Environment Agency

Guidance for the storage and treatment of aerosol canisters and similar packaged wastes

An addendum to Sector Guidance Note IPPC S5.06

(Version 1.0 November 11)

NIEA Northern Ireland Environment Agency
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An Agency within the Department of the Environment
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We cannot do this alone. We work closely with a wide range of partners including government, business, local authorities, other agencies, civil society groups and the communities we serve.

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1 Introduction

This guidance has been produced by the Environment Agency for England and Wales and the Northern Ireland Environment Agency.

This document expands upon the requirements of IPPC S5.06: Guidance for the recovery and disposal of hazardous and non-hazardous waste (SGN 5.06), which sets out standards for the design, operation and management of waste facilities subject to environmental permitting under the Integrated Pollution Prevention and Control (IPPC) Directive[1], and 'Getting the Basics Right: How to comply with your environmental permit'.

IPPC operates under the Environmental Permitting (England & Wales) Regulations (the Regulations) and equivalent legislation in Northern Ireland (the Pollution Prevention and Control Regulations (Northern Ireland)).

This guidance document sets out the additional appropriate measures that we expect relevant regulated facilities to meet for the safe storage, treatment and associated transfer of waste aerosol canisters and similar wastes. The requirements of the guidance do not apply to waste activities carried out under an exemption from the Environmental Permitting Regulations (e.g. Exemption T15 - Treatment of waste aerosol cans).

With the exception of the requirements provided in Section 7 (Appropriate measures for process efficiency), which only apply to IPPC waste installations, the requirements provided by this document apply to relevant waste operations and waste installations. New facilities will normally be expected as a minimum to comply with these requirements from the start of operation. We also expect existing facilities to comply, although where significant improvements are needed we will allow an appropriate length of time to up-grade in order to achieve this[2].

The Environment Agency has also published a generic guidance document relevant to all industrial and commercial premises called 'Getting Your Site Right – Industrial and Commercial Pollution Prevention', which provides advice for businesses on minimising waste and pollution risk.

1.1 Relevant Regulated Facilities

This guidance applies to regulated facilities that are permitted for storage for treatment or transfer of source-segregated or bulk loads of waste aerosol canisters (i.e. UN1950 articles[3]) and similar wastes, such as gas canisters without a release device (i.e. UN2037 articles) and small pressurised and un-pressurised containers containing flammable gases (e.g. UN1057 articles), from now on referred to as "canisters".

The transport of waste to and from the regulated facility is outside the scope of this guidance document. The transport of canisters must comply with the requirements of

[1] Directive 2008/1/EC of the European Parliament and of the Council
[2] Appropriate timescales for upgrading and improving existing plant are discussed in Section 1.4 of Sector Guidance Note S5.06
[3] UN Numbers assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods.

the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR), which are implemented by the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2011. The HSE has issued advice on the carriage of waste aerosols[4].

1.2 Wastes covered

For the purpose of this guidance, when manufactured, a canister is:

- any pressurised container, typically having an internal pressure between 4 and 10 bar and containing two components:
  → a product concentrate (e.g. paint, deodorant, lubricant) and
  → a compressed or liquefied gas propellant; and
- any other pressurised canisters of similar construction
- similar empty or nominally empty containers that have not been made safe e.g. by piercing to ensure no pressurised gas remains
- other similar small containers containing flammable gas that may pressurise when heated (e.g. lighter refills)

This guidance does not apply to waste packaging or containers that require manual energy to create and maintain pressurisation (e.g. pump action toiletries/cleaners)

Examples of relevant European Waste Catalogue (EWC) codes for waste canisters:

16 05 gases in pressure containers and discarded chemicals

16 05 04*	gases in pressure containers (including halons) containing dangerous substances
16 05 05	gases in pressure containers other than those mentioned in 16 05 04

Medicines (e.g. ventilator aerosols) coded in accordance with the relevant Chapter 18 or Chapter 20 codes and treated as healthcare wastes.

1.3 Suitability of wastes for on-site storage and treatment

Canisters, such as those classified under the waste codes given above, may be accepted at waste facilities for storage for treatment or transfer. However, the specific waste canisters a site can accept will depend upon the potential hazards of the waste, the storage and treatment measures provided at the facility and, where applicable, will be defined by the conditions of the environmental permit held by the facility.

The propellant contained in a canister can typically range from 5% to 95% of the total content, and is used to provide the spray energy. It can also act as an essential component of the product, such as the foaming agent in shaving foam, or as the solvent in spray paint.

Canister propellants include liquefied gases, such as hydrocarbons (typically propane or butane), di-methyl ether (primarily in cosmetic products), and compressed gases,

[4] See: http://www.hse.gov.uk/cdg/manual/commonproblems/wasteaerosols.htm

such as carbon dioxide and nitrogen. Due to their ozone-depleting potential, CFCs have not been used in aerosol products manufactured in the UK since 1989. The use of hydrofluorocarbons (HFCs) as a propellant has also been limited due to their high global warming potential (HFCs are 150-1500 times more potent than carbon dioxide (CO_2)). HFCs are only used in products when there are no viable alternatives (e.g. when they must be used to ensure the safety of a non-flammable product).

The contents of canisters can pose a wide range of dangers and may be marked with a variety of warnings, such as:

- *Extremely flammable.*
- *Pressurised container: protect from sunlight and do not expose to temperatures exceeding 50°C.*
- *Do not spray on a naked flame or any other incandescent material*
- *Keep away from sources of ignition- No smoking.*
- *Do not burn or puncture even after use.*
- *Use only in well ventilated areas.*
- *Solvent abuse can kill instantly (the "SACKI" warning)*

Canisters containing water-based products may not burn easily in a fire, whereas those containing highly flammable products, such as an engine ignition fluid, will burn readily and feed the fire. Regardless of their content, however, all canisters are under pressure and therefore pose a potential danger, and must be handled and stored on-site in a safe manner.

Source-segregated or bulk loads of waste canisters should be directed to specialist canister treatment facilities, rather than metal recycling facilities or other material recovery facilities. At some canister treatment facilities, for example those that employ an automated plant provided with an appropriate system for gas collection or abatement, partially full or full canisters may be accepted for treatment, whereas at others it may only be appropriate to treat fully discharged (empty) canisters[5]. If full or partially full canisters are received at a facility that is not appropriate for their treatment they should be segregated, stored safely and transferred to an appropriate facility for treatment.

Some canisters may contain products that make them unsuitable for treatment due to their physical characteristics once released from the canister. For example, canisters may contain products that set solid on ejection from the can, such as expanding foams (e.g. Isocyanate foams), and therefore these wastes should not be accepted for treatment in a plant unless it is specifically designed to process them. Canisters containing foams that expand but do not set hard on ejection, such as shaving foams, may also be unsuitable for treatment, except in purpose built plant, due to the difficulties of removing the ejected foamed product from the plant at the end of the treatment process. Similarly, some plant may not be able to process small plastic

[5] For the purpose of this guidance, the definition of "empty" is taken from British Standard BSEN 13430:2000 *'Packaging: Requirements for packaging recoverable by material recycling'*, which defines empty packaging as "if - under normal and foreseeable circumstances - all product residues that can be removed by the emptier have been removed using practices commonly employed for that type of packaging" e.g. by squeezing, aspirating, pumping, shaking etc. However, this would not necessarily mean that the waste would be classified as "packaging waste" or "non-hazardous waste" under the Hazardous Waste Regulations, which require that the maximum amount of hazardous material has to be removed by physical or mechanical means. This could include piercing, draining and scraping of the packaging to leave a residue or contamination that cannot be removed by such means.

components, such as plastic caps/lids, and therefore these may have to be safely removed from the canisters before they can be processed.

The acceptance, storage and treatment of unsuitable waste canisters, or the storage and handling of canisters in inappropriate containers, can pose significant risks to health, safety and the wider environment. To a lesser extent, the treatment of inappropriate wastes can damage plant infrastructure and also increase the downtime of the treatment equipment, for example due to the time taken to clean out a foam product released inside the equipment. Therefore, it is important that waste acceptance criteria and plant design capability are based on clear specifications, taking into account variations in canister size and design and the quantity and nature of the canister content (i.e. the residual aerosol product and propellant), and that waste producers and site operatives are informed of the types of waste canisters that the facility can accept for storage for treatment or transfer. It is also essential that the Operator confirms (i.e. by visual inspection) that the waste received on site is consistent with what is expected and what can be accepted. These requirements should be achieved through the development and implementation of thorough waste pre-acceptance and acceptance procedures at the facility.

Even with suitable pre-acceptance and acceptance procedures in place, it is possible that canisters will be received at a facility that are unsuitable for treatment or in a condition unsuitable for on-site storage. Therefore, it is important that adequate procedures and provisions are put in place to manage non-conforming wastes in a safe and timely manner (i.e. including their identification, handling, re-packaging (if required), storage/quarantine, and subsequent treatment or transfer) and that suitable accident management measures are in place to cover these activities.

If items are removed from the waste stream prior to treatment (such as plastic caps and lids or canisters unsuitable for treatment) they should be collected, stored and sent for recovery/recycling unless it is technically or economically impractical. Where the waste items must be disposed of, the Operator should use a disposal option that avoids or reduces potential impact on human health and the environment.

2 Key issues

This section introduces the key issues that are covered by this guidance document.

There have been a number of serious incidents at sites not appropriately equipped to handle product and waste canisters, which highlight the potential hazards posed by activities that involve the storage, handling and treatment/transfer of canisters. The primary objective regarding the design and operation of a facility that stores waste canisters for treatment or transfer must be the prevention of accidents and the minimisation of their potential consequences.

This guidance identifies the following issues as being key to the achievement of this objective and the corresponding sections detail the appropriate measures that we expect facilities to meet for them:

- waste pre-acceptance and acceptance (see Sections 3)
- safe waste storage and handling (see Section 4)
- safe and efficient waste treatment, whilst
  - → preventing emissions and
  - → optimising recovery of all materials (see Sections 5, 6 & 7)
- accident management (see Section 8)

However, these issues are not definitive, nor are they independent of each other. They should be managed as part of an integrated system, which incorporates other important measures to protect human health and the environment. It is important to provide suitable training and supervision, maintaining adequate and up-to-date procedures, install and implement adequate fire safety provisions and comply with associated regulations and guidance (see Section 9 for a list of other relevant regulations and guidance).

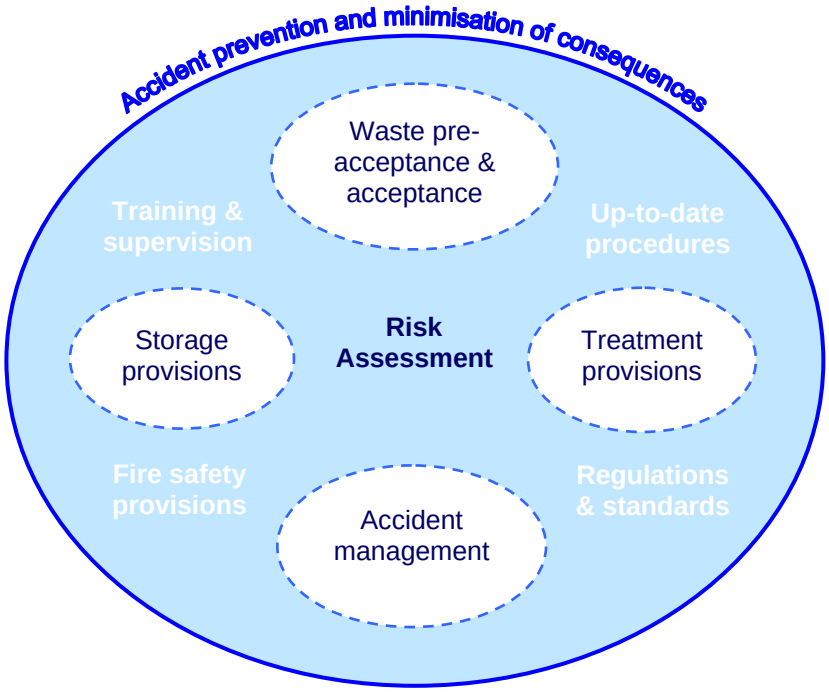

Figure 1 – Summary of key issues relevant for the safe storage and treatment of canisters

The level and extent at which these measures are implemented by an Operator will be proportionate to the potential level of risk (to health, safety and the wider environment) posed by the activities that are carried out at the facility. Therefore, it is essential that risk assessments are carried out at all facilities to identify and assess the potential hazards posed by the wastes accepted and activities carried out on site, and to ensure suitable control measures are put in place and maintained to prevent them and minimise the potential consequence(s) of their occurrence.

Measures to prevent and control the risk of fires should be a priority consideration for the design and operation of the waste storage and treatment areas, which should always be separated from potential sources of ignition and other combustible materials. The design and operation of a facility should be based upon a site specific environmental risk assessment, which should consider the potential risk to the environment as a whole. A risk assessment will also be required under the provisions of the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) and under The Control of Major Accident Hazards Regulations at sites where threshold quantities of dangerous substances identified in the Regulations are kept or used.

Often, the protection of health and safety goes hand in hand with the protection of the environment. Health and safety guidance on the storage and segregation of waste is also available from the Health and Safety Executive (HSE); in particular HSG51 & HSG71[6] and the measures set out in these documents also afford some degree of environmental protection. However it is recognised that in certain circumstances there may be an over-riding need to protect health and safety. Where this is the case this should be made clear so that due regard can be demonstrated both to the protection of health and safety and to the protection of the environment.

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HSG51, The Storage of Flammable Liquids in Containers, 1998, HSE Books, Health and Safety Executive.
HSG71, Chemical Warehousing- The storage of packaged dangerous substances, 2009, HSE Books, Health and Safety Executive.

3 Waste pre-acceptance and acceptance

Failure to screen wastes adequately prior to acceptance and to confirm the characteristics of the waste on arrival at facilities can lead to subsequent problems. These may include: inappropriate storage, accumulation of untreated stock, and accidents during treatment (e.g. fires and explosions). Operators will therefore be required to demonstrate that appropriate pre-acceptance and acceptance checks are carried out rigorously to ensure their effectiveness.

Sections 2.1.1 and 2.1.2 of SGN 5.06 detail the requirements for waste pre-acceptance and acceptance procedures that are expected to be achieved. For example, Operators could use the information provided on the canister's labels, accompanying documents and MSDS data sheets to confirm the composition and hazards of their contents, rather than sampling and analysing the canister contents in a laboratory.

Operators are expected to have procedures in place that satisfy the requirements detailed in Sections 3.1 and 3.2 below, which are specific to the pre-acceptance and acceptance of canisters, and operate to them.

Where facilities provide a service to the emergency services such as the removal of spillages or fly-tipped wastes, there may be situations where the pre-acceptance and acceptance measures detailed in Sections 3.1 and 3.2 are inappropriate. In such instances the operator should communicate the occurrence to the regulator without delay.

Wastes received on site other than canisters, or where there is uncertainty over the content and composition of the canister waste, should only be accepted in accordance with the requirements of Sections 2.1.1 and 2.1.2 of SGN 5.06.

3.1 Appropriate measures for waste pre-acceptance

3.1.1 Written procedures should be in place for ensuring that adequate information (including samples where necessary) is obtained from waste producers to allow the Operator to determine the suitability of a waste for onsite storage and treatment before arrangements are made for its acceptance.

3.1.2 The technical capability of a facility should be pre-determined in terms of the nature and quantities of canisters that can be handled and the condition in which they must arrive.

3.1.3 A system should be in place to inform customers and site operatives of the type of canister(s) that the facility is permitted to accept for storage and/or treatment, specifically considering the chemical content, compatibility and quantity of residual materials.

3.1.4 For bulk loads of waste canisters received from canister manufacturers and retailers, the Operator should obtain the following information in writing from the customer:

- quantity of waste being delivered

- the contents of canisters, including named product and propellant
- whether the canisters are fully discharged, partially discharged or unused
- hazard properties posed by contents of canisters (i.e. from MSDS)
- construction material of canisters (e.g. steel, aluminium or mixed)

3.1.5 For mixed loads of canisters, the Operator should obtain the following information in writing from the customer as a minimum:

- quantity of waste being delivered
- construction material of canisters (e.g. steel, aluminium or mixed)

If not obtained from the customer, the condition, content and hazard properties posed by the contents of the canister should be determined and acceptability for on-site storage for treatment or transfer confirmed by the Operator as a priority once the load has arrived onsite.

3.1.6 Using the information received from the customer (as detailed in 3.1.4), a technical assessment must be made of the waste's suitability for storage and treatment to ensure that Permit conditions are met.

3.1.7 The Operator should instruct the customer on requirements regarding the type and condition of containers and packaging that canisters will be accepted in. Requirements for the on-site storage of canisters are detailed in Section 4 of this guidance. Requirements for the transport of canisters are detailed in the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (CDG) and The European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR).

3.1.8 Wastes should not be accepted at the facility without a clear method of treatment (if treated on site) or a defined disposal route (if stored on site pending transfer) being determined in advance and costed.

3.1.9 There must be a clear distinction between sales and technical staff roles and responsibilities. If non-technical sales staff are involved in waste disposal enquiries, then a final technical assessment prior to approval should be made to confirm that the waste is suitable for storage and treatment on site and to avoid build-up of accumulations of wastes.

3.1.10 All records relating to pre-acceptance should be maintained at the facility for cross-reference and verification at the waste acceptance stage. These records should be kept for a minimum of 3 years.

3.2 Appropriate measures for waste acceptance

3.2.1 The Operator should have clear and unambiguous criteria for the acceptance and rejection of waste, along with written procedures for the reception, inspection, acceptance, non-conformance, and rejection of waste received at the facility. Procedures for the non-conformance and rejection of waste canisters should be in accordance with indicative BAT requirement 34 of Section 2.1.2 of SGN 5.06 and should take into account the requirements of CDR for the carriage of waste dangerous goods.

3.2.2 Upon arrival at the facility, the quantity of waste canisters received should be confirmed (based upon weight and/or number as appropriate) and accompanying documentation checked to ensure that the load is as expected and that the site has sufficient storage capacity to take it.

3.2.3 Following completion of the initial checks, the waste should be directed to a designated waste reception area where it can be unloaded for visual inspection. The reception area should be well ventilated and covered, and have an impervious surface and a sealed drainage system.

3.2.4 The waste should not be directed to the reception area and offloaded without further assessment if, upon arrival, the accompanying documents are found to be inconsistent with the waste expected or, based upon the documents, there are concerns regarding the nature or quantity of the waste.

3.2.5 Wastes should not be directed to the reception area if it does not have adequate space for its safe and secure storage.

3.2.6 If waste canisters are received in containers that are not secure for on-site storage and well ventilated[7], based upon an appropriate risk assessment (e.g. taking into account the nature and quantity of the waste, the design and condition of the containers and available site storage provisions), the canisters should either be prioritised for subsequent acceptance checks and transferred to a secure well ventilated container or held in a secure caged storage area as soon as they are accepted on to the site, or rejected in accordance with the facility's waste rejection procedures.

3.2.7 Once offloaded in the waste reception area, the waste should be subject to the following detailed visual checks:

- Check the waste to ensure that it is as expected, complies with the site's waste acceptance criteria and is consistent with accompanying paper work and the site's Permit.
- Check the condition of the containers in which the canisters have been packaged, in order to identify any that are damaged or unsuitable for handling and storage.

[7] For the purpose of this guidance, a container or storage area is secure for the on-site storage of canisters if it is designed to contain the canisters and any liquid residues released from them, including the prevention of canister expulsion (missiling) if exposed to fire, and it is constructed from a non-flammable or fire-proof material. A well ventilated container will have adequate ventilation measures, at high and low level, to prevent internal pressure build-up and the formation of a flammable/explosive internal atmosphere.

- Inspect the load to identify leaking canisters and potentially explosive accumulations of gas, for example by visual inspection and/or using a suitable portable flammable gas detector.
- Check the labelling of the containers in which the canisters have been packaged to ensure that it accurately identifies and describes the waste, removing any labels that do not relate to the waste.
- The Operator should label each container that holds waste canisters with a unique reference number from the site's waste tracking system, the date of arrival and relevant hazard classification(s).

3.2.8 Unidentified wastes received at the facility (i.e. canisters without legible labels and with unknown content) should not be accepted unless information is obtained confirming that the waste canisters can be safely stored and, where relevant, treated on-site (i.e. based upon the content of the canisters and the hazard properties posed).

3.2.9 Following visual inspection, should the load fail the acceptance criteria, for example if it contains waste that the facility is not permitted to accept, these wastes should be immediately moved to a dedicated quarantine area and dealt with in an appropriate and timely manner. Unless the facility is permitted for the storage and subsequent transfer of the waste, the maximum storage time for waste that has failed the acceptance criteria should be no greater than 5 working days.

3.2.10 Should the load be found to contain leaking canisters, these wastes should be immediately removed from the waste reception area, stored in a well ventilated area (e.g. to the open air or an area provided with adequate local exhaust ventilation) and away from any sources of ignition so gases can be safely dispersed and prioritised for treatment if suitable equipment is available on site. Where suitable equipment is not available, the aerosols should not be transported unless they are repackaged for transfer using UN approved salvage packaging provided with appropriate measures to prevent the dangerous build up of pressure, or until the leaking has ceased or slowed sufficiently to present no threat of a flammable atmosphere being generated during transport.

3.2.11 Once a load has passed the acceptance checks detailed above it should be moved promptly to a designated storage area. Requirements for the on-site storage of canisters are detailed in Section 4.

3.2.12 Records of all the information generated during waste pre-acceptance, acceptance, storage, treatment and/or removal off-site should be made and held in accordance with indicative BAT requirements 35 to 38 (inclusive) of Section 2.1.2 of SGN 5.06.

4 Appropriate measures for waste storage & handling

Waste storage is covered in section 2.1.3 of IPPC SGN 5.06, with limited reference to aerosol canisters; this has been reproduced below. This section provides further clarification of our requirements.

Aerosol Storage SGN 5.06
Most aerosols contain materials which are a low hazard to the environment, indeed most are intended to release their contents just about anywhere. The risks if any, come mainly from fire which spreads to involve other materials. Aerosol cans are thin and will rust through quickly in the open air. If a fire starts in a stack of boxes it can be expected to spread quickly, with canisters ejected as they overheat. Some distribution sites place them in cages to prevent 'missiles'. Indoor storage should be employed, to restrict the rate of rusting, and missile risk. An assessment should be undertaken to ensure that land around the store contains nothing that would be expected to be ignited by the contents of an ejected burning can, and to prevent fire spread by radiant heat on an adjacent stack if containment is compromised.

BAT Point 27
Storage of aerosols should take place under cover in closed containers or cages. Aerosols should not be stored in open containers.

Due to the potential hazards posed by canisters (i.e. pressurised vessels often containing flammable gas propellant and liquid product), it is important that all appropriate measures are implemented at a facility to ensure that they are stored safely on site and to minimise risks (e.g. of explosion and propagation of fire) to an acceptable level.

The Operator should always take into account the requirements of HSG51, HSG71 (revised) and SGN S5.06 along with the additional specific requirements for the storage of canisters provided in this guidance. While HSG51 does not specifically address the storage of canisters; HSG71 was updated in 2009 to cover the warehousing of aerosol canisters (paragraphs 164 to 171).

4.1 Appropriate measures for storage

Storage containers

4.1.1 Storage of canisters must take place under cover in secure well ventilated containers or within caged storage areas (see 3.2.6 for definition of a secure and well ventilated container), in a well vented location which is not subject to extreme temperatures or direct sunlight. Good and bad examples of containers used to store canisters on-site are shown in Figure 2.

4.1.2 Canisters received and held in insecure or flammable containers/packaging (e.g. in cardboard boxes, shrink-wrapped on pallets) must be stored in cages or transferred to secure ventilated containers to prevent the risk of them spreading fires by 'missiling' or 'ejection'.

4.1.3 Canisters held in containers that are not able to collect and hold liquids released from the canisters should be provided with suitable containment measures (e.g. drip trays) or transferred to secure containers that are able to retain free liquid.

4.1.4 During storage, lids on containers holding canisters should remain securely closed at all times when not being filled, emptied or internally inspected and the doors/hatches of cages should remain closed and locked when not being used.

4.1.5 Containers used to store canisters should not be over-filled. Over filling can result in canisters being actuated and discharging their contents, either under the weight of the canisters above them, when the container lid is closed or when containers are stacked.

4.1.6 Cages used for storage should be robust, fire-resistant and of an appropriate mesh size (based upon the size of the canisters to be stored) to constrain the canisters and prevent any ejection. Where the cage is not constructed with a mesh roof, the mesh wall panels should extend into the roof space of the storage area to ensure that the structure is completely enclosed.

4.1.7 Containers and tanks holding materials collected from the treatment process should be compatible with the materials held, fully earthed, UN tested and integrally sound, and designed and constructed to prevent the release of fugitive emissions to air (including odour) and ground, whilst allowing for emergency venting where necessary. Containers that can not be enclosed (e.g. skips containing recovered metal which are open to allow for ventilation and drying), should be stored in well ventilated covered storage areas to prevent the collection (and potential contamination) of rainwater and the corrosion/deterioration of the materials held.

4.1.8 Flammable liquids should not be collected or held in plastic drums or non-conductive plastic IBCs. Containers used to collect and hold flammable liquids from the treatment process should preferably be constructed from steel, or at least anti-static plastic, and designed so that they can be sealed for handling/storage purposes. Anti-static plastic containers and IBCs should only be used to collect and hold flammable liquids if they are held within a self-contained bund and segregated from other dangerous substances (e.g. other flammable materials, oxidisers or corrosive materials).

Infrastructure

4.1.9 Segregated storage and the use of appropriate separation distances and/or suitable engineering measures between containers holding incompatible substances is necessary to prevent incidents and as a means of preventing escalation should an incident occur (see HSG 51 for guidance on separation of flammable materials).

4.1.10 Canisters should always be segregated from other flammable wastes and potential sources of ignition, preferably in a separate building, or by the use of a fire-resistant enclosure or fire wall.

4.1.11 No combustible material should be held within the storage area, other than the canister's packaging, containers and wooden pallets on which they stand.

4.1.12 Storage areas should be provided with signs, which clearly display the hazard properties of the wastes that can be stored in them.

4.1.13 Where safe to do so (i.e. taking into account the potential risk of flammable atmosphere formation), storage areas should be provided with a bunded/kerbed impervious surface and sealed drainage systems.

4.1.14 Packaging (cardboard etc) removed from the waste should be removed and stored under cover to avoid degradation and enhance its re-use/recovery.

Ignition sources and fire suppression

4.1.15 Areas of the site where explosive atmospheres could occur (e.g. aerosol storage, sorting and processing areas) should be assessed and, where appropriate, classified into hazardous zones, in accordance with the requirements of DSEAR. Zoned areas of the site should be provided with warning signs, which identify the zone classification and prohibited activities (e.g. smoking, the use of naked flames or other heat sources and hot work (e.g. shrink wrapping guns, gas and oil heaters), and the use of electrical equipment (e.g. mobile phones, cameras, battery charging) and only equipment suitable for operation in the identified hazardous zones should be used. For further guidance on hazardous area classification see the DSEAR Approved Code of Practice (ACoP) and Guidance Series Documents and HSG71.

4.1.16 Canisters often contain gases that are denser than air, such as propane and butane, which can accumulate in low lying areas and form a potentially explosive atmosphere. In order to prevent the potential accumulation of these flammable gases, canisters should not be stored in or adjacent to basements, sumps or similar sunken areas. The design of the site drainage system and other containment measures (e.g. site bunding and kerbing) should also take account of this risk (e.g. where possible, avoid locating open drains or drainage channels in close proximity to stored canisters).

4.1.17 Appropriate precautions should be taken in the storage and handling of canisters to prevent accidental damage due to crushing, falling or impact.

4.1.18 Powered vehicles must not be used to move damaged stock (i.e. canisters that are leaking or suspected of leaking), unless they are specially adapted for use in flammable atmospheres.

4.1.19 The route to the open air from the storage area should be as short and direct as possible, avoiding areas where gas may collect and sources of ignition.

4.1.20 In order to prevent the risk of a thermite spark[8] during storage and handling activities, wherever possible and practical to do so, aluminium canisters

[8] Thermite sparks may be produced from the reaction between rusty steel and aluminium, which can result when there is an impact between aluminium and rust on the surface of steel and could serve as an ignition source for flammable liquids and vapours in the local area.

should be stored separately from steel canisters that are rusty or in poor condition and should not be stored in direct contact with unprotected or rusty steel containers.

4.1.21 The canister reception and storage areas should be provided with appropriate fire detection and fire extinguisher systems. Fire fighting precautions should be chosen based upon the quantity and nature of the content of the canisters stored on site and agreed in consultation with the Fire Service or the Health and Safety Executive.

Inspection

4.1.22 The Operator should implement written inspection procedures to assess the condition of all waste containers (e.g. tanks, drums, IBCs and skips), pipework, bunding / kerbing and surfacing, and to carryout prompt remedial action where required or take unsuitable equipment out of use.

4.1.23 Canisters should be regularly inspected on a frequent basis, for example by visual inspection and/or using a suitable flammable gas detector. Leaking canisters should be immediately removed from the storage area to the open air or an area provided with adequate local exhaust ventilation and away from any sources of ignition so gases can be safely dispersed. The canisters should be prioritised for treatment (if suitable equipment is available on site) or, if necessary, repackaged for transfer using UN approved salvage packaging.

4.1.24 Canisters affected by rusting or damage from impact should be identified and prioritised for treatment.

4.1.25 An auditable waste booking and tracking system should be in place in order to avoid the accumulation and storage of aged stock. Canisters should not be held on site for a period longer than 3 months, prior to treatment or transfer.

Figure 2 - Examples of containers used for <u>on-site</u> storage:

Steel safe/IBC

✓Containment of canisters and liquid residues

✓Adequate ventilation **<u>if</u>** designed with high and low level louvres

X Limited visual inspection

✓Easily earthed

✓May meet ADR requirements

Steel cage

✓Containment of canisters and liquid residues **<u>if</u>** provided with lid and solid tray base

✓Good ventilation

✓Better visual inspection

✓Easily earthed

X May not meet ADR requirements

Adapted plastic IBC

X Poor containment of canisters

X Poor low level ventilation

X Limited visual inspection

X Not easily earthed

X Unlikely to meet ADR requirements

5 Design and operation of waste treatment processes

Key requirements of the IPPC Directive:

- the necessary measures are taken to prevent accidents and limit their consequences;
- all the appropriate preventive measures are taken against pollution, in particular through application of the best available techniques
- where waste is produced, it is recovered or, where that is technically and economically impossible, it is disposed of while avoiding or reducing any impact on the environment

The key requirements given in the box above should be taken into account when the Operator is:

- Assessing candidate treatment processes and designs as part of an options appraisal (see Figure 3 for examples of two existing processes)
- Operating the selected treatment process
- Making developments/changes to the process design and associated infrastructure

Examples of existing processes that treat canisters

Compactors

The process is sealed and operated under vacuum, preventing emissions to air. Canisters are initially tipped into the hopper and an inert gas is used to prevent the formation of an explosive atmosphere and provide fire suppression. Hydraulic rams squash the canisters into briquettes forcing the release the liquid contents and gases. The gases are collected, recompressed and stored in tanks. The liquids are collected and piped to an IBC.

Shredders

A conveyor feeds the canisters into the top of the shredder. Once shredded, the metal falls out of the bottom of the shredder and is collected. Liquids released from the canisters pass through the shredder and are collected in an IBC. The shredder may be fitted with nitrogen injection, explosion relief doors and a fire detection / CO_2 suppression system. However, unlike the sealed vacuum processes, the shredder system is unlikely to be able to collect the gases released from the treated canisters.

5.1 Assessment of candidate treatment processes

When considering candidate techniques for the treatment of waste canisters (for new facilities and plant upgrades[9]), the Operator should assess each option against the key requirements identified above by ensuring that the following principles are met:

- The treatment process should be designed to minimise the risk of accidents and their potential impact upon the environment and human health.

- The treatment process should aim to prevent emissions to air and water through the capture and collection of all canister gases and residues.

- Any emissions that cannot be prevented should be and minimised and provided with appropriate abatement where necessary.

- The treatment process should maximise the recycling potential and value of the recovered components and residues. Wastes produced should be recovered in line with the Waste Hierarchy[10] or, where this is not possible, disposed of in a way that minimises the potential impact upon human health and the environment.

Additional requirements for IPPC waste installations:

- The treatment process should maximise energy efficiency.

- The treatment process should minimise the use of raw materials (e.g. nitrogen) and where used, raw materials should be selected which are less harmful to the environment.

- The treatment process should prevent and minimise the production of residual wastes.

Horizontal Guidance Note H1 - Environmental Risk Assessment for Permits provides further guidance on the assessment of candidate techniques.

[9] Appropriate timescales for reviewing, upgrading and improving existing plant are discussed in Section 1.4 of Sector Guidance Note S5.06
[10] As set out in Article 4 of the Waste Framework Directive (2008/98/EC)

5.2 Appropriate measures for the design and operation of the treatment process

It is essential that the canisters treated at the facility can be done so safely and effectively by the processes/equipment employed on site. The treatment process should also be designed to maximise the potential for recovering the canister material (e.g. steel or aluminium casing) and the residual contents of the canister (gases and liquids), aiming to prevent and minimise emissions to air and water, whilst maximising energy efficiency and minimising the use of raw materials (see Section 7). The gases and liquids contained in the canisters should be extracted and collected efficiently and safely, as an integral part of the treatment process, enabling them to be recovered and reused where appropriate, for example as a secondary fuel.

The treatment of waste canisters should be carried out taking into account the following specific requirements:

Process design and infrastructure

5.2.1 The treatment process should be fit for purpose and specifically designed for the treatment of canisters and the recovery of their materials and residues whilst managing potentially flammable substances and preventing explosive atmospheres.

5.2.2 The treatment process should be designed and operated (e.g. in terms of waste feed rate, duration of treatment cycle and gas/liquid extraction) to ensure that the residual contents of the canisters are fully discharged and removed in a safe and efficient manner.

5.2.3 The treatment plant should be located in a designated covered area or ventilated building, provided with impervious surfaces and sealed drainage systems, and located with suitable separation from stored combustible materials, other sources of ignition and sensitive receptors. The treatment area should be designed in order to avoid the potential accumulation of flammable gases that are heavier than air, for example in sumps or similar sunken areas.

5.2.4 The treatment process should be carried out in an enclosed and sealed system provided with means to contain or control an explosion. The plant should be strong enough to contain an explosion (typically up to 10 bar overpressure) or should have explosion relief directed to a safe space or explosion suppression fitted. Explosion relief provisions must satisfy the requirements of relevant Health & Safety legislation.

5.2.5 The Operator should ensure that all canisters have been checked and sorted (having regards to relevant COSHH implications[11]) before being fed into the treatment process to ensure untreatable wastes (e.g. foams) are excluded.

[11] COSHH –Control of Substances Hazardous to Health Regulation 2002.

5.2.6 Wherever possible and practical to do so, batches of aluminium and steel cans should be processed separately in order to enhance subsequent recycling of the metals recovered from the treatment process.

5.2.7 In order to maintain the operating efficiency of the treatment system and prevent the accumulation of waste in the treatment area (i.e. of waste that requires sorting, is ready for treatment or has been removed from the treatment stream) the Operator should keep the waste sorting process distinct and separate from the treatment process itself.

5.2.8 To prevent damage to canisters and spillage/fugitive release of recovered residues and materials, the facility should be designed to minimise double-handling for treatment and subsequent storage.

5.2.9 For safety considerations and to prevent the accumulation of wastes on site, the Operator should ensure that reliable recovery or disposal routes are identified and available, and where necessary contracts are in place, for taking the residues/materials recovered from the treatment process and any canisters that have been accepted but can not be treated on site.

5.2.10 The Operator should ensure that as a minimum all LPG piping systems comply with UKLPG Code of Practice 22[12] and are securely sealed, tested and have a procedure in place for their regular inspection.

5.2.11 Before being stored and sent for recycling, residues remaining on the recovered metals should be collected or allowed to dry.

5.2.12 The Operator should consider the need for noise and vibration control measures, having regard to the control practices detailed in IPPC H3 Horizontal Guidance for Noise, Part 2 – Noise Assessment and Control.

5.2.13 Systems should be in place to ensure that the following are available at all times and remain effective and up-to-date:

- process diagrams and plans, with DSEAR hazardous zone areas clearly marked out,
- environmental risk assessment,
- design specification,
- treatable wastes and exclusions,
- control system philosophy,
- venting and emergency relief systems,
- operating and maintenance procedures,
- protection during abnormal operations,
- COSHH risk assessments.

[12] UKLPG Code of Practice 22, LPG Piping System Design and Installation (July 2002)

Accident prevention

5.2.14 Site specific risk assessments should be undertaken for the treatment area and associated treatment activities. This will include carrying out a full DSEAR risk assessment to identify and assess areas of the site where flammable gases and liquids are present, activities involving those substances, how they may give rise to risk of fire or explosion, implement measures to eliminate, control or mitigate potential risks to the safety of workers and, if necessary, classify potentially harmful areas of the site into hazardous zones (see DSEAR ACoP and guidance series documents referred to in Section 9). The risk assessments should also cover the potential for adverse chemical reactions occurring between different aerosol contents, the potential for thermite reactions (sparks) between metals (i.e. aluminium canisters and rusty steel) and build-up of static electricity.

5.2.15 Treatment buildings should be provided with sufficient ventilation both during operation and non-operation periods, for example by providing permanent openings in external walls and roof vents. Large buildings or building where the internal structure prevents clear airflow may require extractive ventilation, which should be interlocked with plant operation, so that the plant cannot operate unless the ventilation system is working, but should also be capable of being turned off in an emergency i.e. in the event of a fire.

5.2.16 The treatment process (tipping/loading, shredding, compaction etc) should take place within a controlled inert atmosphere, for example using gas extraction and nitrogen gas injection to displace air from the plant and to purge it before and following a treatment cycle. Plant operation should automatically cease on failure of the inerting system or high oxygen levels. Similarly, where ventilation is used to prevent the formation of an explosive atmosphere equipment operation should automatically cease when the LEL[13] is approached.

5.2.17 The treatment plant should be shielded in order to prevent the loss of any canisters without compromising the areas emergency escape routes or ventilation. Where possible, the operation of the treatment process (e.g. waste loading, piercing and unloading activities) should be automated, rather than manual, so that operators do not need to be in close proximity to the machine during operation.

5.2.18 The Operator should ensure that the compatibility of collected liquids is assessed and confirmed before treating canisters that contain different products or mixing liquids that were collected from different batches of canisters.

5.2.19 Containers used to hold liquids or metal collected from the processed canisters should be checked and cleaned periodically to prevent build-up of flammable residues.

5.2.20 The Operator must ensure that the treatment plant and associated equipment is cleaned/purged of residual materials between batches or loads of waste where it is assessed that cross-contamination of the collected residues and

[13] LEL - Lower Explosive Limit - For extremely flammable propellant such as LPG this is usually defined as 1.8% in ambient air.

treated waste materials could impede their subsequent recovery or disposal or pose potential chemical incompatibilities or other health and safety risks.

5.2.21 The design and construction of the system used to collect liquids released from the canisters during the treatment process should be appropriate to their hazardous properties to ensure that they can be safely collected, contained and transferred.

5.2.22 Volatile gases are likely to be released from the liquid residues collected from the treated canisters. The treatment process should be designed and operated in a way that maximises the collection and recovery of these gases or, where this is not possible, minimises their release as a fugitive emission to air without giving rise to the creation of potentially flammable atmospheres.

5.2.23 Electrostatic charges may develop on containers holding non-aqueous liquids and the liquid component collected from treated canisters may be flammable and give off flammable vapours. To prevent the risk of fire, the Operator should ensure that only earthed metal (i.e. steel) or anti-static containers are used for holding flammable liquids. Non-conductive plastic and composite metal-clad IBCs should not be used for this purpose. Pipework used to transfer flammable liquids should also be earthed or made from an anti-static material. All equipment that has the potential to develop an electro-static charge should be earthed and effectively grounded and the effectiveness of systems to safely dissipate electrostatic charge should be maintained and inspected on a regular basis (at least annually or after any event that may negate its effectiveness).

5.2.24 The treatment process and treatment area / building should be provided with an appropriate automatic smoke and fire detection, alarm and extinguishing system; linked to automatic plant shut-down where possible.

Management

5.2.25 A written operating procedure/code of good practice should be drawn up, and all site operatives trained to follow it. A good standard of supervision should be maintained throughout.

5.2.26 Adequate and suitable training should be provided for all persons working the treatment process to ensure they are familiar with, and understand, the precautions that must be taken and the emergency procedures to be followed in case of a fire or other incident.

5.2.27 A high standard of housekeeping should be maintained to prevent the accumulation of combustible material beneath or around the treatment equipment.

Monitoring

5.2.28 The treatment process should be subject to a programme of continuous monitoring to ensure that it is operating safely and efficiently. Process monitoring parameters may include parameters such as nitrogen gas levels, internal gas pressure/vacuum, oxygen concentration, lower explosion limit (LEL), motor load, air flow etc.

5.2.29 Where abatement is used, the efficiency and effectiveness of this should be assessed. If activated carbon is being used for abatement, then the effectiveness of the carbon filter should be checked on a regular basis and changed as necessary.

5.2.30 The Operator should have a procedure in place for the regular inspection and maintenance of the treatment plant and associated containers, tanks, pipework and connections, underground structures (sumps), kerbing/bunding and hardstanding.

6 Appropriate measures for emissions control

The content of the treated canisters (gases and liquids) should be collected by the treatment process, stored and sent for recovery where appropriate (e.g. used as a secondary fuel). Therefore facilities should be designed and operated so as to have minimal emissions to air and water. Where it is not possible to collect and recover all components of the canisters and an emission can not be prevented, appropriate abatement should be used to ensure that the environmental impact of the emission is minimised.

6.1 Point source emissions to air

6.1.1 The canister processing plant should be fully enclosed and fitted with an appropriate gas extraction system, subject to conditions 6.1.2, 6.1.3, 6.1.4 and 6.1.5 below. The gas extraction system should be interlocked with plant operation, so that the plant cannot operate unless the system is working.

6.1.2 Wastes containing banned substances[14] and medicines must only be processed in plant that can capture all such materials when released from the canisters by the treatment process.

6.1.3 For new facilities and plant upgrades at existing facilities, the Operator will be expected to design and operate the treatment process in order to collect and recover all gases released from the canisters and prevent point-source emissions to air, other than non-hydrocarbon/non-volatile canister gases such as nitrogen, carbon dioxide and nitrogen purge gases (see Section 5.1 for further guidance regarding the assessment of candidate techniques).

6.1.4 For existing facilities where it is demonstrated that it is not technically or economically viable to collect and recover all canister gases (subject to 6.1.2 above and the requirements of the waste hierarchy), appropriate measures should be taken that aim first to prevent emissions and then to minimise emissions at source, without compromising the safe operation of the facility. Emissions to air (other than system purge gases and non-hydrocarbon/non-volatile canister gases such as nitrogen, carbon dioxide) should then be characterised and assessed in accordance with Horizontal Guidance Note H1 – Environmental Risk Assessment for Permits in order to assess the need for abatement. Abatement options should be considered for emissions that are not assessed as being insignificant.

6.1.5 Where abatement is required, the Operator should review the available abatement options (taking into account their technical feasibility and economic viability) to ensure that the chosen option provides the most effective means of reducing the emission and the impact on the environment as a whole, through the consideration of additional factors including the waste hierarchy, energy efficiency and raw material use. Abatement should not rely

[14] Banned substances are those substances that are no longer manufactured or are being phased out from production (e.g. CFCs and HCFCs in accordance with the EC Regulations on Substances that Deplete the Ozone Layer) but may still be in circulation and therefore could be received for treatment.

upon the dilution of the gases in order to achieve an acceptable concentration. Detailed information on the control of emissions of volatile organic compounds (VOCs) is available in Environment Agency guidance document EPR4.02 Speciality organic chemicals sector and Technical Guidance Note (Abatement) A2, Pollution abatement technology for the reduction of solvent vapour emissions.

6.1.6 Over time an abatement system can become overloaded and ineffective, therefore it should be correctly operated, monitored and maintained to ensure that it continues to reduce emission concentrations to an acceptable level. The additional costs required for monitoring and maintaining/renewing an abatement system should be considered during the design of the treatment system.

6.1.7 Extractive ventilation exhausts from buildings should be provided with suitable abatement unless emissions (including odour) are assessed as being insignificant.

6.2 Point source emissions to water

It is unlikely that there will be a direct emission to water from the canister treatment process. Minimal water use should be required; the main sources are likely to be from yard washing activities and possibly from rinsing the recovered metals.

6.2.1 The Operator should have appropriate measures in place for the collection and discharge of uncontaminated water, including measures to protect it from potential sources of contamination and to prevent its discharge from the site should it be contaminated (i.e. provision of inspection/sampling procedures and infrastructure such as oil interceptors and pen-stock valves prior to discharge).

6.2.2 Unless it can be re-used on site, drainage water from the site should be directed to sewer (under the requirements of a discharge consent obtained from the relevant sewage undertaker) or sent to an appropriate waste facility for treatment prior to discharge.

6.2.3 In order to minimise potential emissions to water, the Operator should undertake measures to minimise water use, in accordance with the requirements of Section 2.4.3 of SGN 5.06.

6.3 Fugitive emissions to air and odour

Likely sources of fugitive emissions include open containers (IBCs, drums etc), storage areas, leaking canisters, pipework and associated connections, seals on enclosed equipment, spillages, washing activities, open conveyors and plant failures. Fugitive emissions to air may be odorous, therefore preventing fugitive releases, by following the requirements in Section 2.2.4 and 2.2.6 of SGN 5.06 and those detailed below, can also help to prevent odour issues.

However, it is important to ensure that any measures designed to prevent fugitive emissions to air and odour will not compromise the safe of operation of the facility and the prevention of the build-up of flammable atmospheres (e.g. by facilitating the accumulation of flammable gases or preventing adequate ventilation).

6.3.1 A procedure should be in place for carrying out a regular programme of inspection and maintenance for all containers, drums, tanks, above-ground pipework and connections, and the treatment plant/equipment itself, including seals, pipework, integral tanks, compartments and monitoring devices, with the aim of preventing (detecting and mitigating) fugitive emissions and the potential build-up of flammable atmospheres.

6.3.2 Where safe and practical to do so, the Operator should use closed/sealed systems for transporting and handling the residues collected from the treated canisters (e.g. covered chutes, conveyors and containers and sealed connections between pipework and containers).

6.3.3 At facilities where odour may be an issue (potential cause of nuisance to local receptors), the Operator should review odour management measures against the recommended practices identified in IPPC H4 Horizontal Guidance for Odour, Part 2- Assessment and Control.

6.4 Fugitive emissions to water, sewer, groundwater

Likely sources of fugitive emissions to water, sewer and groundwater (ground) include incidents such as spills and loss of containment, such as cracked bunds/kerbs and hardstanding, split containers and failure of underground structures. The Operator should take all appropriate measures, as detailed below, to prevent potential fugitive emissions to ground, from the design and construction of the facility to its operation, inspection and maintenance.

However, it is important to ensure that any measures designed to prevent fugitive emissions to ground will not compromise the safe of operation of the facility and the prevention of the build-up of flammable atmospheres (e.g. by facilitating the accumulation of flammable gases or preventing adequate ventilation).

6.4.1 The Operator should ensure that all subsurface structures (e.g. sumps, drains and pipework), surfacing and above-ground tanks are designed, constructed, inspected and maintained in line with the requirements of Section 2.2.5 of SGN 5.06.

6.4.2 The storage (of canisters and collected materials and residues) and treatment of canisters should take place in areas of the site that are:

- Covered, whilst ensuring adequate ventilation, and
- Contained, i.e. provided with impermeable hardstanding and contained drainage, and bunded/kerbed where safe to do so (in terms of preventing the build-up of flammable atmospheres).

6.4.3 Drain covers at the site should be colour-coded, i.e. different colours used to demarcate drains that discharge to surface water, foul sewer and contained drainage.

6.4.4 The Operator's Environmental Management System should include a preventative maintenance program, competence and training systems and accident plans and procedures that satisfy the requirements detailed in Section 2.3 (specifically Indicative BAT Requirements 1 to 11) of SGN 5.06 in order to prevent and mitigate accidents that could result in fugitive emissions to ground.

7 Appropriate measures for process efficiency

The Operator should ensure that the facility is designed and operated in a way that maximises process efficiency, in terms of raw materials and energy, in order to minimise its indirect environmental impact and promote the sustainable use of resources (e.g. in terms of its carbon footprint and use of virgin raw materials), whilst maintaining safe and effective standards of operation.

Energy efficiency

7.1.1 The Operator should ensure that the facility is designed and operated in accordance with the energy efficiency requirements detailed in Section 2.7 of SGN 5.06 and shall have regard to the energy efficiency measures detailed in Horizontal Guidance Note H2, Energy Efficiency[15], specifically Appendix 2.

7.1.2 In terms of potential techniques for energy recovery, at facilities that recover the gases released from the processed canisters, it may be possible to utilise the collected gas on site.

7.1.3 The treatment plant should be subject to a programme of regular inspection and maintenance to ensure that it continues to operate efficiently.

Raw materials

7.1.4 The Operator should ensure that the general requirements detailed in Section 2.4 of SGN 5.06 are met during the design and operation of the facility.

7.1.5 Nitrogen gas is likely to be a raw material used in a waste canister treatment plant, i.e. used in an inerting system. An enclosed/sealed treatment system will reduce the quantity of nitrogen gas required to provide an inert atmosphere compared to an unsealed system that relies upon the continuous extraction and ventilation of gas during the treatment process.

[15] Horizontal Guidance Note IPPC H2, Integrated Pollution Prevention and Control, Energy Efficiency, Environment Agency

8 Appropriate measures for accident management

The prevention and management of accidents should be a fundamental consideration in the Operator's Environmental Management System and during the design and operation of the waste facility. In general terms, it will involve:

- the identification of potential accident hazards posed by the activities carried out at the facility
- assessment of the risk of the identified hazards, in terms of likelihood and consequence
- implementation of measures to reduce the risk of the identified accident hazards and contingency plans for any accident should it occur.

8.1.1 The Operator should develop and implement an accident management plan for the facility, which satisfies the requirements detailed in Section 2.8 of SGN 5.06. The accident management plan should specifically consider foreseeable impacts of fire on aerosol cans stored at the facility, along with any other waste held on site, to receptors both on and off site. This should include foreseeable impacts resulting from the rocketing of aerosol cans and failure of containers (e.g. IBCs and drums) in the event of a fire. Measures should be adopted on site to prevent such impacts and minimise their consequences.

8.1.2 The Operator should produce emergency plans for the potential accidents identified and assessed by the facility's accident management plan. Emergency plans should provide information on the layout of premises, type, quantity and hazards of materials onsite, location and type of fire fighting equipment, the name of contacts in case of emergency and, where possible, be drawn up in consultation with the local fire service.

8.1.3 Procedures and training should be in place to manage identified risks and ensure the rapid initiation of the emergency plan should an accident occur.

8.1.4 Where possible, the Operator should involve the emergency services in relevant emergency training activities.

8.1.5 The accident management plan, and associated emergency plans and risk assessments, should be regularly reviewed and kept up to date, to reflect any changes on site, in terms of waste received, equipment installed/removed, changes in personnel, changes in regulations, and incidents/near-misses.

8.1.6 Physical protection measures should be used at the facility, e.g. bollards and barriers, to protect storage areas and above ground pipework from vehicle and people movements.

8.1.7 The site should have security (e.g. fencing, a single manned entrance) that is adequate to guard against intruders on to the site to prevent the threat of malicious activity. Fencing should be constructed in order to prevent missiles being thrown on site. Waste should not be stored close to the perimeter of the site or visible and in the open without shelter/protection.

8.1.8 Procedures should be developed and implemented, and training provided, for regular site inspections that include, but are not limited to, the following areas:

- Condition and operation of treatment plant
- Condition of site vehicles/fork lift trucks
- Fire detectors, alarms, and fire-fighting equipment
- Standards of general housekeeping
- Condition of pallets, racking and shelving
- Integrity and condition of canisters, drums, containers, tanks, packages, pipework, hoses, seals, and couplings.
- Fire exits, signs and emergency lights
- Spill containment provisions
- Condition and adequacy of PPE
- Condition of nitrogen plant / cylinders and associated pipework.
- Waste identification/labelling, containment, segregation and separation.
- Condition and content of bunds and drains
- Adequacy of earthing/grounding
- Building ventilation
- Condition and accuracy of monitoring/sampling equipment

9 Other relevant regulations and guidance

- Sector Guidance Note IPPC S5.06, Guidance for the Recovery and Disposal of Hazardous and Non Hazardous Waste, Environment Agency.

- The Environmental Permitting (England and Wales) Regulations 2010, Environmental Protection, England and Wales, 2010 No. 675.

- How to comply with your Environmental Permit, Getting the Basics Right, Environment Agency.

- Horizontal Guidance Note H1 - Environmental risk assessment for permits, Environment Agency.

- Control of Major Accident Hazards (COMAH) Regulations, 1999.

- Dangerous Substances and Explosive Atmospheres Regulations (DSEAR), 2002.

- DSEAR ACoP and guidance series documents (HSE Books):
  L134 Design of plant, equipment and workplaces
  L135 Storage of dangerous substances
  L136 Control and mitigation measures
  L137 Safe maintenance, repair and cleaning procedures
  L138 DSEAR Approved code of practice and guidance

- The European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR).

- The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (CDG) 2011.

- HSG71 Chemical Warehousing- The storage of packaged dangerous substances, HSE Books, Health and Safety Executive, 2009.

- HSG51 The Storage of Flammable Liquids in Containers, HSE Books, Health and Safety Executive, 1998.

- The Warehousing of Aerosols, A BAMA Guide to Safe Storage, British Aerosol Manufacturers' Association (BAMA.

- The Disposal of Aerosols - A BAMA Guide for Full and Part-full Aerosols, British Aerosol Manufacturers' Association (BAMA).

- RC19, Recommendations for the Storage of Aerosol Products, The Fire Protection Association, 2004.

- UKLPG Code of Practice 22, LPG Piping System Design and Installation (July 2002).

- Guidance for the storage of liquids in intermediate bulk containers, Chemical Business Association & Solvent Industry Association, March 2008.

- EPR4.02 How to comply with your environmental permit. Additional Guidance for: Speciality organic chemicals sector. Environment Agency.

- Pollution abatement technology for the reduction of solvent vapour emissions, HMIP Technical Guidance Note (Abatement) A2, 1994, ISBN 0-11-752925-7 Available from: www.tso.co.uk/bookshop.