



**WORKING PAPER**

**DANGEROUS GOODS PANEL (DGP)**

**TWENTY-FIFTH MEETING**

**Montréal, 19 to 30 October 2015**

**Agenda Item 6: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:**

**6.2: Development of competency-based training provisions for dangerous goods**

**COMPETENCY-BASED TRAINING  
FOR DANGEROUS GOODS PERSONNEL AND STATE EMPLOYEES**

(Presented by T. Muller)

**SUMMARY**

This working paper presents an overview of the work done and results realized by the DGP Working Group on Training. It contains finalized training provisions and guidance material developed by the training working group based on comments made during discussions at the DGP 2015 working group meeting in Montréal (DGP-WG15, 27 April to 1 May 2015).

**Action by the DGP:** The DGP is invited to agree to:

- a) temporarily include the proposed amendments to Part 1;4 of the Technical Instructions shown in Appendix A to this working as part of a new Attachment 4 to the 2017-2018 Edition of the Technical Instructions with the intention of moving the provisions to Part 1;4 of the 2019-2020 Edition of the Technical Instructions;
- b) include the proposed guidance material on dangerous goods competency-based training shown in Appendix B to this working paper as part of new Attachment 4 to the 2017-2018 Edition of the Technical Instructions;
- c) include the competency framework for State Employees shown in Appendix C to this working paper in the 2017-2018 Edition of the Supplement to the Technical Instructions; and
- d) publish the proposed amendments to Part 1;4 of the Technical Instructions shown in Appendix A and the guidance material show in Appendix B on the ICAO website for information purposes and to welcome comments on the material through the site.

## 1. INTRODUCTION

1.1 At the 2015 DGP working group meeting in Montréal (DGP-WG15, 27 April to 1 May 2015), finalized training provisions and guidance material developed by the DGP Working Group on Competency-Based Training were presented to the meeting. The material included:

- a) a finalized competency framework for dangerous goods personnel (reviewed and supported at DGP-WG/14) proposed for inclusion in a new Attachment 4 to the 2017-2018 Edition of the Technical Instructions;
- b) a finalized competency framework for State employees proposed for inclusion in the 2017-2018 Edition of the Supplement to the Technical Instructions;
- c) guidance material on competency-based training proposed for inclusion in Attachment 4 to the 2017-2018 Edition of the Technical Instructions; and
- d) comprehensive amendments to the training provisions in Part 1;4 proposed for inclusion in new Attachment 4 to the 2017-2018 Edition of the Technical Instructions for information purposes with the intention of moving the provisions to Part 1;4 in the 2019-2020 Edition of the Technical Instructions.

1.2 DGP-WG/15 supported the inclusion of the proposed amendments to Part 1;4, guidance material on the competency-based training approach, and the competency framework for dangerous goods personnel in a new attachment to the Technical Instructions as a transitional measure and for publishing the material on the ICAO website. The meeting agreed to the revisions to Part 1;4 in principle while raising some issues which the working group on training was tasked with addressing. These were:

- a) Concerns related to a proposed new provision (Part 1;4.1) intended to clarify that entities involved with handling general (non-dangerous goods) cargo were still required to be trained for awareness of dangerous goods. It was suggested the new provision expanded the scope to all shippers including those generally not addressed by Annex 18. The need for legal advice by the ICAO Legal Bureau was suggested by the Secretary in order to clarify whether dangerous goods training for persons only handling general cargo was legally enforceable under Annex 18;
- b) The need for additional guidance material was raised, particularly in relation to assessment of competence once training had been completed; and
- c) Some panel members expressed concern with removing Tables 1-4 and 1-5 from the Technical Instructions until more experience with the provisions in the new attachment was gained.

1.3 The DGP Working Group on Training met from 10 to 12 August in Rio de Janeiro, Brazil to refine the material and address comments raised at DGP-WG15. By that time advice was sought and provided by the ICAO Legal Bureau as to whether the current structure of Annex 18 provided a legal basis for addressing staff not normally handling dangerous goods. The working group on training reconsidered the new proposed provision in 1;4.1.1 and the legal advice received from the ICAO Legal Bureau. It was recognized that whether dangerous goods training for persons only handling general cargo was legally enforceable under the scope of Annex 18 was in fact a much broader issue than just training. For that reason it was felt that a separate working paper on the scope of Annex 18 would be more appropriate (see DGP/25-WP/44). The working group on training recommended that the proposed new

provision in 1;4.1 remain within square brackets to signify further consideration was needed once clarity on the scope of Annex 18 was obtained.

1.4 The working group on training developed additional guidance material and further amendments to Part 1;4 of the Technical Instructions. Proposed amendments to Part 1;4 and the guidance material are included in Appendices A and B to this working paper respectively. The competency framework for State employees, which remains unchanged since DGP-WG15, is provided in Appendix C to this working paper.

1.5 With regard to concerns related to removing the training tables, it was felt that keeping the current tables in the new training chapter would be in conflict with the principles of competency-based training. When developing competency-based training, the type and level of training necessary to perform a specific function needed to be determined. Even though the current tables were only provided as guidance, it was recognized that they were often considered as mandatory requirements and the principle of “commensurate with responsibilities” was not often applied. It was believed that retaining the tables could lead to the perception that general knowledge of all subject matter was mandatory, and not only matter necessary to perform a particular function or task. For that reason the working group on training was not in favour of keeping the current Tables 1-4 and 1-5 in revised Part 1;4. The new matrix tool included with the guidance material in Appendix B would foster a more analytical approach for training developers to take in determining the type and level of knowledge needed to perform specific functions and would reinforce the need to determine training needs commensurate with responsibilities.

1.6 Finally, it should be noted that while the guidance material on a competency-based training approach suggests a preferred method of complying with dangerous goods training requirements, other training approaches which result in competent personnel should also be considered acceptable. The proposed revisions to Part 1;4 require a person to be trained in order to be competent to perform his/her function(s). In other words, different training methods would still be acceptable as long as they result in the development of a trained person competent to perform his/her designated function(s).

## 2. ACTION BY THE DGP

2.1 The DGP is invited to agree to:

- a) temporarily include the proposed amendments to Part 1;4 of the Technical Instructions shown in Appendix A to this working as part of a new Attachment 4 to the 2017-2018 Edition of the Technical Instructions with the intention of moving the provisions to Part 1;4 of the 2019-2020 Edition of the Technical Instructions;
- b) include the proposed guidance material on dangerous goods competency-based training shown in Appendix B to this working paper as part of new Attachment 4 to the 2017-2018 Edition of the Technical Instructions;
- c) include the competency framework for State Employees shown in Appendix C to this working paper in the 2017-2018 Edition of the Supplement to the Technical Instructions; and
- d) publish the proposed amendments to Part 1;4 of the Technical Instructions shown in Appendix A and the guidance material show in Appendix B on the ICAO website for information purposes and to welcome comments on the material through the site.



**APPENDIX A**

**PROPOSED REVISIONS TO PART 1, CHAPTER 4 OF THE TECHNICAL INSTRUCTIONS  
FOR INCLUSION IN NEW ATTACHMENT 4 OF THE TECHNICAL INSTRUCTIONS**

**Attachment 4**

**PROPOSED NEW TRAINING PROVISIONS  
(APPLICABLE FROM 1 JANUARY 2019)**

**INTRODUCTORY CHAPTER**

**PROPOSED REVISIONS TO THE TRAINING PROVISIONS**

The training provisions are undergoing an extensive review by the Dangerous Goods Panel (DGP) which will result in revisions to Part 1;4 and the addition of new guidance material in an attachment to these Instructions. Proposed revisions to Part 1;4 are temporarily included as part of this attachment in this edition of the Instructions for the purpose of review and feedback to ICAO by relevant parties.

Chapter 1 of this attachment provides the proposed new training requirements which will replace current Part 1;4 in the 2019-2020 Edition of these Instructions. Chapters 2 to 4 provide guidance material on implementing a competency-based approach to training specific to dangerous goods which will stay in this attachment as Chapters 1 to 3 in the 2019-2020 Edition of the Technical Instructions.

The proposed revisions to Part 1;4 and guidance material can also be found on the ICAO public website at [www.icao.int/safety/DangerousGoods](http://www.icao.int/safety/DangerousGoods). Comments on the revised training provisions are welcome and should be submitted through that website by 31 March 2017. Based on comments received, further amendments to the proposed new provisions may be made by the DGP for further consideration at its twenty-sixth meeting which will be held during the fourth quarter of 2017.

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## Chapter 1

# PROPOSED NEW PART 1, CHAPTER 4 — DANGEROUS GOODS TRAINING (Applicable from 1 January 2019)

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Replace Part 1, Chapter 4 of the Technical Instructions with the following:

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### INTRODUCTORY NOTE

The objective of a dangerous goods training programme is to ensure that persons are competent to perform their assigned functions. An approach to achieving this objective is provided in Chapter 2 to Attachment 4.

## Chapter 4

### DANGEROUS GOODS TRAINING

*Parts of this Chapter are affected by State Variations AE 2, BR 7, CA 11, HK 1;  
see Table A-1*

#### 4.1 GENERAL REQUIREMENTS

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There were varying opinions among members of the DGP Working Group on Training as to whether training requirements for entities involved in the transport of non-dangerous goods as cargo went beyond the scope of Annex 18 and the Technical Instructions. The group agreed that the scope was not clearly defined in Annex 18 but that clarifying it was beyond the group's purview. It recommended the problem be raised as a separate issue at DGP/25. The following alternative provisions are therefore tentatively proposed pending an outcome on the clarification of the scope of Annex 18 (see DGP/25-WP/44).

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[The employer must ensure that personnel are competent to perform any function described in these Instructions for which they are responsible prior to performing any of these functions. This must be achieved through training and assessment.]

[The employer must ensure that personnel with responsibilities for the processing, acceptance or handling of cargo, mail or passengers or of checked and/or carry-on baggage are competent to perform the function for which they are responsible prior to performing any of these functions. This must be achieved through training and assessment.]

*Note.—Guidance on developing a competency-based approach to training is provided in Chapter 2 to Attachment 4.*

#### 4.2 TRAINING PROGRAMMES

4.2.1 The employer must establish and maintain a dangerous goods training programme.

*Note.— A training programme includes elements such as design methodology, assessment, initial and recurrent training, instructor qualifications and competencies, training records and evaluation of the effectiveness of training.*

4.2.2 All operators must establish a dangerous goods training programme regardless of whether or not they are approved to transport dangerous goods as cargo.

4.2.3 Personnel must be trained and assessed commensurate with the functions for which they are responsible prior to performing any of these functions. Personnel that have received training but that are assigned to new functions must be assessed to determine their competence in respect of their new function. If competency is not demonstrated, appropriate additional training must be provided. Personnel must be trained to recognize the hazards presented by dangerous goods, to safely handle them and to apply appropriate emergency response procedures.

[ *Note.— In order to prevent the introduction of undeclared dangerous goods into air transport, any person who performs functions that may indirectly impact the movement of cargo, COMAT, baggage, passengers, or mail such as passenger or cargo reservation personnel and engineering personnel should also be trained.*]

4.2.4 Security personnel who are involved with the screening of passengers and crew and their baggage and cargo or mail must be trained.

*Note.— Security personnel are required to be trained irrespective of whether the operator on which passenger or cargo is to be transported carries dangerous goods as cargo.*

4.2.5 Personnel must receive recurrent training and assessment within 24 months of previous training and assessment to ensure that competency has been maintained. However, if recurrent training and assessment is completed within the final three months of validity of the previous training and assessment, the period of validity extends from the month on which the recurrent training and assessment was completed until 24 months from the expiry month of that previous training and assessment.

4.2.6 Training courses may be developed and delivered by or for the employer.

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DGP/25 is invited to consider whether including the following note is appropriate. Some members of the DGP Working Group on Training suggest it goes against competency-based training principles in that this knowledge is not necessary to perform all dangerous-goods related functions competently. Others, although understanding this point of view, believe that the note should be included as an outreach tool recognizing that there is potential for all categories of personnel to be passengers. This was the original reasoning behind recommending training on passenger provisions for all categories of personnel in current Table 1-4.

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[ *Note.— All training courses should include provisions for dangerous goods carried by passengers and crew (see Part 8).*]

4.2.7 The employer must maintain a record of training and assessment for personnel.

4.2.7.1 The record of training and assessment must include:

- a) the individual's name;
- b) the most recent training and assessment completion month;
- c) a description, copy or reference to training and assessment materials used to meet the training and assessment requirements;
- d) the name and address of the organization providing the training and assessment; and
- e) evidence which shows that personnel have been assessed as competent.

4.2.7.2 Training and assessment records must be retained by the employer for a minimum period of 36 months from the most recent training and assessment completion month and must be made available upon request to personnel or the appropriate national authority.

4.2.8 Dangerous goods training programmes for operators must be approved by the appropriate authority of the State of the Operator in accordance with the provisions of Annex 6 — *Operation of Aircraft*.

4.2.9 Dangerous goods training programmes required for entities other than operators and designated postal operators should be approved as determined by the appropriate national authority.

### 4.3 INSTRUCTOR QUALIFICATIONS AND COMPETENCIES

4.3.1 Unless otherwise provided for by the appropriate national authority, instructors of initial and recurrent dangerous goods training must demonstrate or be assessed as competent in instruction and the function that they will instruct prior to delivering such training.

4.3.2 Instructors delivering initial and recurrent dangerous goods training must at least every 24 months deliver such courses, or in the absence of this attend recurrent training.

### 4.4 DESIGNATED POSTAL OPERATORS

4.4.1 Staff of designated postal operators must be trained commensurate with their responsibilities. The subject matter to which their various categories of staff should be familiar with is indicated in Table 1-4.

4.4.2 Dangerous goods training programmes for designated postal operators must be subjected to review and approval by the civil aviation authority of the State where the mail was accepted by the designated postal operator.

**Table 1-4. Content of training courses for staff of designated postal operators**

<i>Aspects of transport of dangerous goods by air with which they should be familiar, as a minimum</i>	<i>Designated postal operators</i>		
	<i>Categories of staff</i>		
	A	B	C
General philosophy	x	x	x
Limitations	x	x	x
General requirements for shippers	x		
Classification	x		
List of dangerous goods	x		
Packing requirements	x		
Labelling and marking	x	x	x
Dangerous goods transport document and other relevant documentation	x	x	
Acceptance of the dangerous goods listed in 1;2.3.2	x		
Recognition of undeclared dangerous goods	x	x	x
Storage and loading procedures			x
Provisions for passengers and crew	x	x	x
Emergency procedures	x	x	x

**CATEGORIES**

- A — Staff of designated postal operators involved in accepting mail containing dangerous goods
- B — Staff of designated postal operators involved in processing mail (other than dangerous goods)
- C — Staff of designated postal operators involved in the handling, storage and loading of mail

*Note.— Guidance on the aspects of training to be covered by staff of designated postal operators can be found in S-1;3.*



## APPENDIX B

# PROPOSED GUIDANCE MATERIAL ON A COMPETENCY-BASED TRAINING APPROACH TO DANGEROUS GOODS TRAINING FOR INCLUSION AS A NEW ATTACHMENT 4 TO THE TECHNICAL INSTRUCTIONS

## ATTACHMENT 4 TO THE TECHNICAL INSTRUCTIONS

### Chapter 2

## GUIDANCE ON A COMPETENCY-BASED APPROACH TO DANGEROUS GOODS TRAINING

### 2.1 INTRODUCTION

ICAO has recognized that the implementation of a competency-based approach to training for safety-critical functions is essential to ensure that enough qualified and competent personnel support the air transport system. This chapter provides guidance to Contracting States in implementing a competency-based approach to dangerous goods training and assessment for personnel involved in the transport of cargo, mail, passengers and baggage by air. The *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868) contains greater detail on competency-based training and assessment.

### 2.2 COMPETENCY-BASED TRAINING AND ASSESSMENT

2.2.1 Conventional dangerous goods training is typically designed around the job title and is subject-matter driven (e.g. Table 1-4 in Part 1;4 of this edition of the Technical Instructions lists the subject matter relating to dangerous goods which various categories of personnel should be familiar). Competency-based training is designed to ensure that personnel can perform the function for which they are responsible.

2.2.2 The development of competency-based training and assessment is based on a systematic approach whereby competencies and their standards are defined, training is based on the competencies identified, and assessments are developed to determine whether these competencies have been achieved.

2.2.3 Competencies describe what a competent person's performance on the job should be. The PANS-TRG defines competency as "a combination of skills, knowledge and attitudes required to perform a task to the prescribed standard".

2.2.4 A critical feature of competency-based training is continuous assessment to ensure training is efficient and effective in order to provide the skills, knowledge and attitudes required to perform the function.

*Note.*— *Competency-based training and assessment is described in more detail in the PANS-TRG, Chapter 2, 2.2.*

### 2.3 COMPETENCY-BASED PROVISIONS IN ICAO

2.3.1 Competency-based approaches are used to prepare professionals for a variety of domains besides aviation (e.g. medical education, the oil and gas industry, pharmaceutical industry, social work, teacher education).

2.3.2 In 2006, ICAO introduced the multi-crew pilot licence (MPL) in Annex 1 — *Personnel Licensing*. This was the first competency-based training provision developed by ICAO. It resulted from the work of the Flight Crew Licensing and Training Panel (FCLTP) whose goal was to develop provisions that would not put conventional pilot training methods out of compliance but would allow an alternative training path that made use of contemporary instructional methods. The FCLTP developed the first edition of the PANS-TRG to provide detailed procedures to assist States and the industry in implementing the MPL.

2.3.3 Since then, ICAO has introduced several competency frameworks in its provisions related to the following:

- a) aircraft maintenance personnel (PANS-TRG, Doc 9868);
- b) flight procedure designers (*The Quality Assurance Manual for Flight Procedure Design* (Doc 9906), Volume 2);
- c) flight validation pilots (Doc 9906, Volume 6);
- d) designated medical examiners (*Manual of Civil Aviation Medicine* (Doc 8984)); and
- e) air traffic controllers and air traffic safety electronics personnel (PANS TRG, Doc 9868)

## **2.4 BENEFITS OF COMPETENCY-BASED TRAINING TO THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR**

### **2.4.1 Supports safety management systems (SMS)**

2.4.1.1 Annex 19 requires operators conducting international commercial air transport in accordance with Annex 6, Part I or Part III, to implement an SMS. An operator's SMS addresses the aviation activities that are related to the safe operation of the aircraft. These aviation activities include the carriage of dangerous goods in the scope of the operator's SMS. Other entities in the dangerous goods transport chain should be encouraged to implement a similar safety system.

2.4.1.2 Implementing SMS requires that all personnel understand the safety philosophy and embrace a disciplined and standardized approach for SMS. Personnel need to know their roles and responsibilities with respect to dangerous goods and have the requisite competencies to perform their functions within the SMS. Therefore, the depth of training each person receives should be appropriate to the functions they perform. This could range from a familiarization level to expert-level for dangerous goods professionals. To ensure that personnel have the knowledge, skills and abilities to support SMS, training activities should follow the competency-based approach.

2.4.1.3 The "Swiss-Cheese" Model of accident causation proposes that complex aviation systems are extremely well defended by layers of defences making single-point failures rarely consequential in such systems (see paragraph 2.3 of the *Safety Management Manual (SMM)* (Doc 9859)). The model illustrates that accidents involve successive breaches of multiple system defences and that all accidents include a combination of both active conditions (actions or inactions that have an immediate adverse effect) and latent conditions (conditions that exist in the aviation system well before a damaging outcome is experienced). Doc 9859 identifies training as one of the three main groups of defences in aviation and identifies deficiencies in training as a latent condition. The importance of clearly-defined competency-based training is essential for the design and delivery of training programmes aimed at developing qualified personnel better able to eliminate or mitigate risks related to the safe transport of dangerous goods by air.

### **2.4.2 Facilitates development of effective dangerous goods training and reduces risks**

2.4.2.1 The application of competency-based training will benefit the safe transport of dangerous goods, which may reduce occurrences that could introduce risk to the aviation system. Currently the training requirement in the Technical Instructions is based on evidence that personnel have completed the dangerous goods course and successfully passed the test. This, however, does not guarantee that personnel can apply what was learned in the course while performing their functions. A competency-based training approach designs training and assessment that is specific to their functions and not just theoretical knowledge about dangerous goods.

2.4.2.2 The acceptance of dangerous goods for air transport requiring an operator to verify that the dangerous goods are properly prepared for transport can be used as an example. This verification is accomplished through a checklist process so as to prevent dangerous goods not properly prepared from being transported on the aircraft. However, if training has not adequately prepared personnel to complete this process, risks to the aircraft and its occupants may be introduced if an improperly prepared shipment is accepted and transported. In addition, without adequate ability to complete the acceptance process, the shipment may be rejected even though it is properly prepared. This can cause increased costs to the shipper and the operator and delay the shipment.

2.4.2.3 Another example would be the preparation of dangerous goods shipments which includes identifying, classifying, packaging, marking, labelling and documentation for the transport of dangerous goods. These functions are considered critical and key to the correct transport of dangerous goods. In competency-based training, shipper's knowledge, skills and abilities should result in demonstrating their proficiency to meet these functions. It is critical that dangerous goods shipments are prepared in compliance with the Technical Instructions prior to offering the shipment for transport to an operator. This should reduce the number of improperly-prepared shipments thus reducing cost and the introduction of risk into the aviation system.

## **2.5 DRIVING PRINCIPLES**

### **2.5.1 The "function" approach**

2.5.1.1 The Technical Instructions state that personnel must be trained in the requirements commensurate with their responsibilities. Responsibilities are not necessarily category/job specific as indicated in Tables 1-4 and 1-5 in Part 1;4 of this edition of the Technical Instructions. For example, in smaller operations, a person may perform many functions such as accepting dangerous goods and loading/securing dangerous goods on board an aircraft. This person's training must address all of the functions performed. Also, entities such as ground handling companies and freight forwarders may perform functions that are specific to a shipper or an operator. These entities must train their personnel commensurate with their responsibilities and functions they perform regardless of their job title. Concentrating on functions and responsibilities rather than a job title or description will ensure that a person is competent to perform the function in compliance with the Technical Instructions.

2.5.1.2 Tables 1-4 and 1-5 in Part 1;4 of this edition of the Technical Instructions refer only to the aspect of knowledge that personnel should have to perform their specific job, but do not cover the "how to" part of their job. The focus of competency-based training is to ensure that personnel can perform their job. Tables 1-4 and 1-5 in current Part 1;4 do not support a competency-based approach.

## 2.6 ROLES AND RESPONSIBILITIES IN A COMPETENCY-BASED APPROACH TO TRAINING

### 2.6.1 Employer

2.6.1.1 Employers need to determine the purpose and objective of the competency-based training programme based on the functions for which their personnel are responsible. A training programme includes elements such as design methodology, initial and recurrent training, assessment, instructor qualifications and competencies, training records and evaluation of its effectiveness.

2.6.1.2 Employers should ensure that training is designed and developed to establish clear links among the competencies to be achieved, learning objectives, assessment methods, and course materials.

### 2.6.2 Instructor

2.6.2.1 In competency-based training, the instructor facilitates the trainee's progression towards the achievement of competencies. They also collect information about the effectiveness of the training materials which supports continuous improvement. See instructor competencies in PANS-TRG.

### 2.6.3 Trainee

2.6.3.1 In competency-based training, trainees are active participants in their learning process and the achievement of competencies as opposed to passive recipients of knowledge. The competency-based training programme provides them with a clear idea of their learning path towards competency through the training programme and beyond. The competency-based training should directly contribute to improving their performance on the job. Trainees' feedback is essential in ensuring that competency-based training is effective.

### 2.6.4 Regulator

2.6.4.1 There are important differences between the ways the regulator would oversee a traditional training programme versus a competency-based training programme. In a traditional training programme, the authority may assess the course components and final test against the elements described in Part 1, Chapter 4, Tables 1-4 and 1-5 of this edition of the Technical Instructions. The fact that all components of any course are there (or appear to be there) and trainees pass the required test does not necessarily mean that they can perform their assigned functions competently.

2.6.4.2 Where competency-based training has been implemented, regulators should oversee the training programme to ensure that it actually produces personnel that can perform the function for which they are responsible in a specific operational setting and in compliance with the national regulatory framework.

## 2.7 DEVELOPING COMPETENCY-BASED TRAINING FOR DANGEROUS GOODS

### 2.7.1 Methods used to develop the ICAO competency framework

2.7.1.1 A competency framework for dangerous goods personnel and a complementary flowchart are provided in Chapters 3 and 4. The competency framework consists of competency units, competency elements and performance criteria which are defined in the PANS-TRG as:

- a) **Competency unit.** A discrete function consisting of a number of competency elements.
- b) **Competency element.** An action that constitutes a task that has a triggering event and a terminating event that clearly defines its limits, and an observable outcome.

- c) **Performance criteria.** Simple, evaluative statements on the required outcome of the competency element and a description of the criteria used to judge whether the required level of performance has been achieved.

2.7.1.2 All responsibilities of personnel involved in transport of dangerous goods by air are described by the following six functions which correspond to the competency units:

- a) classifying dangerous goods;
- b) preparing a dangerous goods shipment;
- c) processing/accepting cargo;
- d) managing cargo pre-loading;
- e) accepting passenger and crew baggage; and
- f) transporting cargo/baggage.

The flowchart in Chapter 3 illustrates the typical processes of performing these functions.

*Note.— Reporting of dangerous accidents, incidents and other occurrences have not been included as a function as reporting may be required at any point after dangerous goods have been prepared for transport.*

## 2.7.2 Methods to develop competency-based training

2.7.2.1 An employer conducts a training needs analysis to determine what they need as a result of training and what their resources are to achieve this result. This critical step will ensure that training fits the employer's purpose and is effective.

2.7.2.2 The employer selects the appropriate competencies associated with the functions that its personnel perform from the ICAO competency framework. In doing so, employers must consider their own operational and organizational environments. For example, one operator may accept dangerous goods shipments as cargo while another may not; a shipper may be dealing with a single class of dangerous goods, while another deals with many. In addition, an employer must consider domestic and international regulatory requirements that apply to their operations. Prior to proceeding with the development of competency-based training, where appropriate, employers should liaise directly with the regulator to ensure that their requirements are taken into account.

2.7.2.3 The employer then determines the level of knowledge and/or skills necessary to perform each of the customized competencies. For example, the person accepting dangerous goods will not require the same level of knowledge and/or skills related to classification as someone who is classifying dangerous goods. Chapter 5 provides a sample matrix tool that can be used to determine the knowledge personnel performing specific functions should maintain. Functions corresponding to the competency framework provided in Chapter 3 are listed across the columns of the table and subject matter (knowledge) is listed down the rows. The employer should indicate what knowledge is needed for a particular function within the organization with a check mark at the point at which the competency element and the knowledge element intersect.

2.7.2.4 The employer must study the target population (future trainees) with a view to identifying the knowledge, skills and attitudes that they already have, to collect information on preferred learning styles, and on the social and linguistic environments of prospective trainees, all of which could have an impact on the training design. The target population may be a mixture of experienced and newly recruited personnel, groups differing in age, etc. All this information is important for determining the knowledge, skills and attitudes already possessed by the target population and for designing the most appropriate programme of instruction.

2.7.2.5 The employer documents the result of the above work as its own customized competency framework. The training curriculum can then be developed based on this competency framework.

2.7.2.6 Competency-based training requires continuous assessment of the trainee's progress until they are competent to perform their assigned function. A trainee's assessment may be completed through a variety of tools including observation of job performance, tests or other practical exercises. In order for assessment tools to be effective, they must be valid and reliable both in terms of being an appropriate measure of the competency being tested and of obtaining consistent results with different raters and ratings.

2.7.2.7 To ensure its effectiveness, the employer should continuously evaluate the training programme. The purpose of this evaluation is to determine the extent to which the training fulfils the purpose for which it was designed. Where appropriate, corrective actions should be implemented and the training programme re-evaluated.

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**ATTACHMENT 4 TO THE TECHNICAL INSTRUCTIONS****Chapter 3****DANGEROUS GOODS COMPETENCY FRAMEWORK****ABBREVIATIONS USED**

<i>Abbreviation</i>	<i>Meaning</i>
CU	Competency unit
CE	Competency element
PC	Performance criteria

**COMPETENCY FRAMEWORK****CU 1 Classifying dangerous goods**

- CE 1.1 Evaluate substances or articles against classification criteria, as applicable
  - PC 1.1.1 Determine if it is dangerous goods
  - PC 1.1.2 Determine if it is forbidden under any circumstances
- CE 1.2 Determine dangerous goods description
  - PC 1.2.1 Determine class or division
  - PC 1.2.2 Determine packing group, if applicable
  - PC 1.2.3 Determine proper shipping name and UN number
  - PC 1.2.4 Determine if it is forbidden unless approval or exemption is granted
- CE 1.3 Review special provisions
  - PC 1.3.1 Assess if special provision(s) is applicable
  - PC 1.3.2 Apply special provision(s)

**CU 2 Preparing dangerous goods shipment**

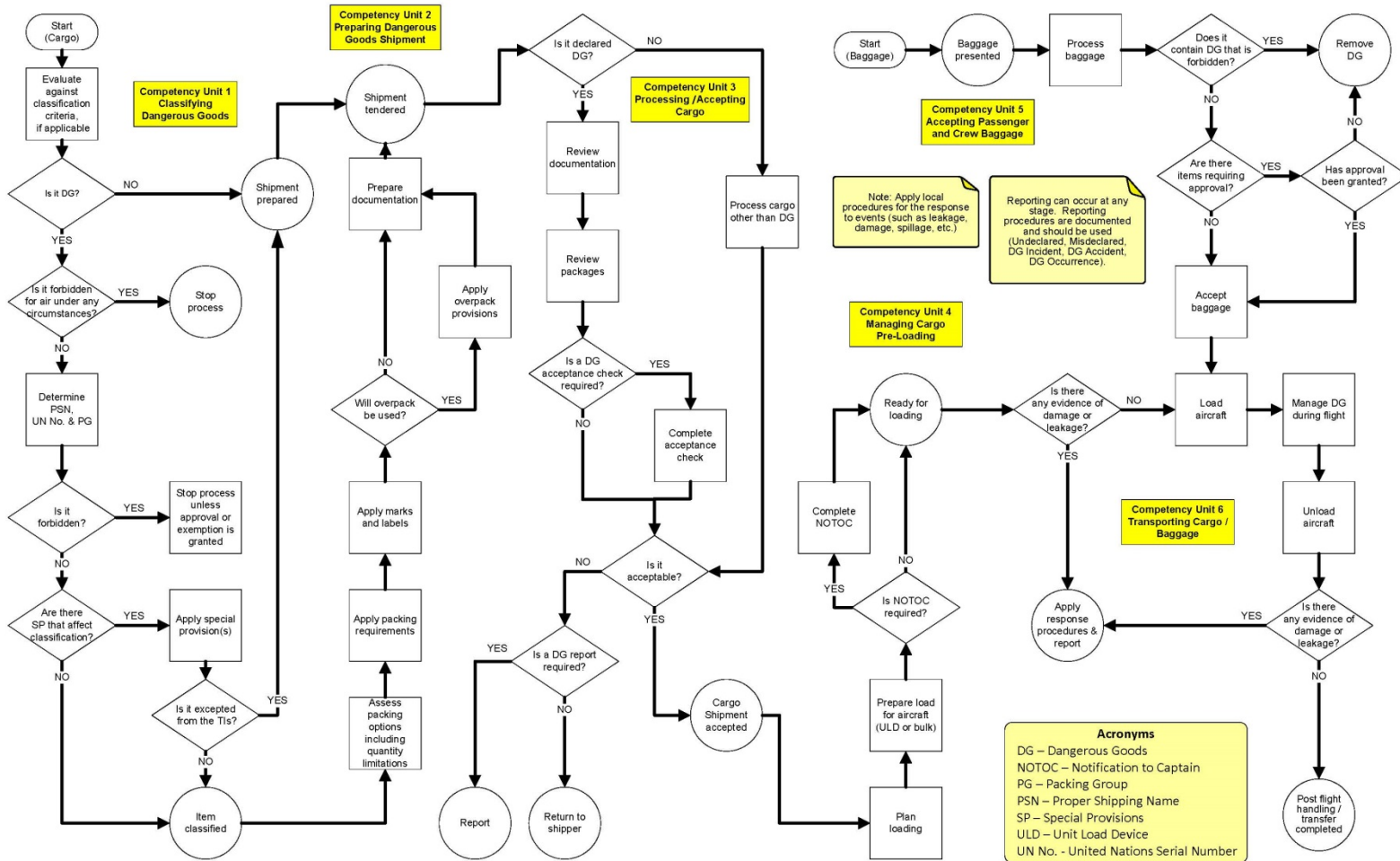
- CE 2.1 Assess packing options including quantity limitations
  - PC 2.1.1 Consider limitations (de minimis quantities, excepted quantities, limited quantities, passenger aircraft, cargo aircraft only, special provisions)
  - PC 2.1.2 Consider State and operator variations
  - PC 2.1.3 Determine if all-packed-in-one can be used
  - PC 2.1.4 Select how dangerous goods will be shipped based on limitations and variations
- CE 2.2 Apply packing requirements
  - PC 2.2.1 Consider constraints of packing instructions
  - PC 2.2.2 Select packaging materials (absorbent, cushioning, etc.)
  - PC 2.2.3 Assemble package
- CE 2.3 Apply marks and labels
  - PC 2.3.1 Determine applicable marks
  - PC 2.3.2 Apply marks
  - PC 2.3.3 Determine applicable labels
  - PC 2.3.4 Apply labels
- CE 2.4 Determine if overpack can be used
  - PC 2.4.1 Apply marks if necessary
  - PC 2.4.2 Apply labels if necessary
- CE 2.5 Prepare documentation
  - PC 2.5.1 Complete the dangerous goods transport document
  - PC 2.5.2 Complete other transport documents (e.g. AWB)
  - PC 2.5.3 Include other required documentation (e.g. approvals/exemptions, etc.), as applicable
  - PC 2.5.4 Retain copies of documents as required

- CU 3 Processing/accepting cargo**
    - CE 3.1 Review documentation
      - PC 3.1.1 Verify air waybill
      - PC 3.1.2 Verify dangerous goods transport document
      - PC 3.1.3 Verify other documents as applicable (exemptions, approvals, etc.)
      - PC 3.1.4 Verify State/operator variations
    - CE 3.2 Review package(s)
      - PC 3.2.1 Verify marking
      - PC 3.2.2 Verify label
      - PC 3.2.3 Verify package type
      - PC 3.2.4 Verify package conditions
      - PC 3.2.5 Verify State/operator variations
    - CE 3.3 Complete acceptance procedures
      - PC 3.3.1 Complete acceptance checklist, if applicable
      - PC 3.3.2 Provide shipment information for load planning
      - PC 3.3.3 Retain documents as required
    - CE 3.4 Process/accept cargo other than dangerous goods
      - PC 3.4.1 Check documentation for indications of undeclared dangerous goods
      - PC 3.4.2 Check packages for indications of undeclared dangerous goods
  
  - CU 4 Managing cargo pre-loading**
    - CE 4.1 Plan loading
      - PC 4.1.1 Determine stowage requirements
      - PC 4.1.2 Determine segregation, separation, aircraft/compartment limitations
    - CE 4.2 Prepare load for aircraft
      - PC 4.2.1 Check packages for indications of undeclared dangerous goods
      - PC 4.2.2 Check for damage and/or leakage
      - PC 4.2.3 Apply stowage requirements (e.g. segregation, separation, orientation)
      - PC 4.2.4 Apply ULD tags when applicable
      - PC 4.2.5 Transport cargo to aircraft
    - CE 4.3 Issue NOTOC
      - PC 4.3.1 Enter required information
      - PC 4.3.2 Verify conformance with load plan
      - PC 4.3.3 Transmit to loading personnel
  
  - CU 5 Accepting passenger and crew baggage**
    - CE 5.1 Process baggage
      - PC 5.1.1 Identify forbidden dangerous good
      - PC 5.1.2 Apply approval requirements
    - CE 5.2 Accept baggage
      - PC 5.2.1 Apply operator requirements
      - PC 5.2.2 Advise pilot in command
  
  - CU 6 Transporting cargo/baggage**
    - CE 6.1 Load aircraft
      - PC 6.1.1 Transport cargo/baggage to aircraft
      - PC 6.1.2 Check packages for indications of undeclared dangerous goods
      - PC 6.1.3 Check for damage and/or leakage
      - PC 6.1.4 Apply stowage requirements (e.g. segregation, separation, orientation)
      - PC 6.1.5 Verify that NOTOC reflects against aircraft load
      - PC 6.1.6 Verify passenger baggage requirements if applicable
      - PC 6.1.7 Inform pilot-in-command and flight operations officer/flight dispatcher
    - CE 6.2 Manage dangerous goods during flight
      - PC 6.2.1 Detect presence of dangerous goods not permitted in baggage
      - PC 6.2.2 Apply procedures in the event of an emergency
      - PC 6.2.3 Inform flight operations officer/flight dispatcher/air traffic control in the event of an emergency
    - CE 6.3 Unload aircraft
      - PC 6.3.1 Apply specific unloading considerations as applicable
      - PC 6.3.2 Check packages for indications of undeclared dangerous goods
      - PC 6.3.3 Check for damage and/or leakage
      - PC 6.3.4 Transport cargo/baggage to facility/terminal
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## **ATTACHMENT 4 TO THE TECHNICAL INSTRUCTIONS**

### **Chapter 4**

#### **DANGEROUS GOODS FUNCTIONS — PROCESS FLOWCHART**





**ATTACHMENT 4 TO THE TECHNICAL INSTRUCTIONS**

**Chapter 5**

**FUNCTION/KNOWLEDGE MATRIX TOOL**





	Dangerous goods functions																			
	CU 1 Classifying dangerous goods			CU 2 Preparing dangerous goods shipment					CU 3 Processing/ accepting cargo				CU 4 Managing cargo pre-loading			CU 5 Accepting passenger and crew baggage		CU 6 Transporting cargo/baggage		
	CE 1.1	CE 1.2	CE 1.3	CE 2.1	CE 2.2	CE 2.3	CE 2.4	CE 2.5	CE 3.1	CE 3.2	CE 3.3	CE 3.4	CE 4.1	CE 4.2	CE 4.3	CE 5.1	CE 5.2	CE 6.1	CE 6.2	CE 6.3
<b>Dangerous goods knowledge</b>																				
Packaging performance tests																				
Requirements for the construction and testing of cylinders and closed cryogenic receptacles, aerosol dispensers and small receptacles containing gas (gas cartridges) and fuel cell cartridges containing liquefied flammable gas																				
Packagings for infectious substances of Category A																				
Requirements for the construction, testing and approval of packages for radioactive material and for the approval of such material																				
Acceptance procedures																				
Storage and loading																				
Inspection and decontamination																				
Provision of information																				
Provisions concerning passengers and crew																				
Provisions to aid recognition of undeclared dangerous goods																				
Helicopter operations																				
Provisions for dangerous goods carried by passengers or crew																				

**Competency elements**

- 1.1 — Evaluate substances or articles against classification criteria, as applicable
- 1.2 — Determine dangerous goods description
- 1.3 — Review special provisions

- 2.1 — Assess packing options including quantity limitations
- 2.2 — Apply packing requirements
- 2.3 — Apply marks and labels
- 2.4 — Determine if overpack can be used
- 2.5 — Prepare documentation
- 3.1 — Review documentation
- 3.2 — Review package(s)
- 3.3 — Complete acceptance procedures
- 3.4 — Process/accept cargo other than dangerous goods
- 4.1 — Plan loading
- 4.2 — Prepare load for aircraft
- 4.3 — Issue NOTOC
- 5.1 — Process baggage
- 5.2 — Accept baggage
- 6.1 — Load aircraft
- 6.2 — Manage dangerous goods during flight
- 6.3 — Unload aircraft

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## APPENDIX C

### COMPETENCY FRAMEWORK FOR STATE EMPLOYEES

#### PROPOSED AMENDMENT TO THE SUPPLEMENT TO THE TECHNICAL INSTRUCTIONS TO INCORPORATE GUIDANCE MATERIAL ON COMPETENCY-BASED TRAINING FOR DANGEROUS GOODS STATE EMPLOYEES

### Part S-1

## GENERAL

### (ADDITIONAL INFORMATION FOR PART 1 OF THE TECHNICAL INSTRUCTIONS)

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Insert new Chapter 4 as follows:

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### Chapter 4

#### GUIDANCE TO STATES ON COMPETENCY-BASED TRAINING FOR STATE EMPLOYEES INVOLVED IN THE REGULATION AND OVERSIGHT OF TRANSPORT OF DANGEROUS GOODS BY AIR

##### 1.1 INTRODUCTION

1.1.1 The objective of this chapter is to provide guidance to States in implementing competency-based training and assessment for personnel engaged in policies, regulation, inspection and supervision of work related to the transport of dangerous goods by air. It includes a competency framework for the uniform implementation of training and assessment required for State employees who must ensure compliance with their State's obligations and with Annex 18 — *The Safe Transport of Dangerous Goods by Air*.

1.1.2 It is noted that States use a variety of systems to exercise safety oversight in the transport of dangerous goods by air. ICAO's safety oversight audits have identified differences among States in their inspectors' performance standards and in the implementation of their respective civil aviation dangerous goods programmes. For example, one State may have a clearly-defined process for the approval of dangerous goods training programmes while another may not. Applying a common competency framework would result in harmonized performance standards of State employees.

1.1.3 A generic competency framework for State employees is at Attachment I to this chapter. This competency framework reflects safety-critical tasks and, when applied, will have a positive impact on specific dangerous goods functions and the ability of individuals to perform their jobs successfully and to the required standards. Each State must provide specific training for these functions to each of its employees involved in policy making, regulation and oversight of compliance of dangerous goods transported by air.

## 1.2 TERMINOLOGY

For the purpose of this chapter, the following terminology applies:

**Air operator certificate.** A certificate authorizing an operator to carry out specified civil air transport operations.

**Competency.** A combination of skills, knowledge and attitudes required to perform a task to the prescribed standard.

**Competency-based training and assessment.** Training and assessment that are characterized by a performance orientation, emphasis on standards of performance and their measurement, and the development of training to the specified performance standards.

**Competency element.** An action that constitutes a task that has a triggering event and a terminating event that clearly defines its limits, and an observable outcome.

**Competency unit.** A discrete function consisting of a number of competency elements.

**Dangerous goods.** Articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Instructions.

**Inspection method.** Techniques that are used during the course of evaluating compliance with relevant regulations. The inspection methods include:

- a) observation: visually observing the performance of regulatory requirements for compliance with relevant regulations;
- b) interview: a technique by which questions or discussions with persons performing transportation functions are used to gather information concerning the transportation of dangerous goods;
- c) document review: reviewing paper or electronic records to determine whether required documents are properly prepared, contain accurate information, and maintained as required by the regulations;
- d) verification: using third party information to independently confirm whether regulatory requirements are being met; and
- e) procedure evaluation: ensuring appropriate written procedures, addressing all regulated activities undertaken, are in place.

**Operations manual.** A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

**Operator.** A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

**Performance criteria.** Simple, evaluative statements on the required outcome of the competency element and a description of the criteria used to judge whether the required level of performance has been achieved.

**Shipper.** A person, organization or enterprise undertaking any of the shipper's responsibilities of Part 5 of the Technical Instructions.



## COMPETENCY FRAMEWORK FOR STATE EMPLOYEES

### 1. SCOPE OF THE COMPETENCY FRAMEWORK

1.1 The scope of the competency framework concerns State employees involved in the regulation and oversight of the transport of dangerous goods by air based on obligations of States according to the Convention on International Civil Aviation:

- a) the State is responsible for implementing a system for determining compliance with Annex 18; and
- b) the application of the basic principles of a competency-based approach determines the performance level for State employees in carrying out their function to meet the State's obligations as defined by the Annex 18;

1.2 The competency framework has taken into account the "ICAO Safety Oversight Transport of Dangerous Goods Audit Checklist", itemizing the separate civil aviation dangerous goods programme activities required by a State:

- a) conduct initial review and approval of an operations manual and training programme on dangerous goods within the approval procedures for the AOC;
- b) conduct initial inspection of new operator or operator that intends to commence carriage of dangerous goods;
- c) conduct periodic inspection of the operator;
- d) conduct an ad-hoc inspection on dangerous shipping and handling procedures;
- e) conduct an investigation on dangerous goods accidents, incidents and other occurrences resulting from violations of the dangerous goods regulations;
- f) conduct a review of a revised operation manual on dangerous goods within the approval procedures for the AOC;
- g) conduct a review of a revised training programme for approval;
- h) conduct periodic inspection of shippers; and
- i) ensure that technical equipment required for inspection is being maintained and/or calibrated.

These activities have been included in the competency framework.

1.3 The details of the competency framework are based on common practices as applied by a number of States on training, operational procedures for inspection, surveillance and enforcement.

### 2. STRUCTURE OF THE DOCUMENT

2.1 Distinction is made between competencies of a "general nature" which are applicable to all State employees and competencies related to the actual "technical performance" of a State employee in relation to their specific tasks.

2.2 For task-related competencies, the basic competency framework is structured according to three levels defined in the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868): competency units, competency elements, and performance criteria. Further detailing at these three levels is derived from job and task analyses of common practices in some States.

2.3 Regarding the responsibilities of State employees and the principles applicable to the definition of the competency framework, distinction has been made between different functional levels: strategic, managerial and operational.

2.4 Taking into account the above, the competency framework for State employees is based on:

- a) Core competencies applicable to all State employees:
  - core competencies and personal attributes; and
  - general awareness, knowledge and skills;
- b) Competency units related to specific activities of State employees:
  - support the development and implementation of a State dangerous goods programme

- approve an operator's dangerous goods system;
- conduct oversight of dangerous goods operations;
- conduct oversight of dangerous goods operations; and
- evaluate dangerous goods accidents, incidents and other occurrences

### **3. CORE COMPETENCIES APPLICABLE TO ALL STATE EMPLOYEES**

Core competencies have not yet been identified for State employees. This will be done once the work of the Next Generation of Aviation Professionals Task Force progresses and will provide a standardized basis from which to work.

### **5. COMPETENCIES RELATED TO SPECIFIC ACTIVITIES OF STATE EMPLOYEES**

Dangerous goods are articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Instructions. The transport of dangerous goods is recognized as an integral part of a State's overall safety oversight programme. Each State must provide training to each of its dangerous goods employees which emphasizes a State's specific dangerous goods standards and regulations. Training should be designed so that it enables all State employees involved in dangerous goods oversight to perform their tasks. In the same manner in which States require industries performing dangerous goods related functions to be trained in the transport of dangerous goods, States should provide their employees with training commensurate with their responsibilities. Table S-1-1 identifies competencies related to the specific activities conducted by dangerous goods State employees.

**Table S-1-1. Competency framework for State employees****COMPETENCY FRAMEWORK FOR DANGEROUS GOODS STATE EMPLOYEES****CU 1 Support the development and implementation of a State dangerous goods programme**

## CE 1.1 Develop regulations

- PC 1.1.1 Apply procedures to develop national regulations on the air transport of dangerous goods
- PC 1.1.2 Monitor relevant changes to ICAO and other relevant international provisions that may impact national dangerous goods air transport regulations
- PC 1.1.3 Develop guidance on how to comply with national regulations

## CE 1.2 Develop policies and procedures

- PC 1.2.1 Develop policies and procedures to approve an operator's manuals specific to dangerous goods
- PC 1.2.2 Develop policies and procedures to approve an operator's training program specific to dangerous goods
- PC 1.2.3 Develop policies and procedures to conduct oversight of entities performing any functions prescribed in national regulations for the air transport of dangerous goods
- PC 1.2.4 Develop surveillance work plan

## CE 1.3 Develop tools to support the implementation of national regulations

- PC 1.3.1 Develop guidance material for entities performing any functions prescribed in national regulations for the air transport of dangerous goods
- PC 1.3.2 Develop training for personnel overseeing any function prescribed in national regulations for the air transport of dangerous goods
- PC 1.3.3 Develop public awareness materials related to dangerous goods

**CU 2 Approve an operator's dangerous goods system**

## CE 2.1 Approve dangerous goods component of the operations manual

- PC 2.1.1 Verify the manual against the national regulations, policies and procedures for transport by air of dangerous goods
- PC 2.1.2 Recommend amendments to the operations manual as necessary
- PC 2.1.3 Verify that amendments in operations manual are completed
- PC 2.1.4 Issue the approval

## CE 2.2 Approve dangerous goods training programme

- PC 2.2.1 Verify the training programme against the national regulations, policies and procedures for transport by air of dangerous goods
- PC 2.2.2 Verify that the training programme addresses all dangerous goods functions identified in the operations manual
- PC 2.2.3 Recommend amendments to the training programme as necessary
- PC 2.2.4 Verify that amendments to the training programme are completed
- PC 2.2.5 Issue the approval

**CU3 Conduct oversight of dangerous goods operations**

## CE 3.1 Prepare for inspection

- PC 3.1.1 Analyze information on dangerous goods-related functions
- PC 3.1.2 Plan inspection activities

## CE 3.2 Conduct inspection

- PC 3.2.1 Communicate scope and intent of inspection
- PC 3.2.2 Determine compliance with national regulations, policies and procedures for transport by air of dangerous goods

## CE 3.3 Finalize inspection

- PC 3.3.1 Communicate inspection results
- PC 3.3.2 Document inspection results

**CU 4 Evaluate dangerous goods accidents, incidents and other occurrences**

CE 4.1 Conduct investigation

PC 4.1.1 Gather evidence

PC 4.1.2 Verify non-compliance against national regulations for dangerous goods transport by air

CE 4.2 Take corrective/appropriate action

PC 4.2.1 Document specific areas of non-compliance

PC 4.2.2 Apply national enforcement policy

PC 4.2.3 Confirm effectiveness of corrective action

— END —