

8<sup>th</sup> May 2020

With reference to the application for the renewal and variation of an IPPC permit for Sant' Antnin Waste Treatment Plant in Marsascula, Application reference number IP0005/13/A. Kindly find the Civil Protection Department comments to add.

The main role of the company is to organise, manage and operate integrated systems for waste management, including for minimisation, collection, transport, sorting, reuse, recycling treatment and disposal of solid and hazardous waste.

Fire in waste facilities around the world continue to be a huge challenge to the fire services around the world. We have experienced it probably it was the largest incident we have ever tackled. Commonly used fuels include waste streams such as municipal solid waste from kerb-side collections, used tyres, waste wood, dried sewage sludge and probably organic biomass. The risks from waste fuel streams can include dust, spontaneous combustion, poor housekeeping, the delivery of already smouldering loads, ignition in bulk storage bins of conveying systems, the hydraulic actuated processing equipment, flue gas filtration systems and the use of combustion loading shovels.

Therefore, good housekeeping is of great importance and the hierarchy for control of the fire risk should be:

- ⇒ Fire separation
- ⇒ Fire prevention
- ⇒ Fire detection
- ⇒ Fire extinguishing

It is important that these risk control measures are built into design and management procedures adopted by such plants.

I went through the two fire safety reports prepared by Ing Fabio Stivala 2017 and the last Risk Assessment Improvement Plan Recommendations made by Ing Claude Farrugia 2018. I hope that all the recommendation made in 2018 by this RAIPR was not just written report but the shortcomings noted have been tackled and implemented. I also read, the maintenance plan schedule and how it executed in weeks, months and/or hours.

The emergency plan, which is well constructed, I cannot stop from envisaging the importance of the rehearsing of emergency response plan so that everyone knows his/her role in an emergency and the importance of on-going training to all employees that are suitable trained in firefighting, spillage/pollution control and first aid. The handling of their machinery safely and this is reordered.

In-hose training on emergency procedures especially to new employees and refresher courses to existing Wasteserv personnel should be continued. Plant and equipment is all maintained in good operational condition and all the maintenance is recorded.

In general, the plant overall design and layout should be based on the processing system that will prevent inadvertent ignition in the fuel feed train. Thus includes physical separation and use of non-combustible construction materials that will prevent the spread of fire. The installation of fixed automatic fire detection and protection systems to detect, control and extinguish a fire is an essential element of the day-to-day operation.

The layout of the building, plant and process equipment should always allow unimpeded access by fire and rescue service emergency response vehicles to all areas.

One of the drawbacks during firefighting operation is water. The water supplies for the fire protection system supply should be provided from a reliable source. Without making an allowance for reservoir filling, the water supply should be able to provide a minimum of two hours of operation. If this interrupted we will lose the battle against it.

The fire hydrants should be well visible and should never be blocked or covered by RDF's stockpiles and machinery left laying in front of it. They should be made visible and marked with suitable signage. It is important to have the fire service couplings matching those of the fire service and they all work.

Fire pumps should be made to meet the demand, if they are not diesel driven, power should be provided from a secured source that is designed to site emergency services. The installation should also include provisions for routine flow testing of each pump.

Internal hoses are tested at least once a year and should meet the requirements they are made for.

Portable fire extinguishers should be provided in accordance with EN3 or BS 5306 part 8 Code of practice for the selection and installation of portable fire extinguishers.

Fire detection all rooms within all buildings should be fitted with an automatic fire detection and alarm system meeting the specifications given in BS 5839 Part 1.

Conveyor belt areas should be kept clean if possible conveyor belts should be made from fire retardant material. As much as possible hose reels if not sprinkler installation system should be made near a conveyor belt but not far off than i.e. 45 metres.

Electrical room as far as possible all the electrical room should be protected by a total gas flooding system.

Warehouses and workshops should be kept clean from any unnecessary items.

Vehicles and plant operators should be trained in their operation and hold appropriate certificates of training for the vehicles that are allowed to operate.

The engine bay of vehicles and mobile plant, both owned or hired in used for handling materials should be fitted with a fire extinguishers if possible fixed with the operator trained how to use it.

Before starting work, vehicle and plant operators should complete a prestart check on their vehicle in accordance with the manufacturers' instructions

Vehicle repairs and maintenance should be complete in a designated area separated by at least 15 metres from combustible or flammable material.

To prevent the accumulation of combustible material on vehicles, a daily wash-down and cleaning programme should be established. This should include the engine compartment.

Outdoor stockpiles of combustible material should be separated from buildings and plant by a minimum distance of 15 metres with a minimum of 5 metres clear separation from the site

perimeter fence line. Where 5 metre separation is not possible, a two hour rated fire barrier is required to protect adjacent plant and buildings.

A regime should be established to monitor the core temperature and emissions from stockpiles. Stockpiles should be regularly turned and damped down to prevent spontaneous combustion. Allowing longstanding stockpiles to develop should be avoided.

At all times, fire and rescue service vehicles should have unobstructed access and no portion of stockpile should be more than 45 m from an access road.

At least a fire main hydrant point should be provided within 90 metre of the stockpile perimeter. An oscillating monitor nozzle should be considered.

Site security should be provided to restrict access by intruders who intend to commit theft, arson or malicious damage. Perimeter fence lines should at least be 3 metres high with intruder control fixtures on the top.

The site main entrance should be controlled at a manned gatehouse and authorised personnel should be allowed access to the facility. All visitors should be accompanied by an authorised person at all times.

Intruder detection should be installed on all buildings and an intruder and fire detection system/s should be linked to a remote monitoring location.

Site security should include a permanent security presence with intermittent patrols or a remote monitoring service using CCTV.

Housekeeping to avoid the accumulation of combustible materials, dust and debris, good site housekeeping should be an ongoing process throughout the site.

There should be a programme in place to regularly clear dust and debris accumulations from beneath and on top of all process equipment, conveyors, hoppers, hydraulic packages and ledges at all levels. Mobile plant should also be checked and cleared of debris accumulations, particularly around tracks, engine compartments and suspension components. Daily, weekly, monthly and annual checklists as present by WasteServ should be provided to monitor and confirm that the cleaning schedule is being followed.

The site should develop a fire action incident plan in coordination with the Civil Protection Department. The plan should consider full range of potential fire scenarios and the type and level of response required.

An onsite incident controller should be designated to manage a fire incidents from the start to finish. A dedicated radio communication system or channel should be allocated so that the incident controller can receive information and give directions. He place himself next to the CPD incident commander as assist him as required.

Civil Protection fire and rescue vehicle should meet at a designated rendezvous point and escorted to the incident site. It is important to give the correct gate where they should proceed from and keep envisaging it as fire service vehicle can turn out from different station from different areas and they do not know the area well.

The plan should include the names of responsible persons, their responsibilities and contact phone numbers for people and services that may be required during an incident.

The fire incident plan document should be held in the control room and at the main gate. It should include drawings showing site layout, locations of key equipment and the location of fire protection equipment and systems. Ideally and as far as possible they should be made laminated.

A procedure should be established to immediately notify the facility's insurers of any impairment of fire protection or detection system.

Permit to work system, the site should operate a documented permit to work system including the lock-out-tag-out of all electrical and mechanical systems before work is permitted on any process plant item.

Control of hot work, the site should operate a permit system for the control of hot work, such as flame cutting, welding and grinding. The fire prevention requirements for any hot work should include the following:

A suitable portable fire extinguisher available at the point of work;

A fire watcher, trained in firefighting, to be stationed at the point of work;

The work area should be cleared of combustion materials before work commences;

Fire retardant sheets or blankets should be used to prevent sparks and hot materials falling on equipment below;

Hot work should be carried at least 20 metres from any combustible materials;

Hoses and bottles sets should be examined and be in good working condition before work begins;

Flammable gas bottles and torches should be fitted with flashback arrestors;

The work area should be examined periodically during the hour immediately after the work has been completed to ensure there are not soldering or incipient fires.

Smoking should be banned within any building in accordance with legal requirements.

Ideally, there should be a ban on smoking anywhere on site but if this cannot be imposed, a limited number of designated outdoor smoking shelters may be provided which should be sited at least 15 metres away from buildings and any combustible materials

Smoking within sites vehicles and mobile plant should be prohibited.

Maintenance and inspection. The site should establish a maintenance and inspection regime that covers all installed plant and equipment.

Maintenance and inspection should be of a type and frequency recommended by the equipment supplier or manufacturer as a minimum requirement.

Regular thermal imaging inspections of motors, bearings, transformers and electrical equipment should be carried out to detect possible overheating as a cause of fires.

Electrical installations and portable equipment should be routinely checked to confirm the continued safety of the equipment, installation of system.

The use and storage of chemicals in variable amounts must be stored in a controlled manner therefore storing of chemical waste before disposal should be made the same as when acting as a warehouse, taking care of the protection of the personnel and the environment from the effects of a spill, or an aerosol or gas emission. When designing a chemical storage facility, regardless of its size, it is important and essential to take into account all hazardous properties of chemicals, intrinsic or arising from interactions.

**Before building a chemical storage room the following consideration should be taken into consideration for hazards and associated risks with chemical storage facilities**

### **Chemical emissions**

Toxicological, chemical and physical properties define the hazards of a chemical. However, in a chemical storage facility further factors added is on the quantity, the storage form, proximity of various chemicals, activities carried out in the facility, etc.

The first hazard materialises, when chemicals are spilt, e.g. out of containers. Among numerous causes for a chemical leak are:

- mechanical damage of the container (bumped during transportation, tilted over after it was placed on an unstable ground or rack...);
- container ageing (plastic becoming brittle with time or under the effect of light or low temperatures, plastic softening through heat, metal corrosion, interaction between the container and its filling);
- expansion of the filling (vapour pressure build-up with heat, crystallisation at low temperature, chemical decomposition with time or induced by light exposure);
- sampling and transfer of chemicals.

This chemical dispersion can have serious consequences.

### **Damage to health**

A leaked chemical, especially when it is volatile or a gas at room temperature, can cause intoxication. The risk of intoxication is particularly insidious, when the spilt chemical on its own does not have any severe toxicological property but releases a toxic substance when it reacts with the environment or other chemicals stored in the same room.

### **Damage to the environment and facilities**

Apart from the hazards they represent for workers' health, stored chemicals may induce hazards for facilities, fauna and flora, and the general public off site.

When they are spilled, chemicals can irreversibly alter soils, streams and ground waters, thus affecting surrounding communities. The nature of the environmental damage caused by a chemical spill depends on its toxicological, physical and chemical properties and those of the polluted site pollution risk increases with the amount of stored chemicals.

Stored chemicals can also cause accidental fire or explosions. We barely hear of fire and explosions as very few occupational accidents happen each year. However, when they happen, they often claim lives and have dramatic environmental and economic consequences.

Hostile fire is an uncontrolled oxidation reaction between combustible matter and an oxidant. Large amounts of both elements can often be found in a storage facility. Oxygen is the usual oxidant involved in fire, while stored goods (organic chemicals like solvents or polymer pellets), packaging materials (plastic bags or containers) or pallets act as combustible matter. Various sources of energy can start a fire, e.g. a spark, heat, an explosion.

Accidental explosions can be either “physical” or “chemical”. A physical explosion can happen when, for example, pressure builds up inside a chemical container. Chemical explosions result from chemical reactions: a decomposition (storage of explosive materials) or the inflammation of an explosive atmosphere (storage of flammable chemicals, of oxidising metal dust, etc.). In some cases, the chemical reaction is essentially combustion.

### **Designing a chemical storage facility**

In order to prevent the risks outlined beforehand, the set-up of a storage facility requires careful planning. Among others the storage facility must:

- prevent exposure to hazardous chemicals, and
- not generate additional risks through its design.

### **Requirement analysis**

As a first step, the planner needs to compile all requirements:

- volumes to be stored, the volume of chemical waste, is to be treated as new chemicals;
- diversity of chemicals in term of shelf-life, storage conditions and compatibility;
- organisation’s activities (chemical sampling or transfer activities within the storage facility, for instance: they will require a separated dedicated area with local exhaust and specific spill containment system);
- accessibility (reachability and number/dimensions/operation of apertures) and access control (for instance, access to toxic chemicals or chemicals with narcotic properties is restricted to properly trained and authorised persons);
- legal requirements concerning the storage location and the stored goods (for instance, specific national construction regulations may apply for the storage of environmentally hazardous chemicals).

Concerning legal requirements, chemical storage falls within the scope of three legislative and regulatory frameworks:

- workers’ health and safety;
- protection of the general public;
- environmental protection.

## Risk assessment

A risk assessment supplements the requirement analysis. Preventive measures are derived from its results. The planner is to define building and operating specifications for the storage facility.

The risk assessment should identify all personnel and environmental risks linked to storage. Beside hazardous properties of chemicals, the assessment should also take into account:

- chemical interactions;
- storage systems;
- delivery and removal;
- traffic and transport of chemicals inside the facility;
- any other activities carried out in or close to the facility;
- emergency response.

A major information source for the risk assessment is the material safety data sheet (MSDS) in its up-to-date version.

Further information can be collected from where the chemical is collected and/or prevention institutes or organisations.

It is important to note that both requirement analysis and risk assessment need to be repeated on a regular basis and whenever a change is introduced in the storage facility or following any abnormal occurrence (incident, accident health issue). As a result, new preventive measures may have to be defined.

## Setting and provision of safety signs



Examples of prohibitive, warning and mandatory signs relative to chemicals from European Directive 92/58/EEC, annex II

The chosen location should sit on stabilised ground and be protected from floodwaters. As far as possible it should be located on ground level.

The chosen location must be solely dedicated to chemical storage. For the set-up of this protected area, a risk assessment must be carried out.

Furthermore, the chemical storage must be visibly indicated. Associated hazards must be clearly identified, for instance through appropriate warning signs. The personnel must also be informed about safety requirements before entering the storage location.

### **Building materials**

All building materials must display chemical resistance, especially towards the stored chemicals. In particular flooring must be damp- and chemical-proof. Moreover, in order to avoid contact with hazardous substances all surfaces should be easy to clean. At the same time a skid-proof flooring will prevent occupational accidents due to falls. Storage facilities should also preferably be constructed of non-combustible materials as far as possible to avoid dissemination of hazardous chemicals, should a fire threaten the storage facility.

### **Access, alleyways, escape routes**

Access to the chemical storage facility is allowed only to authorised personnel. Therefore, constructive arrangements should be made in order to control access.

Furthermore, access to the facility and its alleyways must be large enough and designed according to the activities carried out (use of handling equipment, for instance). In case of emergency, the rescue teams must also be able to access the storage facility quickly. Thus, stairs and steps close to the entrance of the facility should be avoided.

The number of emergency exits depends on the facility size and configuration. Escape doors must be designed in such a way that they open outwards and that they can be opened easily from the inside without the use of any key (installation of panic bars, for instance). All windows and doors should be designed in louvered form to act as a pressure relief in case of overpressure keeping in mind the intrusion of water

In addition, both alleyways and escape routes must be clearly signaled.

### **Containing accidental emissions**

Any leakage or spill must be contained, so that it does not mix with other chemicals or reach the sewers. The type and capacity of the spillage receiver will depend on the nature and volume of the stored chemicals. Suitable absorbents (neutralising or incombustible) should be readily available in case of small leakages; information on such absorbents can be found under 'Accidental release measures' of the material safety data sheet (MSDS).

In the event of a fire, quenching water must not be allowed to reach the sewers. The installation of a specific drain system is therefore recommended such as a blind tank.

### **Ventilation, air-conditioning, lighting**

To prevent the accumulation of hazardous vapours, the storage facility must be well ventilated, with the air renewal rate adapted to the stored chemicals and the activities carried out in the facility. Air inlet and outlet should be placed so as to avoid any 'dead' zone.



Moreover, if coldness or heat can damage products and packaging, air conditioning must be foreseen in the facility. Information on temperature sensitivity can be found in the chemicals material safety data sheet (MSDS).

Aside from these requirements, the whole facility must be sufficiently illuminated, so that labelling can be easily read, and damaged packaging or abnormal occurrences can be detected in time. Ex-proof electrical installation should be considered.

### **Storage systems**

Storage racks or cabinets must display chemical resistance. They should also be made from incombustible material so as to prevent the escalation of an incident and the spread of a fire.

Particular attention must be paid to the maximum load of racks and cabinets (to be clearly indicated on these). The mechanical resistance of the storage systems must be adapted to the stored goods. In addition, the storage system configuration must prevent any tilting of the containers.

Furthermore, it must be easy to place and remove the chemicals from storage. Therefore, suitable handling equipment must be made available, as necessary.

### **Prevention of fire and explosions**

In order to limit the impact of a fire, preventive measures must be taken, especially when the storage facility contains combustible or toxic material. Those include building and fire-fighting elements such as:

- incombustible and heat-resistant building material;
- fire-proof doors and windows;
- avoidance of ignition sources in the facility (lightning protection, heat sources like light bulbs or air heater away from combustible goods...);
- air-conditioning in order to stay below the flammable substances ignition points;
- fire and smoke detectors, and alarms;
- (fixed or mobile) fire extinguishers.

Moreover, combustible gases, combustible dust or flammable liquids can form an explosive atmosphere when they are released from their packaging. When such chemicals are stored, further measures must be taken such as:

- efficient ventilation in order to stay under the lower explosive limits of the substances;
- encapsulated lighting bulbs;
- use of electrical equipment allowed for areas, where an explosive atmosphere can appear;
- use of explosion-proof tools;
- avoidance of electrostatic loading through use of antistatic flooring and equipment;
- earthing.

## **Operation**

Structural preventive measures are of prime importance for a secure chemical storage. For the protection of workers, the public off site and the environment, however, they need to be supplemented by organisational preventive measures, while operating the chemical storage facility. The objective is to avoid hazardous situations and, in particular, to limit exposure by optimising chemical handling.

### **Roles, procedures, rules of conduct**

The employer has a legal responsibility to protect the health and safety of his/her staff and the environment. He/she must thus assess the risks associated with the chemical storage facility, implement the appropriate preventive measures, control their effectiveness on a regular basis and ensure their maintenance.

In this context the employer must inform his/her staff about the risks and preventive measures and provide them with relevant training, including, among others, the following rules of conduct, the respect of which is essential in a chemical storage facility:

- access for authorised personnel only;
- no smoking;
- prohibition of food and like products (beverages, chewing-gum, medicine, tobacco...);
- wearing of prescribed work clothes and personal protective equipment;
- separation of work and street clothes and obligation to change and wear street clothes to enter canteens, for instance;
- changing of work clothes and personal protective equipment, as soon as they are contaminated;
- hand washing before breaks and at the end of workday;
- use of prescribed handling equipment and tools;
- respect of handling (no storage out of specified spaces), cleaning and emergency procedures;
- information about and guidance for any abnormal occurrence
- maintenance and functionality checks (for example, checking the proper functioning of technical equipment, such as handling equipment and the ventilation system, before use).

### **Stock management**

The larger the stored volumes, the greater the hazard. Moreover, chemical waste, generates additional risks. A 'first in, first out' rule must be observed.

Without proper packaging, labelling and an up-to-date material safety data sheet (MSDS) a chemical should not be accepted in the storage facility. This might be exception for WasteServ to this rule: for instance, products for the general public (all relevant safety information must appear directly on their labels) or food additives (in this particular case, safety advice should be requested from the supplier).

Chemicals should be stored in their original container. However, if a transfer proved necessary, the chemical should be transferred in a suitable container with proper labelling: chemically, mechanically and thermally resistant, easy to handle with the existing equipment and tools and easy to store with the existing systems.

Maximum loads of storage systems must be respected as well as stacking rules. Moreover containers should be stored in such a way that their labelling can be easily read and that a leakage or damage can be easily seen and dealt with quickly.

### Separation of incompatible chemicals

#### 10. Stability and reactivity

##### 10.1. Reactivity

May polymerize on exposure to light or heat.

##### 10.2. Chemical stability

Stable under recommended storage conditions.

##### 10.3. Possibility of hazardous reactions

As a result of heat or light exposure or contact with certain substances (see 10.5.), may release excessive heat upon polymerization.

##### 10.4. Conditions to avoid

Avoid light or heat exposure.

##### 10.5. Incompatible materials

Strong acids

Strong oxidising agents

Strong bases

Brass

Copper

Steel

Iron

Iron salts

##### 10.6. Hazardous decomposition products

Hazardous decomposition products form under fire conditions: carbon oxides.

Close-up on heading “10. Stability and reactivity” of a safety data sheet

Some chemicals can react hazardously together, causing harmful emissions, radiating heat, fire or explosions. In case of a leakage they must not come into contact with each other. Depending on the stored volumes, separation can mean placing these incompatible chemicals on different impounding basins or in different walled sections of the facility.

Such incompatibilities are usually described under headings ‘Handling and storage’ and ‘Stability and reactivity’, respectively of the MSDS<sup>1</sup>. Safety institutes or organisations can also provide useful information about the reactivity of specific substances.

### Emergency planning

Finally, in event of an accident, staff must react quickly and in an appropriate way. The employer must therefore draw up emergency procedures, install emergency and first aid equipment as necessary, and inform and train his/her staff accordingly.

Emergency procedures include:

- actions to be taken in case of a chemical accident;
- use of alarm systems;

- emergency call numbers;
- names of contact persons;
- evacuation instructions;
- first aid measures.

On top of safety training, evacuation drills must be organised regularly and first-aiders must be named and trained.

Furthermore when a number of different chemicals are stored, it is recommended to establish an inventory of all stored products as well as a storage plan, to keep them up to date and to have them readily available in case of an accident. These records should inform about the products, their quantities and their location in the storage facility and therefore avoid that the emergency and rescue teams expose themselves to additional risks during their intervention. Then, regular consultation with the local fire and rescue authorities will help them action the appropriate response in case of emergency. This inventory should not only be kept in the in the chemical storage room but also somewhere else safe so that if the department cannot have access into the chemical room they could get access to this information easily.

Tony Pisani

Operations manager

Civil Protection Department