International Civil Aviation Organization

DGP-WG/18-WP/32
20/9/18

WORKING PAPER

DANGEROUS GOODS PANEL (DGP)
WORKING GROUP MEETING (DGP-WG/18)

Montréal, 1 to 5 October 2018

Agenda Item 2: Managing air-specific safety risks and identifying anomalies

2.4: Development of proposals, if necessary, for amendments to the *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481) for incorporation in the 2021-2022 Edition

PROPOSED AMENDMENTS TO THE EMERGENCY RESPONSE GUIDANCE

(Presented by the Secretary)

SUMMARY

This working paper invites the working group to consider whether flowcharts to support the checklists for dangerous goods incidents provided in Section 3 of the *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481) should be introduced. The flowcharts were developed by the ICAO Cabin Safety Group (ICSG) in follow-up to discussions at DGP/26.

The working paper also proposes replacing references to "checklist(s)" with "procedure(s)" in Section 3 of Doc 9481 based on a suggestion by the ICSG.

Action by the DGP-WG:. The DGP-WG is invited to:

a) determine in principle whether the addition of flowcharts in Doc 9481 is necessary; and

b) agree to the replacement of references to "checklist(s)" with "procedure(s)" in Section 3 of Doc 9481 as shown in Appendix B to this working paper.

If DGP-WG/18 agrees in principle that flowcharts should be added to Doc 9481, revised versions taking into account comments raised would be presented to DGP-WG/19.

1. INTRODUCTION

1.1 A proposal to include flowcharts in Section 3 of the *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481) was presented to the Twenty-Sixth Meeting of the Dangerous Goods Panel (DGP/26, 16 to 27 October 2017) (see paragraph 4.2 of the DGP/26 Report). The panel determined that the proposal should be reviewed by the ICAO Cabin Safety Group (ICSG) before coming to any conclusion, recognizing that this group was made of cabin safety experts.

1.2 The ICSG was able to review the proposal before the end of DGP/26, and its secretary briefed the panel. He noted that responding to incidents in the cabin was time critical and that cabin crew therefore performed emergency response procedures through memory and not through the use of flowcharts or checklists. He also noted that the material in Section 3 was used to build procedures and not checklists and suggested that the panel consider renaming the section to "Procedures for Dangerous Goods Incidents". He acknowledged that the material in Section 3 was useful for training and post emergency debriefs, and flowcharts could assist in this regard. He noted that the ICSG had an approach to developing flowcharts and would be pleased to revise the proposed flowchart to align with their methodology. DGP/26 agreed that revised flowcharts developed by the ICSG could be incorporated in Section 3 of Doc 9481, pending a review by the DGP through correspondence.

1.3 The ICSG subsequently developed three flowcharts to support the procedures in Section 3 of Doc 9481. These are presented in Appendix A to this working paper, followed by notes from the ICSG's discussion. The ICSG also proposed replacing references to "checklist(s)" with "procedure(s)". DGP members were invited to review the material through correspondence.

1.4 A number of additional revisions to the flowcharts were proposed and some queries were raised through the correspondence review. Some questioned whether it was really necessary to include the flowcharts. It was therefore decided that the changes should not be introduced into Doc 9481 without a formal review and agreement by the DGP.

2. ACTION BY THE DGP-WG

2.1 The DGP-WG is invited to:

c) determine in principle whether the addition of the flowcharts in Doc 9481 is necessary (see Appendix A); and

d) agree to the replacement of references to "checklist(s)" with "procedure(s)" in Section 3 of Doc 9481 as shown in Appendix B to this working paper.

2.2 If DGP-WG/18 agrees in principle that flowcharts should be added to Doc 9481, revised versions taking into account comments raised would be presented to DGP-WG/19.

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APPENDIX A

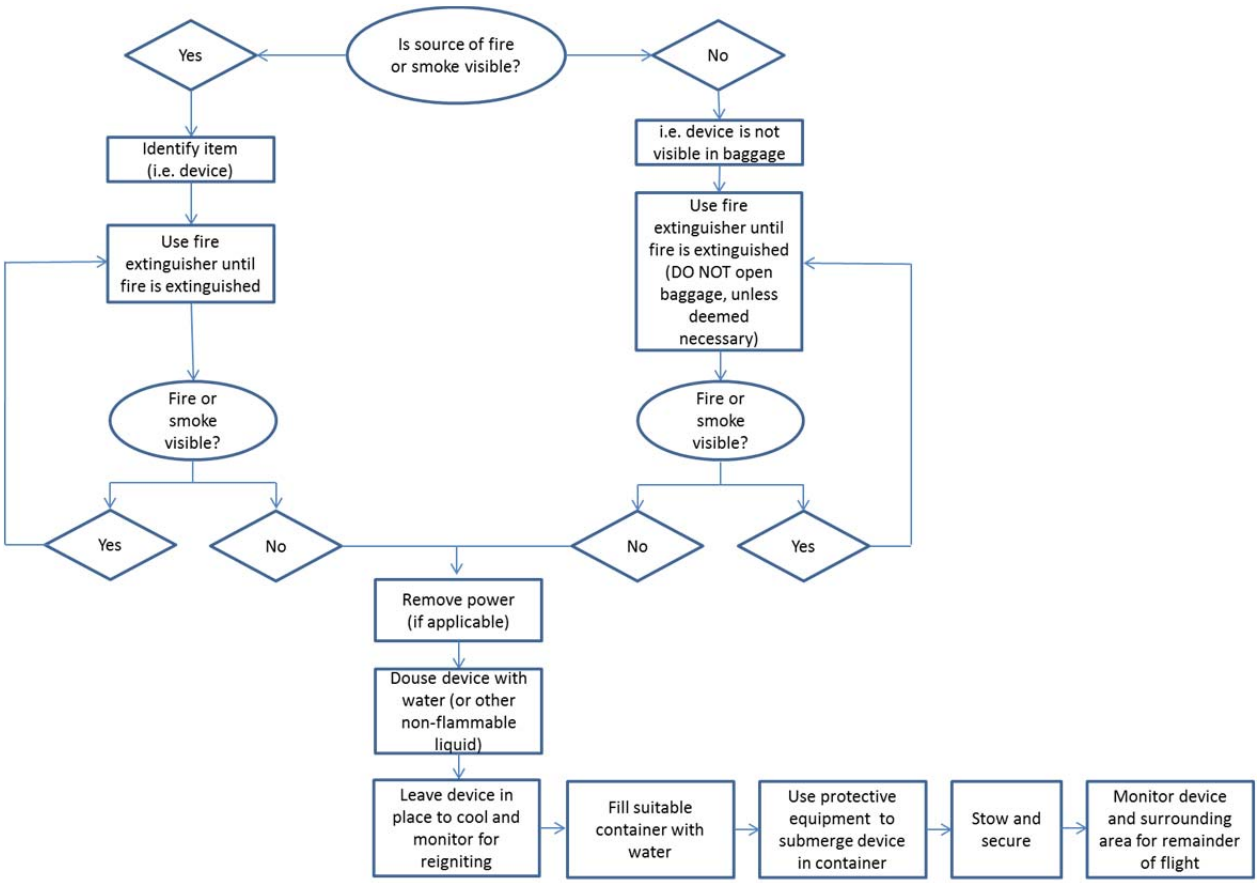

Figure 4-1. Battery / portable electronic device (PED) fire / smoke

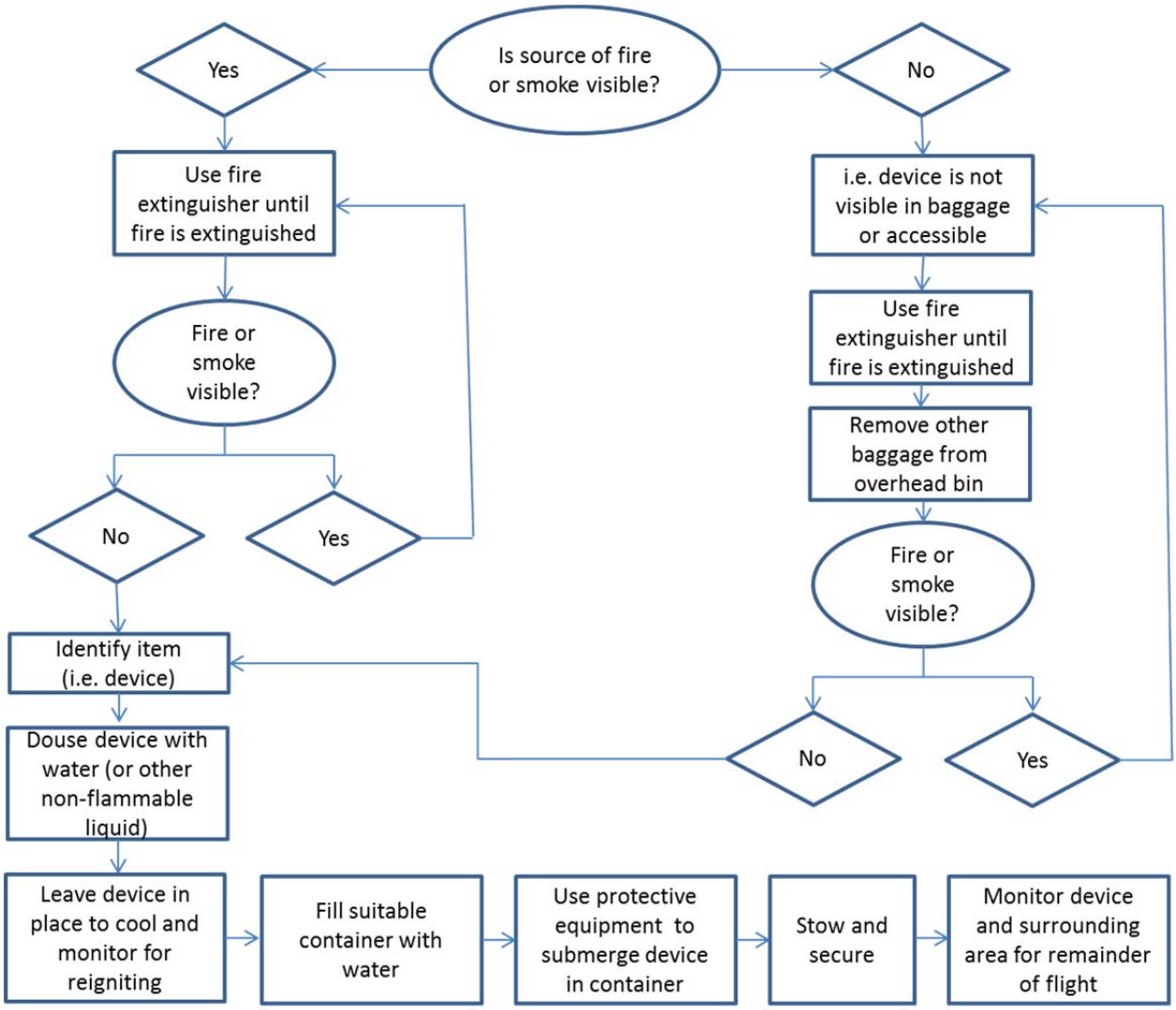

Figure 4-2. Overhead bin battery / portable electronic device (PED) fire / smoke

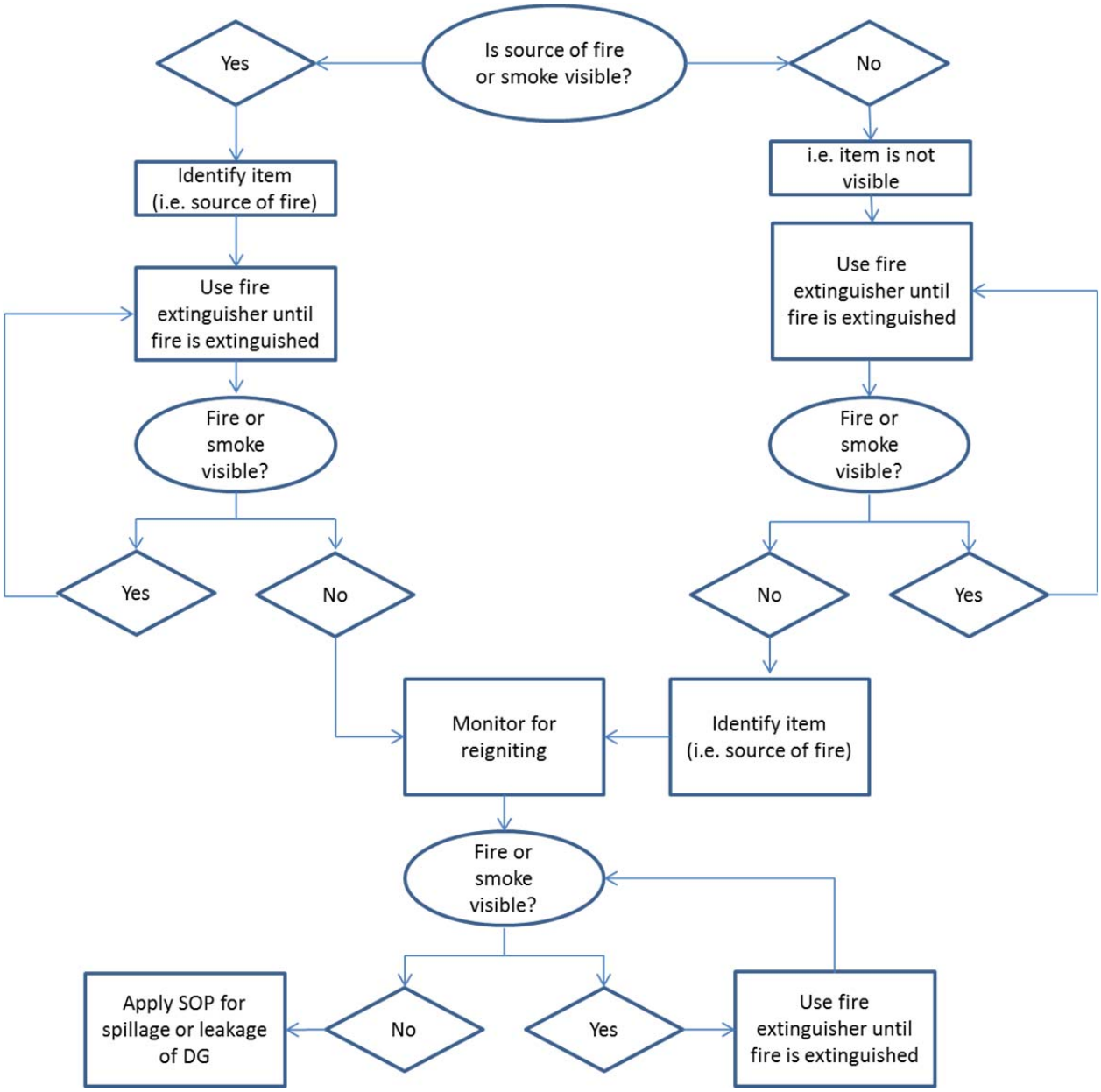

Figure 4-3. Fire involving dangerous goods

Update of *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481)

The ICSG reviewed the draft flowcharts on dangerous goods incident checklists, to be included in Doc 9481. The participants discussed the following main issues:

a) 3.3.1 – *Battery / PED / Fire / Smoke*: The members discussed the extent of details needed in this flowchart (e.g. listing the firefighting procedures in full). It was agreed that all the flowcharts should contain minimal amount of important information, as the details are typically contained in the Operations Manual. In order to avoid a closed loop in the flowchart, the members agreed to include a note about opening baggage if flames are not visible, as per the text in Doc 9481. A note was also added to remove power "if applicable".
b) 3.3.2 – *Battery / PED / Fire / Smoke in Overhead Bin*: In order to avoid a closed loop, the members agreed to use the phrase "Is source of fire or smoke visible?" rather than "is device visible and accessible?";
c) 3.3.3 – *Overheated Battery / Electrical Smell Involving PED / No Visible Fire or Smoke*: the members agreed that this flowchart was not necessary as there is no decision path for this type of occurrence. The actions to be performed by the cabin crew involve a series of sequential tasks;
d) 3.3.4 – *PED Inadvertently Crushed or Damaged In Electrically Adjustable Seat*: the members agreed that this flowchart was not necessary as there is no decision path for this type of occurrence. The actions to be performed by the cabin crew involve a series of sequential tasks;
e) 3.3.5 – *Fire Involving Dangerous Goods*: the members discussed the similarities between this flowchart and the ones dedicated to PEDs. The Secretary noted that this flowchart addressed incidents involving dangerous goods other than electronics (e.g. kerosene spillage in the cabin resulting in a fire). Members noted that this distinction was not clearly stated and should be explained in the text or the flowchart. The Secretary will provide this feedback to the DGP Secretary for consideration. In order to further differentiate between flowcharts, the members agreed to refer to "source of fire" rather than item or baggage for the purpose of this flowchart. References to opening or not opening baggage were removed;
f) 3.3.6 – *Spillage or Leakage of Dangerous Goods*: the members agreed that this flowchart was not necessary as there is no decision path for this type of occurrence. The actions to be performed by the cabin crew involve a series of sequential tasks; and
g) The members agreed that section 3.3 for cabin crew and all subsections should refer to "Procedures" not "Checklists" as these flow charts and the content of Doc 9481 are used by operators to develop cabin crew procedures as part of the Operations Manual. The ICSG will recommend that DGP amend sections 3.3 and 3.4 as follows: "*Cabin Crew Procedures For Dangerous Goods Incidents in the Passenger Cabin During Flight*". The body of the text should also be amended to refer to "Procedures" instead of "Checklists".

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APPENDIX B

PROPOSED REPLACEMENT OF REFERENCES TO "CHECKLIST(S)" WITH "PROCEDURE(S)" IN SECTION 3 OF DOC 9481

Section 3

EXAMPLES OF DANGEROUS GOODS INCIDENTS PROCEDURES~~CHECKLISTS~~

3.1 ~~CHECKLIST~~PROCEDURES FOR DANGEROUS GOODS INCIDENTS

Step	*Action*
1.	**FOLLOW THE APPROPRIATE AIRCRAFT EMERGENCY PROCEDURES FOR FIRE OR SMOKE REMOVAL**
2.	**NO SMOKING SIGN ON**
3.	**CONSIDER LANDING AS SOON AS POSSIBLE**
4.	**CONSIDER TURNING OFF NON-ESSENTIAL ELECTRICAL POWER**
5.	**DETERMINE SOURCE OF SMOKE / FUMES / FIRE**
6.	**FOR DANGEROUS GOODS INCIDENTS IN THE PASSENGER CABIN, SEE CABIN CREW ~~CHECKLIST~~ PROCEDURES AND COORDINATE COCKPIT / CABIN CREW ACTIONS**
7.	**DETERMINE EMERGENCY RESPONSE DRILL CODE**
8.	**USE GUIDANCE FROM AIRCRAFT EMERGENCY RESPONSE DRILLS CHART TO HELP DEAL WITH INCIDENT**
9.	**IF THE SITUATION PERMITS, NOTIFY ATC OF THE DANGEROUS GOODS BEING CARRIED**
After landing	
1.	**DISEMBARK PASSENGERS AND CREW BEFORE OPENING ANY CARGO COMPARTMENT DOORS**
2.	**INFORM GROUND PERSONNEL / EMERGENCY SERVICES OF NATURE OF ITEM AND WHERE STOWED**
3.	**MAKE APPROPRIATE ENTRY IN MAINTENANCE LOG**

3.2 AMPLIFIED ~~CHECKLIST~~ PROCEDURES FOR DANGEROUS GOODS INCIDENTS

Amplified ~~checklist~~ procedures for dangerous goods incidents	
Step	*Action*
1.	**FOLLOW THE APPROPRIATE AIRCRAFT EMERGENCY PROCEDURES FOR FIRE OR SMOKE REMOVAL** (self-explanatory)
2.	**NO SMOKING SIGN ON** A smoking ban should be introduced when fumes or vapours are present and be continued for the remainder of the flight.
3.	**CONSIDER LANDING AS SOON AS POSSIBLE** Because of the difficulties and possibly disastrous consequences of any dangerous goods incident, consideration should be given to landing as soon as possible. The decision to land at the nearest suitable aerodrome should be made early rather than late, when an incident may have developed to a very critical point, severely restricting operational flexibility.
4.	**CONSIDER TURNING OFF NON-ESSENTIAL ELECTRICAL POWER** As the incident may be caused by electrical problems or as electrical systems may be affected by any incident, and particularly as firefighting activities, etc., may damage electric systems, turn off all non-essential electrical items. Retain power only to those instruments, systems and controls necessary for the continued safety of the aircraft. Do not restore power until it is positively safe to do so.
5.	**DETERMINE SOURCE OF SMOKE / FUMES / FIRE** The source of any smoke / fumes / fire may be difficult to determine. Effective firefighting or containment procedures can best be accomplished when the source of the incident is identified.
6.	**FOR DANGEROUS GOODS INCIDENTS IN THE PASSENGER CABIN, SEE CABIN CREW ~~CHECKLIST~~ PROCEDURES AND COORDINATE COCKPIT / CABIN CREW ACTIONS** Incidents in the passenger cabin should be dealt with by the cabin crew using the appropriate ~~checklist and~~ procedures. It is essential that the cabin crew and the flight crew coordinate their actions and that each be kept fully informed of the other's actions and intentions.

Amplified ~~checklist~~ procedures for dangerous goods incidents	
Step	*Action*
7.	**DETERMINE EMERGENCY RESPONSE DRILL CODE** When the item has been identified, the corresponding entry on the pilot-in-command's dangerous goods notification form should be found. The applicable emergency response drill code may be given on the notification form, or if not given, can be found by noting the proper shipping name or the UN number on the notification form and using the alphabetical or numerical list of dangerous goods. If the item causing the incident is not listed on the notification form, an attempt should be made to determine the name or the nature of the substance. The alphabetical list can then be used to determine the emergency response drill code. *Note.— The alphabetical and numerical lists referred to are those in Section 4 of this document.*
8.	**USE GUIDANCE FROM AIRCRAFT EMERGENCY RESPONSE DRILLS CHART TO HELP DEAL WITH INCIDENT** The drill code assigned to an item of dangerous goods consists of a number from 1 to 11, plus a single letter. Referring to the chart of emergency response drills, each drill number corresponds to a line of information concerning the risk posed by that substance and guidance on the preferable action that should be taken. The drill letter is shown separately on the drill chart; it indicates other possible hazards of the substance. In some cases, the guidance given by the drill number may be further refined by the information given by the drill letter.
9.	**IF THE SITUATION PERMITS, NOTIFY ATC OF THE DANGEROUS GOODS BEING CARRIED** If an in-flight emergency occurs and the situation permits, the pilot-in-command should inform the appropriate air traffic services unit of the dangerous goods on board the aircraft. Wherever possible this information should include the proper shipping name and/or UN number, the class/division and for Class 1 the compatibility group, any identified subsidiary risk(s), the quantity and the location on board the aircraft. When it is not considered possible to include all the information, those parts thought most relevant in the circumstances should be given.

Amplified ~~checklist~~ procedures for dangerous goods incidents	
Step	*Action*
After landing	
1.	**DISEMBARK PASSENGERS AND CREW BEFORE OPENING ANY CARGO COMPARTMENT DOORS** Even if it has not been necessary to complete an emergency evacuation after landing, passengers and crew should disembark before any attempt is made to open the cargo compartment doors and before any further action is taken to deal with a dangerous goods incident. The cargo compartment doors should be opened with the emergency services in attendance.
2.	**INFORM GROUND PERSONNEL / EMERGENCY SERVICES OF NATURE OF ITEM AND WHERE STOWED** Upon arrival, take the necessary steps to identify to the ground staff where the item is stowed. Pass on by the quickest available means all information about the item including, when appropriate, a copy of the notification to pilot-in-command.
3.	**MAKE APPROPRIATE ENTRY IN MAINTENANCE LOG** An entry should be made in the maintenance log that a check needs to be carried out to ensure that any leakage or spillage of dangerous goods has not damaged the aircraft structure or systems and that some aircraft equipment (e.g. fire extinguishers, emergency response kit, etc.) may need replenishing or replacing.

3.3 CABIN CREW ~~CHECKLISTS~~ PROCEDURES FOR DANGEROUS GOODS INCIDENTS IN THE PASSENGER CABIN DURING FLIGHT

This section consists of cabin crew ~~checklists~~ procedures for dangerous goods incidents in the passenger cabin during flight involving:

a) battery / portable electronic device (PED) fire / smoke (see 3.3.1);

b) overhead bin battery / portable electronic device (PED) fire / smoke (see 3.3.2);

c) overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke (see 3.3.3);

d) PED inadvertently crushed or damaged in electrically adjustable seat (see 3.3.4);

e) fire involving dangerous goods (see 3.3.5); and

f) spillage or leakage of dangerous goods (see 3.3.6)

3.3.1 Battery / portable electronic device (PED) fire / smoke

~~Checklist~~ Procedures for battery / portable electronic device (PED) fire / smoke	
Step	*Cabin crew action*
1.	**IDENTIFY THE ITEM** *Note.— It may not be possible to identify the item (source of fire) immediately. In this case, apply Step 2 first, and then attempt to identify it.* **Caution:** In order to avoid injury from a flash fire, it is not recommended to open the affected baggage when there is any indication of smoke or flames.
2.	**APPLY FIRE-FIGHTING PROCEDURE** a) Obtain and use the appropriate fire extinguisher. b) Retrieve and use protective equipment, as applicable to the situation. c) Move passengers away from the area, if possible. d) Notify pilot-in-command / other cabin crew members. *Note.— Actions should occur simultaneously in a multi-crew operation.*
3.	**REMOVE POWER** a) Disconnect the device from the power supply, if safe to do so. b) Turn off in-seat power, if applicable. c) Verify that power to the remaining electrical outlets remains off, if applicable. **Caution:** Do not attempt to remove the battery from the device.

~~Checklist~~ Procedures for battery / portable electronic device (PED) fire / smoke	
Step	*Cabin crew action*
4.	**DOUSE THE DEVICE WITH WATER (OR OTHER NON-FLAMMABLE LIQUID)** *Note.— Liquid may turn to steam when applied to the hot battery.*
5.	**LEAVE THE DEVICE IN ITS PLACE AND MONITOR FOR ANY REIGNITION** a) If smoke or flames reappear, repeat Steps 2 and 4. **Caution:** — Do not attempt to pick up or move the device. — Do not cover or enclose the device. — Do not use ice or dry ice to cool the device.
6.	**WHEN THE DEVICE HAS COOLED** (e.g. approximately 10 to 15 minutes) a) Obtain a suitable empty container. b) Fill the container with enough water (or other non-flammable liquid) to submerge the device. c) Using protective equipment, place the device in the container and completely submerge in water (or other non-flammable liquid). d) Stow and secure (if possible) the container to prevent spillage.
7.	**MONITOR THE DEVICE AND THE SURROUNDING AREA FOR THE REMAINDER OF THE FLIGHT**
8.	**AFTER LANDING AT THE NEXT DESTINATION** a) Apply operator's post-incident procedures.

3.3.2 Overhead bin battery / portable electronic device (PED) fire / smoke

~~Checklist of~~ Procedures for overhead bin battery / portable electronic device (PED) fire / smoke	
Step	*Cabin crew action*
1.	**APPLY FIRE-FIGHTING PROCEDURE** a) Obtain and use the appropriate fire extinguisher. b) Retrieve and use protective equipment, as applicable to the situation. c) Move passengers away from the area, if possible. d) Notify pilot-in-command / other cabin crew members. *Note.— Actions should occur simultaneously in a multi-crew operation.*

~~Checklist of~~ Procedures for overhead bin battery / portable electronic device (PED) fire / smoke	
Step	*Cabin crew action*
2.	**IDENTIFY THE ITEM** If the device is visible and accessible, or, if the device is contained in baggage and flames are visible: a) Re-apply Step 1 to extinguish the flames, if applicable. b) Apply Steps 3 to 5. If smoke is coming from the overhead bin, but the device is not visible or accessible: c) Remove other baggage from the overhead bin to access the affected baggage/item. d) Identify the item. e) Apply Steps 3 to 5. **Caution:** In order to avoid injury from a flash fire, it is not recommended to open the affected baggage when there is any indication of smoke or flames.
3.	**DOUSE THE DEVICE (BAGGAGE) WITH WATER (OR OTHER NON-FLAMMABLE LIQUID)** *Note.— Liquid may turn to steam when applied to the hot battery.*
4.	**WHEN THE DEVICE HAS COOLED** a) Obtain a suitable empty container. b) Fill the container with enough water (or other non-flammable liquid) to submerge the device. c) Using protective equipment, place the device in the container and completely submerge in water (or other non-flammable liquid). d) Stow and secure (if possible) the container to prevent spillage.
5.	**MONITOR THE DEVICE AND THE SURROUNDING AREA FOR THE REMAINDER OF THE FLIGHT**
6.	**AFTER LANDING AT THE NEXT DESTINATION** a) Apply operator's post-incident procedures.

3.3.3 Overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke

~~Checklist~~ Procedures for overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke	
Step	*Cabin crew action*
1.	**IDENTIFY THE ITEM**
2.	**INSTRUCT THE PASSENGER TO TURN OFF THE DEVICE IMMEDIATELY**
3.	**REMOVE POWER** a) Disconnect the device from the power supply, if safe to do so. b) Turn off in-seat power, if applicable. c) Verify that power to the remaining electrical outlets remains off, if applicable. d) Verify that the device remains off for the remainder of the flight. **Caution:** Do not attempt to remove the battery from the device.
4.	**INSTRUCT THE PASSENGER TO KEEP THE DEVICE VISIBLE AND MONITOR CLOSELY** **Caution:** Unstable batteries may ignite even after the device is turned off.
5.	**IF SMOKE OR FLAMES APPEAR** a) Apply BATTERY / PED FIRE / SMOKE ~~checklist~~ procedures (see 3.3.1).
6.	**AFTER LANDING AT THE NEXT DESTINATION** a) Apply operator's post-incident procedures.

3.3.4 PED inadvertently crushed or damaged in electrically adjustable seat

~~Checklist~~ Procedures for PED inadvertently crushed or damaged in electrically adjustable seat	
Step	*Cabin crew action*
1.	**NOTIFY THE PILOT-IN-COMMAND / OTHER CABIN CREW MEMBERS**
2.	**OBTAIN INFORMATION FROM PASSENGER, BY ASKING HIM/HER** a) To identify the item. b) Where he/she suspects that the item may have dropped or slipped into. c) If the seat was moved since misplacing the item.
3.	**RETRIEVE AND USE PROTECTIVE EQUIPMENT, IF AVAILABLE**

~~Checklist~~ Procedures for PED inadvertently crushed or damaged in electrically adjustable seat	
Step	*Cabin crew action*
4.	**RETRIEVE THE ITEM** **Caution:** Do not move the seat electrically or mechanically when attempting to retrieve the item.
5.	**IF SMOKE OR FLAMES APPEAR** a) Apply BATTERY / PED FIRE / SMOKE ~~checklist~~ procedures (see 3.3.1).
6.	**AFTER LANDING AT THE NEXT DESTINATION** a) Apply operator's post-incident procedures.

3.3.5 Fire involving dangerous goods

~~Checklist~~ Procedures for fire involving dangerous goods	
Step	*Cabin crew action*
1.	**IDENTIFY THE ITEM** *Note. — It may not be possible to identify the item (source of fire) immediately. In this case, apply Step 2 first, and then attempt to identify it.* **Caution:** In order to avoid injury from a flash fire, it is not recommended to open the affected baggage when there is any indication of smoke or flames.
2.	**APPLY FIRE-FIGHTING PROCEDURE** a) Obtain and use the appropriate fire extinguisher / check use of water. b) Retrieve and use protective equipment, as applicable to the situation. c) Move passengers away from the area, if possible. d) Notify pilot-in-command / other cabin crew members. *Note.— Actions should occur simultaneously in a multi-crew operation.*
3.	**MONITOR FOR ANY REIGNITION** a) If smoke/flames reappear, repeat Step 2.
4.	**ONCE THE FIRE HAS BEEN EXTINGUISHED** a) Apply **SPILLAGE OR LEAKAGE OF DANGEROUS GOODS** ~~checklist~~ procedures, if required (see 3.3.6).

~~Checklist~~ Procedures for fire involving dangerous goods	
Step	*Cabin crew action*
5.	**AFTER LANDING AT THE NEXT DESTINATION** a) Apply operator's post-incident procedures.

3.3.6 Spillage or leakage of dangerous goods

~~Checklist~~ Procedures for spillage or leakage of dangerous goods	
Step	*Cabin crew action*
1.	**NOTIFY THE PILOT-IN-COMMAND / OTHER CABIN CREW MEMBERS**
2.	**IDENTIFY THE ITEM**
3.	**COLLECT EMERGENCY RESPONSE KIT OR OTHER USEFUL ITEMS**
4.	**DON RUBBER GLOVES AND SMOKE HOOD**
5.	**MOVE PASSENGERS AWAY FROM AREA AND DISTRIBUTE WET TOWELS OR CLOTHS**
6.	**PLACE DANGEROUS GOODS ITEM IN POLYETHYLENE BAGS**
7.	**STOW POLYETHYLENE BAGS**
8.	**TREAT AFFECTED SEAT CUSHIONS / COVERS IN THE SAME MANNER AS DANGEROUS GOODS ITEM**
9.	**COVER SPILLAGE ON CARPET / FLOOR**
10.	**REGULARLY INSPECT ITEMS STOWED AWAY / CONTAMINATED FURNISHINGS**
11.	**AFTER LANDING AT THE NEXT DESTINATION** a) Apply operator's post-incident procedures.

3.4 AMPLIFIED CABIN CREW ~~CHECKLISTS~~ PROCEDURES FOR DANGEROUS GOODS INCIDENTS IN THE PASSENGER CABIN DURING FLIGHT

This section consists of amplified cabin crew ~~checklists~~ procedures for dangerous goods incidents in the passenger cabin during flight involving:

a) battery / portable electronic device (PED) fire / smoke (see 3.4.1);

b) overhead bin battery / portable electronic device (PED) fire / smoke (see 3.4.2);

c) overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke (see 3.4.3);

d) PED inadvertently crushed or damaged in electrically adjustable seat (see 3.4.4);

e) fire involving dangerous goods (see 3.4.5); and

f) spillage or leakage of dangerous goods (see 3.4.6).

Note.— Although this guidance material presents sequences of tasks, some of these actions occur simultaneously when carried out by crew members.

3.4.1 Battery / portable electronic device (PED) fire / smoke

Amplified ~~checklist~~ procedures for battery / portable electronic device (PED) fire / smoke	
Step	*Cabin crew action*
1.	**IDENTIFY THE ITEM** It may not be possible to identify the item (source of fire) right away, especially if the fire has started in a seat pocket or the device is not readily accessible. In this case, fire-fighting procedures should be applied as a first step. If the item is contained in baggage, the crew's actions would be similar to the actions for a device that is visible or readily accessible. **Caution:** In order to avoid injury from a flash fire, it is not recommended to open the affected baggage when there is any indication of smoke or flames. However, in certain situations cabin crew members may assess and deem it necessary to slightly open baggage to allow entry of the extinguishing agent and non-flammable liquid. This should be done with extreme caution and only after donning appropriate protective equipment available on the aircraft.
2.	**APPLY FIRE-FIGHTING PROCEDURE** Any occurrence concerning a fire in the cabin should be notified immediately to the pilot-in-command who should be kept informed of all actions taken and of the effect. It is essential that the cabin crew and the flight crew coordinate their actions and that each are kept fully informed of the other's actions and intentions.

Amplified ~~checklist~~ procedures for battery / portable electronic device (PED) fire / smoke	
Step	*Cabin crew action*
	Appropriate fire-fighting and emergency procedures must be used to deal with any fire. In a multi-cabin crew operation, the actions detailed in the fire-fighting procedure should be conducted simultaneously. On aircraft operated with only one cabin crew member, the aid of a passenger should be sought in dealing with the situation. Halon, Halon replacement or water extinguisher should be used to extinguish the fire and prevent its spread to additional flammable materials. It is important to wear available protective equipment (e.g. protective breathing equipment, fire gloves) when fighting a fire. If fire develops, cabin crew should take prompt action to move passengers away from the area involved and, if necessary, provide wet towels or cloths and give instructions for passengers to breathe through them. Minimizing the spreading of smoke and fumes into the flight deck is critical for the continued safe operation of the aircraft, therefore it is essential to keep the flight deck door closed at all times. Crew communication and coordination is of utmost importance. The use of the interphone is the primary means of communication unless the interphone system fails.
3.	**REMOVE POWER** It is important to instruct the passenger to disconnect the device from the power supply, if it is deemed safe to do so. A battery has a higher likelihood of catching fire due to overheating during or immediately following a charging cycle, although the effects may be delayed for some period of time. By removing the external power supply from the device, it will be assured that additional energy is not being fed to the battery to promote a fire. Turn off the in-seat power to the remaining electrical outlets until it can be assured that a malfunctioning aircraft system does not contribute to additional failures of the passengers' portable electronic devices. Visually check that power to the remaining electrical outlets remains off until the aircraft's system can be determined to be free of faults, if the device was previously plugged in. The removal of power may occur simultaneously to other cabin crew actions (e.g. obtaining water to douse the device). Depending on the aircraft type, in-seat power may have to be turned off by the flight crew members. **Caution:** Do not attempt to remove the battery from the device.

Amplified ~~checklist~~ procedures for battery / portable electronic device (PED) fire / smoke	
Step	*Cabin crew action*
4.	**DOUSE THE DEVICE WITH WATER (OR OTHER NON-FLAMMABLE LIQUID)** Water (or other non-flammable liquid) must be used to cool a battery that has ignited to prevent the spread of heat to other cells in the battery. If water is not available, any non-flammable liquid may be used to cool the device. *Note.— Liquid may turn to steam when applied to the hot battery.*
5.	**LEAVE THE DEVICE IN ITS PLACE AND MONITOR FOR ANY REIGNITION** A battery involved in a fire can reignite and emit flames multiple times as heat is transferred to other cells in the battery. Therefore, the device must be monitored regularly to identify if there is any indication that a fire risk may still exist. If there is any smoke or indication of fire, the device must be doused with more water (or other non-flammable liquid). **Caution:** a) Do not attempt to pick up or move the device; batteries may explode or burst into flames without warning. The device must not be moved if displaying any of the following: flames/flaring, smoke, unusual sounds (such as crackling), debris, or shards of material separating from the device. b) Do not cover or enclose the device as it could cause it to overheat. c) Do not use ice or dry ice to cool the device. Ice or other materials insulate the device, increasing the likelihood that additional battery cells will reach thermal runaway.
6.	**WHEN THE DEVICE HAS COOLED (E.G. APPROXIMATELY 10-15 MINUTES)** The device can be moved with caution following a certain period, once it has cooled down and if there is no evidence of smoke, heat, or if there is a reduction in the crackling or hissing sound usually associated with a lithium battery fire (e.g. after approximatly10-15 minutes). The waiting period may vary based on the device and its size. The different circumstances (e.g. types of devices, phase of flight, etc.) should be addressed in the operator's training programme. A suitable empty container, such as a pot, jug, galley unit or toilet waste bin, must be filled with enough water or non-flammable liquid to completely submerge the device. It is important to wear available protective equipment (e.g. protective breathing equipment, fire gloves), when moving any device involved in a fire. Once the device is completely submerged, the container used must be stowed and, if possible, secured to prevent spillage.
7.	**MONITOR THE DEVICE AND THE SURROUNDING AREA FOR THE REMAINDER OF THE FLIGHT** Monitor the device and the surrounding area for the remainder of the flight to verify that the device does not pose further risk.

Amplified ~~checklist~~ procedures for battery / portable electronic device (PED) fire / smoke	
Step	*Cabin crew action*
8.	**AFTER LANDING AT THE NEXT DESTINATION** Upon arrival, apply the operator's post-incident procedures. These may include identifying to ground personnel where the item is stowed and providing all information about the item. Complete the required documentation, as per operator procedures, so that the operator is notified of the event, proper maintenance action is undertaken and the emergency response kit or any aircraft equipment used is replenished or replaced, if applicable.

3.4.2 Overhead bin battery / portable electronic device (PED) fire / smoke

Amplified ~~checklist~~ procedures for overhead bin battery / portable electronic device (PED) fire / smoke	
Step	*Cabin crew action*
1.	**APPLY FIRE-FIGHTING PROCEDURE** Any occurrence concerning a fire in the cabin should be notified immediately to the pilot-in-command who should be kept informed of all actions taken and of the effect. It is essential that the cabin crew and the flight crew coordinate their actions and that each are kept fully informed of the other's actions and intentions. Appropriate fire-fighting and emergency procedures must be used to deal with an overhead bin fire. In a multi-cabin crew operation, the actions detailed in the fire-fighting procedure should be conducted simultaneously. On aircraft operated with only one cabin crew member, the aid of a passenger should be sought in dealing with the situation. Halon, Halon replacement or water extinguisher should be used to extinguish the fire and prevent its spread to additional flammable materials. It is important to wear available protective equipment (e.g. protective breathing equipment, fire gloves) when fighting a fire. If fire develops, cabin crew should take prompt action to move passengers away from the area involved and, if necessary, provide wet towels or cloths and give instructions for passengers to breathe through them. Minimizing the spreading of smoke and fumes into the flight deck is critical for the continued safe operation of the aircraft, therefore it is essential to keep the flight deck door closed at all times. Crew communication and coordination is of utmost importance. The use of the interphone is the primary means of communication unless the interphone system fails.

Amplified ~~checklist~~ procedures for overhead bin battery / portable electronic device (PED) fire / smoke	
Step	*Cabin crew action*
2.	**IDENTIFY THE ITEM** It may not be possible to identify the item right away, especially if the fire has started in the overhead bin and the device is not readily accessible. If the device is visible and accessible or if the device is contained in baggage and flames are visible, the fire-fighting procedures should be applied as a first step. If smoke is coming from the overhead bin, but the device is not visible or accessible, or there is no indication of fire, the fire-fighting procedures should be applied as a first step. Afterwards, all baggage should be removed from the overhead bin with caution until the item can be identified. Once the item is identified, apply Steps 3 to 5. **Caution:** In order to avoid injury from a flash fire, it is not recommended to open the affected baggage when there is any indication of smoke or flames. However, in certain situations cabin crew members may assess and deem it necessary to slightly open baggage to allow entry of the extinguishing agent and non-flammable liquid. This should be done with extreme caution and only after donning appropriate protective equipment available on the aircraft.
3.	**DOUSE THE DEVICE (BAGGAGE) WITH WATER (OR OTHER NON-FLAMMABLE LIQUID)** Water (or other non-flammable liquid) must be used to cool a battery that has ignited to prevent the spread of heat to other cells in the battery. If water is not available, any non-flammable liquid may be used to cool the device. *Note.— Liquid may turn to steam when applied to the hot battery.*
4.	**WHEN THE DEVICE HAS COOLED** The device should be moved from the overhead bin to prevent a hidden fire from potentially developing. The device can be moved with caution following a certain period, once it has cooled down and if there is no evidence of smoke, heat, or if there is a reduction in the crackling or hissing sound usually associated with a lithium battery fire. The waiting period may vary based on the device and its size. The different circumstances (e.g. types of devices, phase of flight, etc.) should be addressed in the operator's training programme. A suitable empty container, such as a pot, jug, galley unit or toilet waste bin, must be filled with enough water or non-flammable liquid to completely submerge the device. It is important to wear available protective equipment (e.g. protective breathing equipment, fire gloves), when moving any device involved in a fire. Once the device is completely submerged, the container used must be stowed and, if possible, secured to prevent spillage.

Amplified ~~checklist~~ procedures for overhead bin battery / portable electronic device (PED) fire / smoke	
Step	*Cabin crew action*
5.	**MONITOR THE DEVICE AND THE SURROUNDING AREA FOR THE REMAINDER OF THE FLIGHT** Monitor the device and the surrounding area for the remainder of the flight to verify that the device does not pose further risk.
6.	**AFTER LANDING AT THE NEXT DESTINATION** Upon arrival, apply the operator's post-incident procedures. These may include identifying to ground personnel where the item is stowed and providing all information about the item. Complete the required documentation, as per operator procedures, so that the operator is notified of the event, proper maintenance action is undertaken and the emergency response kit or any aircraft equipment used is replenished or replaced, if applicable.

3.4.3 Overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke

Amplified ~~checklist~~ procedures for overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke	
Step	*Cabin crew action*
1.	**IDENTIFY THE ITEM** Identify the source of overheat or electrical smell. Ask the passenger concerned to identify the item.
2.	**INSTRUCT THE PASSENGER TO TURN OFF THE DEVICE IMMEDIATELY** It is important to instruct the passenger to turn off the device immediately.
3.	**REMOVE POWER** It is important to instruct the passenger or crew member to disconnect the device from the power supply, if it is deemed safe to do so. A battery has a higher likelihood of catching fire due to overheating during or immediately following a charging cycle, although the effects may be delayed for some period of time. By removing the external power supply from the device, it will be assured that additional energy is not being fed to the battery to promote a fire.

Amplified ~~checklist~~ procedures for overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke	
Step	*Cabin crew action*
	Turn off the in-seat power to the remaining electrical outlets until it can be assured that a malfunctioning aircraft system does not contribute to additional failures of the passengers' portable electronic devices. Visually check that power to the remaining electrical outlets remains off until the aircraft's system can be determined to be free of faults, if the device was previously plugged in. The removal of power may occur simultaneously to other cabin crew actions (e.g. obtaining water to douse the device). Depending on the aircraft type, in-seat power may have to be turned off by the fight crew members. It is important to verify that the device remains turned off for the duration of the flight. **Caution:** Do not attempt to remove the battery from the device.
4.	**INSTRUCT THE PASSENGER TO KEEP THE DEVICE VISIBLE AND MONITOR CLOSELY** The device must remain visible (not stowed such as in baggage or seat pocket or on a person (pocket)) and should be monitored closely. Unstable batteries may ignite even after the device is turned off. Verify that the device is stowed for landing.
5.	**IF SMOKE OR FLAMES APPEAR** If smoke or flames appear, apply the BATTERY / PORTABLE ELECTRONIC DEVICE (PED) FIRE / SMOKE ~~checklist~~ procedures (see 3.4.1).
6.	**AFTER LANDING AT THE NEXT DESTINATION** Upon arrival, apply the operator's post-incident procedures. These may include identifying to ground personnel where the item is stowed and providing all information about the item. Complete the required documentation, as per operator procedures, so that the operator is notified of the event, proper maintenance action is undertaken and the emergency response kit or any aircraft equipment used is replenished or replaced, if applicable.

3.4.4 PED inadvertently crushed or damaged in electrically adjustable seat

Due to the design of some electrically adjustable passenger seats, a PED can slip under a seat covering and/or cushion, behind an armrest or down the side of a seat. Inadvertent crushing of the device poses a risk of fire.

Amplified ~~checklist~~ procedures for PED inadvertently crushed or damaged in electrically adjustable seat	
Step	*Cabin crew action*
1.	**NOTIFY THE PILOT-IN-COMMAND / OTHER CABIN CREW MEMBERS** Any occurrence concerning a risk of fire in the cabin should be notified immediately to the pilot-in-command who should be kept informed of all actions taken and of the effect. It is essential that the cabin crew and the flight crew coordinate their actions and that each are kept fully informed of the other's actions and intentions.
2.	**OBTAIN INFORMATION FROM PASSENGER** Ask the passenger concerned to identify the item, and where he/she suspects it may have dropped or slipped into, and if he/she has moved the seat since misplacing the item.
3.	**RETRIEVE AND USE PROTECTIVE EQUIPMENT, IF AVAILABLE** If available, cabin crew members should don fire gloves before trying to retrieve the item.
4.	**RETRIEVE THE ITEM** To prevent crushing of the PED and reduce the potential fire risk to the device and the surrounding area, cabin crew members and/or passengers must not use the electrical or mechanical seat functions in an attempt to retrieve the item. Move the passenger and, if applicable, the passenger seated next to the affected seat from the area, to facilitate the search. Do not move the seat. If the cabin crew member is unable to retrieve the item, it may be necessary to move the passenger to another seat.
5.	**IF SMOKE OR FLAMES APPEAR** If smoke or flames appear, apply the BATTERY / PORTABLE ELECTRONIC DEVICE (PED) FIRE / SMOKE ~~checklist~~ procedures (see 3.4.1).
6.	**AFTER LANDING AT THE NEXT DESTINATION** Upon arrival, apply the operator's post-incident procedures. These may include identifying to ground personnel where the item is located and providing all information about the item. Complete the required documentation, as per operator procedures, so that the operator is notified of the event, proper maintenance action is undertaken and any aircraft equipment used is replenished or replaced, if applicable.

3.4.5 Fire involving dangerous goods

Amplified ~~checklist~~ procedures for fire involving dangerous goods	
Step	*Cabin crew action*
1.	**IDENTIFY THE ITEM** Ask the passenger concerned to identify the item. The passenger may be able to give some guidance on the hazard(s) involved and how these could be dealt with. If the passenger can identify the item, refer to Section 4 of this document for the appropriate emergency response drill. It may not be possible to identify the item right away, especially if the source of the fire is unknown or the item is not readily accessible. In this case, fire-fighting procedures should be applied as a first step. Once it is possible to do so, identify the item after the fire is under control. If the item is contained in baggage, the crew's actions would be similar to the actions for an item that is visible or readily accessible. **Caution:** In order to avoid injury from a flash fire, it is not recommended to open the affected baggage when there is any indication of smoke or flames. However, in certain situations cabin crew members may assess and deem it necessary to slightly open baggage to allow entry of the extinguishing agent and non-flammable liquid. This should be done with extreme caution and only after donning appropriate protective equipment available on the aircraft.
2.	**APPLY THE FIRE-FIGHTING PROCEDURE** Any occurrence concerning a fire in the cabin should be notified immediately to the pilot-in-command who should be kept informed of all actions taken and of the effect. It is essential that the cabin crew and the flight crew coordinate their actions and that each are kept fully informed of the other's actions and intentions. Appropriate fire-fighting and emergency procedures must be used to deal with any fire. In a multi-cabin crew operation, the actions detailed in the fire-fighting procedure should be conducted simultaneously. On aircraft operated with only one cabin crew member, the aid of a passenger should be sought in dealing with the situation. In general, water should not be used on a spillage or when fumes are present since it may spread the spillage or increase the rate of fuming. Consideration should also be given to the possible presence of electrical components when using water extinguishers. If fire develops, cabin crew should take prompt action to move passengers away from the area involved and, if necessary, provide wet towels or cloths and give instructions for passengers to breathe through them. Minimizing the spreading of smoke and fumes into the flight deck is critical for the continued safe operation of the aircraft, therefore it is essential to keep the flight deck door closed at all times. Crew communication and coordination is of utmost importance. The use of the interphone is the primary means of communication unless the interphone system fails.

Amplified ~~checklist~~ procedures for fire involving dangerous goods	
Step	*Cabin crew action*
3.	**MONITOR FOR ANY REIGNITION** Monitor the area regularly to identify if there is any indication that a fire risk may still exist. If there is any smoke or indication of fire, continue to apply the fire-fighting procedure.
4.	**ONCE THE FIRE HAS BEEN EXTINGUISHED** In the event of a fire involving dangerous goods, the SPILLAGE OR LEAKAGE INVOLVING DANGEROUS GOODS ~~checklist~~ procedures (see 3.4.6) may need to be applied once the fire has been extinguished.
5.	**AFTER LANDING AT THE NEXT DESTINATION** Upon arrival, apply the operator's post-incident procedures. These may include identifying to ground personnel where the item is stowed and providing all information about the item. Complete the required documentation, as per operator procedures, so that the operator is notified of the event, proper maintenance action is undertaken and the emergency response kit or any aircraft equipment used is replenished or replaced, if applicable.

3.4.6 Spillage or leakage of dangerous goods

Amplified ~~checklist~~ procedures for spillage or leakage of dangerous goods	
Step	*Cabin crew action*
1.	**NOTIFY THE PILOT-IN-COMMAND / OTHER CABIN CREW MEMBERS** Any incident concerning dangerous goods should be notified immediately to the pilot-in-command who should be kept informed of all actions taken and of their effect. It is essential that the cabin crew and the flight crew coordinate their actions and that each are kept fully informed of the other's actions and intentions. Minimizing the spreading of smoke and fumes into the flight deck is critical for the continued safe operation of the aircraft, therefore it is essential to keep the flight deck door closed at all times. Crew communication and coordination is of utmost importance. The use of the interphone is the primary means of communication unless the interphone system fails.

Amplified ~~checklist~~ procedures for spillage or leakage of dangerous goods	
Step	*Cabin crew action*
2.	**IDENTIFY THE ITEM** Ask the passenger concerned to identify the item and indicate its potential hazards. The passenger may be able to give some guidance on the hazard(s) involved and how these could be dealt with. If the passenger can identify the item, refer to Section 4 of this document for the appropriate emergency response drill. On aircraft with only one cabin crew member, consult with the pilot-in-command as to whether the aid of a passenger should be sought in dealing with the incident.
3.	**COLLECT EMERGENCY RESPONSE KIT OR OTHER USEFUL ITEMS** Collect emergency response kit, if provided, or collect for use in dealing with the spillage or leakage: — a supply of paper towels or newspapers or other absorbent paper or absorbent fabric (e.g. seat cushion covers, head rest protectors); — oven gloves or fire-resistant gloves, if available; — at least two large polyethylene waste bin bags; and — at least three smaller polyethylene bags, such as those used for duty-free or bar sales or, if none available, airsickness bags.
4.	**DON RUBBER GLOVES AND SMOKE HOOD** The hands should always be protected before touching suspicious packages or items. Fire-resistant gloves or oven gloves covered by polyethylene bags are likely to give suitable protection. Gas-tight breathing equipment should always be worn when attending to an incident involving smoke, fumes or fire.
5.	**MOVE PASSENGERS AWAY FROM AREA AND DISTRIBUTE WET TOWELS OR CLOTHS** The use of therapeutic oxygen bottles or the passenger drop-out oxygen system to assist passengers in a smoke- or fume-filled passenger cabin should not be considered since considerable quantities of fumes or smoke would be inhaled through the valves or holes in the masks. A more effective aid to passengers in a smoke- or fume-filled environment would be the use of a wet towel or cloth held over the mouth and nose. A wet towel or cloth aids in filtering and is more effective at doing this than a dry towel or cloth. Cabin crew should take prompt action if smoke or fumes develop and move passengers away from the area involved and, if possible, provide wet towels or cloths and give instructions to breathe through them.

Amplified ~~checklist~~ procedures for spillage or leakage of dangerous goods	
Step	*Cabin crew action*
6.	**PLACE DANGEROUS GOODS ITEM IN POLYETHYLENE BAGS** . *Note.— In the case of a spill of known or suspected dangerous goods in powder form:* — *leave everything undisturbed;* — *do not use fire agent or water;* — *cover area with polyethylene or other plastic bags and blankets;* — *keep area isolated until after landing.* **With emergency response kit** If it is absolutely certain that the item will not create a problem, the decision may be made not to move it. In most circumstances, however, it will be better to move the item and this should be done as suggested below. Place the item in a polyethylene bag as follows: — prepare two bags by rolling up the sides and placing them on the floor; — place the item inside the first bag with the closure of the item, or the point from which it is leaking from its container, at the top; — take off the rubber gloves while avoiding skin contact with any contamination on them; — place the rubber gloves in the second bag; — close the first bag while squeezing out the excess air; — twist the open end of the first bag and use a bag tie to tie it sufficiently tight to be secure but not so tight that pressure equalization cannot take place; — place the first bag (containing the item) in the second bag, which already contains the rubber gloves and secure the open end in the same manner as that used for the first bag. **With no emergency response kit** Pick up the item and place it in a polyethylene bag. Ensure the receptacle containing the dangerous goods is kept upright or the area of leakage is at the top. Using paper towels, newspaper, etc., mop up the spillage, after having ascertained there will be no reaction between what is to be used to mop up and the dangerous goods. Place the soiled towels, etc., in another polyethylene bag. Place the gloves and bags used to protect the hands either in a separate small polyethylene bag or with the soiled towels. If extra bags are not available, place the towels, gloves, etc., in the same bag as the item. Expel excess air from the bags and close tightly so as to be secure but not so tight that pressure equalization cannot take place.

Amplified ~~checklist~~ procedures for spillage or leakage of dangerous goods	
Step	*Cabin crew action*
7.	**STOW POLYETHYLENE BAGS** If there is a catering or bar box on board, empty any contents and place the box on the floor, with the door upward. Place the bag(s) containing the item and any soiled towels, etc., in the box and close the door. Take the box or, if there is no box, the bag(s) to a position as far away as possible from the flight deck and passengers. If a galley or toilet is fitted, consider taking the box or bag(s) there, unless it is close to the flight deck. Use a rear galley or toilet wherever possible, but do not place the box or bag(s) against the pressure bulkhead or fuselage wall. If a galley is used, the box or bag(s) can be stowed in an empty waste bin container. If a toilet is used, the box can be placed on the floor or the bag(s) stowed in an empty waste container. The toilet door should be locked from the outside. In a pressurized aircraft, if a toilet is used, any fumes will be vented away from passengers. However, if the aircraft is unpressurized there may not be positive pressure in a toilet to prevent fumes from entering the passenger cabin. Ensure when moving a box that the opening is kept upward or when moving a bag that either the receptacle containing the dangerous goods is kept upright or the area of leakage is kept at the top. Wherever the box or bag(s) have been located, wedge them firmly in place to prevent them from moving and to keep the item upright. Ensure that the position of the box or bags will not impede disembarkation from the aircraft.
8.	**TREAT AFFECTED SEAT CUSHIONS / COVERS IN THE SAME MANNER AS DANGEROUS GOODS ITEM** Seat cushions, seat backs or other furnishings which have been contaminated by a spillage should be removed from their fixtures and placed in a large bin bag or other polyethylene bag, together with any bags used initially to cover them. They should be stowed away in the same manner as the dangerous goods item causing the incident.
9.	**COVER SPILLAGE ON CARPET / FLOOR** Cover any spillage on the carpet or furnishings with a waste bag or other polyethylene bags, if available. If not, use airsickness bags opened out so that the plastic side covers the spillage or use the plastic covered emergency information cards. Carpet which has been contaminated by a spillage and which is still causing fumes despite being covered, should be rolled up, if possible, and placed in a large bin bag or other polyethylene bag. It should be placed in a waste bin and stowed, when possible, either in the rear toilet or rear galley. If the carpet cannot be removed it should remain covered by a large bin bag or polyethylene bags, etc., and additional bags should be used to reduce the fumes.

Amplified ~~checklist~~ procedures for spillage or leakage of dangerous goods	
Step	*Cabin crew action*
10.	**REGULARLY INSPECT ITEMS STOWED AWAY / CONTAMINATED FURNISHINGS** Any dangerous goods, contaminated furnishings or equipment which have been removed and stowed away or covered for safety should be subject to regular inspection.
11.	**AFTER LANDING AT THE NEXT DESTINATION** Upon arrival, apply the operator's post-incident procedures. These may include identifying to ground personnel where the item is stowed and providing all information about the item. Complete the required documentation, as per operator procedures, so that the operator is notified of the event, proper maintenance action is undertaken and the emergency response kit or any aircraft equipment used is replenished or replaced, if applicable.
