



European Bank
for Reconstruction and Development

Sub-sectoral Environmental and Social Guideline: Manufacture of Bricks

Introduction

This guideline is designed to be used by EBRD Financial Intermediaries (FIs) to understand the nature of environmental and social (E&S) risks associated with existing operations in this sector and suggested actions for businesses to manage these E&S risks. It also provides guidance for FIs on potential due diligence questions to discuss with management to understand how their business is managing these E&S risks. This guideline focuses on material E&S risks; it is not an exhaustive list of E&S risks. In managing E&S risks, all businesses should be compliant with relevant E&S laws and regulations.¹ Where applicable, this includes European Union legislation, which may also be taken as a benchmark for good practice

This guideline focuses on the manufacture of bricks.

Reference NACE codes:

23 Manufacture of other non-metallic mineral products

23.3 Manufacture of clay building materials (ceramic tiles, and flags, bricks, tiles and construction products, in baked clay)

Material risks

Below is an overview of the material environmental and social (E&S) risks present in brick manufacturing:

¹This guideline outlines some relevant legislation but does not provide an exhaustive list of applicable laws and regulations.



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E&S Risk Category	Environment	Health and Safety	Labour	Community	Page no.
<i>Key E&S Risks²</i>	 Affect the natural environment	 Affect the health or safety of employees	 Affect workplace conditions and the treatment of employees	 Affect the health and safety, livelihoods, and environment of the community and wider public	
Air Emissions	✓	✓		✓	5
Noise	✓	✓	✓	✓	7
Water Use	✓			✓	7
Wastewater	✓				8
Biodiversity	✓				9
Solid Waste	✓			✓	9
Energy Use	✓				10
PCBs/Asbestos		✓			10
Hazardous Materials	✓	✓	✓		11
Machine & Electrical Safety		✓			11
Manual Handling		✓	✓		12

² Note: this table provides an indicative list of the EHS risks associated with the sub-sector; it is not meant to be an exhaustive list and EHS risks will depend on the specific setting and scale of the operation or facility.



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Slips, Trips & Falls		√			12
Temperature Exposure		√			13
Confined Space		√			13
Labour & Working Conditions			√		14
Community Relations				√	14



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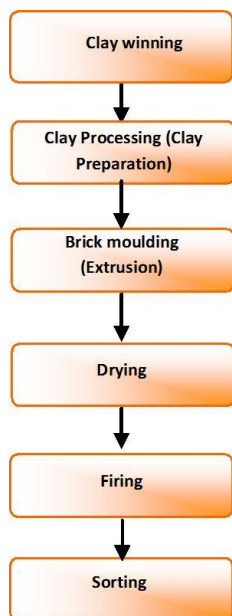


1. Process description

Brick manufacture includes the abstraction of clay from the ground, mixing of clay with water to create a mud which is then placed into a highly-mechanised and automated brick production process.

Typically, the clay is extruded in a continuous line and wire-cut into bricks. Bricks are then hydraulically pressed to ensure resistance to weathering. Bricks are dried and slow-fired in kilns. In some cases, glazing takes place that includes the use of additives or additional gases. The simplified process is illustrated in Figure 1 below.

Figure 1. Brick Manufacturing Process



This guideline does not cover the subsequent transport to wholesalers, builders or customers. Brick manufacturing sites are sometimes used for landfilling of waste after the clay has been

extracted. This note does not cover the landfilling activity.

2. Key E&S Risks

Below are the material E&S risks associated with this sector and key measures to manage them.

Where gaps are found in the management of key E&S risks, the E&S risk management measures may form part of a corrective E&S action plan agreed with your customer.

Air Emissions



Emissions to air occur from the use of kilns to fire bricks. Emissions arise from both the burning of fuel to generate heat and from the effect of heat on clay itself.

Air emissions include:

- Nitrogen oxides (NO_x) as a result of burning hydrocarbon fuels;
- Sulphur dioxides (SO_x) generated from the effect of heat on clay. The amount of SO_x generated will depend on the sulphur content of the clay. A low sulphur clay is typically one with less than 0.1% sulphur content. Additionally, SO_x will also be emitted if heavy fuel oil or coal is used to fire kilns;
- Greenhouse gases from the use of boilers and kilns;



- Chlorides and fluorides emitted as a result of brick firing, due to the presence of these elements in the clay;
- Dust and particulate matter from kilns, originating from firing bricks and from the burning of heavy fuel oil, coal or recovered oil used in the firing process;
- Dust raised by the movement of vehicles on unpaved or dirty roadways on or offsite;
- Dust emissions from “quarrying” type processes used in clay extraction.

Dust emissions can cause nuisance or damage to property or vegetation.

Respiratory diseases can result from the inhalation of dusts created during the process. Silica is present in clay and, if inhaled, can result in the respiratory disease ‘silicosis’.

Public/environmental health and nuisance issues associated with dust and vented fumes can arise from production activities and may have an adverse effect on neighbouring locations. This may be particularly important if there are neighbouring residential areas or other sensitive receptors.

How can a business manage this risk?

- Consider air emissions under the requirements of EU air quality and emissions directives (e.g. Directive 2008/50/EC on ambient air quality also the Industrial Emissions Directive (IED) 2010/75/EU) and local environmental regulations and permitting requirements;

- Install appropriate and specific scrubber equipment in kilns and chimneys to reduce harmful releases to atmosphere to acceptable levels;
- Install filters and extraction units to reduce dust emissions;
- Install/upgrade and maintain abatement technology to minimise exposure to gaseous emissions e.g. through enclosure of equipment, appropriate ventilation with filters, gas balancing systems etc.;
- Inventory greenhouse gas (GHG) emissions. This information can be used in the reporting processes where necessary, and to set effective reduction targets/initiatives;
- Undertake regular testing of internal air quality (workspace) and external air emissions;
- Ensure that regular maintenance and monitoring of fuel-burning equipment is undertaken;
- Provide adequate ventilation in operational areas;
- Carry out appropriate construction and maintenance of site roadways to minimise dust generation (for example, by spraying with water or paving roadways);
- Consider air emissions under the requirements of EU air quality and emissions directives (e.g. Directive 2008/50/EC on ambient air quality also the Industrial Emissions Directive (IED) 2010/75/EU) and local environmental regulations and permitting requirements;
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technology to minimise exposure to gaseous emissions e.g. through enclosure of equipment, appropriate ventilation with filters, gas balancing systems etc.;

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- Undertake regular testing of internal air quality (workspace) and external air emissions;
- Ensure that regular maintenance and monitoring of fuel-burning equipment is undertaken;
- Provide adequate ventilation in operational areas;
- Carry out appropriate construction and maintenance of site roadways to minimise dust generation (for example, by spraying with water or paving roadways);
- Within discharge limits, it may be possible to use process water for dust control;
- Ensure that driving practices support dust suppression, for example, sheeting vehicles;
- Provide workers with suitable Personal Protective Equipment (PPE) including respirators, where necessary.

Noise



Public/environmental health and nuisance issues associated with noise can arise from production activities and may have adverse effects on neighbouring locations.

This may be important if there are neighbouring residential areas in the locality or other sensitive receptors.

For employees, noise-induced hearing loss can occur from working in noisy areas, for example near conveyors and fans.

How can a business manage this risk?

- Locate and design facilities to avoid sensitive receptors to noise or minimise their exposure;
- Enclose noisy machinery to isolate people from noise where practicable and eliminate noise exposure through the hierarchy of controls;
- Identify sources of elevated noise and demarcate these;
- Provide PPE (e.g. hearing protection) where workers and visitors have to enter noisy areas and ensure appropriate use of PPE;
- Rotate tasks to minimise workers' time spent in noisy areas over an eight hour period;
- Conduct regular hearing tests for workers.

Water Use



Water is consumed in the brick production process and evaporates into the atmosphere as steam. No toxic emissions are expected from this evaporation though there could be localised increases in air temperature.

Water is needed for cooling and production purposes, but can be readily recycled into the process.

Water abstraction volumes are likely to be controlled through permitting conditions.



Over-abstraction may impact other water users.

How can a business manage this risk?

- Abstraction from water resources should comply with the EU Water Framework Directive (2000/60/EC) and local environmental regulations and permitting requirements;
- Evaluate water supply and water efficiency measures (e.g. recycling, reuse, run-off reduction, storage etc.) to reduce impacts on surrounding resources and community supplies;
- Install water collection tanks to allow water to be captured and reused in the process;
- Undertake regular testing of water quality, whether municipal or from groundwater abstraction to ensure appropriate quality for use;
- Assess and understand downstream water users to identify and manage and risks and vulnerabilities;
- Reduce water volume used through the use of high-pressure hoses and re-use and recirculation of water where practicable.

Wastewater



Wastewater is discharged from the brick manufacture production process. Contaminated wastewater presents a pollution risk if allowed to enter a watercourse without adequate treatment.

How can a business manage this risk?

- Use a closed process water system (to minimise water use and losses);
- Discharge into watercourses should comply with the EU Water Framework Directive (2000/60/EC) and local environmental regulations and permitting requirements;
- Ensure permits are in place for wastewater discharge to a municipal wastewater treatment plant (WWTP) or for effluent discharged from an on-site operated WWTP, as appropriate;
- Install (or upgrade) any on-site WWTP treatment plant to meet permitted effluent discharge standards;
- Install dedicated drainage systems for the collection and settling or removal of contaminated or silt-laden waters from the site, including runoff from vehicle standing areas;
- Separate cooling water from process water;
- Install grids to reduce or avoid the introduction of solid materials into the wastewater drainage system;
- Adopt equipment cleaning-in-place (CIP) methodologies to reduce chemical, water and energy consumption;
- Assess and understand downstream water users to identify and manage and risks and vulnerabilities;
- Monitor effluent to ensure compliance with wastewater discharge standards.



Biodiversity



Development of a new brick cutting site for clay extraction, or extension of an existing one may have an adverse impact on biodiversity through impacts to local landscape, habitats and wildlife.

An environmental impact assessment may be required by law to assess impacts and propose mitigation measures.

How can a business manage this risk?

In some countries, strict national regulations may limit the siting of clay quarries. In addition, clay extraction operations may be prohibited in areas with conservation value. Specific measures are as follows:

- Ensure careful siting of clay quarry operations to avoid areas of conservation interest or conservation significance;
- Comply with Environmental Impact Assessment (EIA) Directive 85/337 EEC as amended by 97/11/EC which defines the threshold above which an EIA is required and Directive 2003/35/EC which seeks to align the provisions on public participation with the Aarhus Convention on public participation in decision-making, and Directive 2014/52/EU;
- Comply with the EU Habitats Directive 92/43/EC which defines Natura 2000 sites (sites of conservation interest);
- Ensure that extraction operations are conducted with a minimal footprint to reduce biodiversity impact.

Solid Waste



The brick manufacturing process itself produces little waste material other than packaging waste and used chemical containers. Brick offcuts may also arise and are classified as waste.

Other wastes include dust from abatement equipment, residues from the glazing process, wooden pallets, replacement refractory materials from kiln maintenance and packaging/labelling wastes.

How can a business manage this risk?

- The Waste Framework Directive 2008/98/EC sets out the basic concepts and definitions related to waste management, such as definitions of waste, recycling, recovery. It explains when waste ceases to be waste and becomes a secondary raw material (so called end-of-waste criteria), and how to distinguish between waste and by-products. The Directive lays down some basic waste management principles. It requires that waste be managed without endangering human health and harming the environment, and in particular without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest;
- Companies operating within the European Union (either as a manufacturer or as a supplier into European Union countries) will also be subject to the Packaging and Packaging Waste Directive (94/62/EC amended by 2005/20/EC), which aims to



reduce the amount of packaging that is being introduced into the waste streams;

- Consider whether offcuts can be reused and/or sold for other uses. Dispose of un-marketable offcuts in the site, according to national regulations;
- Store solid wastes in adequate containers and segregate where possible to encourage recycling;
- Examine options for the compression of waste packaging materials (that can be used as plasterboard etc.);
- Where possible and safe to do so, recycle or re-use benign waste products; maintain an inventory of wastes generated and minimise where possible.

Energy Use



Brick manufacture is an energy-intensive process due to the high temperatures required. Typically, the energy source for the kilns is natural gas. Alternatively sawdust or waste tyres can be used as a fuel.

Energy is also required in the form of electricity for machinery operation, lighting and production of compressed air.

How can a business manage this risk?

- Implement energy-saving initiatives involving heat recovery, controlling boiling temperatures, optimisation of cooling systems etc.;
- Examine options for heat recovery and

insulation to reduce/supplement energy consumption;

- Use low carbon content fuels where possible;
- Recover waste heat from furnace flue gases to preheat materials or for space heating;
- Upgrade insulation techniques and materials;
- Ensure kiln size and throughput is efficient

Polychlorinated Biphenyls (PCBs) & Asbestos



PCBs are a group of substances which are good electrical insulators. Typically, PCBs may be present as constituents of hydraulic oils or dielectric fluids in electrical switchgear, transformers and fluorescent light starters.

Asbestos has been used on a large scale for many years as a fire proofing and insulation material and may be encountered in a wide range of forms including asbestos cement boards, as fire retardant gaskets in pipe work and as fire retardant insulation around boilers and furnaces. Asbestos may be present as an insulation material in older brick plants.

How can a business manage this risk?

- Where the presence of asbestos or PCBs is known or suspected, seek professional advice in order to commission a survey;
- Particular attention should be paid to facilities constructed prior to the 1990s.



Hazardous Materials



Hazardous materials used in the brick manufacturing industry may include fuels, oils, glazing agents, solvents etc. Incorrect storage or handling of these substances may be a source of contamination or health risk (to people, habitats, soil or water resources).

Fuel oils and brick oil (creosote) may be stored on site and if not stored or handled properly spillage can occur which can lead to contamination of land.

Underground storage tanks (e.g. diesel storage) may be present which may pose a risk of soil and groundwater contamination.

How can a business manage this risk?

- Maintain storage areas to ensure that they are organised, secure, clean and dry. Review storage arrangements on a regular basis to ensure that leaks do not occur;
- Record all hazardous materials held on site in an inventory with Materials Safety Data Sheets (MSDSs) available in the appropriate language;
- Provide secondary spill containment for bulk storage and tanks;
- Prepare and implement procedures for the handling and treatment of hazardous materials in the event of spillage;
- Conduct regular inspection of all bulk containment on site to prevent leakage and product loss;
- Provide personal protective equipment

(PPE) that is fit for the task to prevent exposure to hazardous materials;

- Train staff in the correct selection, use and maintenance of PPE. Inspect PPE regularly and maintain or replace as necessary.
- Maintain storage areas to ensure that they are organised, secure, clean and dry. Review storage arrangements on a regular basis to ensure that leaks do not occur;
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- Train staff in the correct selection, use and maintenance of PPE. Inspect PPE regularly and maintain or replace as necessary.

Machine & Electrical Safety



In a busy manufacturing environment, it is common to have injuries where people interact with machinery or equipment.

This can be owing to moving or falling objects such as crates and boxes, using equipment such as conveyors, packaging machines and palletisers or operating fork



lift trucks and delivery vehicles/trucks, all of which can lead to serious injury or death.

In many processes manual packing of bricks takes place which can result in wrist, hand and lower back injuries.

How can a business manage this risk?

- Separate people from vehicle movements to ensure the safety of workers, the community and the public;
- Train vehicle and forklift drivers to properly operate the machinery and equipment;
- Within the EU, machinery purchased after 1 January 1995 must comply with the Machinery Directive 2006/42/EC;
- Assess machine safety in consultation with machine operators, reduce hazards according to the hierarchy of controls and undertake modifications/install guards and interlocks as required;
- Assess electrical installations and ensure that appropriate insulation, earthing and residual current devices (RCDs) are in place.

How can a business manage this risk?

- Assess tasks throughout the process, with particular focus on heavy and repetitive tasks;
- Implement mechanised packing to reduce manual handling;
- Install work stations that reduce the amount of reaching, bending and twisting required;
- Rotate packing tasks to vary posture and reduce musculoskeletal problems;
- Redesign manual processes to avoid lifting/repetitive activities;
- Install mechanical lifting aids where possible and rotate work tasks to reduce repetitive activities.

Manual Handling



Lifting, repetitive work and posture injuries occur as a result of lifting and carrying heavy or awkward shaped items such as crates, products and solid wastes.

Repetitive tasks can lead to musculoskeletal injuries and work-related upper limb disorders.

Slips, Trips and Falls



Slips trips and falls are regular occurrences in brick manufacturing environments and can result in many injuries. Typically these are due to uneven ground, wet/greasy floors from oil and other spillages and poor housekeeping.

Additionally, brick manufacturing operations may involve working at height to access roofing or lighting areas and/or equipment.



How can a business manage this risk?

- Install covers, fences and fall prevention methods to prevent falls;
- Keep walking and working surfaces clean and dry and provide workers with anti-slip footwear;
- Restrict access to areas being cleaned or where spillages have occurred;
- Schedule floor cleaning for a time when work is not in progress or has finished for the day and floors have dried as much as possible;
- Restrict access to working at height;
- Conduct a job risk assessment for all tasks that require working at height;
- Install correct fall arrest systems where necessary (guarding and harnesses etc.).

Temperature Exposure



Kilns working at high temperatures can increase the temperature of the working environment which can lead to heat stress.

Burns can result from contact with hot equipment particularly during maintenance activities. In addition, there can be contact burns from alkali materials that are used in the process and mixed with moisture.

How can a business manage this risk?

- Minimise time needed for staff to access areas with elevated heat levels;
- Issue protective clothing for use in high temperature areas;
- Comply with hazardous materials procedures for alkali handling.

Confined Space



Brick manufacturing plants contain vessels such as tanks and pits which may require entry by staff during maintenance and cleaning. Entry to confined spaces without effective management and control can result in engulfment and asphyxiation.

How can a business manage this risk?

- Implement confined space procedures, training, equipment and control systems if confined space entry is necessary;
- Strictly control entry to silos and prevent solo working in accordance with safety procedures;
- Confined spaces training is required for all staff working in confined spaces.



Labour & Working Conditions



Brick manufacturing operations may use casual and contract labour. Worker accommodation standards, particularly for temporary/casual labourers may not reach the standard required for permanent employees.

How can a business manage this risk?

- Comply with International Labour Organisation (ILO) requirements on working hours, pay, overtime, child labour, forced labour etc.³;
- Provide worker accommodation which is clean, safe, and at a minimum, meets the basic needs of workers, national legislation and industry good practice (e.g. see guidance note from IFC & EBRD⁴).

Community Relations



Having good relationships with neighbouring communities reduces the risk

³ Refer to Performance Requirement 2: Labour and Working Conditions.

⁴ <http://www.ebrd.com/downloads/about/history/workers.pdf>

of local opposition to the brick manufacturing activities.

Transport of products by either road or rail can lead to road noise and traffic congestion together with increased risk of accidents.

How can a business manage this risk?

- Assess opportunities for the involvement of the local community in direct employment or in the provision of goods and services;
- Engage with the local community and other interested and/or affected stakeholders to maintain good social relations;
- For areas of high population density or high community interest, prepare and implement a Stakeholder Engagement Plan (SEP);
- Develop a Traffic Management Plan.

3 Financial implications

Outlined below are key financial implications of ineffective management of E&S risks related to brick manufacturing.

- Fines, penalties and third party claims may be incurred for non-compliance with environment, health and safety regulations;
- Capital expenditure for installing or upgrading wastewater and waste treatment facilities;
- Capital expenditure for installing or upgrading storage facilities for chemicals, fuels and oils;



- Inadequate health and safety provisions (including risk assessments, training, infection control and provision of PPE etc.) for workers (permanent, temporary and/or casual) may lead to absenteeism, health care costs or health and safety incidents and claims;
- Inefficient energy usage can result in unnecessarily high operating costs to the business;
- Injuries may lead to increased payroll costs to replace workers and lost production time;
- Fires and explosions will have a substantial financial impact and insurance should be obtained;
- Capital investment may be required to comply with new environmental, health and safety requirements. Financial provisions may need to be set aside to address contamination and retirement of assets;
- Fines, penalties and third party claims may be incurred for non-compliance with environment, health and safety regulations or industry/customer standards.

4. Suggested due diligence questions

Perform a complete tour of the facility, accompanied by someone knowledgeable about all the activities at the site.

When assessing E&S risks, it is important to engage the customer on how these risks are managed.

During the initial site visit, the issues will vary according to the type of brick manufacturing and the level of environment, health and safety management already introduced. While visiting the site it is important to discuss and review the following:

General Housekeeping

- Check the standard of housekeeping at the facility, e.g. do areas look clean and tidy, is there build-up of dust on floors and surfaces, is there evidence of any recent spills or releases of raw materials/product.
- Are the walking and working surfaces kept clean and dry?
- Confirm what processes are undertaken and whether any hazardous materials are used?
- How hazardous are the materials and have associated risks been documented and addressed in appropriate systems?
- Check the condition of storage facilities for chemicals/hazardous materials;
- Check the age and condition of equipment, look for signs of wear and tear, degradation, leaks and breaks.

Environmental, Health and Safety

While visiting the site it is important to discuss and review the following:



- Confirm organisational responsibilities and systems for environment, health, safety and social matters and that these systems cover both employees employed directly and sub-contractors;
- Check the condition and efficiency of any wastewater treatment plant present and location of discharge points. Note the colour and appearance of adjacent watercourses;
- Note whether the plant discharges to a local watercourse or the municipal wastewater treatment works;
- Note the noise and dust levels at the site to determine whether abatement equipment is in use or might be required;
- Check the condition of storage facilities for bulk raw materials;
- Are staff wearing Personal Protective Equipment?
- Check signage around the site:
 - Does it convey the health and safety risks?
 - Are fire exits and/or evacuation routes clearly marked?
 - Are there demarcated routes for pedestrians and vehicles?
- Is fire-fighting and first aid equipment available? Are there trained and competent fire-fighting resources on site?
- Check the age and condition of equipment, look for signs of wear and tear, degradation, leaks and breaks;
- Check that waste storage and disposal (storage equipment) is in a good condition. Check that waste storage areas are clear of debris and that skips are covered to prevent waste escaping, for example, check that waste containers have lids or are stored in an area with a roof;
- Check that waste disposal takes place on a regular basis;
- Have the premises been inspected recently by the regulatory authorities for worker health & safety and environmental issues? What were their findings?
- Check for automatic safeguards on machinery to prevent accidental injury;
- Does the organisation have insurance to cover any significant damage to the environment/community/operations (this may be covered by public liability insurance or the organisation may be party to an industry insurance scheme). Review the terms of the cover.
- Has the organisation been subject to environment & safety or quality audits by customers/insurers? What was the outcome of these audits?
- Have there been any recent incidents on site such as fatalities, fires/explosions, spills? Is insurance in place to cover such incidents? Is there any legal action pending/likely?



- Does the business plan have line items for Environment, Health and Safety improvements as well as asset management?
- Check the conditions and duration of validity for all permits;
- If investment or refinancing will lead to restructuring of the organisation what will be the potential impacts on health and safety at the operation and wider community? Have these been considered and assessed by the company?
- If the company plans to invest in new technology, what will be the impacts and benefits for human resources?

Social, Labour and Community

- Check that labour standards, contracting and remuneration are in line with national law and are consistent with the average for the sector.
- Check that hours worked, including overtime, are recorded and staff should receive written details of hours worked and payment received.
- Ask particularly about the working hours, pay and conditions regarding casual labour, and check what health and safety provisions (e.g. PPE) are provided for them; are these comparable with employees?
- Has the Company received inspections from the local labour inspectorate in the previous three years? Have these resulted in any penalties, fines, major

recommendations or corrective action plans?

- Does the organisation have a grievance mechanism which allows employees to raise workplace concerns? Establish whether any complaints have been received;
- Are employees free to form, or join, a worker's organisation of their choosing?

Take notes/ask questions relating to any activities that address the improvements listed in the improvements section of this document

Action Plans

As a minimum, any business should be required to have the following in place:

- Operational procedures to manage environmental, health and safety risks;
- Monitoring programmes;
- Improvement objectives, targets and project plans;
- Training for personnel;
- Regular inspections, checks and audits with records to demonstrate achievement of the required level of performance against legal requirements and improvement action;
- Emergency plans for environment, health and safety accidents or hygiene non-compliance;



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- Management review/demonstrated involvement in environment, health, safety and hygiene management.



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