Vedanta Resources Plc

Sustainability Governance System

Guidance Note GN02

Hazardous Materials Management

Guidance Note – Hazardous Materials Management

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Confidentiality

Guidance Note – Hazardous Materials Management

1. INTRODUCTION

1.1. Who is this Guidance Note aimed at?

All Vedanta subsidiaries, operations and managed sites, including new acquisitions, corporate offices and research facilities and to all new and existing employees and contractor employees. This Guidance Note is applicable to the entire operation lifecycle (including exploration and planning, evaluation, operation and closure).

This Guidance Note is for those operations and individuals responsible for procuring, managing and supervising the use of hazardous materials. It is also for those responsible for designing and installing hazardous material storage infrastructure. The Guidance Note may also form the basis for hazardous material training and communications. The Guidance Note should be used in conjunction with the Guidance Note on *Risk Assessment* GN07 and also associated Standards as listed in the back of this Guidance Note.

1.2 What is the aim of this Guidance Note?

The aim of this Guidance Note is to outline the company requirements which Vedanta implements in order to avoid (or if not possible, minimise) adverse impacts to the environment and human health from the use, handling, storage and disposal of hazardous materials at its operations.

1.3 What issues does this Guidance Note address?

This Guidance Note presents the framework for managing hazardous materials showing the key technical activities that may apply and identifying the main decisions to be undertaken.

The focus of the Guidance Note is to provide a practical “how to” guide for all Vedanta operators. It is intended that the Guidance Notes will represent standard baseline guidance for all Vedanta staff within all the operations whilst recognising the need for flexibility at a site and activity level depending upon project specific circumstances or regulatory specific requirements. In this sense, Guidance Notes are not designed to be definitive text, nor are they designed to provide prescriptive methods and procedures for undertaking tasks.

1.4 How should this Guidance Note be used?

This Guidance Note is not mandatory and is intended to reflect good practice and provide the basis for continual improvement of sustainability issues across the Vedanta business. However, where this Guidance Note is not used, operations will need to demonstrate (and document) how an equivalent process is in place and how the management of hazardous materials achieves good practice. The management of hazardous materials is either a regulatory requirement, or at a minimum, best practice. The operation should establish a programme to manage the storage, handling, use, and disposal of hazardous materials. As such the first part of this Guidance document provides recommendations regarding the management of hazardous materials, whilst the second part addresses specific technical requirements for the storage and handling of hazardous materials, and also addresses requirements for specific hazardous materials.

The transport of hazardous materials is not covered in the scope of this Guidance Document.

Guidance Note – Hazardous Materials Management

The Guidance Note is structured as follows:

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2. WHAT ARE HAZARDOUS MATERIALS?

Hazardous Materials are defined as materials that represent a risk to human health, property, or the environment, due to their physical or chemical characteristics. Hazardous Materials can be classified according to their hazardous characteristics, and include explosives, compressed gases (including toxic and flammable gases), flammable liquids, flammable solids, oxidising substances, toxic materials, radioactive materials and corrosive substances. The classification of hazardous materials will differ across countries according to local or regional legislation; operations need to ensure that these legal requirements are complied with.

When a hazardous material is no longer usable for its original purpose and is intended for disposal, but still has hazardous properties, it is considered to be a hazardous waste (see Vedanta Technical Standard TS09 *Resource Use and Waste Management*).

This Guidance Note addresses hazardous materials which are typically used or produced at the operations, or are which are located within buildings or ancillary equipment present at the operations including hydrocarbons, chemicals, fumes, dusts, vapours, mists, gases, radioactive materials and polychlorinated biphenyls (PCBs).

Not included within this document are biological agents (such as legionella, leptospirosis), or hazardous geological materials and flora & fauna. Asbestos-containing materials (ACMs) are considered in GN11 on *Asbestos Management*.

3. REGULATORY REQUIREMENTS

3.1 Introduction

All over the world, there are different laws on how to identify the hazardous properties of materials (called ‘classification’) and how information about these hazards is then passed to users (through labels, and safety data sheets for workers). Operations are required to identify the requirements which are relevant, and ensure compliance.

3.2 Global Harmonised System of Classification and Labelling of Chemicals (GHS)

The regulatory requirements for substance classification (hazard descriptions) differ globally, as do the requirements for providing information to people handling / storing / using the substances (e.g. labels, safety data sheets etc.). This can lead to confusion, as the same substance can have different classifications in different countries. For example, a chemical could be labelled as ‘toxic’ in one country, but not in another.

To address these differences, the United Nations (UN) has created the Globally Harmonised System of Classification and Labelling of Chemicals (referred to as ‘GHS’).

The objective of the GHS is to promote global consistency by ensuring that countries have the same:

- Criteria for classifying chemicals, according to their health, environmental and physical (i.e. hazardous) properties; and
- Hazard communication requirements for substance labelling and material safety data sheets (MSDS).

The GHS aims to ensure that information regarding the physical hazards and toxicity of chemicals is available in order to enhance the protection of human health and the environment

GHS is not a formal treaty; rather it is an international agreement which is not legally binding or enforceable. This means that countries are required to implement the GHS via national legislation. As such, each Operation is required to determine the national legislation applicable, as well as the requirements of the GHS. To date, India has not signed up to the GHS international agreement. The following link provides a list of those countries that have implemented the GHS:

http://www.unece.org/trans/danger/publi/ghs/implementation_e.html.

The UN has also introduced the *UN Recommendations on the Transport of Dangerous Goods, Model Regulations ('UN Regulations')*. These regulations contain symbols to be used when transporting a substance (e.g. on tankers) which may be slightly different to those included in the GHS for similar classifications.

The following table provides some examples of the classification from GHS and UN Regulations, which may be seen at operations on tanks, packaging and on vehicles containing or handling hazardous substances.

It should be noted that under GHS, the same symbol (pictogram) may be used for a number of different hazards through the inclusion of additional text ('signal word' and 'hazard statement'). The full list of classifications, categories, symbols, signal words and hazard statements from the GHS can be found at the following links:

General Information: http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html
Pictograms: http://www.unece.org/trans/danger/publi/ghs/pictograms.html

Classification	Acute toxicity: Oral	Acute Toxicity: Skin	Corrosive to Metals	Flammable Gas
Category	Category 1	Category 1	Category 1	Category 1
GHS Symbol				
GHS Signal Word	Danger	Danger	Warning	Danger
GHS Hazard Statement	Fatal if Swallowed	Fatal in contact with skin	Maybe corrosive to metals	Extremely flammable gas
UN Regulations Symbol				

3.3 Permits and Licences

Any Vedanta or local regulatory requirements to hold permits and/or licences in relation to hazardous materials should be identified. It should be ensured that:

- Regulation(s) and legislation relevant to hazardous materials management are documented in a legal register.
- All relevant licences/permits/authorisations in relation to hazardous materials are held by the operation.
- Legal requirements in relation to hazardous materials management are understood and implemented.

An example template for a Legal Hazardous Materials Permit and Licence Register is provided in Annex A but the structure of the register should include consideration of the following:

- Category (e.g. environment);
- Level of regulatory requirement (e.g. national legislation, local legislation);
- Regulation title;
- Applicable sections of the regulation;
- Date of issue of regulation;
- Last amendment date/version;
- Detail of the main requirements;
- Priority ranking (for the operation);
- Date of Permit or Licence Expiry;
- Issuing Body; and
- Copy of the Permit or Licence

3.4 Thresholds

It is necessary to identify and meet any internationally accepted regulatory standards which are relevant in relation to the volume or tonnage of hazardous materials which are handled at an operation.

It is also important to have identified and met any internationally accepted and regulatory reported occupational exposure limits for relevant hazardous material(s), for example the World Health Organisation (WHO) and OSHA Guidance in the USA.

4. CONTROLLING EXPOSURE TO HAZARDOUS MATERIALS

4.1 Initial Steps

The level of risk presented by hazardous materials should be established at each operation through a documented risk assessment process which includes the following:

- Characteristic(s) that make(s) the material hazardous (e.g. flammability, toxicity);
- The types and amounts of hazardous materials present at the operation;
- Name and description (e.g. composition of mixture) of the specific hazardous material(s);
- Classification of specific hazardous material(s) (e.g. code, class, division);
- Regulatory reporting threshold quantity equivalent for specific hazardous material(s) or groups of hazardous material(s);
- Quantity of hazardous material(s) stored/used on a periodic basis as appropriate (e.g. monthly, annually etc.);

- Identification of the locations of hazardous materials and associated activities on an emergency plan site map;
- Analysis of potential spill and release scenarios for the hazardous materials using industry statistics on spills and accidents where available;
- Analysis of the potential for uncontrolled reactions such as fire and explosions; and
- Analysis of potential consequences such as its distance to local community settlements, water resources, and other environmentally sensitive areas.

This information should be recorded in a summary table to provide the operation an overview.

A risk assessment or Job Safety / Hazard Analysis (JHA / JSA) can be used to identify specific potential occupational hazards, and industrial hygiene surveys, as appropriate, to monitor and verify chemical exposure levels, and compare them against applicable occupational exposure standards.

For example, JSA template headings should include the following:

Task/Job Title:		Date JSA performed:			
JSA Number:		New or Revised JSA:			
Site:		Analysis by:			
Department:		Reviewed by:			
Title of person completing task:		Page:		of	
Required and/or recommended PPE for the task					

Sequence of Basic Job or Task Steps (maximum 15 steps)	Potential Hazards	Recommended Action or Procedure

See also Section 7 on Risk Assessment and Vedanta Guidance Note GN07 on *Risk Assessment*.

4.2 Responsibility of Operations Management

Examples of local operational management responsibilities regarding hazardous materials include as follows:

- Europe: European Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures – the 'CLP Regulation'

- India: Manufacture, Storage and Import Hazardous Chemicals (MSIHC)-2000.

Responsibilities should include consideration of the following:

- Managing activities to minimise the emission, release and spread of hazardous materials.
- Considering all relevant routes of exposure – inhalation, skin absorption and ingestion – when developing control measures for hazardous materials.
- Choosing effective controls to minimise the escape and spread of materials hazardous to health.
- Where adequate control of exposure cannot be achieved by other means, providing, in combination with other control measures, suitable personal protective equipment.
- Checking and reviewing regularly all elements of control measures for their continuing effectiveness.
- Informing and training all employees on the hazards from the materials they work with and the use of control measures to minimise the associated risks.
- Ensuring that the introduction of control measures does not increase the overall risk to health, safety or the environment.
- Needing to segregate products, especially if incompatible and would react if mixed; and
- Needing to segregate from road and other site traffic.

Operations should ensure that the above listed processes are documented and communicated to all persons involved, for example through Permit to Work, Personal Protective Equipment, and regular reviews of the Material Safety Data Sheets.

4.3 Occupational Health / Exposure to Hazardous Materials

General requirements in relation to Occupational Health are included in the Vedanta *Occupational Health Management* Technical Standard TS12. Additional requirements in relation to hazardous materials are described below.

When making an estimate of occupational exposure to a hazardous material, take into account information that may be available regarding:

- The effort needed to do the task and how this may affect the rate and volume of air employees breathe (for some work activities, employees might breathe three or four times the volume of air that they would breathe whilst resting);
- The effect of any engineering measures and systems of work currently used for controlling potential exposure. To complete the assessment, it may be necessary to carry out atmospheric sampling and measurement to determine exposure; particularly where operations are complex or specialised and the materials involved have an occupational exposure limit; and
- The concentration of hazardous material likely to be produced by the work concerned.

For example: the use of sulphuric acid, should be undertaken with suitable exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective threshold limit value. Personal protective equipment, such as an approved/certified respirator or equivalent, glove, and protective footwear should be used.

The need to protect particular groups of employees who may be at an increased risk must be considered, e.g., inexperienced trainees and young people aged under 18 years of age;

pregnant workers; disabled workers; and any employees known to be susceptible to certain illnesses such as dermatitis, asthma or other diseases which may be caused by exposure to hazardous materials. Particular consideration should be given to activities which can give rise to the highest exposures, e.g. cleaning of equipment, work in confined spaces, or non-routine or end-of-shift tasks.

Manual handling should be avoided to reduce occupational exposure and hazards from manual handling activities.

5. CONTROL MEASURES

5.1 Overview

Control measures can include the use of equipment and ways of working to reduce exposure. No measures, however practical, can work unless they are used properly by trained people.

Any 'standard operating procedure' should combine the right equipment with the right way of working. This means instructing, training and supervising the workers doing the tasks.

For those hazardous materials brought on to, and used at, operations, a priority is to prevent exposure to the material by identifying and substituting a non-hazardous or less hazardous alternative. This should consider and evaluate the hazards posed by alternative materials available and the degree of risk they present in the work activity concerned.

The hierarchy of control specific for hazardous materials is *(in order of priority):*

- Eliminate the use of a harmful product or substance and use a safer one;
- Substituting wherever reasonably practicable, a non-hazardous material which presents no risk to health, where a hazardous material is used intentionally, i.e. use a safer form of the product;
- Modifying a process to eliminate the use of hazardous materials, the production of a hazardous by-product or waste product, including reducing the quantities of the hazardous material which are used & stored, i.e. change the process to emit less of the substance;
- Enclose the process so that the product does not escape;
- Extract emissions of the substance near the source;
- Provide personal protective equipment (PPE) such as gloves, coveralls and a respirator. PPE must fit the wearer.

Often it is not possible, or practicable, to eliminate exposure to materials hazardous to health completely. Where it is necessary to use a hazardous material, operations should consider how to prevent employees being exposed and the prevention of exposure should be achieved by measures other than the use of PPE (which is the last line of defence).

5.2 Technical / Engineering Controls

Engineering controls should be used (such as containment, automatic alarms and shut off systems) to minimise the impact from hazardous materials to people and the environment.

5.3 Management Controls

The implementation of management controls (procedures, inspections, communications, training and drills) should be used to address residual risks that have not been prevented or controlled through engineering measures.

Specific requirements in relation to hazardous materials include:

- Ensuring that all equipment specifications and codes, and standards used to design, build and operate the process involving hazardous materials are documented.

- Ensuring that safe systems of work (*whether in place or to be developed*) have:
  - Identified and defined methods of work which minimise emission, generation or release of materials hazardous to health:
  - Reduce people's exposure time; and
  - Minimise the number of people exposed.

- Reducing, as far as possible, the:
  - Number of employees exposed and exclude non-essential employees, e.g. by using 'refuges';
  - Level and duration of exposure; and
  - Quantities of hazardous materials used or produced.

- Considering the provision of safe handling, storage and disposal of materials hazardous to health.

It is necessary to ensure that hygiene measures have been provided. Where applicable these should include adequate facilities for washing, changing and storage of clothing and PPE, including arrangements for laundering contaminated clothing, separate accommodation for clothing worn at work which may become contaminated, and where appropriate, prohibiting employees from eating, drinking and smoking in contaminated areas which may result in the ingestion of hazardous materials.

5.4 Standard Operating Procedures (SOPs)

To assist with implementation of management controls, it is recommended that documented Standard Operating Procedures (SOPs) are completed for activities including filling of bulk storage tanks or other containers or equipment with hazardous materials, as well as transfer and filling of the hazardous materials, spill prevention and response, and for the management of secondary containment structure(s). (see also Guidance Note GN08 on *Pollution Prevention*)

SOPs should be prepared for each step of all processes or activities including initial start-up, normal operations, temporary operations, emergency shutdown, emergency operations, normal shutdown and start-up following normal or emergency shutdown or major change. These should include special considerations for hazardous materials used in process or operations.

5.5 Personal Protective Equipment and / or Respiratory Protective Equipment

The last control measure which may be used is that of Personal Protective Equipment (PPE) and / or Respiratory Protective Equipment (RPE). PPE should adequately control exposure to

the hazardous materials to which the wearer is exposed, or is liable to be exposed, throughout the time it is used.

Situations where PPE/RPE will normally be necessary include:

(a) where adequate control of exposure cannot be achieved solely by good practice and the application of operational or engineering measures;

(b) where new or revised assessment shows that PPE/RPE is necessary until adequate control is achieved by other means;

(c) where there is temporary failure to achieve adequate control of the process, e.g. because of plant failure, and the only practicable solution to maintain adequate control in the time available may be the provision and use of suitable PPE/RPE; and

(d) where maintenance operations have to be carried out.

Further details on the use, design and suitability of PPE are provided in the Vedanta Guidance Note GN10 on *Personal Protective Equipment.*

6. INFORMATION, INSTRUCTION AND TRAINING

The extent of the information, instruction and training to be provided to employees (and contractors) will depend on the hazards, risks, and processes involved and also local legal requirements. Where a material is being used that is not particularly hazardous and exposure is adequately controlled, basic instructions and training may be all that is required.

Training should be included for all existing employees, new starters, contractors and include refresher training.

The instruction and training must ensure that people at work at the operation do not put themselves, others, or the environment at risk through exposure to hazardous materials. In particular, the instruction/training must be sufficient and suitable for workers to:

- Identify the hazard(s), *and if applicable specific hazards to operators tasks;*
- Be familiar with safe operating and materials handling procedures, safe working practices (including use of Material Safety Data Sheets (MSDS));
- Know where MSDS are available for all hazardous materials being handled. They should be readily accessible to employees in their local language. Training should incorporate use of MSDS;
- Know how to undertake works safely which are associated with hazardous materials for any permitted activities (such as hot works, confined space entry), including;
    - How and when to use the control measures;
    - The defined methods of work; and
    - The use and provision of PPE / RPE.
- Select, use and maintain suitable PPE including RPE, emergency eye wash and shower stations, ventilation systems and sanitary facilities, as applicable.

Information, instruction and training should include the procedures to be followed in an emergency. This should include:

- Operations must ensure that they have a documented detailed description of response activities in the event of a spill, release or other chemical emergency including internal and external notification procedures; specific responsibilities of individuals or groups; decision process for assessing severity of the release, and determining appropriate actions (both on and off-site); and facility evacuation routes.

- Post-event activities such as clean-up and disposal, incident investigation, managing contaminated firewater and other run-off, employee re-entry, and restoration of spill response equipment.

Further information is also provided in the Vedanta Technical Standard TS13 on *Emergency and Crisis Management*.

Although training to be developed and delivered will be dependent on the types of hazardous materials being used at any one location, training/awareness materials should, as a minimum, include the following:

a. Regulatory and company standards & requirements ;
b. Identification of the hazards and risk;
c. Who / what might be harmed and how;
d. Control measures to use and how to use them (including engineering controls, administration controls such as permits, MSDS and Protection equipment)
    i. Storage
    ii. Handling
    iii. Disposal / Waste;
e. Audits and Inspections;
f. What might go wrong including unsafe acts and conditions; and
g. Where to get further information.

See also Vedanta Management Standard MS6 on *Competency, Training and Awareness* for further information on the provision of training.

7. RISK ASSESSMENT REQUIREMENTS

Risk assessments should be used to record the process of controlling hazardous substances (also refer to the Vedanta Management Standard MS02 on *Stakeholder Materiality and Risk Management* and the Guidance Note GN07 on *Risk Assessment*).

Competent persons for the operation / process etc. should be involved in the hazardous substance risk assessment process. They should have the following:

- Knowledge, training and expertise in understanding hazard and risk;
- Knowledge of how the work activity uses or produces materials and materials hazardous to health;
- Ability and the authority to collate all the necessary, relevant information; and
- Knowledge, skills and experience to make the right decisions about the risks and the precautions that are needed.

The following additional considerations should be made for any risk assessment completed in relation to hazardous materials, or processes involving hazardous materials:

- Hazardous properties of the substance (physical, chemical or biological);
- The health, safety and environmental effects of the material, provided by the supplier, including information contained in any relevant safety data sheet;
- Where the substances are likely to be present and in what form, e.g., dust, vapour, mist, fume etc., whether they are used or produced, in what quantities and how often;
- The ways in which, and the extent to which, any groups of people or environmental receptors could be exposed, taking into account the type of work and process, and any reasonably foreseeable deterioration in, or failure of, any control measure provided;
- The level, type and duration of exposure;
- The potential for impacts to occur (e.g. exceed lower explosive limits, exceed environmental release parameters etc.);
- The circumstances of the work, including the amount of the substance involved;
- Activities, such as maintenance, where there is potential for high level of exposure to people and the environment;
- Any relevant workplace exposure limit or similar occupational exposure limit;
- Effect of preventive and control measures already taken or planned;
- Results of relevant health surveillance;
- Results of monitoring of exposure or release to the environment; and
- Where work involves exposure to more than one hazardous substance, the risk presented by exposure to those substances in combination (including cumulative health effects and mixing of incompatible substances).

An example of risk assessment headings is provided below:

Area/Activity:							
Hazard	Who/What Might Be Harmed	How	Existing Controls	Risk			Additional Controls
				Likelihood	Severity	Total	

8. CHECK AND MAINTAIN

8.1 Introduction

It is important that any engineering controls and management requirements are reviewed to ensure they continue to be effective.

8.2 Inspection programmes

Inspection and maintenance procedures should be developed and documented to ensure mechanical integrity of equipment, piping and instrumentation and prevent uncontrolled

releases of hazardous materials. These procedures should be included in any SOPs. An example checklist for routine inspections of areas used for the storage of hazardous materials is provided in Annex B.

Specific monitoring in relation to hazardous materials is typically required:

- When failure or deterioration of control measures could result in a serious impact to the environment or harm to people;
- When measurement is required so as to be sure that an occupational exposure limit, safety threshold or environmental limit (regulatory or voluntary) is complied with;
- As an additional check on the effectiveness of any control measure provided ;
- When any change occurs in the conditions affecting risks which could mean that adequate control of exposure or potential impact is no longer being maintained, e.g., an increase in the quantity of a material used or changing systems of work or introducing new plant (See Vedanta Management Standard MS07 on *Management of Change*); and
- As a result of a specific legal requirement.

9. MANAGEMENT OF BANNED HAZARDOUS MATERIALS

It is important that an understanding is obtained of Vedanta and other legal requirements for the management of banned hazardous materials.

Operations should ensure that all banned hazardous materials, including materials to be banned in the future, in their local country & globally have been identified. Operations need to ensure that there is a suitable programme in place to remove / dispose appropriately of these materials.

Operations need to ensure that materials used or introduced are not banned materials.

Supporting information can be found on the World Health Organisation website *'International Programme on Chemical Safety'*: http://www.who.int/ipcs/en/index.html

In the event that an Operation identifies a banned hazardous material the site should ensure that the location of all these materials are identified and isolated so they cannot be used. The materials should be stored appropriately for the material type, preferably in a locked container with appropriate signage. The material should be disposed of in accordance with national and international legislation.

10. PROCUREMENT OF HAZARDOUS MATERIALS

It is recommended that a hazardous material approval process is established for all procurement of hazardous materials. This may require input from operational functions or teams that have a role in the procurement of hazardous materials e.g. HSE, finance, legal etc.

It is important that all hazardous materials brought to site by contractors are identified prior to the work commencing.

Before accepting delivery of hazardous substances, the responsible person must ensure that:

- Work instructions / SOPs are available and being used for loading and unloading of substances;
- All substances are adequately labelled and MSDS, and any damaged packages are returned to the supplier;
- A review is undertaken to ensure that operations can respond to emergency incidents during loading and unloading, storage and use of the hazardous material;
- All equipment required, including PPE, is available and the involved people have been trained in the correct use of the equipment;
- Deliveries are only made to a supervised operation (as far as is practicable);
- Consignment documentation is signed by an authorised operation's receiver (as far as is practicable); and
- When bulk substances are received, the receiving container is correct, can contain the volume delivered, and is sufficiently clean for filling with the product being delivered.

11. HAZARDOUS MATERIAL STORAGE

11.1 General Guidance

- Establish an inventory of hazardous materials stored on the operation (if possible, a plan of the operation should be marked-up to show the hazardous materials storage points (tanks, drum stores, storage yards etc.)). An example template of an inventory is provided in Annex B.

- Ensure that all MSDS and material risk assessments are complete, available in local language(s) and are retained, preferably at points of use of hazardous materials.

- Establish an inventory of tanks at the operation (including redundant and empty tanks) and assess the condition of the tanks. An example template is provided in Annex D.

- Ensure that all hazardous materials storage is provided with suitable and sufficient secondary containment, and that secondary containment does not automatically divert rainwater to storm water (surface water) drains (*see GN08 Pollution Prevention* and *GN30 Drain Management)*. (*see Annex D Secondary Containment*).

- Ensure that all hazardous materials storage is provided with relevant signage and containers of hazardous materials are correctly labelled in accordance with local legal requirements and / or EU/UN signage etc.
- (*see also Section 3.2*).

- Ensure that tanker off-loading/loading points are provided with suitable secondary containment, earth protection (as appropriate), and that all fill points and off-take points are labelled.

- Ensure that drains in the vicinity of hazardous materials delivery and storage areas are protected e.g. through the use of protective pads, drain covers etc.(*see also GN08 Pollution Prevention* and *GN30 Drain Management)* .

- Ensure that hazardous materials of different risk phrases (e.g. toxics, corrosives, flammables, carcinogens etc.) are suitably and efficiently segregated and provided with dedicated storage where required.

- Ensure that the operation is "zoned" (e.g. for explosion risk) with respect hazardous materials (where applicable) and that potential source of ignition (e.g. matches, lighters, smoking, mobile phones, laptops, sparking tools etc.) are eliminated from the zoned areas (as required) and that access to areas is restricted as necessary.

- Where appropriate in hazardous material storage areas (such as store rooms and buildings), ensure that appropriate measures including, but not limited to, intrinsically safe lighting, suitable ventilation are provided to flammable storage areas.

- Ensure that spill kits, spill procedures and appropriate PPE are available in proximity to areas of hazardous materials storage and use (*see Annex F Spill response*).

- Ensure that hazardous materials are transported/delivered by qualified carriers in accordance with local legislative requirements (and there are formal documented procedures to include, but not be limited to, full declaration and labelling of materials; use of proper and safe containers; the selection, choice and control of qualified carriers; the provision of information to carriers and employees).

- Ensure there is appropriate protection from vandalism, unauthorised use and arson.

- Ensure the mains water supply (except water based fixed fire fighting systems and safety shower / eye wash) does not enter the containment area of the store.

11.2 Hazardous Material Designated Areas

- These areas should be clearly defined to mark out if being used for: delivery, handling and transfer or decanting;
- These areas should be impermeable and isolated from surface water drainage systems. The use of ramps, sumps or drainage shut-off valves should minimise the risk of pollution;
- If surface water drains cannot be isolated, reusable drain covers should be used during delivery to prevent pollution if an incident occurs;
- If the area is external, a roof or canopy over the area can help manage surface waters;
- All employees, contractors or visitors involved in these activities should be informed and / or trained in the correct procedures;
- Operations should ensure that there is a competent person to supervise the deliveries (loading and unloading) and transfer of hazardous materials;
- Ensure that operators are trained to use equipment, such as forklift trucks; and
- Decanting of hazardous materials from or between drums or IBC's should be undertaken in accordance with an approved procedure within designated areas.

12. COMMUNITY AWARENESS

When hazardous materials are in use above Vedanta or local legislative threshold quantities, a management plan should be in place which must include a system for raising community awareness. This should include mechanisms for sharing the results of hazard and risk assessment studies with potentially affected communities in a timely, understandable and culturally sensitive manner which provides a means for community engagement.

Community involvement in relation to hazardous materials specifically should include:

- Information (e.g. identification, handled, stored and disposal) relating to the hazardous material that could potentially impact the affected community should be provided in an effective manner; and
- The potential for effects to human health or the environment off-site, following an accident at planned or existing hazardous installations. This should include access to information necessary to understand the nature of the possible effect of an accident and an opportunity to contribute to the development of community emergency preparedness arrangements.

The Operation requirements in relation to stakeholder engagement are included in the Vedanta Technical Standard TS05 on *Stakeholder Engagement.*

13. USEFUL SOURCES OF ADDITIONAL INFORMATION

It may be necessary to consult information to determine the hazards and risks of activities involving hazardous materials, for example:

- Product labels;
- Other information provided by the manufacturer or supplier;
- Regulator information / guidance;
- *Risk assessment reports* published by the European Union on specific chemical materials;
- Previous experience of using the material, similar material, or agent;
- Technical reference sources (textbooks, scientific and technical papers, trade journals etc.);
- Professional institutions, trade associations, trade unions and specialist consultancy services; and
- Internet (note: use with caution).

A. BULK TANKS, INTERMEDIATE BULK CONTAINER & DRUM STORAGE

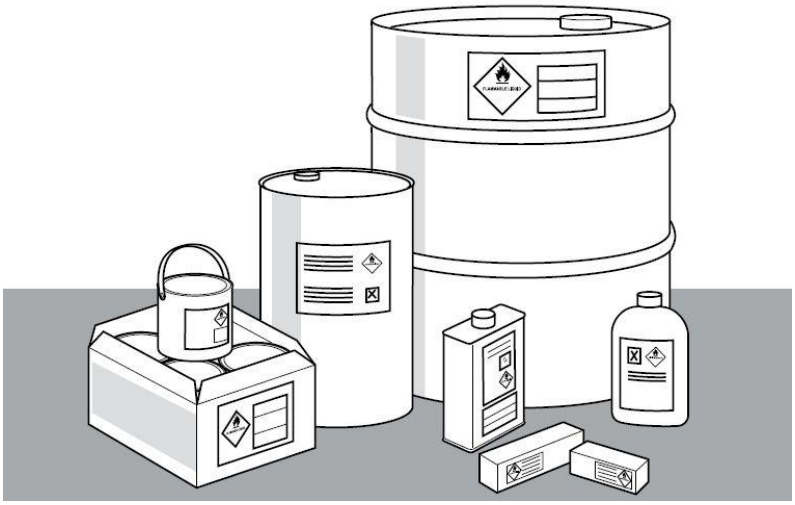
What are we talking about:

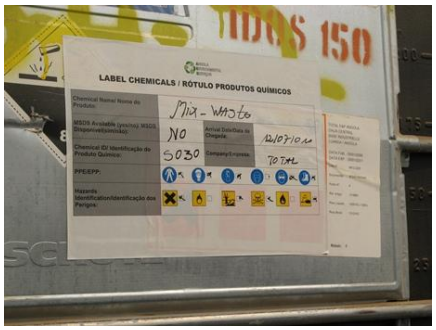
Containers of hazardous materials have the potential to cause pollution for a number of reasons such as: incorrect storage and handling of containers, cleaning, accidental leaks, vandalism, overfilling or failure of storage structures, run-off from fires and contaminated fire water to incorrect or damaged drainage systems.

Control measures should include:

- Clearly label individual containers with details of contents and hazardous properties;
- Label storage areas with details of what can be stored in them;
- Fit warning signs, for example hazardous material pictograms, at access points to dedicated stores;
- Segregate materials; store different materials separately so they cannot mix if there is a leak;
- Ensure quantities of hazardous materials are kept to a minimum;
- Protect storage areas from extremes in weather, for example sunlight, frost; and
- Keep storage areas away, or isolated, from drainage, surface waters and groundwater and vehicle routes.

Example of appropriately labelled containers from the *UK Health and Safety Executive (HSE) Publication HSG51.and photograph example*





During both use and containment, additional requirements from specific materials must be implemented, such as: providing ventilation, avoiding ignition sources, segregating from other hazardous materials, storing away from heat and direct sunlight (may impact and degrade chemicals, deteriorate storage containers and labels), ensuring lids, caps and drain points are securely tightened, using flammable storage lockers /containers to store flammable and combustible liquids, storing inorganic acids in corrosive or acid storage cabinets, and providing open storage shelves with raised edges or lips.

B. BULK TANKS: ABOVE GROUND STORAGE TANKS AND UNDERGROUND STORAGE TANKS

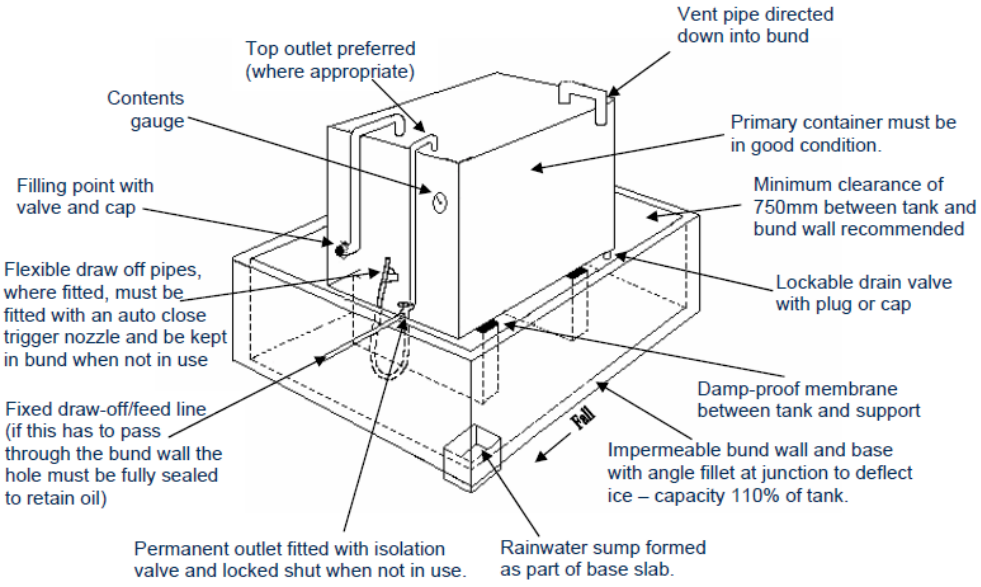
B1 What are we talking about?

- Above ground storage tanks (ASTs) usually with a capacity of greater than approximately 200 litres; and
- Underground storage tanks (USTs) usually with a capacity of greater than approximately 200 litres.

All Operations should establish an inventory of tanks present (including redundant and empty tanks) – an example template is provided in Annex D. The inventory should include the following information for each tank:

- Contents (e.g. type of solvent, type of oil etc);
- Whether the tank is above or below ground;
- Whether the tank is bunded and bund capacity;
- Age and when installed in its current location;
- Capacity (m3 or litres);
- Materials of construction (e.g. stainless steel, glass reinforced plastic etc.) and whether the tank is provided with a second containment within the tank itself;
- Whether there is any monitoring (i.e. monitoring of the cavity between the double skins of the tank) (if applicable); and
- Whether the Operation has a level gauge or read-out, high level alarms, vapour vent pipe (for loading/unloading).

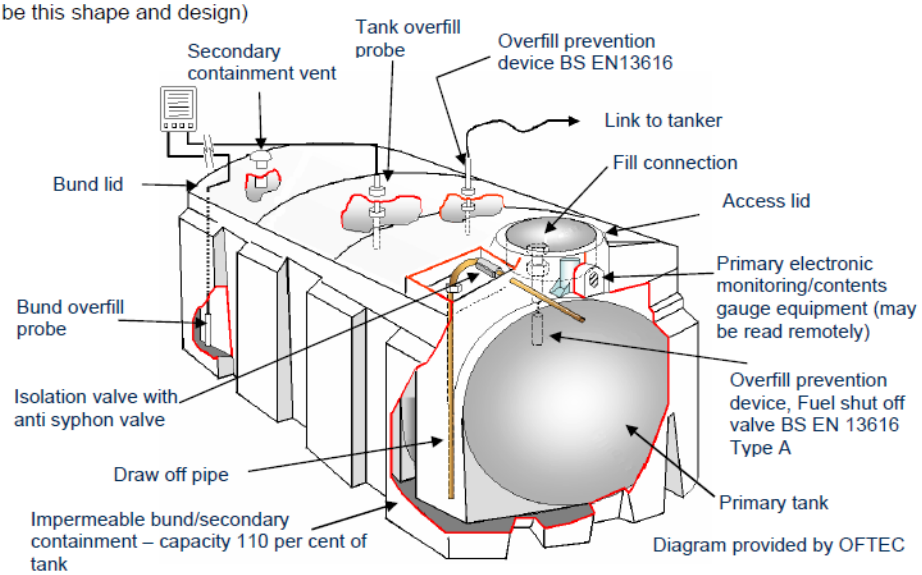
Example of above ground tank installation with bund from *UK Environment Agency Guidance PPG2 (not to scale):*



Example of a bulk storage tank within a bund

Example of integrally bunded tank (metal or polyethylene) (not to scale) from *UK Environment Agency Pollution Prevention Guideline PPG2.*

Figure 2. Example of integrally bunded tank (could be constructed of metal or polyethylene and may not be this shape and design)



Figures 1 and 2 aren't drawn to scale or engineering drawings. They are for illustration only. Different configurations exist depending on the manufacturer, type of tank and installation.

B2. Installation

An appropriate choice of tank needs to be undertaken at the design stage (prior to installation):

- Consideration should be given to: the environmental sustainability of the operation, the tank design, the tank contents and the construction materials for the tank and associated pipework; and
- Operations should aim to avoid the use of underground storage tanks (USTs) for highly soluble organic materials.

Selection considerations need to include:

- The proximity of the installation to water course;
- The operation's geology and hydrogeology;
- Subsurface pipes and structures;
- Historical operation activities (including presence of existing USTs);
- The corrosive nature of the soil; and
- Groundwater conditions such as high acidity, sulphate content or saline conditions.

Operations are recommended that bulk storage should not be located in high risk locations, including:

- Within 50m of a spring, well or borehole;
- Within 10m of a watercourse (rivers, streams, reservoirs etc.);
- In areas with the potential for flooding;
- Places where spillages could enter open drains, loose fitting manhole covers or soak into the ground;
- Places where a spill could run over hard ground to enter a watercourse or soak into the ground;
- Places where tank vent pipe outlets cannot be seen from the fitting point; and
- Locations above roof level, as spilt oil can run down guttering which is connected to surface water systems.

Consideration should be made to providing access for maintenance and deliveries to tank(s), and associated filling activities from both pollution prevention and health and safety aspects. This should include the tank, filling points, and associated pipework both above and below ground.

Sight gauges should be located within the secondary containment, supported and fitted with a closing valve.

Tanks should be constructed of an impermeable lining such as two layers (skins) of plastic. Where this is not possible (e.g. single skinned of steel construction), additional secondary containment should be provided. The secondary containment should be lined for example with plastic coating or impervious and chemical resistant painted surface.

B3. Design and materials

When installing tanks, operations should ensure that:

- Tanks are constructed of materials that are suitable for their contents (All containers should be designed and constructed to standards suitable for the purpose. They should be robust and have well-fitting lids or tops to prevent leakage of liquid or vapour. As an example, for Petroleum Cans and drums should normally be made from metal although 5

litre plastic containers designed to meet local regulations] can also be used. However, plastic containers will, however, fail more quickly than metal ones in the event of a fire.)

- Assess local soil for corrosion potential, and installing and maintaining protection (or equivalent rust protection) for steel tanks;
- Tanks are of sufficient strength and structural integrity to ensure that they will not rupture or leak during ordinary use;
- Controls are in place to prevent natural runoff from the containment e.g. isolating valves;
- Monitoring devices are in place with automatic alarms;
- Overfill protection should be provided;
- Underground pipework should be avoided; and
- Monitoring devices should be present which check the surface above any underground tank for indications of soil movement.

See Annex I, Flammable Substances, for information on earthing requirements.

It is recommended that tanks are provided with two internal layers, however the following requirements are:

- If tanks are provided with a single layer/skin of steel or plastic, tanks must be put into additional secondary containment;
- If tanks are provided with two layers of plastic or steel with a very small space between them, ancillary equipment is to be positioned outside the second skin. The second skin will not be sufficient to contain 110% of the tank. Therefore, it should be installed in a constructed secondary containment; and
- Integrally bunded tanks: have a primary container manufactured with integral secondary containment that can hold a minimum of 110% of the volume of contents the inner tank is designed for. Ancillary equipment is positioned within the secondary containment.

Note: For tanks with two layers, in the event of either layer failing, stored product should be prevented from entering the surrounding subsurface through a monitoring system which should alert the operator to the problem so that is can be corrected immediately.

Any access chambers should have some form of containment to prevent leaks or spillages.

All associated pipework should be of a material suitable for the contents and be supported. Pipework should be positioned or protected to minimise the chances of damage by impact or collision, and pipework should also be protected against corrosion.

For oil storage, vent pipes should be located within the secondary containment and should be arranged so that any discharge is directed vertically downwards into the system. The tank must be fitted with an automatic overfill protection device if the filling operation is controlled from a place where it is not reasonably practicable to see the tank and any vent pipe.

B4. Fill Points

The fill point is where the tanker delivery pipework connects to fill the tank. Fill points should have a lockable fill cap with a chain and marked clearly with the product type, tank capacity, and if appropriate tank number. The cap must be replaced to the pipe after reach delivery to protect from damage and unauthorised use.

Fill points should, where possible, be located within the secondary containment system or in a suitable cabinet with a drip tray to catch any oil spilled during deliveries. If outside the containment, a drip tray should be used during deliveries.

Drip trays should be:

- Clean, free from water and other debris;
- Of suitable size to contain drips arising during fill point shut off;
- Be able to mover with risk of spill; and
- Left in an area to avoid collection of rainwater.

Where extended fill pipes are used, these should have shut-off valves.

If there is more than one tank, separate fill points should be provided and should have their own shut-off valve.

B5. Records

All records should be

- Dated and maintained for the life of the storage tank including technical drawings of the installation with location and orientation of the tank and pipework, dimensions and materials used, maintenance work conducted;
- Located in a place where they can be retrieved quickly in the event of an emergency; and

C. INTERMEDIATE BULK CONTAINERS AND DRUMS

C1. What are we talking about:

- Small containers, drums (up to 205 litres, or 45 gallon) and Intermediate Bulk Containers (IBCs, up to 1,000 litres); and
- Containers that are not directly connected as an input, outflow from, a process.

C2. Storage

For the storage of hazardous chemicals using intermediate bulk containers and drums, the following should be included:

- Identification of materials (Ensure all containers are labelled including hazardous properties);
- Ensure containers are in a good condition and are suitable for the contents;
- Review the storage location (including containment) and compatibility with nearby stored materials;
- Identify and label areas for delivery and handling;
- Review the environmental setting ensuring locations of handling, delivery and storage area are isolated from surface water and groundwater;
- Supervise all deliveries and material transfers;
- Ensure containers, secondary containment are included in inspection and maintenance programmes; and
- Ensure suitable emergency procedures are in place.

Primary storage containers should have sufficient strength and be constructed from suitable materials. Repair or remove any damage or unsuitable containers as soon as identified.

It is recommended that drums are not stored directly on top of one another to reduce the risk of drums splitting under pressure or drums falling.

C3. Reuse / Recycling

If containers are to be reused, sold for recycling, it is the operations' responsibility to remove any residues from the previous contents to remove the risk of to human health, including contamination or reaction with new contents.

Examples of storage of bulk containers and drums from *UK Environment Agency Pollution Prevention Guidelines PPG26:*

Sump pallets

- Pallets to hold containers with a sump to contain spills.
- Suitable for use with small containers, two, four or eight drums, or up to four IBCs.
- Containers are kept off the ground and containment is provided.

Bunded dispensing station

- Designed to allow drums or IBCs to be stored safely and collect any drips or spills while they're in use.
- Still providing secondary containment volume but with extra space to allow small containers to be filled over the secondary containment.

Decking

- Decking units allow containers, of any size, to stand off the ground on a grid while providing containment underneath.
- Proprietary units can be added to cover the floor area required, either in the area of use or in a dedicated store.

Drum racking, indoor storage

- Racks specifically for storing drums, either vertically or horizontally. They may have facilities that allow you to dispense from the drums.
- They are stored off the ground with integral bunding or can be used in dedicated stores.
- Drums stored horizontally would ideally be turned so both outlets are horizontal with each other (i.e. at 3 and 9 o'clock) this means not all the product will be lost if there's a leak.

Racking, external storage

- Similar to drum racking but designed for use outside.
- Manufactured with a roof and doors to keep rainwater off the drums or IBCs and the integrated sump.
- Drums stored horizontally should be turned as above.
- You need to consider the security of the area to reduce the risk of vandalism.

Dedicated internal store

- Purpose-built or adapted store room/area.
- Can be built to be suitable for any size container or a mix of containers.
- Ideal where substantial storage capacity is required.
- Containment can be provided using stepped or ramped access, kerbing, bund walls, sloping floors or use of a proprietary system.

Dedicated external store

- Purpose-built, or adapted, external storage area, for any storage container, incorporating containment design features, for example ramped access.
- Useful for storing large quantities of materials, particularly where ventilation is important.
- Containment provided as above. In addition, containers should be protected from the elements by roofing (which will also prevent rainwater accumulating) and be stored off the ground. Consider the need for fencing for security and to prevent containers being ejected in the case of fire.

D. SECONDARY CONTAINMENT (BUNDING)

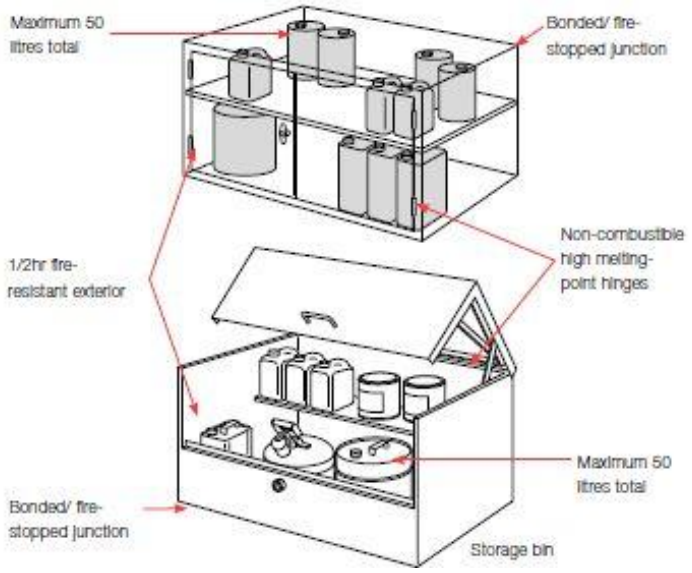
D1 What are we talking about?

Secondary containment is designed to contain leaks or spills from the containers or tanks. All containers need to be placed in, or on, a suitable secondary containment system. Secondary containment will allow the controlled recovery or treatment of any spilled materials. In the event of a fire, this should reduce the risk of burning liquids spreading. The secondary containment should not have any drainage.

The secondary containment area is the area around the tank / containers and its ancillary equipment designed to contain any loss of materials and to prevent it escaping to the environment. It can be manufactured as part of an integrally bunded tank system or built on operation ready for the tank to be put into it. Secondary containment must hold at least 110% of the volume of the tank it is designed to contain or 25% percent of the combined tank volumes in areas with above-ground tanks with a total storage volume equal or greater than 1,000 litres and will be made of impervious, chemically resistant material (*International Finance Council; Environmental, Health, and Safety (EHS) Guidelines GENERAL EHS GUIDELINES: ENVIRONMENTAL HAZARDOUS MATERIALS MANAGEMENT*, April 2007).

Containment methods include a bund (which can be around, incorporated into, a storage facility). For containers it can be a drip tray, dispensing sump trolley, sump pallets, bunded dispensing station, decking, drum racking (internal or external) with integrated bund, dedicated internal / external store with containment and any other system that will prevent a spilled product escaping.

Example of dedicated secondary containment for containers from the *UK Health and Safety Executive (HSE) Publication HSG51.*



The location of secondary containment and storage needs to consider the following factors:

- Minimising the risk of vandalism;
- Minimising risk of vehicle impact;
- Preventing the build-up of rainwater in the containment which could be contaminated by drips, leaks or spills; and
- Reducing the risk of exposure to from extremes of temperature that could affect the contents or integrity of the containers.

Identification of the hazards in the proposed or existing storage area must include:

- Surface water drains;
- Sensitive groundwater areas;
- Flood plains including high tidal water levels;
- Designated vehicle movement areas;
- Ignition sources;
- People who could be affected by odours, fire or spills (e.g. residential areas); and
- Other storage areas that contain materials that would react with those in this storage area.

If storage must be within these areas, suitable protection must be provided such as bollards to protect storage areas from vehicle traffic, protection against rising flood waters, etc.

Type	Minimum secondary containment volume
Single Drum	Secondary containment for drum storage can be provided by a drip tray with at least 25% of the volume of the drum
Multiple Drums	Secondary containment for drum storage can be provided by a drip tray with at least 25% of the total drum storage
Single IBC	Secondary containment must be at least 110% of the container volume
Multiple	Secondary containment with a minimum of either 25% of the total volume of the

Type	Minimum secondary containment volume
IBC	containers or 110% of the largest container, whichever is greater volume.
Tank	110% of tank volume
Multiple tanks	If there is more than one tank stored in the system, the secondary containment must be capable of storing 110% of the biggest tank's capacity or 25% of the total capacity, whichever is greater.

Where containers are stored inside buildings, it is recommended that facilities should be designed proportionate to the risk.

For large external stores, 25% containment may result in low containment walls. These may be quickly overwhelmed by rainfall or fire-fighting agents. An additional 100mm height on the walls can provide additional support.

The construction of the secondary containment systems should be suitable for the materials being stored. Systems can be prefabricated from steel, plastic, fibre glass or built from in-situ concrete or masonry bund with suitable lining to ensure no permeability. All walls and floors must not be permeable and should be resistant to degradation from materials stored. There must be no drainage outlet from your secondary containment.

For tanks, to reduce the risk of materials escaping beyond the containment area the following should be considered:

- Keep the tank as low as possible within the bund;
- Increase the height of the bund walls;
- Leave space between the tank and bund walls; and
- Never put one tank above another.

Secondary containment systems used for short term or emergency containment must not be used for long term storage.

If secondary containment is of masonry/concrete construction, these are not impermeable unless treated or painted with a suitable lining material (e.g. special paint).

Where possible, secondary containment should be designed to prevent rainwater ingress for example a canopy or covered area. Where this cannot be achieved, rainwater ingress may occur and need to be ensure there are procedures in place . Where there is collected water, which may include potential spills or chemical residues, this will reduce the capacity and will need to be pumped (e.g. sump fitted to base) or bailed out in a controlled way. If there is the potential for it to contain hazardous materials, the waste should be disposed of appropriately.

Containers should not be stored at such a height, or so close to walls, that they can fall outside the containment system or that liquid which jets from a leak can reach over the bund wall.

Any damage, including structural or other defects should be repaired promptly using the appropriate technique to ensure the container or containment system retains its integrity. If a repair cannot be made within a suitable timescale, the container or containment system should be taken out of use immediately.

Electricity (e.g. electrical cables) should be carried over the secondary containment system, and should not penetrate it.

Check and Maintain

An inspection and maintenance programme must be developed to ensure the following are considered:

- Monitoring of the surface above any underground tank for indications of soil movement;
- Measuring the volume of materials received and used to ensure there are no leaks in the system;
- Testing on all tanks at regular intervals to ensure there are no leaks;
- Primary and secondary containment facilities should be inspected regularly;
- No damage or leaks (corrosion, deformities, cracks or stains);
- Rainwater collected in bunds or drip trays is removed and disposed of appropriately;
- The bund or drip tray is clean and clear of product and debris;
- Product labels / signs and hazard information is undamaged;
- Maximum storage volumes and stack heights are not exceeded;
- Products are stored correctly and required segregation is adhered to; and
- Pipework attached to any containers is located inside the secondary containment, and unused taps are closed.

Additional inspections should be undertaken during extremes of weather conditions. Operations should consider monitoring groundwater quality, especially for underground storage tanks, down gradient of storage locations*. See Annex B for an example of an inspection checklist.*

E. SPILL MANAGEMENT

E1 What are we talking about?

Operations need to ensure suitable procedures and equipment are in place to manage any potential spills of hazardous materials.

Leak detection may be used in conjunction with secondary containment, particularly in high-risk locations (e.g. where there is a risk to drinking water supplies). Leak detection is especially important where secondary containment is not feasible or practical. It is recommended that operation have a quarantine area where leaking containers can be placed safely. It is recommended that operation have equipment available to seal leaks at delivery and handling areas, or other high risk locations so that temporary seals can be made. Spill kits should be available on all vehicles transporting drums and IBCs, with PPE, appropriate to the goods being transported.

Examples of spill kits that could be used include the following:

Examples of what should be included in a spill kit are: absorbent pads, booms or absorbent socks, spill granules, PPE, disposal bags & ties, These should be stored in known locations within close proximity of hazardous chemical storage and use.

See also Vedanta Guidance Note GN08on *Pollution Prevention*.

Operations should also have metal and plastic trays for leaking IBCs and written procedures for dealing with spills and damaged containers. Procedures for taking hazardous liquids form bulk tanks into smaller containers and repackaging flammable liquids should give full details of arrangements to control static ignitions. To minimise the risk of spillage during handling and transfer, it is recommended that containers should have lids securely fitted.

Example of spill prevention equipment being used to prevent the release of oil as taken from the *UK Environment Agency Publication PPG22.*

Staff who deal with spills should have access to:

- Comprehensive data on the hazards;
- Compressed air breathing apparatus;
- A disposable chemical suits;
- A chemical splash suit;
- Several fume respirators with cartridges for organic and inorganic chemicals;
- A dust respirator;
- Protective footwear and gauntlets;
- Safety goggles;
- Face shield; and
- Medium density foam for control of vapours if appropriate.

Damaged or leaking containers should be stored in a designated area/building well away from the main buildings so that is well ventilated, equipped with appropriate security features and has segregated areas to ensure compliance with the segregation rules for hazardous materials.

Acid Spill Response

Any spilt acid should be handled as a hazardous waste because it is corrosive and may contain toxic levels of heavy metals and acids. Any significant spills should be reported via the operations incident reporting system.

Where appropriate, neutralize the acid using cement, lime, or other caustic. It is recommended that a dilute lime or caustic solution is used as violent reactions can occur (always seek specialist advice before implementing acid neutralising arrangements). Litmus paper can be used to determine if the acid is neutralized. Any neutralized solutions should be appropriately disposed of, with the disposal route approved to ensure discharge consents are not exceeded; alternatively the material must be collected and disposed of as hazardous waste. Operations should not put acid solutions into septic systems or storm sewers.

F. WASTE CONTAINERS

The following table indicates typical containers that may be used for different types of waste:

Waste Types	Container	Notes
Paper, metals, plastics, tyres, concrete/rubble, general non-putrescible wastes	Open skips, closed skips	Depending on storage location/exposure to weather
Putrescible wastes (food scraps)	Plastic bags, closed plastic bins	Plastic bags should be stored within skips or other rigid containers to protect them from damage
Oil	Metals drums, IBC	
Liquid chemicals	Metals drums Plastic drums	Chemical compatibility must be checked
Laboratory smalls	Glass jars	To be stored within a locked cabinet or compound
General clinical waste	Double-bagged plastic – specific colour	Colour and markings depending on national legal requirements – use proprietary containers where possible
Clinical waste – sharps (syringe needles)	Rigid plastic containers with secure closure	

Waste containers must always be clearly labelled with their contents. All waste and waste containers should be stored in designated areas which are isolated from surface water drains or direct discharge to the environment. The area where waste is collected and stored should be able to safely contain any spill or leak. Waste containers should be not be allowed to accumulate, reducing the risk of odour, vermin or pest problems and reduce the risk of fire.

Also see Vedanta Guidance Note GN 14 on *Waste Management*.

SPECIFIC HAZARDOUS SUBSTANCES

G. POLYCHLORINATED BIPHENYLS (PCBS)

G1. What are we talking about:

PCBs are classified as persistent organic pollutants (POPS). They were commercially produced world-wide on a large scale between the 1930s and 1980s.

Given their great chemical stability and heat resistance, they were extensively employed as components in electrical and hydraulic equipment and lubricants.

They have been used in two types of applications:

- Closed uses: fluids in electrical equipment such as transformers, capacitors (big industrial capacitors, but also small capacitors in household electrical appliances), heat transfer and hydraulic systems.
- Open uses (less known): as pesticide extenders, sealant, carbonless copy paper, industrial oils, paints, adhesives, plastics, flame retardants and to control dust on roads.

PCBs are persistent chemicals which can contain highly toxic impurities such as chlorobenzodioxins and polychlorodibenzofurans.

They are resistant to chemical and biochemical degradation. They also accumulate in the fatty tissues of living organisms, a particular concern for the aquatic food chain. Their manufacture has now been banned in almost all countries.

Equipment that could contain PCBs includes: electrical transformers, power factor capacitors, heat transfer equipment, pole-mounted transformers, process heating equipment, high temperature hydraulic systems, electrical resistors, bushings and other high voltage equipment, fluorescent light ballasts, hospital diagnostic equipment and vacuum pumps.

Recommendations:

- Identify equipment which may contain PCBs and conduct appropriate tests to determine concentrations of PCBs
- Develop an inventory of all contaminated equipment.
- Where PCBs are present at > 50 ppm:
    - Label all PCB-containing equipment with the level of PCB present, or the name of the replacement fluid, date when it was decontaminated, name of the company who undertook the decontamination; PCB concentration of the old fluid; and PCB concentration of the new fluid.
    - Ensure a system is in place to reduce the concentration of PCBs over a periodic basis (e.g. through oil replacement/decontamination services).
- If the Operation uses PCBs only for analytical or research work – it still needs to ensure adequate disposal when this purpose comes to an end.

H. RADIATION AND RADIOACTIVE MATERIALS (CLOSED SOURCES)

H1. What are we talking about:

All matter that consists of elements such as iron, oxygen, basic unit of which is the atom, these are made up of protons, neutrons and electrons. The number of neutrons in atom can vary for any element to give different isotopes of that element. A particular isotope of an element is a nuclide. Losing or gaining electrons is called ionisation. Some nuclides are unstable and change into other nuclides emitting energy (radiation) – this property is called radioactivity.).

The structure of sealed or closed radioactive sources prevents the dispersion of any radioactive material during normal use. Sealed sources include foil or electro-deposited materials. High-activity sealed sources (HASS) are included in this category.

Operations must have a responsible and competent person to manage works associated with radioactive materials.

H2. Specific requirements for risk assessment

Operation is required to undertake a prior risk assessment, the following matters need to be considered, where they are relevant:

a) The nature of the sources of radiation to be used, or likely to be present, including accumulation of radon in the working environment;
b) Estimated radiation dose rates to which anyone can be exposed;
c) The likelihood of contamination arising and being spread;
d) The results of any previous personal exposure or area monitoring relevant to the proposed work;
e) Advice from the manufacturer or supplier of equipment about its safe use and maintenance;
f) Engineering control measures and design features already in place or planned;
g) Any planned systems of work;
h) Estimated levels of airborne and surface contamination likely to be encountered;
i) The effectiveness and the suitability of personal protective equipment to be provided;
j) The extent of unrestricted access to working areas where dose rates or contamination levels are likely to be significant;
k) Possible accident situations, their likelihood and potential severity;
l) The consequences of possible failures of control measures - such as electrical interlocks, ventilation systems and warning devices - or systems of work; and
m) Steps to prevent identified accidents situations, or limit their consequences.

H3. Routine checks on source location

For radioactive sources securely attached to machines or other fixed equipment, checks may be carried out once a month provided that additional checks are carried out following any maintenance or repair which could have affected the source. Records should be kept of these checks. If the source is portable, e.g. nuclear moisture/density gauges or Operation radiography containers, daily checks and records (on each working day the equipment is used) are recommended. In small-scale laboratories using open sources, it will be sufficient to know the radioactivity present involved in each room, supported by records of ordering, receipt, stock and disposal of radioactive material.

H4. Leak tests

Unless it is inappropriate to do so, the operation should ensure that any article containing or embodying a radioactive material is tested for leakage. The interval between leak tests should not normally exceed two years. However, it is advisable to increase the frequency when a sealed source is going to be retained in use beyond the recommended working life given to the source capsule by the supplier or manufacturer. The manufacturer or supplier will normally advise about periodic leak testing and the methods to adopt to give the required level of assurance that radioactive material will not be allowed to disperse.

I FLAMMABLE SUBSTANCES

There is a large variety of flammable substances to be found in the workplace. They range from the obvious, e.g. petrol, paint thinners, welding gases and heating fuels, to the not so obvious, e.g. packaging materials, dusts from woodworking and dusts from food stuffs such as flour and sugar etc.

Reactive flammable and explosive materials should also be managed to avoid uncontrolled reactions on conditions resulting in fire or explosion. When assessing the risk of flammable substances, Operations should consider the three components that are needed for a fire: a fuel at the right concentration, a good supply of air (oxygen), and a source of ignition.

There are five key principles to consider when trying to reduce the risk of fire and explosion.

1. *Ventilation*: Operations need to ensure that there is there plenty of fresh air where flammable liquids or gases are stored and used, good ventilation will mean that any vapours given off from a spill, leak, or release from any process, will be rapidly dispersed.

2. *Ignition:* Operations need to ensure that all the obvious ignition sources have been removed from storage and handling areas. Prohibit the use of all sources of ignition near flammable storage areas. Ignition sources can be very varied and they include sparks from electrical equipment or welding and cutting tools, hot surfaces, open flames from heating equipment, smoking materials etc. The risk assessment should consider the use of flame arresting devices on vents from flammable storage containers. Provision of grounding and lightening protection for tank farms, transfer stations and other equipment that handles flammable materials.

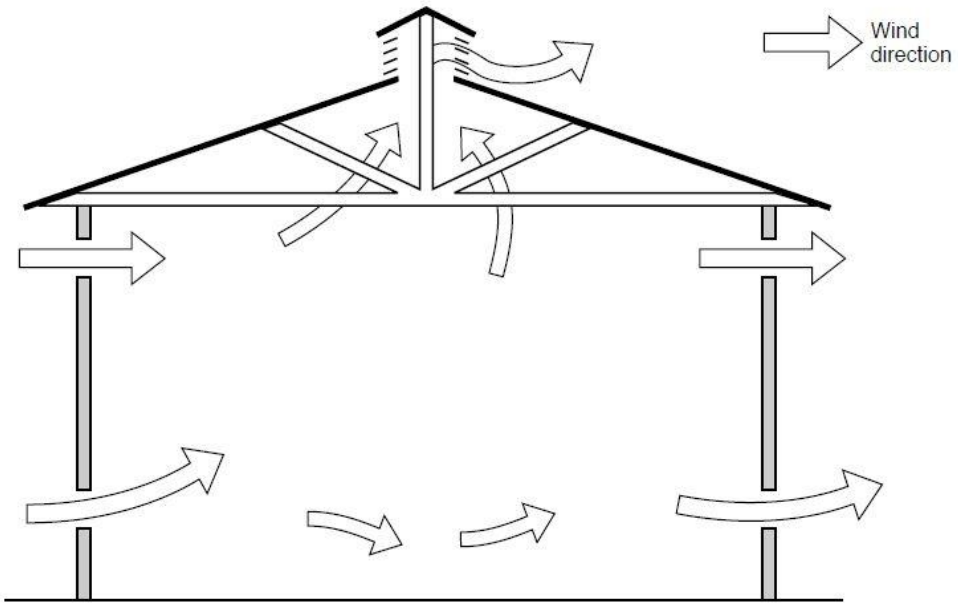
3. *Containment:* Operations need to ensure that the risk assessment has identified flammable substances and that they are kept in suitable containers.. Operations should use of lidded containers and spillage catchment trays, for example, can help to prevent spillages spreading.

4. *Substitution:* Operations should try to substitute a flammable substance for a less flammable one, or operations should where possible, eliminate flammable substances from the process altogether. Operations should review and adopt other ways of carrying out the job more safely via a good risk assessment process. (See also Vedanta Guidance Note GN07 on *Risk Assessment*.

5. *Separation:* Operations should ensure that flammable substances stored and used well away from other processes and general storage areas, can flammable substances be

separated by a physical barrier, wall or partition. Operations should ensure that storage of incompatible materials (acids, bases, flammables, oxidizers, reactive chemicals) in separate areas, and with containment facilities separating materials storage areas. Operations should ensure that there is provision of material-specific storage for extremely hazardous or reactive materials. Selection of materials of construction compatible with products stored for all parts of storage and delivery systems, and avoiding reuse of tanks for different products without checking material compatibility.

Example of the provision of natural ventilation through roof and wall vents from the *UK Health and Safety Executive (HSE) Publication HSG51.*



I1. Flammable Liquids

Flammable liquids can give off large volumes of flammable vapours at room temperature. These vapours, when mixed with air, can ignite, often violently. Spilled flammable liquids can, if not contained, flow a long way to an ignition source, and then flash back to the source of the leak. Spills on clothing can represent a serious risk of injury if ignited.

To help control these risks:

- Store flammable liquids in a separate storage area, or in a purpose-made bin or cupboard;
- Dispense and use them in a safe place where there is good ventilation and no source of ignition;
- Keep containers closed when not in use. If possible, use safety containers which have self-closing lids;
- Dispense liquids over a tray and keep some non-flammable absorbent material handy to mop up spills; and
- Dispose of contaminated materials safely or call in disposal experts.

I2. Flammable Dusts

Finely divided flammable dusts dispersed in the workplace atmosphere can, if ignited, explode violently and cause a lot of damage.

If handling flammable dusts the following should be considered:

- Keep the working area dust-free by regular cleaning, and vacuuming spillages as they occur; and
- Some dust handling plant has special safety features built in. The purpose of these needs should be properly understood and they should be maintained in good working order.

I3. Flammable Solids

- Some types of plastic foam, packaging materials, polyester wadding and textiles will ignite easily and burn fiercely, giving off a lot of dense black smoke.It is important not to store these materials close to heaters or electrical equipment which could run hot and act as a local ignition source. In addition, make sure that gangways and exits from storage and working areas are kept clear of packaging materials, finished products containing flammable solids etc. In the event of fire, gangways and exits could become obscured by smoke, so the easier they are to find, the better.

I4. Flammable Gases

Flammable gases are often stored at very high pressures, and so their uncontrolled release can be physically dangerous. A small amount of released gas can fill a large area with a potentially explosive mixture. This is particularly true of liquefied gases such as LPG. Further information is provided in Section G of this Guidance Note.

I5. Reactive

Some products contain chemicals, such as organic peroxides, which can explode if they are not stored and handled correctly. Other substances can react vigorously with incompatible materials or contaminants. For example, oxidising chemicals can cause flammable materials to ignite, and some substances, such as sodium, react violently with water and can ignite. The following points need to be considered:

- Storage and process temperatures may need to be carefully controlled to prevent dangerous decomposition or reaction; and
- Check labels and safety data sheets for physical properties and incompatibility with other materials.

I6. Electro Static Charges and Earthing Requirements

Precautions should be taken to prevent vapours being ignited by the discharge of static electricity. The movement of process liquids, for example, during pumping, emptying, filling and spraying, can cause electrostatic build-up. Movement of other materials, such as powders or cleaning operations, can also create electrostatic hazards. Non-conducting footwear and clothing made of synthetic fibres can cause electrostatic sparks, especially if they are worn in areas with non-conducting floors. Earthing of containers is important mainly when you are transferring liquid. The objective is to ensure that static electricity is discharged to ensure a flammable atmosphere is not created.

To protect against electrostatic build-up all metal (or other conducting) components must:

- Be adequately earthed before any liquid flow begins. All fixed equipment used to handle flammable liquids should be electrically bonded together and adequately earthed. For example, some IBCs will have earthing strips and metals drums can be placed on an earthed metal plate when transferring or dispensing product.
- Earthing contacts should be maintained and kept clean, and inspected regularly.
- Portable containers should also be earthed before use with bonding clips connected by a wire to the fixed earthed plant or by some other equally effective method. Bear in mind any unearthed metal components in transfer systems, such as in valves, dispenser heads or sections of piping: these may need additional earthing straps.

J. BATTERIES

J1. What are we talking about?

Batteries are used to store electrical energy. There are two types of batteries:

- Primary batteries (disposable batteries), which are designed to be used once and discarded; and
- Secondary batteries (rechargeable batteries), which are designed to be recharged and used multiple times.

J2. Hazards and risks associated with batteries

The injuries associated with both disposable batteries and rechargeable batteries include:

- Chemical burns to the face, eyes and hands:
- Injuries from flying pieces of metal and plastic:
- Burns from metal objects that have become very hot or have exploded after short-circuiting the battery's terminals;
- Electric shocks and burns are common in accidents involving high-voltage battery packs; and
- Damage to the environment from leaking chemicals. Batteries contain heavy metals such as mercury, lead, cadmium, and nickel, which can contaminate the environment when batteries are improperly disposed of.
- Hydrogen build-up

It should be noted that the safety hazards associated with disposable batteries are relatively low as in general these batteries are small, sealed and of low voltage. The hazards are generally associated with the environment (if damaged) and inappropriate disposal. The following section provides further details on the specific hazards associated with rechargeable batteries.

J3. Specific hazards associated with Rechargeable Batteries

Chemical

Batteries are usually filled with solutions (electrolytes) containing either sulphuric acid or potassium hydroxide. These very corrosive chemicals can permanently damage the eyes and

produce serious chemical burns to the skin. Sulphuric acid and potassium hydroxide are also poisonous if swallowed.

The lead, nickel, lithium or cadmium compounds often found in batteries are harmful to humans and animals. These chemicals can also seriously damage the environment.

Explosion

Hydrogen and oxygen are produced more quickly as the battery gets close to being fully charged. If you continue charging after the battery is fully charged, gas will be produced, greatly increasing the risk from explosion.

Operations should ensure that sources of sparks have been removed from these charging areas, especially in areas where there is poor ventilation or areas which are enclosed (e.g. confined space).

Operations should ensure that control measures are in place to remove the likelihood of sulphuric acid fumes in battery charging areas being inhaled and those who may be affected are wearing suitable eye protection.

Valve-regulated (‘maintenance-free’) batteries are much less likely to release hydrogen than vented batteries. However, it is still important to take care when charging them. Gas pressure may build up inside the battery if it is charged too quickly or for too long. If this happens, the pressure relief valves in the battery may open and let the gases escape. An explosion is likely if this happens close to an ignition source.

Electrical

Batteries contain a lot of stored energy and under certain circumstances this energy may be released very quickly and unexpectedly. This can happen when the terminals are short-circuited, for example with an uninsulated metal spanner or screwdriver.

When this happens, a large amount of electricity flows through the metal object, making it very hot very quickly. If it explodes, the resulting shower of molten metal can cause serious burns and ignite any explosive gases present around the battery. The sparks can give out enough ultra-violet (UV) light to damage the eyes.

Most batteries produce quite low voltages, and so there is little risk of electric shock. However, some large batteries produce more than 120 volts DC.
To reduce the potential for electrical shock, operations should:

- Ensure that live conductors are effectively insulated or protected.
- Display suitable notices/labels warning of the danger.
- Control access to areas where dangerous voltages are present.

J4. General Control Measures for working with batteries or in areas where batteries are present

As a minimum it is recommended that operations have the following in place:

- Risk assessments for all activities which involve the use, storage or disposal of batteries.
- Instructions and warning signs in relevant locations.

- Arrangements, based on risk assessment, to share the load with a workmate when lifting batteries – they can be very heavy.
- Arrangements to ensure good hygiene by employees working with batteries such as hand washing facilities, especially before eating, smoking or going to the toilet.
- Work with batteries should be undertaken by properly trained persons.
- Suitable inspection programmes to review condition and appropriate use of the batteries and equipment. These could include:
  - Checking that dry cell batteries are not being recharged, as they are not specifically designed to be recharged, as they can leak and in some cases, rupture if recharged.
  - Battery compartments should be checked every few months to be sure batteries are not leaking.
  - Inspecting batteries for defects such as bulging, cracks, leakage. Batteries should not be used if any defects are detected.
- When changing batteries it is recommended that:
  - Persons using batteries, their pockets are empty of any metal objects that could fall onto the battery or bridge across its terminals.
  - Where appropriate, use suitable single-ended tools with insulated handles.
- Operations should ensure that there is storage and disposal arrangements are in place. These should include;
  - Ensuring there is suitable storage for new and used batteries, which should be secure, dry, well ventilated storage where there can be no deterioration of the battery e.g. exposure to the weather, tampering, collision from vehicles etc.
  - Ensuring there is suitable disposal for used batteries, where possible batteries should be recycled.

General environmental requirements include:

- The ground / floor of battery storage areas should be made of a material that won't be corroded by battery acid.
- In large storage areas acid-resistant curbing can be used that is capable of holding any liquids within the battery storage area. For smaller storage areas, alternatives such as prefabricated pans for leak collection may be used.
- If only a few batteries are to be stored, a durable acid-resistant tub to contain any leaked acid can be used.
- In the storage area, operations should avoid floor drains that lead outdoors or connect to storm or sanitary sewer systems or septic tanks.
- Inspect batteries regularly for cracks or leaks. For larger, frequently used batteries, this inspection should be made at least weekly, and more frequently if the batteries have been exposed to freezing temperatures.
- Place cracked and leaking batteries in sturdy, acid-resistant, leak-proof sealable containers and keep the containers closed within the storage area. This prevents further leakage into the storage area.
- Label containers and/or storage areas as "Used Batteries."

J5. Specific considerations when working with Disposable Batteries

The following provides recommendations and instructions that operations could provide to battery users.

- Check the contacts of both equipment and batteries for cleanliness. If necessary, clean with a damp cloth and then dry.
- Ensure batteries are inserted correctly with regard to polarity (+ and -) marked on the battery and the equipment.
- Exhausted batteries should be immediately removed from the equipment and dispose of.
- Batteries should all be replaced at one time. The replacement of a partial set or mixing batteries from the different chemical systems exposes the device to the possibility of electrolyte leakage and damage through over-discharge of the lower capacity batteries.
- Dry cell batteries should be kept in original packaging until ready to use. This helps to identify damage, such as swelling and leakage of batteries.
- If batteries are not used for several months, they should be removed from the device. Equipment should be switched off after use.
- Avoid batteries being short-circuited. When the positive (+) and negative (-) terminals of a battery are in electrical contact with each other, the battery becomes short-circuited. For example, loose batteries in a pocket with keys or coins, can be short-circuited. This can result in venting and leakage.
- Avoid batteries being left in clothing pockets as they could discharge on each other and even rupture if put too close to heat.
- Avoid batteries being heated, as when a battery is heated it can result in leakage and explosion.
- Avoid batteries being damaged such as being crushed, punctured, or otherwise damaged. This can result in venting, leakage and/or explosion.
- Batteries should not be taken apart, as it can be damaged by heat causing internal short-circuiting resulting in leakage, venting and possibly explosion.
- Batteries should not be disposed of in a fire, as the heat build-up can cause an explosion. Attempting to charge a non-rechargeable battery can cause internal gas and/or heat generation resulting in venting, explosion and/or possibly fire.
- Unpacked batteries should not be mixed. They can easily short-circuit each other, particularly button-type batteries. In some cases, it is very dangerous since batteries can heat up and cause an explosion.

J6. Specific Requirements for Lead / Acid Rechargeable Batteries

For lead / acid rechargeable batteries, as a minimum, it is recommended that operations have the following:

- Ensure that persons undertaking the recharging activities are trained and competent to complete the activities.
- Ensure that appropriate PPE is provided and worn during recharging activities such as:
  - Appropriate gloves and suitable eye protection, preferably goggles or a visor.
  - Wear a plastic apron and suitable boots when handling battery chemicals such as sulphuric acid or potassium hydroxide.
  - Any item that conducts electricity such as watches, rings, chains, bracelets or any other metal item are removed and stored in a safe place.
- Use insulated lifting equipment and check there are no tools, cables or other clutter producing a trip hazard.
- Ensure suitable first aid provisions are available in the recharging area including emergency eye wash, hand washing facilities, if appropriate emergency eye wash and showers.

- Sources of ignition should be kept away from recharging activities and batteries that are being charged, have recently been charged, or are being moved. Such as flames, sparks, electrical equipment, hot objects and mobile phones.
- A dedicated, well-ventilated area is provided to charge batteries.
- Ensure there is no smoking in the area.
- Temporary plastic covers should be fitted over the battery terminals.
- Ensure that batteries are not over charged and that and that charging is stopped as soon as batteries are fully charged.
- Risk assessments have been undertaken for activities including the use, recharge and disposal of batteries.

Making and breaking connections

Many explosions happen when batteries are being connected or disconnected. The sparks produced when this is done incorrectly may cause the battery to explode, especially if it has just been charged. Operations should document and implement procedures for making and breaking connections.

Electric vehicles

Electric vehicles such as fork-lift trucks have large, specifically designed traction batteries. These provide large amounts of electrical power and use substantial electric currents during recharging. Many batteries and charger units have special fittings to reduce the chance of poor or incorrect connections.

Operations should use a charging unit recommended by the manufacturer of the vehicle/battery. Operations are recommended to raise the lid or open the doors of the battery enclosure to aid ventilation before starting to charge the battery. Switch off all electrical circuits before connecting or disconnecting the battery.

Leave the battery to stand for at least 20 minutes after charging to allow any flammable gases to disperse.

J7. End of Use

At the end of the life of the battery, operations should ensure that the batteries are disposed of in compliance with local legislative requirements.

Waste batteries should be recycled (including buy-back) where possible, even if this is not a legal requirement. If this is not possible, batteries should be disposed of as a hazardous waste. Written records should be kept of the disposal / recycling of batteries. Prior to disposal, all batteries should be stored in secure, dry, well ventilated storage where there can be no deterioration of the battery e.g. exposure to the weather, tampering, collision from vehicles which can damage the integrity of the battery.

If using contractors / third- parties to support in this process, Operations should ensure that they are approved (licensed where applicable).

Guidance Note – Hazardous Materials Management

DEFINITIONS

Definitions of key terms used in this document are shown in the following table.

Term	Definition
Emergency Response	The decisions and measures taken to contain and/or mitigate the effects of an emergency, to prevent any further impact and to regain control and restore order in its immediate aftermath, and then recover to a normal state. This process is facilitated by an Emergency Response Team and Emergency Preparedness and Response Plans, which should both exist at the Vedanta Company and operation level.
Employee	An individual who is engaged to work directly for Vedanta on either a part-time or full-time basis and for a fixed period or on permanent basis and is salaried. By virtue of the individual's contract of employment, the employee is obliged to adhere to Vedanta's terms and conditions of employment (specific to Group or the subsidiary employing the individual), and is protected by national (where it exists) and international laws concerning labour and working conditions.
Formal Training	Recognised, accepted and prescribed training with a set and replicable structure.
Hazard	An object, property or an activity that can cause adverse effects e.g. a high voltage electricity supply or a toxic chemical may present a hazard, meaning that they present the potential for harm.
Hazard identification	Identification of the inherent capability of a substance to cause adverse effects.
Hazardous materials	Materials that represent a hazard due to their physical or chemical characteristics.
Impact	Environmental and social impacts refer to any potential change to the physical, natural, or cultural environment, surrounding community, or health and safety of the community.
Incident	An event or chain of events which caused or could have caused injury, illness, loss of assets or potential or actual damage to relationships or reputation.
Investigation	A systematic and structured analysis of an incident and the events and conditions leading up to it, with the aim of (i) identifying the root cause(s) that allowed that incident to occur, and (ii) proposing effective corrective and preventive actions so as to prevent any future recurrences.
Job Safety / Hazard Analysis	A job hazard analysis is a technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment. Ideally, after you identify uncontrolled hazards, you will take steps to eliminate or reduce them to an acceptable risk level.
MSDS (Material Safety data Sheet)	A document containing information about a material or chemical including the chemical and generic name of its ingredients, the chemical and physical properties of the substance, health hazard information and precautions for safe use and handling.
Operation(s)	A location or activity that is operated by a Vedanta Company and is part of the Vedanta Group. Locations could include mines, refineries, ports or transportation activities, wind farms, oil and gas development sites, offices including corporate head offices, and research and development facilities.
Risk	The effect of uncertainty on objectives (as defined by the ISO 31001 Standard). Uncertainties include events (which may or not happen) and

Term	Definition
	uncertainties caused by a lack of information or ambiguity.
Risk assessment	The formal process of identifying, assessing and evaluating the health and environmental risks that may be associated with a hazard.
Secondary Containment	Secondary containment is designed to contain leaks or spills from the primary container while in use.
Storage Containers	Bulk Tanks (underground and above ground storage). Small containers, drums (up to 205 litres, or 45 gallon) and Intermediate Bulk Containers (IBCs, up to 1,000 litres)
Vedanta Company	A subsidiary of Vedanta Group either fully or majority owned that has its own management structure (e.g. Hindustan Zinc Limited, Vedanta Aluminium Limited, Sterlite Industries Limited, etc.)
Waste	Any substance (solid, liquid, or contained gaseous material) or object that is being discarded – e.g. by disposal, recycling or incineration.

RELATED DOCUMENTATION

A summary of the references and supporting documents relevant to this document is provided in the following table.

Doc. Ref.	Document name
POL 06	HSE Policy
MS02	Stakeholder Materiality and Risk Management
MS07	Management of Change
TS 05	Stakeholder Engagement
TS 06	Supplier and Contractor Management
TS 09	Resource Use and Waste Management
TS 12	Occupational Health Management
TS 13	Emergency and Crisis Management
GN 07	Risk Assessment
GN 08	Pollution Prevention
GN 10	Personal Protective Equipment
GN 11	Asbestos Management

ANNEX A – Example template legal register

Category	Level of legal requirement	Title of requirement	Section of requirement	Issue Date	Last Amendment	Main Requirements	Priority	Responsibility	Due Date	Comments	Date Register Last Updated:

ANNEX B – Example Hazardous Materials Inspection Checklist

The example checklist provided below is the type of checklist that can be used as guidance for routine inspections of areas used for the general management and storage of hazardous materials. This checklist is not intended to be all-inclusive and there may be specific in-country regulatory requirements or inspection/maintenance requirements in relation to specific hazardous materials which are not included here and which may apply to Vedanta operations.

General Requirements	**Yes / No**	**Comments**
General		
• Are MSDS and material risk assessments available at the point of use of hazardous materials?		
• Are all hazardous materials areas provided with the appropriate signage?		
• Are flammable storage areas provided with suitable ventilation and safe lighting?		
• Are hazardous materials quantities being kept to a minimum?		
• Are storage areas protected from extreme weather?		
• Is the appropriate PPE available in proximity to areas of hazardous materials storage and use?		
Bulk storage tanks		
• Are bulk storage tanks in good condition?		
• Are bulk tanks provided with appropriate secondary containment?		
• Are off-loading/loading fill points from bulk tanks labelled and located within the secondary containment? If not, are fill points provided with drip trays?		
• Are all fill points provided with a locked cap and is the cap in place?		
• Are all valves, sight gauges, vent pipes and taps located within the containment system?		
• Are bulk tanks free of leaks?		
• Are bulk tanks free from damage/corrosion?		
• If automatic/permanent leak detection is provided, is it in working order?		
• Are all taps and valves fitted to the bulk tank through which hazardous materials can be discharged to the open, fitted with locks and locked shut when not in use?		
Containers		
• Are containers stored in an appropriate manner?		
• Are containers placed on, or within, appropriate secondary containment and not on the edges of containment?		
• Are containers within maximum storage volumes and stack heights?		
• Are containers made of a suitable construction/material according to the hazardous characteristic nature of the contents?		
• Are containers in good condition?		

• Are containers appropriately segregated according to their contents and risk phrases?		
• Are containers free from leaks?		
• Are all containers appropriately labelled with their contents?		
Pipework		
• Is above ground and below ground pipework in good condition?		
• Is all pipework free from leaks?		
• Is pipework free of damage/corrosion?		
Spill kits / emergency response materials		
• Are spill kits provided in the appropriate locations?		
• If spill kits have been used, have the contents been fully replenished?		
• Is drainage protection equipment available where drains are located in the vicinity of hazardous materials?		
Secondary containment		
• Is the secondary containment in good condition?		
• Is the secondary containment system intact and integrity maintained?		
• Is the secondary containment free of rainwater?		
• Is the secondary containment free of products, detritus and debris?		
• Is the secondary containment impermeable to oil and water e.g. through walls and floor of the containment?		
• Are any draw-off pipes/feed lines that pass through the secondary containment sealed and locked off to prevent unauthorised access?		
Batteries		
• Are batteries free from leaks/damage?		
• Are batteries stored in appropriate areas to prevent leaks to the drainage system?		
• Are batteries stored in appropriate containers?		
• Are battery recharging areas/refuelling areas provided with appropriate ventilation?		

ANNEX C – Example Hazardous Materials Inventory

Hazardous Material	Hazardous characteristics	UN GHS or local classification	UN GHS or local hazardous code	Physical State	Primary use	Volume stored on site (m^3 or litres)	Reporting threshold (m^3 or litres)	Location of MSDS
e.g. Diesel	*e.g. flammable, toxic, carcinogenic*	*e.g. code, class, division*		*e.g. liquid*	*e.g. fuel*			*EHS Manager office*

Guidance Note – Hazardous Materials

ANNEX D – Example Tank Inventory

Material / Content	***Volume/ capacity***	***Construction details and location***	***Age***	***Containment details***	***Monitoring Arrangements***	***Loading/Unloading Arrangements***	***Date of last integrity testing (and frequency required)***
e.g. diesel		*e.g. Steel tank, above ground etc.*		*e.g. secondary containment / spill kits nearby? etc.*			