NATO STANDARD

AEP-4783

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, NUCLEAR (CBRN) CONTAMINATED WASTE MANAGEMENT

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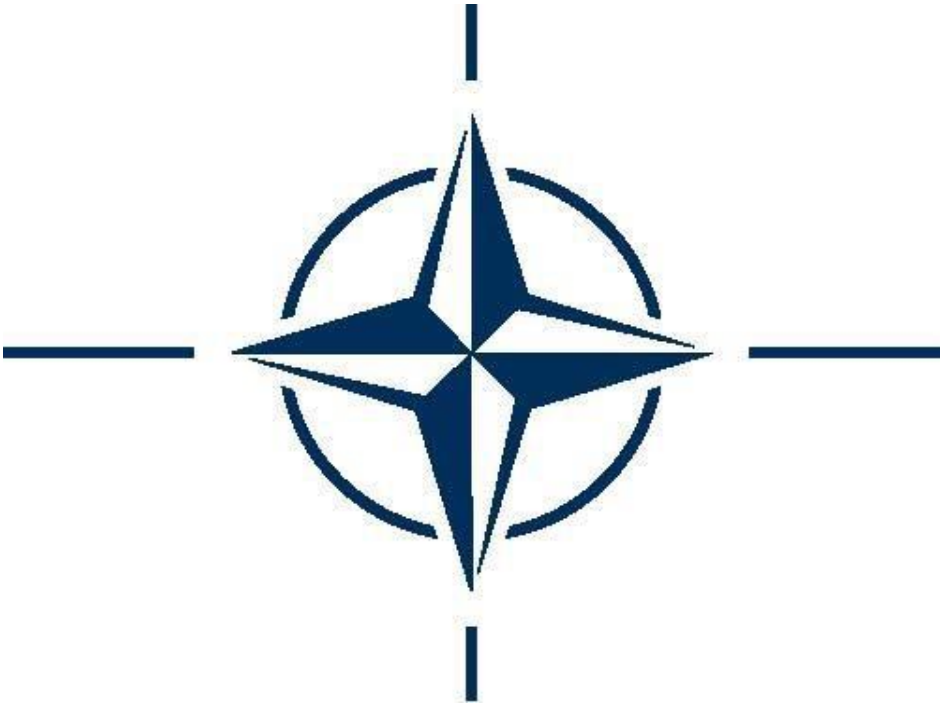
FEBRUARY 2018



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NATO LETTER OF PROMULGATION

22 February 2018

1. The enclosed Allied Engineering Publication AEP-4783, Edition A, Version 1, CHEMICAL, BIOLOGICAL, RADIOLOGICAL, NUCLEAR (CBRN) CONTAMINATED WASTE MANAGEMENT, has been approved by the nations in the NATO Army Armaments Group (AC/225), and is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 4783.

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4. This publication shall be handled in accordance with C-M(2002)60.

Dieter Schmaglowski
Deputy Director NSO
Branch Head P&C

Edvardas MAŽEIKIS
Major General, LTUAF
Director, NATO Standardization Office

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
NLD	The Commander is responsible for the Waste Management Plan (WMP) including CBRN Waste Management. The EPO and CBRN advisor will support and assist the Commander in fulfilling his responsibilities" Environmental officer (EO) support and assist the commander in fulfilling his responsibilities for actions: 1, 2, 3, 11. o 1 Waste management plan, responsibility of commander o 2 Coordination of environmental issues will be done by the EO, Logistics coordination will be fulfilled by the logistic officer, CBRN issues by CBRN advisor. o 3 Waste collection point; Logistic officer o 11 Report, responsibility of the logistic officer The EPO and CBRN advisor will support and assist in all the different phases.
TUR	Due to not possesing CBRN Analysis Loboratuaries, Turkish Air Forces will apply the related parts of the STANAG by using the national CBRN Analysis Laboratuaries.
USA	The U.S. will defer to U.S. national guidance and regulations for all nuclear waste; and any instance of conflict or clarity between AEP-4783 and U.S. guidance and regulations.
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

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1. Introduction

1.1. Aim

001. The aim is stated to provide CBRN Contaminated Waste Management principles, operational guidance and general technical specifications for equipment, in order to enable NATO forces to appropriately manage hazardous waste generated during CBRN Defence operations. This publication is applicable through the range of NATO operational engagements and can also be used as a guideline for domestic operations within the context of national regulations.

002. This standard does not give any requirements for the development of CBRN waste disposal material/equipment.

1.2. Scope

003. States that the publication is applicable to all personnel involved in NATO CBRN defence operation activities,

004. This publication provides guidance to answer the questions “who, what, when and how” with regards to CBRN Waste Management and is consistent with the principles as described in Allied Joint Environmental Protection Publications (AJEPPs).

005. This publication supports the acquisition and development of equipment with regard to CBRN waste management.

2. Limitations

006. This publication does not replace the considerations set forth in the applicable Allied Joint Protection Publications (AJEPPs) or in the various national regulations, but should be read in conjunction with them.

007. It does not cover the following aspects:
- Non-hazardous waste (which is described in detail in the AJEPP-2).

- Anatomical healthcare CBRN waste[1] and infectious healthcare CBRN waste[2], even though these can fall into the category of hazardous CBRN waste, both are defined as a Medical responsibility.
- The method of transportation of CBRN waste from the CBRN waste collection point to the disposal area (which is usually a logistic responsibility).
- The collection and/or disposal of CBRN contaminated human remains.
- Human body or human remains.
- Permanent laboratories regulated by national standards.

[1] Medical waste including human or animal body parts, including tissues and organs. (AJEPP-1).
[2] CBRN waste from medical, dental or veterinary treatment activities (AJEPP-2).

3. **Related Documents**

AEP-7 (STANAG 4521)	Chemical, Biological, Radiological and Nuclear Contamination Survivability Factors in the Design, Testing and Acceptance of Military Equipment.
AEP-58 (STANAG 4653)	Combined Operational Characteristics Technical Specifications, Test Procedures and Evaluation Criteria for Chemical, Biological, Radiological and Nuclear Decontamination Equipment.
AEP-65 (STANAG 4360)	Chemical Agent Resistance Requirements for Coatings Applied to Military Equipment.
IAW AAP-47	Allied Joint Doctrine Development.
ATP 3.8.1 (STANAG 2522)	Specialist CBRN Defence Capabilities
STANAG 2582	Best Environmental Protection Practices and Standards for Military Compounds in NATO-Led Military Operation (AJEPP-2).
STANAG 2583	Environmental Management System in NATO Operations (AJEPP-3).
STANAG 2451	AJP-3.8 Allied Joint Doctrine for CBRN Defence.
STANAG 2521	ATP 3.8.1 – Vol 1 CBRN Defence on Operations.
STANAG 7141	Joint NATO doctrine for environmental protection during NATO-led military activities (AJEPP-4).
STANAG 2510	Joint NATO waste management requirements during NATO-led military activities (AJEPP-5)
AMedP-7(D)	Concept of operations of medical support in CBRN environments.

4. Terms and Definitions

Decontamination	The process by which the hazard from chemical, biological, radiological and nuclear substances is reduced or removed.
CBRN Defence	The plans, procedures and activities intended to contribute to the prevention of chemical, biological, radiological and nuclear incident, to protect forces, territories and population against, and to assist in recovering from, such incidents and their effects.

5. CBRN Waste Management – General Principles

5.1. CBRN Waste Management Principles

008. There are AJEPPs on a number of underlying principles that govern public health and safe management of hazardous waste. These principles, outlined below, should be taken into consideration when regulations governing CBRN Waste Management during NATO-led military activities are developed.

009. The precautionary principle is a key principle governing environmental and safety protection.

- Environmental damage is to be avoided.
- Inevitable environmental damage must be minimized.
- Environmental damage that has occurred is to be remediated as far as possible.

010. CBRN waste hierarchy is the same as for hazardous waste and must be treated as such. It implies that CBRN waste must primarily be destroyed safely without any impact to the environment for organic chemicals or biological material, or concentrated for final disposal for radiological isotopes and heavy metals.

011. Reservations

- Due to the nature of combat operations and the CBRN environment, units may do their best to capture, contain, store or otherwise properly dispose of CBRN materials. Every effort can be made to do this, but the tactical situation may not allow this.
- Legally compliant CBRN waste disposal must take place in an appropriate and safe

location to reduce the risk of misuse of such material. CBRN waste disposal in NATO-led operations should be coordinated with local authorities.

- Waste minimization usually benefits the waste producer: Costs for both the purchase of goods and CBRN waste treatment and disposal are reduced and the liabilities associated with the disposal of CBRN waste decrease.
- The personnel involved in the CBRN waste management must have a sufficient knowledge and capabilities. They have a role to play in this process and should therefore be informed about waste minimization and the proper management of hazardous materials. This is particularly important for department staffs that generate large quantities of hazardous waste. Suppliers of hazardous substances also have a role to play in waste minimization programs.

5.1.1. CBRN Waste Management Responsibilities

5.1.2. General Waste Management

012. The Environmental Officer[3] (EO) is responsible for the Waste Management Plan (WMP) including CBRN Waste Management.

[3] Member of a staff with Commander responsibilities.

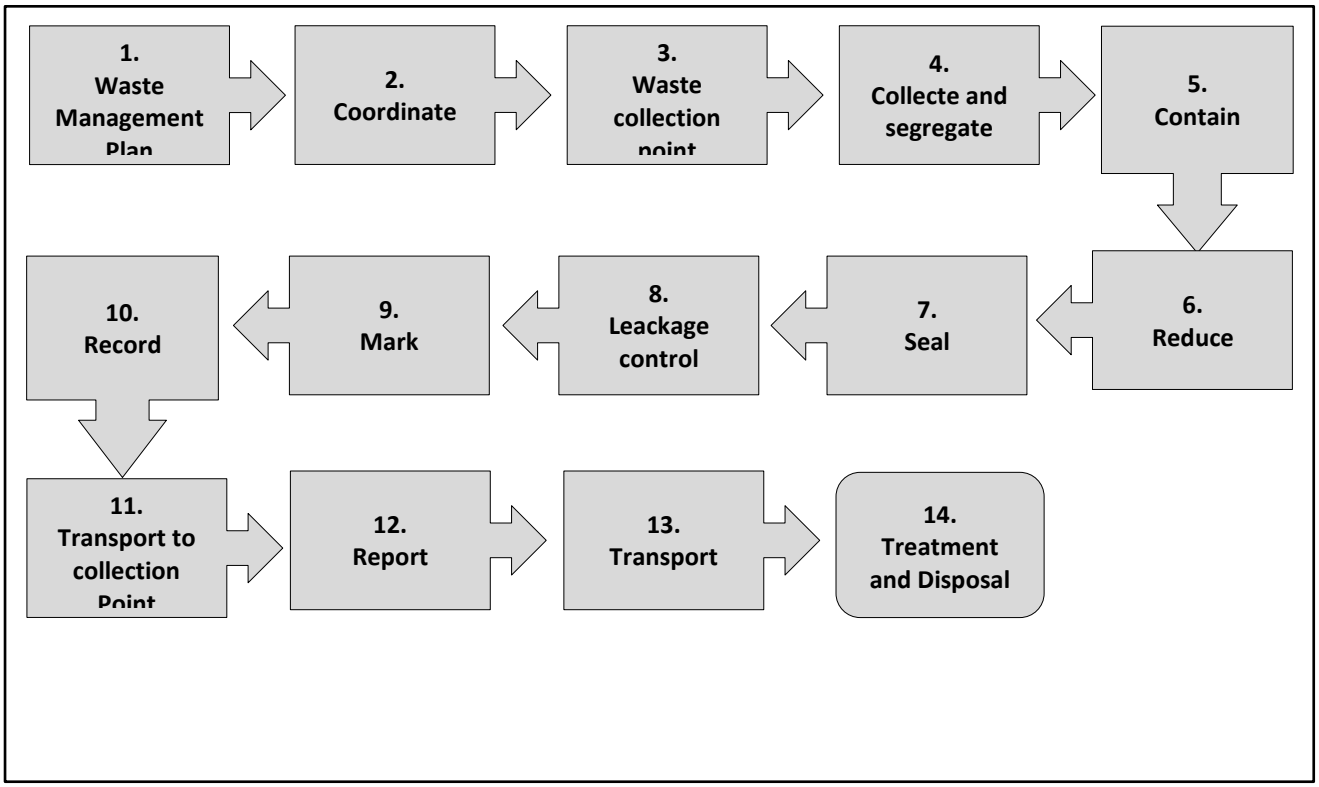

Figure 1: Waste Management Plan.

Environmental officer (EO) responsible for actions: 1, 2, 3, 11.

013. The EO coordinates with (neither limiting nor exhaustive):

- the legal advisor,
- the logistics staff,
- the military engineers,
- the host nation,
- the different supporting nations,
- all services producing any kind of waste (for CBRN Waste this would be the CBRN Advisor),
- the political leadership.

5.1.3. Specific CBRN Waste Management

014. For CBRN wastes, management is under the responsibility of the CBRN Advisor with the support of a CBRN lab or unit and medical staff. Additionally, as practical and excluding during active combat operation, any NATO force producing CBRN waste is responsible for:

- spill prevention;
- proper collection of CBRN waste;
- segregation;
- containment;
- reduction;
- sealing;
- leakage control;
- marking;
- reporting;
- transportation and disposal of CBRN waste as a logistic responsibility;
- disposal.

015. General guidelines and responsibilities are provided in the AJEPP-2.

5.2. Categorisation[4] and Types of CBRN Waste[5]

016. This figure below shows some kind of wastes that could have been contaminated with CBRN agents.

[4] The definitions of the different categories and types of waste, as found in the AJEPP-2.
[5] Vapours are not considered waste.

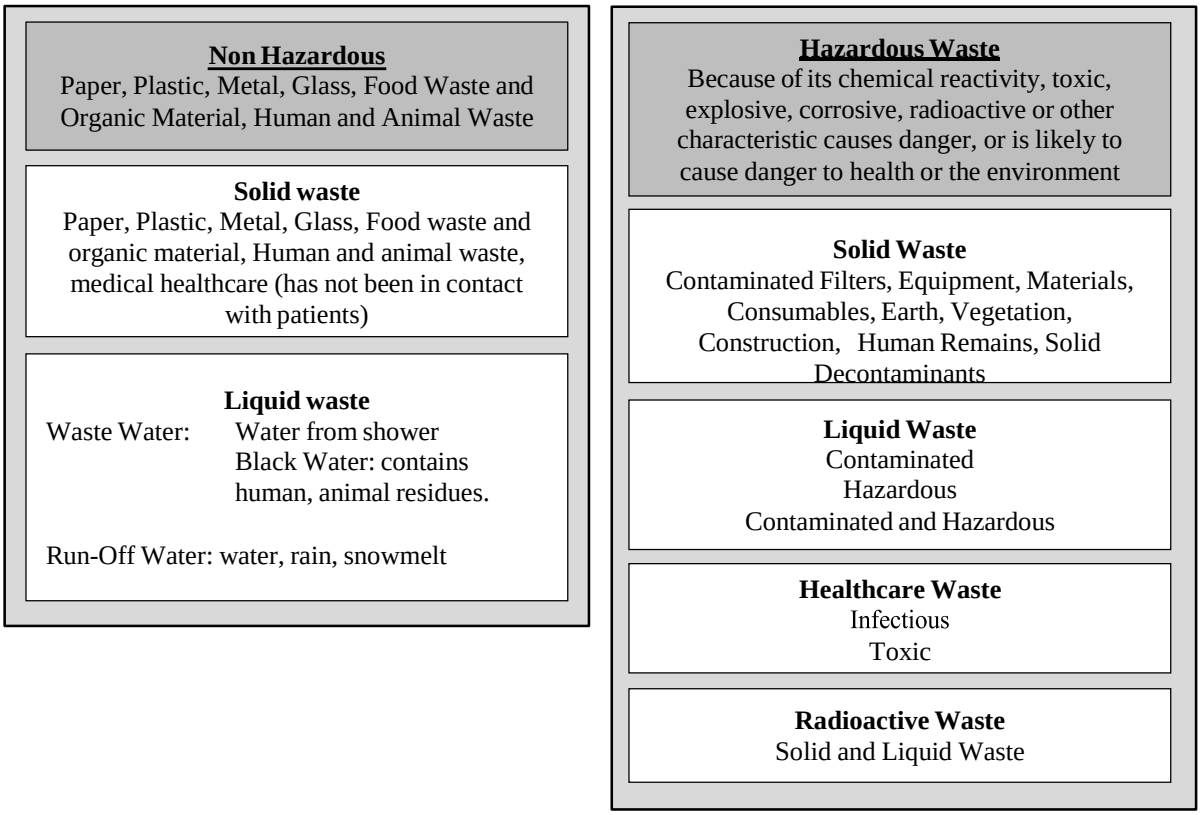

Figure 2: Categorisation and possible Types of CBRN Waste.

5.2.1. Hazardous CBRN Waste

017. CBRN waste is hazardous waste resulting from the conduct of CBRN defence operations. It presents a chemical, biological, radiological or combined danger to health or the environment.

018. Hazardous CBRN waste contains significant amounts of specific chemicals including explosives, toxic and infectious (include biological healthcare) materials, or radioactive isotopes which cause danger, or are likely to cause effect or danger to health or the environment.

019. CBRN wastes can be solid or liquid waste. They are generated from immediate or persistent effects of a CBRN incident that could not be decontaminated beyond the thresholds of thorough decontamination and could not be reconditioned to a non-hazardous state.

5.2.1.1. Impact of Hazardous Waste versus Remediation

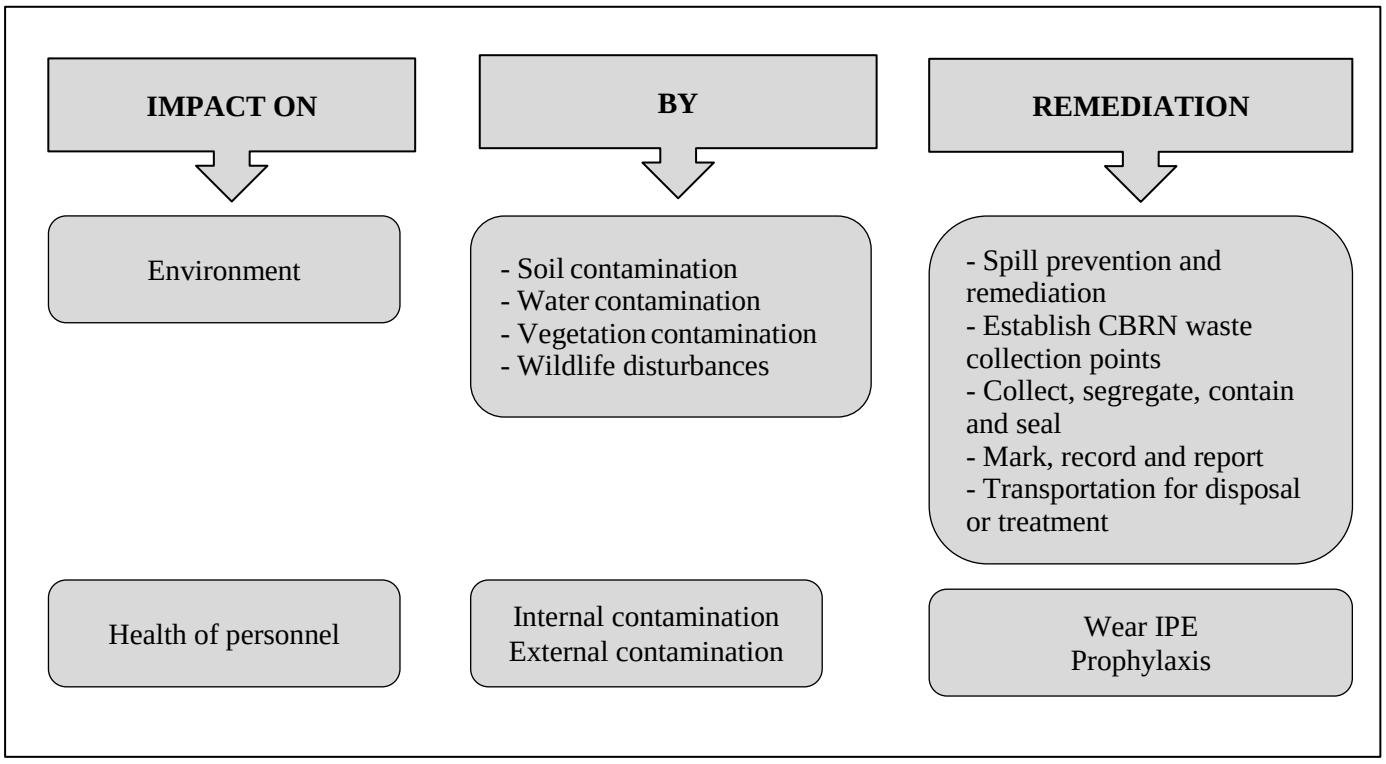

Figure 3: Impact of Hazardous Waste and Remediation.

5.2.1.2. Hazardous CBRN Waste Management

020. Hazardous CBRN waste must be handled, stored, transported and disposed of in a manner that protects human health, the environment and equipment, and meets legal regulations.

021. The following general principles are to be observed:

- If the properties of the waste are unknown, it is to be tested and classified. SIBCRA or CBRN units could be involved in such testing and classification.
- Ensure CBRN wastes are handled correctly to prevent contamination or injury of personnel.
- Proper storage locations and appropriate receptacles must be selected.
- Hazardous CBRN waste must be suitably packed, marked and recorded for inventory control, and all means of transport must be labelled with appropriate symbols and placards.
- Transportation of hazardous CBRN waste must be in accordance with all applicable legislation[6].
- Corresponding records and documents are to be maintained.
- Personnel responsible for handling the tasks listed above must take appropriate protection measures (e.g. wearing of IPE).
- Storage of hazardous CBRN waste must be coordinated with local authorities where applicable.

5.2.1.3. Origin and Categorisation of CBRN Waste

022. Every action performed during military activities and missions generates waste. The different CBRN defence capabilities are listed in detail in the ATP-3.8.1 Vol I and II.

[6] For NATO deployments normally host nation regulations would be applied. If not available, international legislation or national legislation of troop contributing nations should be used.

023. CBRN defence actions can generate:

- Non-hazardous waste which is to be treated as normal waste and in accordance with AJEPPs.
- Hazardous vapours coming from solid and liquid waste, although vapours are not considered contaminated waste.
- Hazardous waste (solid and liquid), including CBRN waste (solid and liquid).

024. Therefore, the different operational CBRN defence capabilities need to specify and identify what kind of hazardous waste and CBRN waste is generated. In general it can be assumed that the main CBRN defence capabilities generate both liquid and solid waste.

025. Furthermore, the use of contamination avoidance material may increase the amount of contaminated waste that must be properly collected and disposed of after a CBRN incident. Contaminated items may include IPE, field gear, CBRN detection and decontamination equipment, pallet covers, bulk heavy-duty plastic, tarps, and other contamination avoidance covers and decontamination solutions. CBRN waste should be collected, treated and stored safely to limit hazards. Depending on the type and quantity of contaminated material, a waste collection point[7] could increase local hazards and require increased protective measures. Advance planning is the key to the successful handling and disposal of contaminated waste.

5.2.1.4. CBRN Waste Hierarchy

026. The aim of the CBRN waste hierarchy is to generate the minimum amount of waste.

027. Prevention. Preventing the generation of additional CBRN waste by secondary dispersion of CBRN contaminated material applying effective contamination control measures.

028. Re-use. Use of waste material, products or components thereof for their original or a different purpose without processing for treatment in a waste recovery operation other than one which has the purpose of removing the item from the waste stream and repairing it for further use. It constitutes the second best option within the waste hierarchy, but is very limited in the case of CBRN.

[7] Waste Collection Point (WaCP): area where all the CBRN waste and hazardous materials are gathered and properly identified.

029. Reduction. Reducing the quantity of CBRN waste produced by considering appropriate and safe neutralisation methods, in particular the use of passive rather than active decontamination measures. If this cannot be achieved or might consume too many resources, the CBRN waste must be stored safely. The decision to conduct active decontamination will be made based upon mission requirements and welfare of the forces; the volume of CBRN waste produced will be considered, but will not be a primary factor in the decision-making process.

030. Recovery (recycling). Some form of waste treatment which delivers benefit from the waste as an alternative to final disposal. Treatment of effluents to extract water or solvent for use in further decontamination operations would be a considerable benefit.

031. The possible options for treating the waste are, from the most favourite to the least favourite: prevention > re-use > reduction of the waste > recovery > disposal.

032. During a CBRN incident, the CBRN-contaminated waste hierarchy may not apply.

5.2.1.5. CBRN Waste Management Responsibilities

033. As stated earlier, CBRN Waste Management is not the sole responsibility of one individual but a sound coordination of different services and responsible parties. For CBRN Waste Management:

- Unit commanders[8] ensure that Waste Collection Points are established, properly marked, reported, and maintained.
- Environmental Officer. His tasks are (AJEPP-2):
    - Co-ordinate environmental policies/plans/programs/procedures at the unit level
    - Advise the Unit Commanding Officer on environmental issues
    - Co-ordinate environmental reports and returns at the Unit level
    - Co-ordinate the environmental assessment process at the Unit level
    - Promote environmental awareness at the Unit
    - Co-ordinate environmental audits, reviews and/or inspections at the Unit
    - Ascertain the environmental requirements of the unit
    - Evaluate Unit environmental performance

[8] Guidance can be provided by the Joint Force Commander (JFC).

- CBRN personnel apply contamination avoidance techniques and procedures, establish and maintain Waste Collection Points, and segregate waste for localized collection. Deployed personnel are responsible for limiting, to the greatest extent possible, cross contamination, post conflict clean up needed, and the amount of restorative actions needed.
- Specialized CBRN capabilities and staffs provide technical guidance and oversight for establishing unit contaminated waste disposal areas and mark and plot collection points and disposal areas on local area and grid maps.
- Medical authorities provide technical oversight and guidance for personal safety and health- related issues.

5.2.1.6. CBRN Waste Management Operations

034. In accordance with the general CBRN Waste Management Principles and considering the different phases of operations, the actions hereunder should be performed:

- When deployed:
  - The CBRN advisor or CBRN defence officer:
    - contacts the EO on site and participates in the establishment of the overall WMP;
    - integrates CBRN waste management principles in the overall WMP;
    - defines the safe Waste Collection Points for the specialized CBRN capabilities such as operational and thorough decontamination sites, observation posts, collective protection facilities and CBRN analytical labs.
    - advises the commander on CBRN matters and the different CBRN capabilities with regard to the CBRN Waste Management principles.
  - The CBRN capabilities prepare their assets so as to be able to:
    - Reduce spills as much as possible,
    - Perform their mission,
    - Implement CBRN Waste Management principles.
- Before the incident the CBRN defence personnel should:
  - Identify the location of the nearest CBRN waste collection point if known.
  - Check and test all available equipment.
  - Prepare reporting forms as needed.
- After an incident when contamination has occurred and the risk to the force is

acceptable to the commander, the CBRN team can be directed to:

- Collect, segregate and treat CBRN waste so as to render it non-hazardous if at all possible.
- Contain and seal remaining CBRN waste.
- Perform leakage control by employing available detection equipment.
- Mark in accordance with the directives of the environmental officer. If no guidelines are given, the marking of sealed containers will be performed in accordance with the ATP-3.8.1 Vol I.
- Record amount, type and date of containerization of hazardous waste for custody control.
- Transport the sealed containers to the nearest CBRN Waste Collection Point or properly dispose of contaminated waste if not able to transport.
- Identify who should report and to whom as well via what means (verbal or written; verbal first due to time sensitivity of incident and follow up with written reporting to document incident).

5.2.1.7. CBRN Waste Management collection and disposal

5.2.1.7.1. Unit Waste Collection Points

035. Units must effectively plan for the disposal of CBRN waste during decontamination operations.

036. Planners should consider site selection based on a number of factors, such as terrain and prevailing seasonal winds. The area must be selected to reduce the hazard as low as reasonably achievable to NATO Forces and host nations, and to identify work areas and rest and relief locations. The plans, procedures and activities are intended to contribute to the prevention of CBRN incidents, to protect forces, territories and populations against, and to assist in recovering from such incidents and their effects.

037. Collection points should be downwind from the rear or entrance to areas such as bunkers or firing positions, or contamination control areas.

038. All unit collection points should be identified and reported to the CBRN advisor or CBRN defence officer. They will ensure each collection point is marked/plotted on local, grid, or area maps.

039. When feasible, the CBRN Waste Collection Point (WaCP) should be located on concrete, asphalt, or other paved surfaces. Avoid positioning the collection point on grass or vegetation. Position the CBRN WaCP so that personnel can transverse a straight line from their shelter, bunker, or facility to the area without having to cross wet or muddy areas or vegetation.

040. Waste should be separated by type (solid versus liquid). No sharp objects that could puncture the plastic liner are to be placed directly into the waste container.

041. Sharp objects should be packaged in a rigid waste container. Collecting sharp objects or material in a cardboard box overwrapped with a heavy-duty plastic bag should prevent objects from penetrating or perforating the waste container.

042. Check CBRN waste compatibility. Liquids should be prioritized.

043. Proper marking prevents unintentional contact and alerts personnel of the hazard.

044. Containers holding contaminated waste must be in good condition and compatible with the waste being stored.

- The container must always be closed during storage, except when it is necessary to add or remove CBRN waste.
- Large trash receptacles, 200-litre (55-gallon) barrels, or similar containers are ideal vessels for collecting contaminated solid CBRN waste. Bags must be sealed against CB agents, liquids, vapours and gas.
- Liquid waste can be stored in 20-litre (5-gallon) or larger containers. A small containment berm should be placed around any liquid-holding area to control potential runoff or spills. The use of sandbags or other suitable material should be used to construct a small containment berm.

045. If sufficient equipment exists, place automatic vapour alarms around or just downwind of the area.

- CBRN reconnaissance personnel should also periodically monitor just outside the area with handheld vapour detection devices for chemical and radiological material as well as possible release of biological material.
- To indicate contamination from an attack or cross contamination, detectors should be positioned around the collection point.

5.2.1.7.2. Equipment and Material

046. The following items or suitable substitute are recommended for establishing and maintaining the CBRN WaCP. Quantities of this material will vary based on the number of individuals and area supported.

- Containers for solid-waste and liquid-waste streams (e.g., waste receptacles).
- Marking material: CBRN marking kit.
- Recommend heavy-duty or tear and puncture resistant plastic bags.
- Pressure-sensitive tape.
- Personal decontamination materials.
- CBRN detection equipment.
- Funnel for pouring liquid waste into collection containers.
- Sandbags.
- Retention tray.
- Individual Protective Equipment (IPE).

5.2.1.7.3. Transportation Procedures

047. The transportation of CBRN waste should be coordinated and controlled through the CBRN advisor or CBRN defence officer. This is accomplished to effectively control and account for the CBRN waste, reduce the contamination of multiple vehicles, and eliminate unnecessary risk to personnel.

- Transportation personnel will wear appropriate protective clothing and have personal decontamination kits immediately available.
- Prior to starting the transportation and collection process from unit collection points to a centralized disposal site, the vehicle driver will:
    - Ensure that the vehicle is properly marked as carrying hazardous material in accordance with international transportation legislation.
    - Allow no one to ride in the open back of a vehicle or trailer.
    - Position a layer of plastic in the bed of the vehicle to minimize the spread of contamination.
    - Verify that contaminated bags or containers are properly marked.
    - Use specific containment after the identification of the kind of contamination according to specific regulations of transportation.

5.2.1.7.4. CBRN Waste Collection Point (WaCP)

048. Establishing the CBRN WaCP must be a well-thought-out process to ensure the safety of all personnel in the area.

049. Planners must coordinate with joint and host nation forces for proper siting of the CBRN WaCP. To avoid multiple large collection points, consideration must be given for the consolidation of CBRN waste from nearby friendly forces or sister services. Site selection should be based on prevailing seasonal winds and be away from any living, working, and rest or relief areas, terrain, and security. The location and size will vary based on the amount of waste generated. Preferred locations are downwind of the friendly forces, on flat, terrain clear from vegetation, in a secure but remote area, and away from areas that are populated by friendly forces or civilians.

050. Any CBRN waste must be disposed of in accordance with applicable local guidance and with consideration of segregation of waste.

051. The disposal site and CBRN waste are to be clearly identified with marking signs for contamination. Proper marking prevents unintentional contact and alerts personnel of the hazard. The collection containers must be marked with their contents, along with the type of contamination or agent, date, and time. Additionally, personnel should establish a cordon around the immediate area and put up signs to control unauthorized access.

052. If sufficient equipment exists, automatic alarm systems are to be placed around or just downwind of the area. CBRN reconnaissance personnel should also periodically monitor just outside the area with detection devices.

053. When contaminated material or waste material require disposal, different methods can be used. Material must be safely packed for appropriate transportation or neutralisation. Note, however, that burning produces a vapour hazard and the CBRN advisor must submit a report if material is burned in order to warn downwind units. Similarly, while burial is effective for all types of contamination, the area must be marked to ensure it is avoided, and the unit that closes the decontamination site must also notify the CBRN advisor, who must submit a report outlining the CBRN waste burial site.

054. Personnel should establish a cordon around the immediate area and put up signs

to control unauthorized access.

6. CBRN Waste Management - Technical Considerations

6.1. Introduction

055. This part of the standard applies to technical management of the waste contaminated by CBRN substances. It is applicable to all kinds of CBRN waste likely to be contaminated in a theatre of operation: Individual Protective Equipment (IPE), small equipment, medical materials, organic materials, aqueous liquids, and various solid waste including soil, oil, materials from infrastructure and lubricants.

6.2. Objectives

056. The aim of CBRN Waste Management is to treat the waste from the decontamination processes as well as items of CBRN Waste (e.g. filters) and CBRN Contaminated Waste.

057. The technical management of waste aims to:

- Reduce/avoid the secondary risks of contamination after decontamination.
- Reduce the volume of CBRN waste to be treated in order to reduce the volume of the effluents.
- Define the most appropriate decontamination method to reduce the toxicity of the waste to the lowest level as possible.
- Contain the CBRN waste before and after decontamination.
- Deal with risks due to residual contamination or possible incompatibilities between reactants (ex: RSDL is incompatible with hypochlorite).
- Recycle materials or equipment after decontamination.
- Destroy the CBRN waste in accordance with host nation or national or international regulations and conventions either in the theatre of operation or at an approved disposal. This site may be in an adjacent country or in the national home base.

6.3.CBRN Waste Management

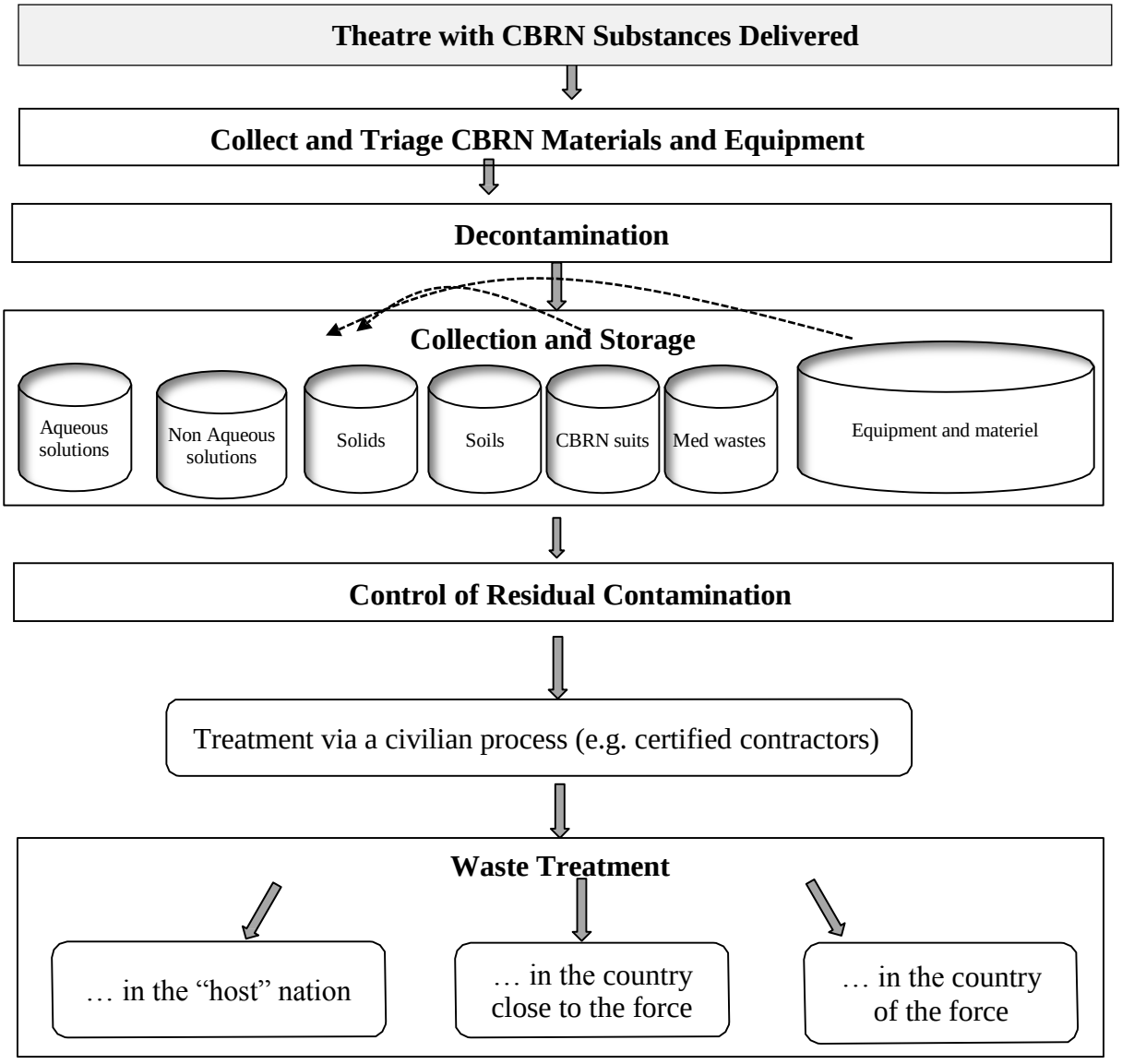

Figure 4: Global CBRN Waste Management

6.4. Collection, Triage and Storage of CBRN Materials and Equipment

058. The following procedures should be implemented to minimize the time and effort needed to perform the collection of CBRN waste and to ensure personnel are properly protected:

- The collection of contaminated waste should be accomplished in the shortest possible time by trained personnel; the number of personnel must be adapted to the situation.
- Prior to starting the operation, personnel must check to ensure that IPE[9] is properly worn, using the buddy system. The risk for personnel to be cross-contaminated is at its highest during the collection of contaminated material for disposal.
- Supervisors will assign personnel trained to perform the duties to detect contamination and remove contaminated protective covers in and around their area.
    - A systematic search of the area for contamination should be planned and communicated to unit personnel.
    - The priority for removing contaminated protective covers from unit assets must be established. Priority should be given to immediate-use items and high-value and/or limited-quantity items that directly affect mission accomplishment.
- The number of personnel can be dependent on the climatic conditions. Rest and relief must be taken into account.
    - A second person can help the main worker to prevent cross contamination and to help him as a “clean hand.”
- The personnel in the clean area can be partially dressed in IPE to contribute if necessary to CBRN waste management.
- Unit personnel must check for contamination in assigned areas.
    - Starting with the priority items, remove and replace contamination avoidance material (e.g. detector material).
    - Chemical and biological material collected should be placed in air tight plastic bags (preferably transparent plastic). When collection bags are approximately three- quarters full, personnel must seal the bag. Radiological material collected should be placed in air tight bags or boxes adapted to the threat. When collection bags are approximately three-quarters full, personnel must seal bag/box.
    - Place the first bag into a clean bag. To reduce the risk of

[9] Once removed IPE must be treated as contaminated waste.

contaminating the outside of the clean bag, the assistance of a second person may be required.

- Perform immediate glove decontamination.
- Repeat the bag-sealing process for the outer (clean) bag.
- Perform immediate glove decontamination.
- Prepare the material for transport to the CBRN WaCP.
- Place contamination markings on the outer bag. The bags must be clearly marked with the contents, type of contaminant or agent, date, time, and location.

- Material (such as pallet covers and bulk plastic) that will not fit into standard trash bags require a different procedure or process as follows:
  - Starting from the long end of the material, with arms extended, grasp the bottom and roll the material onto itself. Properly done, this will contain any contamination inside the cover or plastic, away from the individual, while reducing air pockets and the bulkiness of the material.
  - After the material is rolled, fold the two outer ends toward the centre and secure the material with tape or string so that it will not unfold or unroll.
  - Secure and seal the material in an outer wrapping.
    - If ground contamination is/was suspected, place a drop cloth on the ground to reduce the risk for cross contamination of the outer wrapper.
    - Avoid kneeling on the ground.
    - Place the material on a section of clean plastic sheet, large enough to fully wrap the material.
    - Perform immediate glove decontamination if appropriate.
    - Fold the ends of the outer wrapper toward the centre, overlap the material, and secure the seals with pressure-sensitive tape.
  - Perform immediate glove decontamination.
  - Prepare the material for transport to the CBRN WaCP.
  - Place contamination markings on the outer wrapping. The outer wrapping must be clearly marked with the contents, type of contaminant or agent, date, and time.

059. Decontamination will generate liquid and probably solid waste which will have to be treated according to appropriate process.

060. After decontamination, the generated waste should be collected as much

as possible into air tight containers according to their nature, the physical state (liquid or solid), the threat and the level of residual contamination. The waste should be identified and the containers monitored in order to identify appropriate measures and risks for subsequent transportation and storage. Chemical, biological and radiological waste cannot be mixed but should be stored in different and appropriate containers according to the threat. Chemical materials to be mixed must be chemically compatible. Use specific containers recommended by NATO or national regulations.

061. Use specific containers recommended by NATO or national regulations.

062. Collected CBRN waste should be marked and recorded identifying the hazard posed. Marking should be robust enough to survive transport and storage. A copy of the record is to be attached to the waste container.

063. The air tight containers must be identified at every moment, even during their displacement.

064. If the attack or incident has occurred with different kinds of agents (e.g. attack with chemicals and radioactive material), the different wastes, if they are identified as C, B and R in different areas before collection, must not be put in the same containers. If the different wastes cannot be identified as C, B and R in different areas before collection, their containers must be declared as containing mixed materials with as much information as possible (e.g., types and quantities of agents).The record should include the following information:

- The hazard, (refer to Emergency Response Guide (ERG)) and/or UN numbers if applicable;
- The nature/physical state of the CBRN waste;
- First aid guidelines appropriate to the hazardous material/substance if possible;
- The decontamination process and decontaminants used.
- The nature and the volume of waste;
- The residual level of contamination; and
- Any information related to the residual hazard.

065. The collection of contaminated waste must carried out by personnel who are appropriately trained and experienced to deal with CBRN waste. They should also be equipped with the appropriate IPE as well as detection, identification and monitoring equipment. • Prior to transport or for short term storage, record type, date and quantity of hazardous waste for

proper custody control and handoff.

066. In case of radiological and chemical hazards, monitoring and control of the waste management process may be carried out by deployed forces using portable detection, identification and monitoring equipment provided limits of detection are well above health hazards levels for the agents of concern.

067. In case of biological risk, monitoring and control is likely to require the support of a laboratory.

068. In each case, CBRN contaminated waste must be stored in different and appropriate containers according to the threat.

069. All the contaminated materials and equipment should be decontaminated in the field if possible with the appropriate method (immediate and operational decontamination) and with respect to the specific contaminant and the base material (e.g., soda reacts on aluminium) being decontaminated.

6.5. Triage: Decontaminable vs. Non Decontaminable

070. Triage aims to separate decontaminable material from non decontaminable material. Non decontaminable material must be treated as CBRN waste. Material that cannot be fully decontaminated should only be decontaminated as necessary to permit handling in order to prevent waste streams.

6.6. Decontamination

071. After a CBRN event, protected personnel, and their belongings (small items, ammunition, armaments, protective gear…), can be contaminated. Immediate, operational, and thorough decontamination are done as soon as possible in order to save lives, to reduce the risks of cross contamination, and to let the military staff recover their operational capability as soon as possible.

6.7. Contamination Control of Residual Contamination during Storage and Transport

072. The containers must be controlled and monitored in order to verify whether there is any residual contamination on the surface of the container which could generate cross contamination or a hazard to the personnel.

073. According to the toxicological effects posed by the waste, each nation has to select the appropriate protocol/ devices to measure the residual contamination: point detection system, tests in mobile labs and tests in "stationary" labs.

074. If possible, a monitoring of the containers can be set up during the storage and the transport to inform any spill (leakage, road accident…) according to the level of sensitivity required by the nation and the equipment / materials available.

075. A CBRN unit with decontamination equipment can join the transport to reduce and treat any spill on vehicle, road, and environment.

076. Responsible waste management practices require recording of date, type and amount of hazardous waste for inventory control and custody management (see annexes A, B, C).

6.8. Treatment of CBRN Waste

077. Liquid and solid CBRN waste resulting from decontamination must be treated safely and in accordance with civilian regulations and in plants/ facilities designed for the treatment and neutralization of CBRN waste. This destruction can occur either in the country where the CBRN incident occurred, in a country volunteering to support, or host or home nation. The toxicity of liquid/ solid waste can generally be reduced by adding decontaminants/ oxidizers (at certain concentration) like hypochlorite to the CB waste to destroy chemical or biological agents in the liquid. This will help to reduce the hazard and make handling and storage easier. Verification is needed to confirm the destruction.

078. Safe disposal. The final destination of CBRN waste which cannot be neutralised, including residual waste from re-use and recovery operations, which is not otherwise reused or recovered.

6.9. Reduction of CBRN Waste Volume

079. Reducing the volume of the waste is recommended for better handling, storage and disposal. This will improve logistic capacities and help save costs.

080. Solid waste: Where applicable, a separation of contaminated and non-contaminated parts should be carried out. For larger objects or systems, partial disassembling should be taken into consideration.

081. Liquid waste: Decontamination processes may lead to huge volumes of contaminated liquid waste containing decontaminants, solvents, reactive compounds, decomposition products of chemical agents, radioactive particles, etc.

082. There are many different technologies available to reduce the amounts of this waste: filtration, evaporation, reverses osmosis, ion exchange.

083. However, higher concentration of hazardous material in the waste may complicate either its handling or transportation or storage conditions, e.g. radiological contaminated waste generally leads to higher dose rates which can cause ionising radiation to the surrounding environment.

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ANNEX A

Waste Generated by CBRN Capabilities from the Units of the Different Services

CBRN of the Units	CBRN Waste							
	Solid Waste				Liquid Waste			
	C	B	R	N	C	B	R	N
Organic RECCE								
Observation Post								
Collective Protection Facilities								
Immediate Decontamination								
Operational Decontamination								

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ANNEX B

Waste Generated by Specialized CBRN Capabilities

CBRN of the Units	CBRN Waste							
	Solid Waste				Liquid Waste			
	C	B	R	N	C	B	R	N
Specialized RECCE								
CBRN EOD Teams								
SIBCRA-Teams								
Thorough Decontamination								
Casualties Decontamination								
CBRN Analytical Labs								

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ANNEX C

Annex C: Existing Equipment for CBRN Management

Missions	CBRN Waste Management SOLID WASTE				
	Mobile Assets		Fixed Assets		
	RECCE	IMMEDIATE DECON	RECCE	IMMEDIATE DECON	OPS DECON
Collect					
Segregate					
Treat					
Contain					
Seal					
Leakage control					
Mark					
Transport					
Report					

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LEXICON

ABREVIATIONS AND ACRONYMS

AJEPPs	Allied Joint Environmental Protection Publications (AJEPPs).
EO	Environmental Officer
IPE	Individual Protective Equipment
WaCP	Waste Collection Points
WMP	Waste Management Plan

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