INDUSTRIAL HAZARD MANAGEMENT

General Issues

1. Industrial facilities include a wide variety of mining, transportation, energy generation, manufacturing, and waste disposal operations with inherent hazards which require careful management. For example, industrial operations involve the handling, storage, and processing of potentially hazardous substances (e.g., reactive chemicals and hazardous wastes). Industrial facilities also involve potential hazards which are distinct from hazardous substances.

2. Because of the existence of hazards at industrial facilities, the following risks need to be adequately managed to minimize adverse impacts: conditions potentially leading to major release accidents (e.g., releases from pipes, flexible connections, filters, valves, vessels, pumps, compressors, tanks, and stacks), occupational health and well-being conditions, and occupational safety conditions.

3. For purposes of this document, hazardous materials and hazardous wastes are categorized by any one or more of the following definitions:
   (a) **Ignitable**: substances which ignite easily and thus pose a fire hazard during normal industrial conditions (e.g., finely divided metals, liquids with flash points of 100oF or lower).
   (b) **Corrosive**: substances which require special containerization because of their ability to corrode standard materials (e.g., acids, acid anhydrides and alkalies).

(c) **Reactive**: substances which require special storage and handling because they tend to react spontaneously with acid or acid fumes (e.g., cyanides, concentrated alkalies), and because they tend to react vigorously with steam or water (e.g., phosphine, concentrated acids or alkalies), or they tend to be unstable to shock or heat (e.g., pressurized flammable liquids, ordinance supplies) with the result being either the generation of toxic gases, explosion, fire, or the evolution of heat.

(d) **Toxic**: substances (e.g., heavy metals, pesticides, solvents, petroleum based fuels) which when improperly managed may release toxicants in sufficient quantities to pose a direct chronic or acute health effect through inhalation, skin absorption and ingestion, or lead to a potentially toxic accumulation in the environment and/or food chain.

(e) **Biological**: substances which when improperly managed may release pathogenic micro-organisms in sufficient quantities to cause infection, pollens, molds, or dander in sufficient quantities to cause allergic (serious and sometimes fatal) responses in those susceptible to the hazard.

4. In addition to the above-described categories of hazardous subtances, there are general hazards associated with industrial faciliies. These hazards include the following categories:

(a) **Electrical:** electrocution from live conductors and misuse of power tools, overhead power lines, downed electrical wires, buried cables, electrical works mostly abandoned in public places such as schools and work during electric storms,

(b) **Structural:** potential for falling or strain when working conditions include slippery surfaces, steep grades, narrow stairs, open holes, trip hazards and unstable flooring; potential puncture from sharp objects, and

potential burial from trench or mine cave-in or from unstable slopes on material stockpiles.

(c) **Mechanical:** collision accidents with moving equipment, especially when operating in reverse, failed pulleys, snapped cables, and clothes catching in gears or drills.

(d) **Temperature:** heat stress in hot environments or when working in clothing which limits the dissipation of body heat and moisture; cold stress in cold environments or when the wind-chill factor is low.

(e) **Noise:** stress and physical damage to the ear when subjected to noise levels exceeding recommended guidelines (e.g., an 8-hour, time-weighted average sound level of 90 dBA, decibels on the A-weighted scale).

(f) **Radiation:** burns and/or internal damage when subjected to excessive levels of ionizing radiation.

(g) **Oxygen Deficiency:** health effects due to displacement of oxygen by another gas or consumption of oxygen by a chemical reaction, particularly in confined spaces or low-lying areas, may occur when levels drop below 19.5 percent oxygen.

5. Ergonomic stresses may result from inappropriately designed tools or work areas which can cause workers to experience discomfort, mental stress, loss of efficiency or loss of well-being. While ergonomic stresses are not hazards in the sense described above, they may lessen a worker's abilities to respond clearly and quickly to a hazard, and thus need to be considered in project development. When stress results from human reaction to monotony, fatigue, repeated movement, or repeated shock, the potential increases for hazards and accidents to occur.

Bank Policy, Procedures, and Guidelines

6. The principles of the West African Development Bank for industrial risks are reflected in the points below. The Bank says these principles are a major risk if toxic or explosive or highly reactive flammable substances are released into the environment. It also lists the types of installation industrial potential risk as well as the substances and quantities for major risks. Once a project funded by the West African Development Bank has major industrial risks, the policy of the latter requires that an assessment is carried significant risks.

7. The assessment of major risks must be written in the context of the development of the project in conjunction with the assessment of impacts on the environment and refer to it. The objectives of the evaluation of major hazards under the guidelines mentioned above are defined as follows :
   - specify the nature of the hazardous materials used in the plant as well as the importance and necessity of such use;
   - specify the steps taken to ensure the operation of the plant safely control any significant differences that could lead to a serious incident and the establishment of emergency measures;
   - determine the nature , probability and the general consequences of major accidents ;
   - demonstrate that the proponent has appreciated at its true value the main risks of plant operations and verified that the controls were satisfactory.

8. Guidelines for health and safety at work which looks at the working conditions in a number of types of industrial facilities and summarizes the main risks to the health and safety of workers. These guidelines also specify the essential control measures and the need for training and monitoring. The general policy of the West African Development Bank states that its guidelines on health and safety must be complied with for all projects it finances. Principles advocated a "plan health and safety" is established during project preparation, whenever there is the risk of serious issues occur or if it can have serious consequences health and safety of workers. The section entitled "Guidelines for conducting assessments of impacts on the environment" offers the contents of such a plan.

9. The West African Development Bank has prepared a document on hazardous waste and review the technical management of these wastes. It also specifies the minimum design standards (for the treatment and disposal of hazardous waste) confer the management of hazardous materials that projects must meet to be eligible for Bank financing.

10. All these documents are subject to be regularly updated, as and when progress assessment and risk management. We should contact the Department of Environment of the Bank whether the latest guidelines are available. Moreover, if local regulations differ from guidelines issued by the Bank, are demanding to be applied in the case of any project financed by the Bank.

11. The documents discussed above are meant to be upgraded on a regular basis, as the state-of-knowledge on hazard identification and hazard management improves. In referring to these documents, the Bank's

Environment Department should be contacted to determine whether more up-to-date guidelines are available. Furthermore, if local regulations differ from the Bank's guidelines, the stricter set of requirements shall prevail in any project financed by the Bank.

Relationship to Bank Investments

12. The issue of industrial hazard management is relevant in energy, industry, mining, pollution control, transportation and agriculture projects.

13. Energy projects may have hazards such as the following: toxic and fire hazards from oil spills or gas leaks, mechanical hazards from drilling rigs, noise hazards around generators, physical hazard from inhalation of dusts from coal ash and oil residues, toxic or corrosive leachate from coal and ash piles, chemicals used in water and wastewater treatment, oxygen depletion in tanks, and electrocution from live conductors.

14. Industry projects may have hazards such as the following: physical hazard from machine moving parts, heat stress from strenuous work near furnaces, noise hazard around machinery, dusts from grinding and sawing, rupture of pressurized vessels, exposure to water and wastewater treatment chemicals, explosion during high speed chemical reactions, and toxic fumes from chemical spills.

15. Mining projects may have hazards such as the following: physical hazard from use of explosives and excavation equipment, dusts from drilling, blasting and crushing, oxygen depletion, and toxic gases in underground mines and cave-ins, manne produced by gas.

16. Pollution control projects may have hazards such as the following: rupture of pressurized vessels (e.g., chlorine tanks at wastewater treatment plants, pressurized containers in incoming solid waste received at an incinerator), explosion or toxic gas generation from incompatible wastes being mixed, release of dusts and mist containing pathogenic micro-organisms during wastewater and solid waste processing operations, and toxic gases from solid waste disposal.

17. Transportation projects may include facilities which are commonly used for the loading, transport and unloading of hazardous substances. As part of both an environmental impact assessment and a major hazard assessment for transportation project, the potential for a collision or derailment to occur needs to be reviewed. During such an accident, there is potential for a toxic spill, fire and/or explosion.

18. Agricultural projects and control of pests, such as locust, bring unique problems with the handling and storage, use and disposal of pesticides. In Sub-Saharan Africa, disposal of unused pesticides has been a challenging problem for the donor community.

19. The Bank finances projects with the wide range of potential industrial hazards described above. In the cases of industry, energy or pollution control projects, the increased risk of industrial hazards would directly result from the project. In the cases of transportation projects, risk of an industrial hazard probably would be an indirect impact of the project. Through careful project preparation with strict adherence to Bank guidelines for hazard management, the occurrence of industrial hazards would be minimized and the resulting adverse impacts would be mitigated.

Guidance for Environmental Assessments

20. Many industrial hazards occur as unforeseen accidents caused by inadequate operating and maintenance activities. It is the job of the Environmental Impact Assessment and the Major Hazard Assessment to high light the potential for such accidents, by anticipating the worst case scenario of events which might cause them to happen, and to provide management and monitoring plans with the goal of risk minimization (for further discussion, see Table 10.1 at the end of this section).

21. Both the draft Environmental Impact Assessment and the draft Major Hazard Assessment are meant to be conducted in parallel with detailed engineering design of the proposed project, and before design is completely finalized. In this way, any hazards which are identified in the draft assessments can be addressed within the final stages of design and the reduction of impacts reflected in the final assessments.

22. Industrial hazards are minimized and managed through use of engineering controls, administrative controls, personnel protection, occupational health and safety training, health and safety planning, and medical monitoring, as discussed below.

23. Engineering controls include the following design and operational changes:

    (a) Siting. Facilities with risk of structural collapse, rupture, fire, or explosion will need to be located in geotechnically stable locations (e.g., minimal risk of seismic activity or subsidence).

(b) Buffer Zones. Based on the nature of the potential hazard (e.g., fireball, toxic gas release, spill), facilities will need to have an appropriately sized buffer zone.

(c) Layout Design. Within an installation with industrial hazards, unit operations will need to be laid out so that incompatible substances are not located within proximity of each other (e.g., substances which would react upon mixing to generate heat, fire, gas, explosion, or violent polymerization). Also, incompatible operations are not to be located within proximity of each other (e.g., welding operations are not to be located near storage of ignitable materials).

(d) Resource Substitution. Within processing operations, substitute a hazardous material with a nonhazardous material. Change the form of the material (e.g., to a gas or a liquid) if the resulting form would be less hazardous (e.g., store toxic gases in a suitable solvent form).

(e) Resource Minimization. Minimize the quantities of hazardous materials used by recovering and recycling them within the process operation. Reduce the inventory of hazardous materials in storage. Use more efficient processing techniques.

(f) Process or Storage Modifications. Store hazardous gas as a refrigerated liquid rather than under pressure. Reduce process temperatures and pressures. Change process methods (e.g., change from spray painting to dip or brush painting).

(g) Dust Control. Dust control measures include spraying water (or water with a wetting agent) at the source of dust dispersion, to minimize the generation of dust. Ventilation, collection and filtration are also effective for dust control. Dusty operations should be isolated and/or contained to the extent possible, especially when the dusts could lead to lung diseases such as silicosis, one the most common occupational diseases in the world and most prevalent at mines, brickyards, glassmaking plants, and sand blasting operations. Occupational

asthma is caused by a broad array of chemicals and natural substances, including isocyanates, acid anhydrides, danders, grain dust, cotton dust and wood dust.

(h) Access Control. Limitation of personnel to those specifically trained in the work conditions present within a potentially hazardous area, including use of personnel identification, double locks, security services, barriers.

(i) Labeling. Complete hazard labeling of all switches, valves, containers, and unit operations. In addition to identifying specific hazardous substances by name, also identify the type of hazard (e.g., toxic, reactive, ignitable, explosive).

(j) Temperature Control. Provision of air temperature control may be needed at certain operations in order to avoid heat stress or cold stress. A particularly hot or cold operation may need to be segregated from the others in order to minimize the number of personnel exposed.

(k) Monitoring. Monitoring of the environment in the immediate vicinity of potential hazards, as well as at the fence-line of the installation, provides an early warning of a hazard occurring. For example, air quality monitoring for volatile organics, oxygen levels, combustible gas levels, and/or specific air constituents could be conducted on a regular basis using portable equipment or a continuous basis with stationary equipment. Smoke detectors, heat monitors, radiation detectors, as appropriate to the type of installation, are used to signal a hazard occurring.

(l) Shut-Down. Provide manual and automatic systems for shutdown of electrical systems and/or process operations, so that the release of hazardous material is minimized.

(m) Secondary Containment. Provide, as appropriate, systems to contain releases, such as: water curtains to restrict gas release, dikes and portable booms to contain spills, emergency response equipment to

collect spilled material, bunkers or blast walls to confine explosions, fire-proofing to limit the spread of fire, absorbents to absorb or adsorb hazardous substance, and buffer zones.

24. Administrative controls are used when it is not possible to reduce exposure to acceptable levels through engineering controls. Administrative controls may include rearranging work schedules to minimize the duration of exposure to hazards and transfer or rotation of personnel who have reached a maximum allowable exposure limit over time. It is therefore redevelopment measures service to protect the health of workers.

25. Use of personnel protection equipment is appropriate for work with in the vicinity of potential hazards. Personnel protection choices are based on the nature of the hazard, the level and/or concentration of the hazard, the duration of exposure, and the personspecific susceptibility to being adversely affected.

26. When the nature of the hazard is known and routine, the precise type and level of protective gear can be defined and routinely used (e.g., hard hats, chemical-resistant gloves, air-purifying respirators, safety shoes, ear protection, safety glasses). On the other hand, when the nature of the hazard is unknown (e.g., when several hazardous materials accidentally are combined, or when a toxic waste dump is unexpectedly discovered), it may be necessary to use the most conservative type of protective gear (e.g., 0 chemically resistent and gas impermeable suits, self-contained breathing apparatus) -downgrading only after the hazard is identified as requiring a lower level of protective gear.

27. Personnel protection involves more than special clothing, glasses, hard hats, ear plugs, etc., to protect the body from harm. The following items are also part of personnel protection, as appropriate to the situation: knife (for emergency exit of a protective suit), portable light, personal monitor (e.g., dosimeter for radiation, personal thermometer for heat/cold stress), harness and lifeline, safety belt, two-way radio, locator beacon (e.g., for locating a victim of hazard) and any other relevant means of protection.

28. Occupational health and safety training is essential to ensure that personnel adhere to appropriate operating practices which minimize adverse health and safety impacts. The following areas of knowledge and experience are considered essential:
    (a) Appreciation of the properties (e.g., flammability, corrosiveness, toxicity, reactivity) of hazardous substances, as well as the levels at which they pose a significant danger requiring protective measures.
    (b) Awareness of early-warning indicators of hazard/risk identification, and ability to recognize potentially hazardous situations.
    (c) Familiarity with engineering controls to avoid occurrence of hazardous situations.
    (d) Familiarity with capabilities and limitations of the facility to response to hazardous emergencies: ventilation systems, plumbing systems, shut-off systems, containment devices, and emergency response procedures as outlined in the appropriate health and safety plans.
    (e) Knowledge of the use and maintenance of emergency response equipment,as well as routine equipment for health and safety monitoring and protection.
    (f) Knowledge of methods and procedures for decontaminating personnel, equipment, and facility, following potential chemical contamination.

(g) Refresher training and regular drills simulating emergencies and appropriate emergency response procedures.

(h) Familiarity with and acceptance of the need for continuous reliance on the "Buddy" system. In the Buddy system, work groups are organized so that each employee exposed to hazard is designated to be observed by at least one other employee who would be ready and able to provide immediate emergency assistance as needed.

(h) Empowerment to act decisively in accordance with health and safety plans during potentially hazardous situations or actual emergencies, especially in situations where supervisors are unavailable or have become victims of the emergency.

29. Health and safety planning involves a complete assessment of an installation with all potential hazards identified. The plan provides the following information:

(a) Definition of all potential hazards.

(b) Health and safety implications of each hazard.

(c) emergency measures to apply

(d) Description of routine health and safety management techniques (e.g., health and safety inspections, maintenance /repair follow-up on inspection citations, record-keeping, personnel protective gear, and medical monitoring).

(e) Outline of emergency response procedures following occurrence of a major hazard (e.g., organization structure of key trained personnel to act as emergency responders, action steps for entering and working within zone of hazard, evacuation procedures, protective gear requirements, decontamination procedures, lines of communication, emergency telephone numbers, map of route to nearest emergency medical care).

(f) Follow-up procedures after the emergency are over.

30. In defining potential hazards and the health and safety implications of each hazard, industrialized countries such as the U.S. have regularly updated exposure guidelines (i.e., threshold limit values) based on the current state-of-knowledge. For example, there are time-weighted average threshold limit values which define the concentration for a normal 8 hour work day, 40 hour work week to which most workers may be exposed without adverse impacts. Similarly, there are short-term exposure limits which define the maximum concentration to which a worker may be exposed within a 15 minute period without adverse impacts. (There are international telephone numbers for obtaining information about specific chemicals or combinations thereof.)

31. If the hazard involves an area contaminated from a major release of a hazardous material or an area of hazardous waste material, the health and safety plan will need to outline the site control process. Based on knowledge of safe distances relative to site conditions (e.g., wind direction and site topography), site control defines the zones of work for which the corresponding levels of required personnel protection would also be defined (e.g., zone of contamination, zone of decontamination, and support zone).

32. If there is potential that hazardous conditions could extend beyond project site boundaries to properties occupied by residents or farm animals, the plan will need to address emergency notification procedures and possibly evacuation procedures. Early in the health and safety planning stages it will be necessary to designate community coordinators who would be trained to help lead/coordinate emergency response activities with the community, including conducting training and practice emergency response drills. It is the Bank's policy that the community around a

potentially hazardous installation has a right to know the dangers which might occur and what plans have been developed to minimize and manage risk of such dangers occurring.

33. Medical monitoring is necessary for all workers who might be in contact with hazardous substances or hazardous situations. A baseline medical exam conducted at the start of employment defines initial health condition, including blood levels of specific chemicals with which the worker might be working. The baseline examination includes questioning the worker above his/her medical history. Regular exams (e.g., annual) determine whether there have been adverse health effects potentially attributable to the work. It is essential that the medical examiner be adequately trained to recognize sysmptons/signs which might indicate overexposure to hazards to which the worker might be exposed.

Rational use of resources

34. The project promoter will implement practical and cost-effective measures at technical and financial plan for improving the efficiency of its energy, water consumption, and other resources and material inputs, focusing on areas considered its core business activities. These measures will integrate the principles of cleaner production in products design and production processes in order to save raw materials, energy and water.

Greenhouse gas

35. The promoter will consider alternatives and implement those that are at technical and financial plan, and profitable to reduce greenhouse gas emissions related to the project during its design and operation. These alternatives may include other project possible geographical locations, adoption of renewable energy sources or at low-carbon emission,

sustainable farm, forest and pastoral management practices, reduction of fugitive emissions and gas flaring reduction.

Water consumption

36. If the project is potentially a large water user, in addition to the rational use of resources, the client must take measures to avoid or reduce the use of water, so that the water consumption by the project does not have a significant adverse impact on other users of the resource. These measures will include, for example, the use of additional water conservation measures technically within the promoter activities, the use of alternative sources of water supply, compensation measures of water consumption, evaluation of alternative sites for the project.

Pollution Prevention

37. The Promoter will prevent the release of pollutants or, if this is not feasible, limit and / or control the intensity or mass flow of their discharge. This provision applies to the release of pollutants into the air, water and soil in routine, exceptional or accidental conditions with a risk of local, regional and cross-border impacts. When pollution such as contamination of soil or surface water has already occurred, the promoter will seek to determine whether the responsibility of mitigation measures is assigned to it. If it is determined that the client is legally responsible, then the responsibilities are assumed in accordance with national law, or if the case is not provided for by national law, in accordance with international best practices in the industry.

38. In order to cope with the negative impacts of projects on existing ambient conditions, the promoter will have to consider a number of relevant factors, including: (i) existing ambient conditions; (ii) the limited nature of environmental assimilative capacity; (iii) the current and future foreseeable land; (iv) the project's proximity to areas of interest for biodiversity; and (v) the potential for cumulative impacts with uncertain consequences and / or irreversible.

39. In addition to measures of resource efficiency and the fight against pollution required by this operational directive, if the project has the potential to be a significant source of emissions in an already degraded area, the promoter will consider additional strategies and adopt measures to prevent or reduce the negative effects. These strategies include, in particular, the evaluation of other potential project locations and emission compensation.

Waste

40. The client will avoid producing hazardous and non-hazardous waste. When waste production cannot be avoided, the client will reduce waste production, retrieve and reuse this waste in a way that is safe for human health and the environment. If the waste cannot be recycled or reused, the promoter will treat, destroy and eliminate these wastes appropriately for the environment, including through appropriate measures for the treatment of emissions and waste resulting from the handling and waste treatment. If the wastes produced are considered hazardous, the promoter will have to adopt alternatives consistent with good international industry practice for proper disposal on environment plan, given the limitations applicable for their cross border transport.

41. When wastes disposal is conducted by third parties, the promoter will use reputable and legitimate contractors who hold a license granted by public bodies of relevant regulatory and it will get the documentation from the chain of custody to the final destination. The promoter must ensure that there are discharge that meet acceptable standards and, if any, it will use them. Otherwise, the client will reduce the amount of wastes sent to such sites and consider other wastes disposal options, in particular the possibility of establishing its own recycling and disposal facilities on the project site.

Hazardous Materials Management

42. Hazardous materials are sometimes used as raw materials or produced by a project. The promoter will avoid or, if not possible, reduce and control the release of hazardous materials. In this context, it should evaluate their production, transportation, handling, storage and use in the context of the project activities. The client will consider the possibility of using less hazardous materials of substitution, when hazardous materials are to be used in the manufacturing process or other operations. The client will avoid the manufacture, marketing and use of chemicals and hazardous materials internationally prohibited or subject to a phase-out process.

Use and pesticide management

43. The promoter shall formulate and implement, where appropriate, an integrated fight program against pests and / or anti integrated vector control for economically important pest infestations and disease vectors representing a risk to public health.

44. In situations where fight against parasites activities include the use of pesticides, the promoter will opt for low-toxicity pesticides to humans, recognized as effective and having minimal effects on non-target species and on the environment. If the project leader opts for chemical pesticides, its choice will depend on whether the packaging of pesticides is safe, clearly labeled for safe and appropriate use and those pesticides are produced by an entity currently licensed by organizations with relevant regulations.

45. The client will design its pesticide application regime so as to (i) prevent damage to natural enemies of pests targeted, and when it is not possible to avoid, limit them, and (ii) avoid risks related to the development of resistance of pests and vectors and, when it is not possible to avoid, limit them. In addition, pesticides must be handled, stored, applied and disposed of according to the International Code of Conduct on the Distribution of pesticides of United Nations Organization for food and agriculture, or other good practices international of the sector.

46. The Promoter shall not purchase, store, use, manufacture or market products that are part of the recommended classification of pesticides by hazard, Category Ia (extremely hazardous) and Ib (highly dangerous). The promoter will not purchase, store, use, manufacture or marketing pesticides of Category II, unless the project requires appropriate control measures in the manufacture, acquisition or distribution and / or use of these chemicals. These chemicals should not be accessible to untrained staff, appropriate equipment and facilities to handle, store, apply, and properly dispose of these products.

Picture: Summary of potential negative impacts and their mitigation

	Potential Negative Impacts	Mitigation Measures
Direct impacts		
1	Fires, explosions, release of toxic gases, vapors, dust, discharges of toxic liquids, release of radiation and combination of these effects.	• Provide bunkers or parapets. • Install walls and fireproof structures. • Provide emergency exits for staff. • Develop a training program for security and emergency services. • Execution of on and off-site emergency procedures. • Provide warning devices and public information activities for populations. • Provide a plan and evacuation drills. • Install buffer zones around the plant. • Provide intermediate places after work
2	Explosives : explosion	• The storage and handling of explosives should comply with the manufacturer's recommendations.

		• It should guard against theft and fire and take the necessary precautionary measures during explosions. • It would be important to comply with the following rules by ensuring that: • lighting in warehouses either natural or authorized • that the lamps are vapor-tight and switches installed outside of buildings, • we have to use the tools of wood or non-metallic, • that the boxes containing the explosives are not stacked on top of each other more than 1.80 m high. • they are stored in the right direction, so that the cartridges are placed flat. • they are turned regularly to prevent deterioration.
3	Flammable substances: fire risk	• Store substances in places fresh enough to prevent them from catching fire in the event vapors from substances would mix with air. • Provide ventilation warehouses allowing fumes from containers to disperse enough to prevent a spark to ignite.

		• Install the storage away from places where fires can be triggered (in places, for example, where metals are cut with a torch) areas. • Keep flammable substances away from strong oxidizers which the temperature may rise spontaneously (or explosive materials my which , in contact with air or moisture, heat up) . • Provide control equipment against fire. • Prohibit smoking or using heaters bare filaments. • Equipping warehouses circuits with ground, equip them with smoke detectors or fire. • Equipping warehouse fire extinguishers
4	Oxydants : Fire risks	• Store them away from liquids whose point of combustion is low (flammable). • Keep cool and well ventilated warehouses. • Keep fuel away. • Structures should be fireproof. • Note: A normal control equipment against fire is of little use since the masking effect of choking or fire extinguishers is mitigated by the

		nature of the oxidants that produce their own oxygen.
5	Water sensitive substances: elements which generate heat, flammable or explosive gases in contact with water, steam or a water-based solution.	• Store materials in dry and cool areas. • These substances are for the most flammable, it is essential not to use an automatic watering system against fires in warehouses • There should be a location that is fully protected from water. • The heating mode can be electric or hot dry air. • The storage area must be sealed, raised and separated from other storage buildings. • It should pay particular attention to the following aspects: • formation of light gases under the roof • introduction of ignition sources • Periodic inspection • automatic detection systems • alarm systems trigger if the concentration of flammable gas reaches a dangerous level
6	Substances susceptible to acids or acid	• Do not store near acids such substances (eg. Storing acids in shelters

	fumes: elements which generate heat, hydrogen or flammable or explosive gases.	whose structures are made of alloy materials). • If you must use such a metal construction, painted or treated against acids. Keep cool, ventilated spaces and inspect regularly. • Provide emergency measures and instruments needed
7	Pressurized storage of flammable liquids can cause , in contact with flames, " explosive release of a boiling liquid vapor ."	• Keep away anything that can catch fire. • Store containers upright and tie or fixed to a solid support so they do not fall and break, or valve or other part does abyss. • The warehouses which are maintained tanks should remain cool, out of direct sunlight and away from hot pipes. • Provide means (sprinklers) to maintain the tanks at a low temperature in case a fire occurs in or near the warehouse. • Ensure that containers are not damaged during handling. • It is important to use taps and keep them in good condition. • Do not hammer the tap. • Avoid interventions of any kind on the tanks.
8	Toxic: danger of serious accidents (serious	• Reduce the storage and use of materials.

	and fatal injuries and adverse effects on the environment).	• Changing patterns of treatment and storage conditions (eg. Storing and processing the toxic gas • Store hazardous gases as refrigerated liquids rather than pressure. • Improve the cessation of operations and the secondary containment in order to prevent gas from escaping from the enclosure or location device. • provide an operating stop device for reducing the quantities of gas escaping: • water curtains limit gas leakage. • dams reduce runoff.
9	Corrosive substances: destroy the tanks and become toxic gases in contact with substances such as cyanides and arsenides.	• Keep storage areas and fresh treatment and well ventilated to prevent the accumulation of vapors. • Ensure that the tanks are still closed and labeled. • Paint all the metals in the vicinity and verify that they are not corroded. • Keep away from substances that produce from them extremely toxic fumes. • Provide neutralizing accompanied by instructions for use in case of a

spill, leak or a serious incident.