# Document Preparation Profile (DPP)
# Version 1.2 dated November 5, 2019

## 1. IDENTIFICATION

**Document Category** **Nuclear Security Series Technical Guidance**

**Working ID:** **NST063**

**Proposed Title:** **Identification and Categorization of Sabotage Targets, and Identification of Vital Areas at Nuclear Facilities**

**Proposed Action:** **Revision and combination of existing documents**

***IAEA NSS No.4 Engineering Safety Aspects of the Protection of Nuclear Power Plants against Sabotage***

***IAEA NSS No.16 Identification of Vital Areas at Nuclear Facilities***

**Review Committee(s) or Group:** **NSGC, NUSSC (informal)**

**Technical Officer(s):** **Kristof Horvath (NSNS/MAFA), Shahen Poghosyan (NSNI/SAS)**

## 2. BACKGROUND

To accomplish the goal of reducing the worldwide risk of nuclear sabotage, the IAEA leverages the Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM), a legally binding international instrument that specifically mentions sabotage. The IAEA recommendations for the physical protection of nuclear material and nuclear facilities against sabotage are contained in IAEA Nuclear Security Series (NSS) No. 13, *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)*. The recommendations for physical protection measures against sabotage are made on the basis of the potential radiological consequences resulting from an act of sabotage. If the potential radiological consequences of sabotage exceed the State's threshold for unacceptable radiological consequences, then the operator should identify as potential sabotage targets the structures, systems and components, and/or the nuclear material, the sabotage of which could directly or indirectly lead to such radiological consequences, and protect them. If the potential radiological consequences of a sabotage are greater than the State's threshold for high radiological consequences, then vital areas need to be identified and protected by providing an additional layer wihtin the protected area for detection, access control and delay. Any area containing nuclear material in an amount which, if dispersed, could lead to high radiological consequences should be designated a vital area, located inside a protected area, and a minimum set of equipment, systems or devices provided within that vital area to prevent high radiological consequences.

Currently, two Technical Guidance publications — IAEA NSS No.4 *Engineering Safety Aspects of the Protection of Nuclear Power Plants against Sabotage* and IAEA NSS No.16 *Identification of Vital Areas at Nuclear Facilities* — provide guidance on target identification for sabotage and identification of vital areas.

IAEA NSS No.4 provides guidance for evaluating the engineering safety aspects of the protection of nuclear power plants against sabotage, including standoff attacks. It describes a methodology for assessing the capacity of a selected subset of a nuclear power plant's safety related structures, systems and components to withstand sabotage induced events. This guidance takes into account the robustness of existing containment structures, systems and components, and emphasizes those aspects of sabotage protection that work synergistically with the protection

against extreme external events such as earthquakes, extreme meteorological events (e.g. tornadoes) and external accidents (e.g. aircraft crashes). The publication introduces a defence in depth approach to protect against sabotage, with layers comprising safety and security related systems and activities, and promotes self-assessment by the operator in cooperation with the competent authorities.

IAEA NSS No.16 provides detailed guidance on the identification of vital areas at nuclear facilities. It presents a structured approach to identifying the areas that contain equipment, systems and components to be protected against sabotage. The method builds upon safety analyses to develop sabotage logic models for sabotage scenarios that could cause unacceptable or high radiological consequences. The sabotage actions represented in the logic models are linked to the areas/locations from which they can be accomplished. The logic models are then analysed to determine areas that should be protected to prevent high radiological consequences.

Several national and regional workshops were held based on the above mentioned publications.

## 3. JUSTIFICATION FOR THE PRODUCTION OF THE DOCUMENT

In considering its 'roadmap' of guidance to support NSS No.13, the Nuclear Security Guidance Committee suggested that NSS No.4 and NSS No.16 both be considered for revision and possible combination into a single publication (Technical Guidance), and further guidance added to address categorization of sabotage targets on the basis of the level of potential radiological consequences, to help in designing graded levels of protection. Based on feedback from the Secretariat to this suggestion, NSGC at its 15$^{th}$ meeting in July 2019 requested the submission of a DPP to its next meeting.

Based on the feedback and experience gained during national and regional *Workshops on Preventive and Protective Actions against Sabotage*, the participants expressed the need for a more detailed and logical technical guidance on sabotage target identification. As IAEA NSS No.4 and IAEA NSS No.16 describe together the sabotage target identification and vital area identification process, which are closely interlinked, their consolidation and further development in a single publication will provide comprehensive Technical Guidance in this area.

IAEA NSS No.4 and IAEA NSS No.16 were published in 2007 and 2012, respectively. During the combination and revision of the two documents into one, other relevant publications developed more recently in the NSS will be reviewed in order to strengthen the harmony among these documents. As the outcomes of safety analyses provide input for the target identification process, relevant IAEA Safety Standards Series publications will also be taken into account when developing the draft.

## 4. OBJECTIVE

The Technical Guidance will provide further guidance to the Implementing Guide IAEA NSS No.27-G *Physical Protection of Nuclear Material and Nuclear Facilities* (*Implementation of INFCIRC/225/Revision 5*) on how to implement recommended requirements established in IAEA NSS No. 13 related to sabotage target identification and identification of vital areas.

The Technical Guidance will provide a detailed methodology for the identification of sabotage targets, including nuclear and other radioactive material used or stored in a nuclear facility, as well as its structures, systems and components important to nuclear safety and/or nuclear security, which, if subject to an initiating event of malicious origin, may contribute to an event sequence leading to unacceptable or high radiological consequences. Furthermore, the Technical Guidance will provide guidance on vital area identification.

The process described in the Technical Guidance will use the threat statement approach based on Revision 1 of IAEA NSS No.10 (*National Nuclear Security Threat Assessment, Design Basis Threats and Representative Threat Statements*, NST058) and will provide input to designing nuclear security systems and measures.

## 5. SCOPE

The Technical Guidance will apply to nuclear material and nuclear facilities under regulatory control, specifically those having the potential (e.g. radioactive material content, potential criticality) for sabotage to result in unacceptable radiological consequences or high radiological consequences. Taking into account the specificities of nuclear facilities, it will address the identification of sabotage targets and vital areas. It will also discuss how sabotage targets can be categorized, in order to apply a graded approach for the designing of the physical protection system. s and measures for protection of those targets. However, it will not address in detail the design of specific systems and measures.

The guidance will not address the identification of targets for unauthorized removal of nuclear material. Further, it will not address measures to mitigate or respond to such radiological consequences if sabotage occurs.

Although designed for nuclear material and nuclear facilities, the process and methodology of sabotage target identification may also be applicable to radioactive material, associated facilities, other high-valued assets, and structures, systems and components associated with facility operation and nuclear material processing.

## 6. PLACE IN THE OVERALL STRUCTURE OF THE RELEVANT SERIES AND INTERFACES WITH EXISTING AND/OR PLANNED PUBLICATIONS

As sabotage targets include structures, systems and components important to nuclear safety, and the methodology described in the document uses the outcomes of deterministic and probabilistic nuclear safety analyses, the Technical Guidance will address interfaces between nuclear security and nuclear safety. Consequently, the document will be developed in consultation with NSNI. Although, as Technical Guidance, this publication will not formally be an interface document, drafts will be provided to NUSSC for comment whenever they are submitted to NSGC for approval.

The Technical Guidance is expected to make reference to at least the following IAEA publications and international legal instruments (the list is not intended to be final or exhaustive):

1) Objective and Essential Elements of a State's Nuclear Security Regime, IAEA Nuclear Security Series No. 20, IAEA, Vienna (2013).
2) Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5), IAEA Nuclear Security Series No. 13, IAEA, Vienna (2011).
3) Physical Protection of Nuclear Material and Nuclear Facilities (Implementation of INFCIRC/225/Revision 5), IAEA Nuclear Security Series No. 27-G, IAEA, Vienna (2018).
4) Preventive and Protective Measures Against Insider Threats, IAEA Nuclear Security Series No. 8, IAEA, Vienna (2008).
5) National Nuclear Security Threat Assessment, Design Basis Threats and Representative Threat Statements, Draft Implementing Guide NST058 (revision of NSS No. 10).
6) Security of Nuclear Information, IAEA Nuclear Security Series No. 23-G, IAEA, Vienna (2015).
7) Use of Nuclear Material Accounting and Control for Nuclear Security Purposes at Facilities, IAEA Nuclear Security Series No. 25-G, IAEA, Vienna (2015).
8) Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015).
9) Safety of Nuclear Power Plants: Design, IAEA Safety Standards Series No. SSR-2/1 (Rev. 1), IAEA, Vienna (2016).
10) Safety of Nuclear Power Plants: Commissioning and Operation, IAEA Safety Standards Series No. SSR-2/2 (Rev. 1), IAEA, Vienna (2016).
11) Deterministic Safety Analysis for Nuclear Power Plants, IAEA Safety Standards Series No. SSG-2 (Rev. 1), IAEA, Vienna (2019).

12) Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants, IAEA Safety Standards Series No. SSG-3, IAEA, Vienna (2010).
13) Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants, IAEA Safety Standards Series No. SSG-4, IAEA, Vienna (2010).
14) Protection against Internal Hazards in the Design of Nuclear Power Plants, Draft Safety Guide DS494 (revision and combination of NS-G-1.7 and NS-G-1.11).
15) The Interface Between Safety and Security at Nuclear Power Plants, INSAG-24 (2010).
16) Amendment to the Convention on the Physical Protection of Nuclear Material, INFCIRC/274/Rev.1/Mod.1, IAEA, Vienna (2016).

## 7. OVERVIEW

The objectives of the State's physical protection regime should include protection against unauthorized removal, which is theft and other unlawful taking of nuclear material, and protection of nuclear material and nuclear facilities against sabotage. Targets for unauthorized removal are nuclear material used and stored in a nuclear facility; these materials should be categorized according to the categorization table included in IAEA NSS No.13, which document also establishes recommended minimum physical protection requirements. Targets for sabotage include the nuclear material, but also those other radioactive material, as well as structures, systems and components important to nuclear safety and/or nuclear security, which if subject to an initiating event of malicious origin may contribute to an event sequence leading to unacceptable or high radiological consequences. Unlike the categorization for the unauthorized removal of nuclear material described in Table 1 of IAEA NSS No. 13, there is no such simple classification scheme for sabotage targets.

The input data for the methodology to identify sabotage targets are the type, quantity and location of nuclear material used or stored in the facility, as well as information on the above described systems, structures and components important to nuclear safety and/or nuclear security. The methodology starts with the identification of potential targets, including material, structures, systems and components based on documents of the operator of the facility, including its security system design and operation documentation, facility design documentation, facility operating procedures, nuclear material flows, and outcomes of safety analyses, including Level 1 and 2 PSA. This is followed by a detailed assessment on categorization of these targets, according to the graded approach, from viewpoint of their importance regarding potential radiological consequences, taking into account, among others, the adversary capabilities defined in the relevant threat statement as well as the accident scenarios described in deterministic and probabilistic safety analyses.

The Technical Guidance will explain how the robustness of existing structures, systems and components important to nuclear safety and/or nuclear security can be taken into account during the identification and categorization of the sabotage targets in the mirror of the threat capabilities, with due consideration that a change in the threat assessment or the DBT could have an impact on this identification and categorization. It will also review those aspects of sabotage protection that can work synergistically with the protection against extreme external events, such as earthquakes and tornadoes, and external accidents, and it will explain how to assess the security effectiveness of such protection measures.

The Technical Guidance will also provide a methodology how to identify vital areas.

The sabotage target identification and categorization, and the vital area identification should be performed by a multi-disciplinary team at the facility consisting of (at a minimum) nuclear engineering, safety specialist, systems engineering, PSA specialist, operations specialist, and nuclear security specialist.

Tentative table of contents:

1. INTRODUCTION (Background, Objective, Scope, Structure)

2. GENERAL OVERVIEW OF THE METHODOLOGY FOR IDENTIFICATION OF SABOTAGE TARGETS AND VITAL AREAS
3. AVAILABLE DATA
4. IDENTIFICATION OF POTENTIAL TARGETS
5. ASSESSMENT OF IMPORTANCE
6. CATEGORIZATION OF SABOTAGE TARGETS
7. IDENTIFICATION OF VITAL AREAS
8. ADDITIONAL CONSIDERATIONS (documentation requirements, information protection, conservatism, regular and occasional review/revision of results)

**8. PRODUCTION SCHEDULE:** Provisional schedule for preparation of the document, outlining realistic expected dates for *(fill the column corresponding to your proposed document and delete the other columns)*:

| | A* | B* | C* |
|---|---|---|---|
| STEP 1: Preparing a DPP | DONE | DONE | DONE |
| STEP 2: Approval of DPP by the Coordination Committee | | 2019 Sep | |
| STEP 3: Approval of DPP by the relevant review Committees | | 2019 Nov | |
| STEP 4: Approval of DPP by the CSS | | | |
| STEP 5: Preparing the draft | | 2020 Jan | |
| STEP 6: Approval of draft by the Coordination Committee | | 2020 Aug | |
| STEP 7: Approval by the relevant review Committees for submission to Member States for comments | | 2020 Nov | |
| STEP 8: Soliciting comments by Member States | | 2021 Jan | |
| STEP 9: Addressing comments by Member States | | 2021 May | |
| STEP 10: Approval of the revised draft by the Coordination Committee<br>Review in NSOC | | 2021 Aug | |
| STEP 11: Approval by the relevant review Committees | | 2021 Nov | |
| STEP 12: Endorsement by the CSS | | | |
| STEP 13: Establishment by the Publications Committee | | 2022 Feb | |
| STEP 14: Target publication date | | 2022 Dec | |

## 9. RESOURCES

Estimated resources involved by the Secretariat (person-weeks) and the Member States (number and type of meetings)

- IAEA NSNS Technical Officer – 20 person-weeks
- IAEA NSNI Technical Officer – 10 person-weeks
- CM#1 – To discuss the concept and develop the skeleton of the Technical Guidance
- Home Based Assignment (20 days) – To populate text in the document
- CM#2 – To discuss the first draft of the Technical Guidance and prepare a draft for review by experts from MSs
- TM – To review the draft Technical Guidance and gather comments from experts

- CM#3 – To discuss the comments from experts and prepare the final draft of the Technical Guidance
- CM#4 (if required) – To resolve comments from MSs received during the 120-days review