



DNSR article – CNSC Expectations for Licensee Response During Skin Contamination Events

This article describes the Directorate of Nuclear Substance Regulation's (DNSR) expectations for licensee response to skin contamination incidents. Experience gained over the past several years has shown that most skin contamination incidents, if detected promptly, actually result in relatively low extremity doses. Consequently, continued reporting of incidents which do not result in a significant dose would be unnecessarily burdensome for both licensees and the regulator. As a result, the DNSR is implementing a revised reporting scheme: only incidents in which the dose exceeds 10 percent of the corresponding dose limit must be reported to the licensing officer. In addition, this article provides a standardized method for evaluating skin dose, including detection screening levels to assist licensees in evaluating whether or not a particular incident must be reported.

Irrespective of the requirement to report, all licensees are required to document, record and investigate every skin contamination event to ensure work practices are optimized and to minimize the probability of repeat occurrences.

Response to skin contamination events can be divided into three parts:

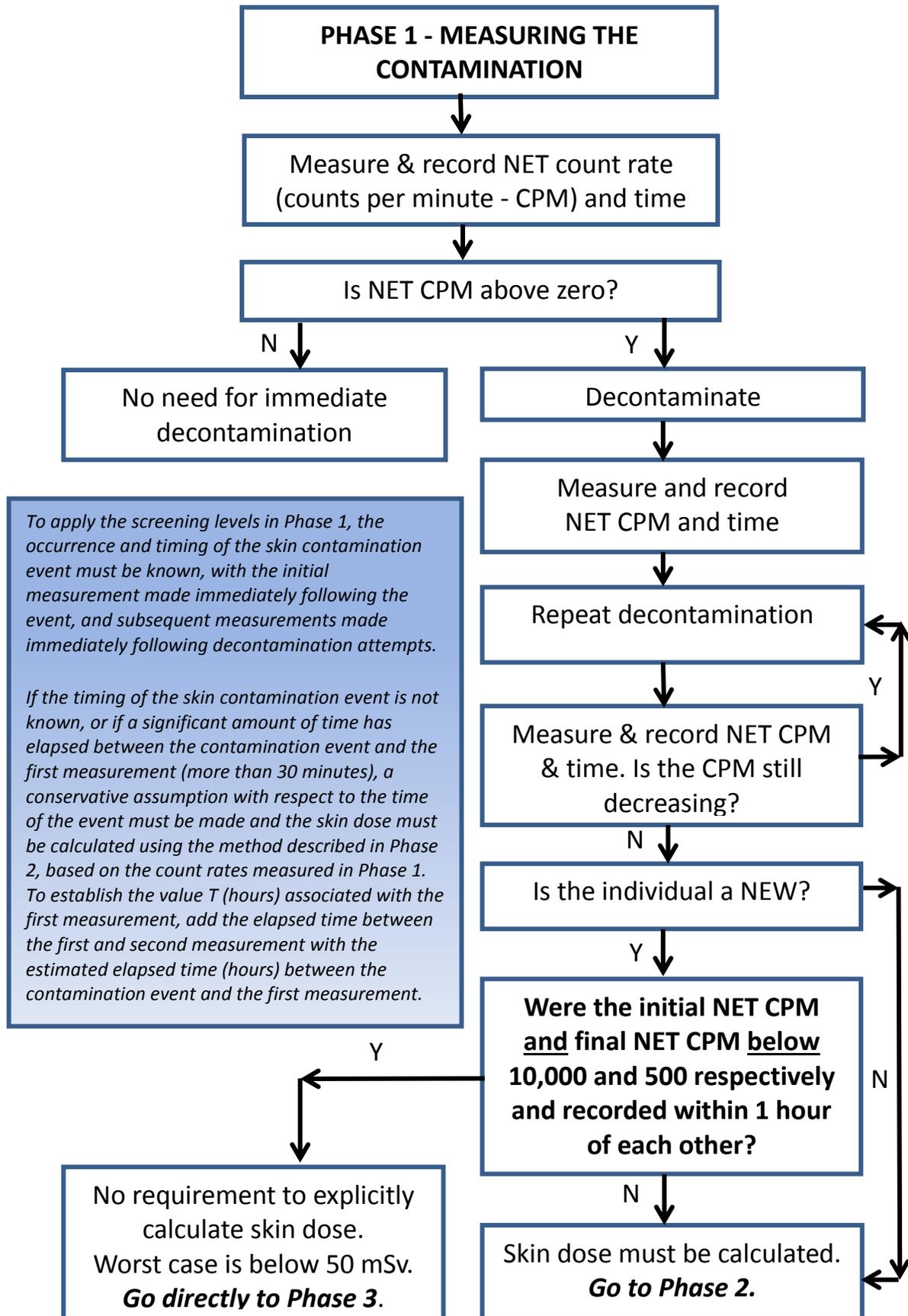
- Phase 1 – Measuring the contamination and decontaminating the skin
- Phase 2 – Calculating the skin dose
- Phase 3 – Reporting to the CNSC, if necessary

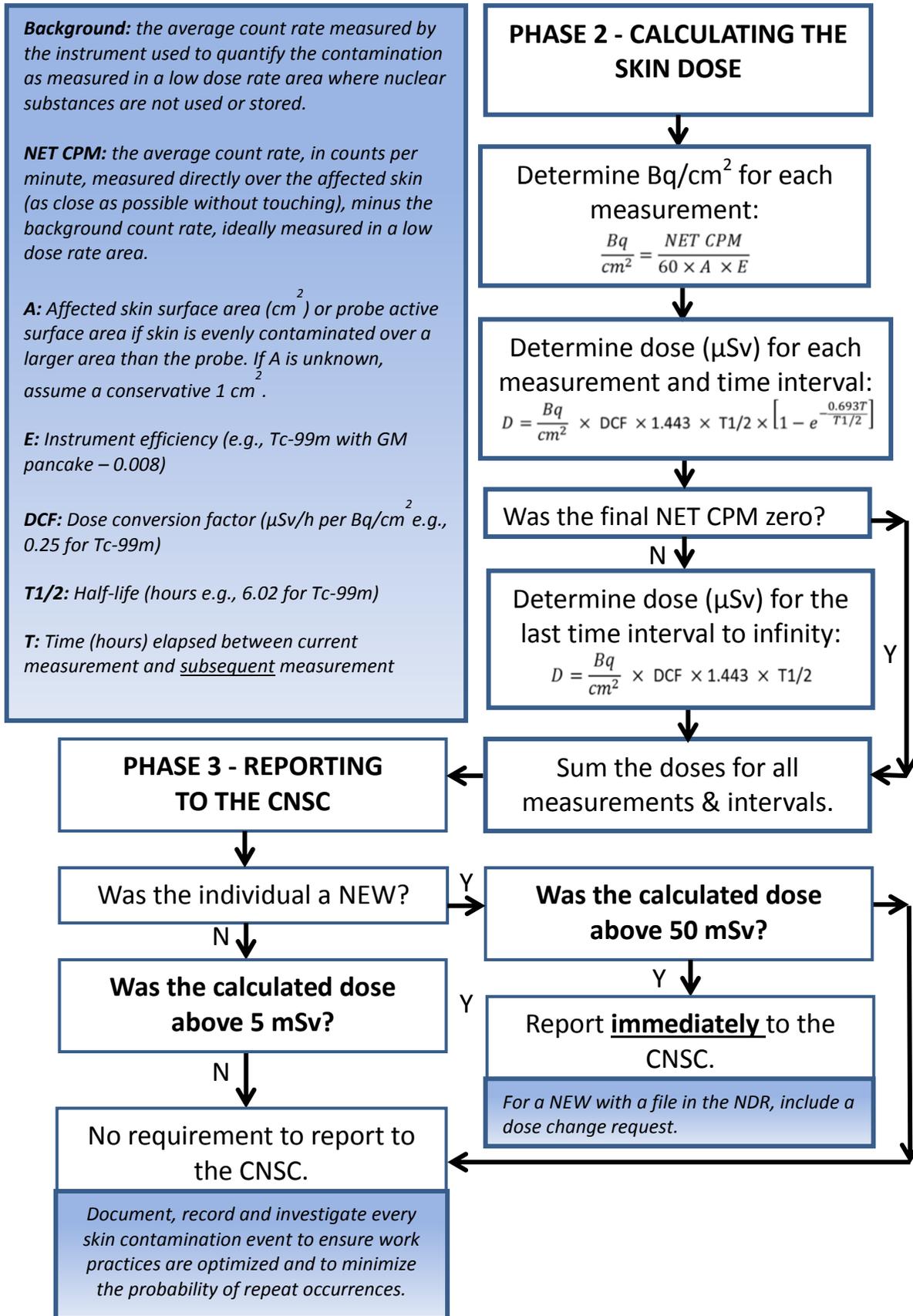
Reporting skin contamination events to the CNSC is only required for the following circumstances:

1. If a nuclear energy worker (NEW) was calculated to have received an extremity (skin) dose above 50 mSv.
2. If a Non-NEW was calculated to have received an extremity (skin) dose above 5 mSv.

The flow diagrams and appendices on the following pages provide step-by-step instructions on how to respond to skin contamination events.

Please contact your licensing officer if you have any questions regarding your regulatory requirements for event response and event reporting.





Appendix 1 – Flow diagram assumptions

1. Any measurement of contamination on the skin should be immediately washed.
2. The skin dose **must** be calculated whenever the incident involves a non-NEW.
3. The calculated skin dose threshold above which immediate reporting to the CNSC is required is **50 mSv** for a NEW and **5 mSv** for a non-NEW.
4. The worst case skin dose resulting from a 10,000 CPM NET measurement followed by a 500 CPM NET measurement after decontamination within one hour is approximately 48.3 mSv (Ga-67 measured with a pancake meter over 1 cm², skin decontamination unsuccessful beyond the 500 CPM, and a 27-day exposure). Consequently, the default screening level(s) for which the ascertaining of dose for a NEW is not required is:
 - **Less than 10 000 CPM NET (167 CPS)** on the initial measurement **AND 500 CPM NET (8.3 CPS)** on the subsequent measurement after decontamination efforts when both measurements are taken **within one hour** of each other
OR
 - **Less than 500 CPM NET (8.3 CPS)** if only one measurement is taken
5. These default values were established based on a worst case combination of isotope and detector. Note that, as illustrated in appendix 2, at these count rates, the dose incurred from isotopes other than Ga-67 would be much less than 50 mSv.
6. Licensees may choose to establish their own screening thresholds for reporting based on the isotopes they use and detection efficiency of their contamination monitors for those isotopes. In general, this would be expected to increase the count rates, at which reporting is required. Licensees who wish to adopt this approach must submit their evaluation of the screening levels to the CNSC for review prior to implementation.

*Note: Equivalent skin doses that have been ascertained to be above **50 mSv** should result in the licensee submitting a dose change request to the CNSC on behalf of the affected individual to facilitate the addition of the equivalent dose to the skin to their dose of record in the National Dose Registry.*

Appendix 2 – Skin dose calculations

Skin dose conversion coefficients ($\mu\text{Sv/h}$ per Bq/cm^2):

C-14	F-18	P-32	Ga-67	Y-90	Tc-99m	In-111	I-123	I-125	I-131	Tl-201
0.32	1.9	1.9	0.35	2.0	0.25	0.38	0.38	0.021	1.6	0.27

Reference: IAEA-TECDOC-1162

10 000 CPM NET - Doses after 1 hour				
Tc-99m	Ga-67	I-131	F-18	P-32
4.9 mSv	7.3 mSv	1.8 mSv	1.3 mSv	1.3 mSv
500 CPM NET - Doses after 27 days				
Tc-99m	Ga-67	I-131	F-18	P-32
2.3 mSv	41.0 mSv	22.3 mSv	0.2 mSv	22.8 mSv
Total Doses				
Tc-99m	Ga-67	I-131	F-18	P-32
7.2 mSv	48.3 mSv	24.1 mSv	1.5 mSv	24.1 mSv

Assumptions used in skin dose calculations

- Instrument used: pancake (Background 50 CPM)
- Measurement efficiencies: Tc-99m 0.8%, Ga-67 0.8%, I-131 15%, F-18 20%, P-32 25%
- Contaminated skin surface area: 1 cm^2