst documentation (if applicable), and the resulting dose assignment for clarity, completeness, and conformance to NTPR policies and procedures. The QA auditor may be assisted by a QA reviewer in this review. The QA auditor documents the results of the review on a QA/QC Review Report for Decision Summary Sheet. If corrections or changes are recommended by the QA auditor, actions described above may be repeated as appropriate for the completion and documentation of the dose assignment and reporting of results to the VA.

6. Data and Records Management

Documentation resulting from implementation of this SOP is added to the case file and may include any of the following:

- Relevant documentation obtained or developed in accordance with DTRA (2015);
- NTPR researcher additions to the DTRA DSS;

- DTRA analyst additions to the DTRA DSS;
- Results of consultation with an RDA analyst, consisting of a brief summary of any communications;
- An RDA Report and supporting radiation dose calculations, in accordance with SOP RA01 (DTRA, 2017) if a full RDA is performed;
- QA auditor QA/QC Review Report for Decision Summary Sheet;
- Draft and/or final VA response letter.

7. Quality Control and Quality Assurance

Independent review of the records, process, and results related to radiation dose assignment, including both expedited processing and full RDAs, is performed and documented by the QA auditor. Results of case processing and quality reviews are reported to DTRA NTPR program management during semi-annual NTPR Program Management Reviews and in a Quarterly Quality Report with associated Reported Quality Issues (RQIs) spreadsheet. Areas in need of corrective action are identified and tracked through to correction on the RQI.

8. Referenced NTPR Standard Operating Procedures

(1) RA01 – Radiation Dose Assessment for Cases Requiring Detailed Analysis

(2) RA02 – Expedited Processing of Radiation Dose Assessments for Atmospheric Nuclear Weapons Testing Veterans

9. Reference Materials

(1) DTRA (Defense Threat Reduction Agency), 2015. NTPR Program Support SOP. CDRL – A008, Defense Threat Reduction Agency. Fort Belvoir, VA. March 27.

(2) DTRA (Defense Threat Reduction Agency), 2017. *Nuclear Test Personnel Review, Standard Operating Procedures for Radiation Dose Assessments – List and Overview, Update: January 2017*. DTRA-SOP-17-01, Defense Threat Reduction Agency, Fort Belvoir, VA. January 13.

(3) McKenzie-Carter, M. and Egbert, S. 2015. *Technical Basis for Expedited Processing of Radiation Dose Assessments for NTPR Hiroshima and Nagasaki Participants.* DTRA-TR-15-044, Defense Threat Reduction Agency, Fort Belvoir, VA. November 16.

(4) Reeves, G. to Murray, B. 2012. Electronic mail (email), Subject: Expedited doses for non-malignant thyroid disease. June 28.

(5) VA (U.S. Department of Veterans Affairs), 1985. 38CFR3.102: *Title 38 - Pensions, Bonuses, and Veterans' Relief. Chapter 1 – Department of Veterans Affairs (Continued). Part 3 – Adjudication. Section 3.102 - Reasonable doubt*. 50 FR 34458, Aug. 26, 1985, as amended at 66 FR 45630, Aug. 29, 2001.

Attachment 1

Expedited Processing Group (EPG) Doses for H&N Participants

Table A1-1. Whole Body and Internal Organ Expedited Processing Group (EPG) Doses for H&N Participants

External Whole-Body Gamma Doses (rem)						
Organ or Tissue	**Hiroshima**		**Nagasaki**		**POW**	
All	0.22		0.74		2.2	
Internal Organ Doses (rem)						
	Hiroshima		**Nagasaki**		**POW**	
Internal Organ	**Alpha**	**Beta plus Gamma**	**Alpha**	**Beta plus Gamma**	**Alpha**	**Beta plus Gamma**
Adrenals	<0.001	0.051	0.030	0.31	0.004	0.074
Bone surface	0.001	0.026	17	2.6	2.0	0.30
Brain	<0.001	0.010	0.030	0.24	0.004	0.040
Breast	<0.001	0.051	0.030	0.25	0.004	0.044
Stomach wall	<0.001	0.032	0.031	0.90	0.004	1.6
Small intestine wall	<0.001	0.024	0.032	1.9	0.004	2.4
Upper large intestine wall	<0.001	0.038	0.043	8.4	0.004	7.4
Lower large intestine wall	<0.001	0.069	0.068	23	0.004	12
Kidneys	<0.001	0.025	0.070	0.36	0.009	0.20
Liver	<0.001	0.053	3.6	0.47	0.43	0.18
Extra-thoracic region	<0.001	0.34	0.12	0.50	0.020	1.5
Lung	<0.001	0.64	0.25	1.6	0.043	1.7
Muscle	<0.001	0.026	0.030	0.31	0.004	0.078
Pancreas	<0.001	0.041	0.030	0.33	0.004	0.11
Red marrow	<0.001	0.032	0.81	1.3	0.097	0.17
Spleen	<0.001	0.041	0.030	0.31	0.004	0.085
Testes	<0.001	0.009	0.23	0.29	0.028	0.060
Thymus	<0.001	0.060	0.030	0.27	0.004	0.053
Thyroid	<0.001	0.025	0.030	2.3	0.004*	17*
Urinary bladder wall	<0.001	0.013	0.030	0.47	0.004	0.48

* POW cases with thyroid cancer are excluded from expedited processing. However, these doses should be assigned for all other POW claims for which the thyroid is the target or surrogate organ, including benign thyroid nodular disease.

Table A1-2. Eye Lens and Skin Expedited Processing Group (EPG) Doses for H&N Participants

External Beta + Gamma Doses (rem)					
Organ/Tissue/Disease	**Hiroshima**		**Nagasaki**	**POW**	
Lens of Eye (posterior subcapsular cataract)	0.23		1.8	4.1	
	Hiroshima		**Nagasaki**	**POW**	
Organ/Tissue/Disease	**All sites above the ankle**	**Foot or ankle**	**All skin sites**	**Top of head, neck, waist, foot/ankle**	**All sites except top of head, neck, waist, foot/ankle**
Skin: Malignant Melanoma and Basal Cell Carcinoma	3.4	*	*	*	*
Skin: Squamous Cell Carcinoma	3.4	7.3	68	*	170

* Cases with these skin cancer/skin site combinations are excluded from expedited processing.

Table A1-3. Expedited Processing Group (EPG) Total Organ Doses for H&N Participants

Total Organ Doses* and applicable Limiting Doses (rem)				
Organ or Tissue	**Hiroshima TOD**	**Nagasaki TOD**	**POW TOD**	**Limiting Dose†**
Adrenals	0.28	1.1	2.3	30
Bone surface	0.25	20	4.5	32
Brain	0.23	1.0	2.3	30
Breast	0.28	1.1	2.3	36
Stomach wall	0.26	1.7	3.8	18
Small intestine wall	0.25	2.7	4.6	44
Upper large intestine wall	0.26	9.2	9.6	26
Lower large intestine wall	0.29	24	14	26
Kidneys	0.25	1.2	2.4	31
Liver	0.28	4.8	2.8	7.7
Extra-thoracic region	0.56	1.4	3.7	22
Lung	0.86	2.6	3.9	30
Muscle	0.25	1.1	2.3	34
Pancreas	0.26	1.1	2.4	61
Red marrow	0.26	2.8	2.5	14
Spleen	0.27	1.1	2.3	44
Testes	0.23	1.3	2.3	41
Thymus	0.28	1.1	2.3	41
Thyroid	0.25	3.1	20‡	5.1
Urinary bladder wall	0.24	1.3	2.7	33

* Total Organ Doses were calculated by adding the upper-bound external dose to the upper-bound internal doses (alpha and beta+gamma), and rounding up to two significant digits. Neither occupation troops nor POWs were exposed to initial gamma radiation or neutron radiation from the bombs. All POW camps were at least 6 miles from the detonations. (McKenzie-Carter and Egbert, 2015)

† The Limiting Dose corresponds to a probability of causation of approximately 40 percent at the upper 99 percent confidence level for primary cancers of the indicated organ or tissue. The values shown are the lowest doses for any disease for which the NTPR standard organ is used, based on the cross-reference list in SOP RA02 (DTRA, 2017, Attachment 2).

‡ Cases for POWs with thyroid cancer are excluded from expedited processing and require a full RDA. These doses should be assigned for all other POW claims for which the thyroid is the target or surrogate organ, including benign thyroid nodular disease.