

TAMPERE POLYTECHNIC  
Environmental Engineering

Final Thesis

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PLANNING THE USAGE OF A NEW OIL AND WASTE STORAGE FOR KALMAR  
INDUSTRIE OY AB

Supervisor  
Commissioned by  
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Kalmar Industries Oy Ab

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## **ABSTRACT**

Environmental awareness of a company is increasing as the markets are growing in the production and service sectors. When responsibilities are acknowledged their management is improved. With sustainable development within an organisation the environmental issues can be handled.

The use of chemicals and the production of wastes is unavoidable what ever is produced. The aim is for every organisation to understand the principles of good waste management and safe storing of substances. The proper collection and separation of wastes and a proper storing of chemicals will reduce the impacts on the environment. Further more it will decrease the damages to owned property and human health.

By building a new storage to the wastes and chemicals Kalmar Industries Oy Ab will develop the sustainable and safe storing. It will also act according to the laws and regulations set by authorities and to the companies own aspects.

The aim of this project is also to make sure of the right kind of usage of the storage. Proper guidelines, education and training will help to keep the storage in order and it will help the control of it. A well operated storage will also give a responsible image of the whole company.

## TIIVISTELMÄ

Yritysten ja organisaatioiden ympäristövastuut kasvavat toimintojen sekä tuotannon lisääntyessä. Kun vastuut ymmärretään niiden hallitseminen ja johtaminen paranevat.

Kemikaalien käyttö sekä jätteiden synty missä tahansa tuotannossa on väistämätöntä. Tarkoituksena on, että jokainen organisaatio huomioi nämä asiat tuotannossa ja järjestää niille asianmukaisen hallintajärjestelmän. Näin pystytään vähentämään ympäristöön kohdistuvia haittoja. Lisäksi voidaan luoda turvallinen työympäristö ja minimoida omaisuuteen sekä terveyteen kohdistuvia vahinkoja.

Rakentamalla uuden varastotilan Kalmar Industries Oy Ab voi taata turvallisen ja kestävä kemikaalien sekä jätteiden varastoinnin. Tällä hankkeella toimitaan myös lakien ja vaatimusten puitteissa sekä niiden ohjeiden ja päämäärien mukaan, joita Kalmar on itse laatinut.

Tämän työn tarkoituksena on taata varaston asianmukainen toiminta. Tarvittavat ohjeet ja koulutus auttavat varaston järjestyksen ylläpitämisessä. Hyvin hoidettu varasto antaa vastuullisen kuvan yrityksen johdosta ja siitä, miten ympäristöasioita yrityksessä hoidetaan.

Työn päämäärä on saavutettu yhdessä Kalmarin työntekijöiden kanssa, auditointeja ja haastatteluja hyväksi käyttäen sekä erilaisten viranomaisten tapaamisten perusteella. Turvallisen ja toimivan varaston takaamiseksi myös tulevaisuudessa eri tahojen työntekijöiden tulee toimia yhdessä. Kaikkien panos varaston käytössä ja hoidossa sekä vastuiden tiedostaminen luovat hyvän työympäristön varastolle.

## **FOREWORD**

I have been working for Kalmar Industries Oy Ab for over a year and the experience have been very educative. The working environment has been great and every one has taken me kindly as their co-worker.

This is why now I would first of all like to thank the vice president of quality and the environment Kauko Autio for taking me as a trainee to the company in the winter 2006.

Maintenance and Environmental Manager Antero Vainio and Real Estate Manager Pekka Puska have given me great work experience with several interesting fields. They have also been very supportive in my theses work and pushing me when inspiration was low. Thank you for the guidance and motivation you have given me the past year.

I would also like to thank all the employees of Kalmar who participated in my work and has given me great advice and ideas concerning the topic.

It has been a great chance for me to make my final thesis for Kalmar Industries Oy Ab.

Tampere 13.4.2006

Kaisa Mäkinen

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## **1. Introduction**

Every company and organisation has their responsibility of the environmental impacts that their production may cause. These issues must be recognised and handled in a proper manner.

Chemicals that are used in a production must be known and handled according to regulations. Their storing requires certain knowledge of the laws and regulations in force. Also the company or organisation needs to be aware of the changes in them. The same ideas concern the wastes produced. Wastes must be handled so that they will have little impact to the environment. The basis for waste management is to utilise the materials and energy in wastes produced.

Wastes and chemicals are still unavoidable in different companies. The way they are handled makes the difference.

A new storage as such doesn't prevent the production of waste but it will give a good round for the waste management. The reduction of wastes, which also is important, will be achieved with different methods.

## **2. Aim of the work**

The aim of this work is to develop a sustainable and a working storage for oils and waste oils for Kalmar Industries Oy Ab Tampere factory. The storage will also contain other wastes such as cardboard, batteries, mixed and combustible wastes etc.

This project is made mainly due to the big changes at the factory area and also because of the regulating factors from the higher authorities and Kalmar's own guidelines.

The new storage will give the surrounding environment a better overview as oils are placed from out side to one closed space. It will also minimise the risk of leakages and so minimise the risks of environmental pollution.

A unified space for chemicals and oil wastes will develop Kalmar's environmental policies. It gives a space that is easy to monitor and control.

This thesis will give me a good perspective how companies manage their wastes and chemicals. It helps me too understand the needs of a large factory and things that need to be taken in to consideration when dealing with such relevant issues.

There are several factors that need to be taken into account when dealing with different chemicals and wastes. A lot of background information needs to be found out and dealt with before the storage can be taken into operation. Different authorities will affect the building process and the actual storing.

### **3. Work description**

My main role in this project has been the planning the usage of the storage so that it is easily managed and controlled. I also needed to determine what will be placed in to the storage and find out the critical areas from where they are brought at the factory premises.

The subcontractors and companies collecting wastes need to be informed of the changes made.

There are rules and regulations affecting the storage and they need to be determined before building the storage and operating in it.

I have been working with this project from the very beginning starting from the external audits made in 2006 where the subject was first discussed and gave one purpose for the building of the storage.

I have also been working with the investment proposals that were made to get the project going forward.



The work has included meetings with the regional fire department, the constructor and between Kalmar personnel. In these meetings the regulating factors have been discussed and also the basic ideas for the storage.

Interviews were made to determine the opinions of the workers and production line supervisors. Their purpose was also to get an overview of the storied substances. What will be placed to the storage and from where?

Interviews were used also to gather information on the possible risk factors that may occur in the storage and when using it. Based on these questioners the risk assessment and management program were made.

I needed to prepare a short presentation for the heads of departments, environmental-, real estate- and quality managers and the vice president of environment and quality on the basic views of the storage and how it will operate. Internal audits to the tenants and subcontractors were made first of all to ensure that their actions are according to Kalmar's guidelines but also to recognise their interests on the storage.

The work will also include a lot of preparations after the storage is built in the spring 2007.

The personnel working with the storage will be trained and take the guidelines in to force.

## **4. Cargotec**

Cargotec provides machinery, services and systems for loading and unloading goods and products. Container handling solutions include different on-road load-handling equipment, container handling equipment, heavy industrial material handling equipment and marine cargo flow solutions. It is the world leader in its production range.

Electronic solutions, remote control and automation are the main focus in their production development.

The Cargotec group is divided into three main business segments that are Hiab, Kalmar and MacGregor, which all are also business leaders in their own business segments.

Cargotec employs around 9000 people in 160 countries with net sales of 2,6 billion in 2006. Cargotecs B shares are listed in the Helsinki Stock Exchange.

(1,2)

### **4.1. Kalmar Industries**

Kalmar Industries is one of the world's biggest container handling suppliers and has manufacturing units, sales companies and distributors/dealers all around the world, all together in 140 countries. Its customers include ports and terminals, heavy industry (sawmills and stevedoring being the most important) and distribution and logistics. It also provides automation solutions to its machines.

Every fourth container is handled by Kalmar's equipment of the hundreds of millions of containers that are transported. About 80 000 machines are currently operating.

Kalmar has factories in Finland, Sweden, Holland, The United States and China. Also 20 sales units and 300 representatives operate all around the world.

The Finland's factory Kalmar Industries Oy Ab is situated at Tampere. Kalmar Tampere is an assembly unit of terminal tractors, straddle carriers and RTGs. Kalmar Tampere also operates the after sales services. It is the centre for marketing, product- and system development and automation. Port automation has been developed together with customers and business partners and it provides automated container handling technology and remote-controlled maintenance services which has led to the first totally automated straddle carrier system.



*Picture 1. Kalmar's products; starting from left Terminal tractor, straddle carrier and RTG.*

Kalmar Industries Oy Ab employs over 700 workers

The history of the factory dates back to 1930's when the national airplane factory moved from Santahamina. Air planes were built until the end of the Second World War. Since then the area has been manufacturing heavy machinery ranging from locomotives and trams to forklifts until today's heavy container handling equipment.

There are also other business partners, subcontractors and tenants operating at the factory area. All together the factory area covers over 1000 work places.

(1,2)

## 4.2 Environmental issues at Kalmar

As a large international company Kalmar needs to take its environmental issues seriously. The reputation and responsibilities need to be taken care of. These are meaningful issues not only for the benefit of the environment but today it also is an area that customers value and determines recognition.

As Kalmar is an assembly unit only its pollutants to the environment are quite small. The main pollutants come from the use of ready made machinery. Product design and development, assembly and services are there for the main focus point.

The goal of the company is to provide its customers products that will help them to keep up with the standards and limits of today by minimising pollutants, noise levels, preventing oil leaks and improving product energy efficiency.

Four of Kalmar's seven production units are certified under the ISO 14001 standard and the goal is to certify the rest during 2007.

Kalmar is driven with the sustainable development and continual improvement of its products and services. Regular external and management audits are made to monitor the achievements of the related objectives.

The International Chamber of Commerce sets also out its principles not only in the development of products but also in the environmental issues. These principles are very much related to those in ISO 14001.

Kalmar provides environmentally friendly products such as E-one- RTG cranes, electricity powered EDRIIVE straddle carriers and forklift trucks and terminal tractors that utilise natural gas or other alternative fuels.

Kalmar is participating on a development project that tries to minimise and reduce the pollutants at the west coast ports and terminals of the United States. By developing a hybrid terminal tractor the emissions are expected to reduce significantly.

This hybrid terminal tractor is tested for six months and it is made together with the West Coast Collaborative of the US Environmental Protection Agency and the ports of Los Angeles and Long Beach.

(1,2)

### **4.3. Waste management at Kalmar**

Wastes are the most visible environmental issue at Kalmar Industries. Kalmar policies tries to minimise the amount of waste produced and tires to recycle as much as possible.

Kalmar follows closely to the rules and regulations set by authorities.

All wastes are separated as well as possible. The main focus is to reduce the amount of solid wastes by separating the recyclable materials and combustible wastes away from it. Metal scrap, paper, cardboard, etc are recycled and sold forward.

Hazardous wastes are separated and disposed to a licensed disposal sites.

Instructions of waste disposal and recycling are given in the internal instructions and new workers are trained to take these things into account in their daily work routine.

Wastes are monitored and reported in annual reports.

All waste are collected from the area by companies that have the right kind of permits and the wastes are disposed to licensed sites.

Hazardous wastes are collected by Lassila&Tikanoja Oy, Säkkivaihto Oy is responsible of the mixed and combustible wastes and bio waste is collected by Pirkanmaan Jätehuolto Oy.

As there are several different businesses working at the area the waste management is a some what challenging. Every one is obligated to comply with the rules set by the different authorities but also with the rules that are in Kalmars own policy. This

area has still some challenges and a lot needs still to be done in order to achieve best possible results in waste management.

(3)

## **5. Storing wastes and chemicals**

The environmental protection is an important issue today in all companies operating in different fields. The environmental issues should be taken as a whole and added to the entire production line from planning to the finished products. The main issues in reducing the environmental impacts are the use of raw materials, energy efficiency, reducing wastes and scrap, manufacturing and the life cycle of the product. All these need to be identified as a whole as it will give the best possible results in environmental protection.

How ever in order to manufacture goods and cervices wastes will be produced and chemicals will be used. The way they are handled is a different issue.

A good waste management includes the knowledge of wastes in production and the characteristics so does the identification of all chemicals. When they are acknowledged they can be managed.

A unified space for different wastes and chemicals is an appropriate way to minimise the environmental impacts caused by them. It gives a solid unified space that is easy to control.

There is always the possibility of accidents in these kinds of storages that could cause damages to the people working with them and to the environment that is why there are different legislations, regulations and rules controlling the use and building of these kinds of facilities. Therefore it is important to know these before taking chemical and waste storages in to use.

(4,5)

### **5.1. Law and regulation**

When ever dealing with hazardous wastes and other chemicals it is important to be aware of the laws and regulations concerning them. This decreases the risks to human health and the impacts to the environment.

There are several legislations that will concern the waste storage. Chemical act, waste act and environmental protection act being the most relevant. Legislations that also affect the use of a storage, are the Occupational health and safety act, Land use an building act and Rescue act. All these have an affect to the building process and the usage of the new storage. In addition all the sub legislations have rules and regulations that need to be acknowledged.

(6)

The main legislations are listed below.

### **Chemical act (744/1989)**

The aim of Chemical act is to prevent and control the health and environmental impacts caused by chemicals. Also the prevention of fire and explosion risks needs to be taken in to consideration to protect the not only the health and environments but also property damages.

The storing of chemicals requires certain licence and notification procedures and inspections which depend on the amount and quality of the substances storied.

Adequate carefulness is required when ever handling and storing chemicals to prevent health and environmental impacts. If any misuse causes pollution of the surroundings the responsible needs to take care of the clean up to such extends that it will not cause any harm to human health and to the environment.

(6,7)

### **Occupational health and safety act (738/2002)**

The Occupational health and safety act gives the guidelines for a safe working environment. This concerns also the working area where chemicals are handled. The aim is to prevent the workers from accidents and health risks.

This is supervised by the Occupational health and safety authorities.



This act is intended mainly to the employers but it also provides guidelines to producers, importers, suppliers and designers.

The employer needs to have adequate information of the chemicals in use, their characteristics and dangerous nature. Every company must have a list of the chemicals in use and their safety data sheets. The possible risks are determined by the safety data sheets and other sources of information. By determining the nature of the danger prevention methods are planned to reduce the risks to the minimum. Prevention methods can be obtained in various ways; the risk can be reduced by taking less harmful chemicals into use, isolating operations, improving ventilation etc. if these technical possibilities can not be arranged the employer is obligated to provide for the workers proper personal protection equipment and emergency equipment. The employer is also obligated to monitor the workers health as it is determined in the Occupational healthcare act (2383/2001).

Limiting values for the air quality in the working environment have been set. The increase in these values obligates the employer to take active measures to reduce the values.

Moving, handling and storing goods and products must be planned and arranged so that it will not oppose workers to any risks of accidents. There must be enough space and visibility to move and handle products. If this is not possible the employer must provide good safety equipment, machinery and signs.

Chemicals need to be storied in proper containers in the places marked for them. The containers also need to be marked properly with enough information that will not fade away from the containers in time.

The employer needs to be aware of the possible larger accidents related and make a plan according to the findings.

The employer must give enough information for the workers concerning the chemicals and substances and their characteristics used in the production. The work

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safety issues need to be clear before starting a particulate work. Information flow between the employer and the employee must be open.

(6, 8)

### **Environmental protection act (86/2000)**

Environmental protection act aims at the prevention and minimisation of environmental impacts at such manner that takes the environment as whole. Polluting soils, water areas and ground water is according to the act forbidden.

The producer needs to be aware of the possible damages a production might cause and take responsibilities of them.

When ever there is a possibility of environmental polluting the risks are determined and their consequences. Actions are taken to the best possible extend.

The best available technology is to be used in order to reduce the environmental impacts.

When regulating pollutions an important part is licensing and permits that are regulated in this act.

(6, 9)

### **Waste act (1072/1993)**

The aim of waste act is to improve sustainable development by promoting practical use of raw materials and preventing the damage caused by wastes to health and the environment. The best waste management is to prevent the production of wastes to the minimum.

The created wastes must be managed and recycled to the best extend if it can be done economically and it doesn't cause extra expenses to the regular waste management possibilities.

First priority is to reuse the materials in wastes and after that the energy in them.

There are different requirements making the wastes harmless on the basis of the characteristics of wastes. The requirements are stricter with hazardous wastes.

Waste producer needs be aware of the wastes it produces, the amounts, origin, their environmental effects and the important issues concerning waste management. Only by knowing these issues it is possible to control the produced wastes and manage them in a proper way, and if possible improve the future situation.

Special attention to the produced hazardous wastes is required.

The producer is responsible of all the wastes it produces. Responsibility concerning the hazardous wastes moves to the collector when the wastes are delivered with proper markings and documentations to a disposal site that has the license to receive these wastes.

Hazardous wastes are not allowed to be disposed or handled uncontrollably nor to release to the environment. Different kinds of hazardous wastes are also not allowed to be mix with each other unless it is possible with out causing damages to health or to the environment.

Storing hazardous wastes applies the same regulations as new chemicals. Basic safety measures need to be followed not depending on the amount of wastes.

(6, 10)

### **Land use and building act (132/1999)**

Land use and building act and degree regulates the use of land areas and building in the municipal level. The constructions and planning should create a good base for the living environment and promote ecologically, economically, socially and culturally sustainable development. It emphasises the possibility of every one to interact in building planning.

Construction of buildings always requires a permit. (6, 11)

### **Rescue act (468/2003)**

The real estate owners are required to draw up a safety and rescue plan that will include safety of the personnel, property and environment, preparation for incidents

and their prevention. The responsible also needs to identify the possible risks the working environment may include and their effects, methods used to prevent the incidents from happening and protection possibilities.

Certain people need to be trained to act in possible accidents and incidents and the needed material and equipment needs to be available at any time.

These are regulated and monitored by the fire authorities at a municipal level to see that these requirements are met. Also special attention is given to the emergency exits, lightings, the surrounding environment, availability of extinguishing waters and other equipment that will help in fire fighting and rescue operations.

(6, 12)

## **5.2. The International Organization for Standardization, ISO 14001**

Today organizations working in any fields needs to prove that their area of operation is economically, socially and environmentally sustainable. It creates an image to a company that many customers value.

By setting own environmental policies and goals, monitoring and guiding them a good sustainable and safe environmental sound system can be achieved. This can be included to all areas in an organization from operations and products to services and after sales. To this organizations are driven not only by the customers but laws and regulations as well.

ISO 14001 gives good ground in achieving the environmental goals to an organization. It is an international system that comply the standards in ISO technical committees. Different authorities, organizations and IEC (the International Electrotechnical Commission) are working together with ISO.

The aim is to comply international standards that help organizations to set their goals and policies, observe that these are taken into force and to see that the continual improvement methods are taken into consideration in these goals and aspects.

This standard is highly used in numerous countries all over the world and it is the best known standardization system. The standardization has been made flexible so

that any company small or large is able to utilize the guidelines and tools in public or private sectors in any part of the world.

ISO 14001 is also a base for those companies that want to utilize other ISO/TC 207 tools in their environmental management programs.

The standard is based on a plan-do-check-act system. It is an on going system where the environmental issues are tried to improve continuously. Goals are determined for processes from the environmental aspects point of view and then these processes are taken into action. The process should be monitored all the time to see if the aspects and goals are achieved. If improvements need to be done the process is changed according to the findings. This cycle is continuous so that an organization can monitor the process all the time as the legislations, methods and technology changes.

With ISO 14001 an organization can achieve its management policies and goals that are highly dependent on the legislation.

The success of the organization is dependent on the management of an organization and their devotion on the issues in every step of the processes.

As the standard helps organizations to develop and maintain a sustainable development on their operations it at the same time reduces the environmental impacts. By reducing the raw materials and resources, energy usage, side products such as wastes from a process, improving the operation and utilizing renewable

materials an organization is able to improve the economical situation without excess loading of the environment.

(14,13)

### **5.3. Environmental license**

When ever dealing with chemicals and hazardous wastes there is the possibility of several risks. That is why storage of hazardous wastes and chemicals is subjected to

a license. This is determined by the amount and quality of the wastes and the amount of pollutants it may cause to the environment.

The environmental license is based on the Environmental protection act (YSL 86/2000) and Environmental protection degree (YSA 169/2000). A licence is needed if the activities of a company etc. will in any way excessively disturb or pollute the surrounding environment or water areas or the disposal of wastewaters will have an effect on the environment.

Kalmar Industries has applied for the environmental license in 2002 and the regional environmental centre has confirmed that Kalmar is not obligated to an environmental license.

According to the chemical act (744/1989) Kalmars handling and storage of chemicals that have an impact on health and to the environment is not wide-ranging. Due to this the licence is not required as it is set in the environmental protection degree.

The waste waters are properly discharged to the municipal waste water sewage. Storied containers are placed securely and the rain waters surrounding them are also disposed to the municipal sewage system.

There are also no other operations at the factory premise that requires the licence.

There is also no need for a license in this new project as it does not increase any risks to the environment.

(15, 16)

## **5.4. ATEX**

The directives of the European Union 94/9/EY (machine directive) and 1999/92/EY (Occupational health and safety directive) are commonly called as the ATEX directive. It includes the explosive work areas, working and the machinery used in these areas. The aim is to protect the people working in these areas and to unify the risk areas and machinery used in these areas between the EU member states.

The new directive came in to force 1.7.2003.

The ATEX directive concerns those production units and working areas where flammable liquids, gases or dust can cause the risk of explosion.

The Kalmar factory area has made the ATEX documentations in the area in 2006. This needs to be done again for the new storage. This will be made after the storage is finished and in operation.

(17)

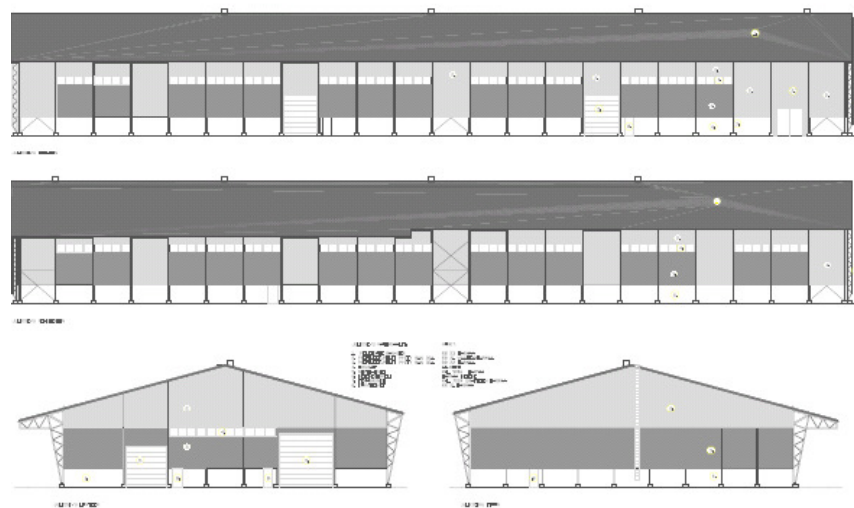
## 6. The Storage

The new storage is going to be build during spring 2007 to the North part of the factory premises. The whole storage area is 3312 m<sup>2</sup>. Most of the storage area is reserved for storing components.

The waste and chemical storage is build to the East end of the building and it is going to be the size of 306 m<sup>2</sup>.

The project is operated by NordiHall Oy.

The storage is going to be built according to the laws and regulations mentioned before and those given by the regional rescue department (see chapter 6.2.)



Picture 2. New storage (NordicHall)

### 6.1 Why a new waste storage?

The aim of the project is to ensure the sustainable development of Kalmar's environmental issues and acting according to Kalmars own policies and regulations and to those set by different authorities.

According to the standards all hazardous wastes need to be safely storied in a unified space. Also the amount of waste needs to be well known at all times.



This storage will help Kalmar and its workers to identify the wastes and stored oils and keep the amounts up to date. It also ensures a safe storage and working area and will decrease the possibility of oil and other damages to the environment.

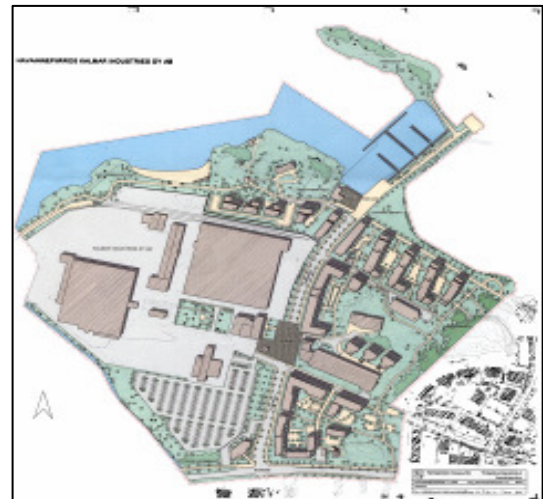
The need for a unified space came up in the external audits in 2006.

In the summer 2006 Kalmar Industries Oy Ab sold nearly half of the factory premises to a building company which is going to build about 1200 new apartments to the area between 2007 and 2011.

This project requires a lot of smaller projects at the area that still remains Kalmar's. New office, production and storage facilities need to be organised and build in order to move the people and products from the sold part.

As the factory premises decreases in size it has created the need for new storage space for different components. Also an oil and waste storage is included to the storage.

There are going to be some buildings demolished during this project and therefore creating the need for new storage space.



*Picture 3. The old and new factory site.*

## 6.2 Regulations for the storage

The storage building will follow closely to the demands in different legislations and other authorities, also to the production and warehouse units fire protection regulations set by the Ministry of the Environment.

Building structure and materials are chosen to secure the warehouse and the surrounding environment, preventing from leakages and other hazards. The fire protection equipment and other safety measures need also to be adequate.

The Regional rescue department was asked to make an evaluation of the new storage and to give its recommendations based on the chemicals stored.

According to the Regional Rescue Department the following things need to be taken into consideration when planning the storage:

1. The room must be equipped with a ventilation system which will change the room air in the storage at least once an hour
2. The area must be classified according to the ATEX regulations. Electrical appliances must be installed according that classification.
3. The storage must be included to ATEX
4. The floor must be tight and it should bear chemicals
5. The room must be equipped either with a doorstep or a catch basin so that the possible leakages will not extent outside of the area. The basin should hold the largest container in the storage.
6. Chemicals that react with each other must be kept apart from each other to prevent the possible reactions.
7. The amount and quality of the chemicals need to be updated and the danger markings and R-phrases.
8. There shouldn't be any sewage near the storage to prevent the chemicals and oils to leak to the sewage system.

## 7. Storied substances

The wastes that are placed to the storage have been determined together with the managers of production lines, Maintenance and environment manager, real estate manager and by internal audits. Also the new project has been taken into consideration when determining the substances storied in the storage.

The storage have been taken some inspiration from Kalmar's factory in Ljungby, Sweden where some while ago the same kind of storage was build.

The aim is to create a tidy overall area where the wastes from the nearby outside areas are brought. Oils and other hazardous wastes are given a safe space where the leakages, environmental and health hazards can be minimised.

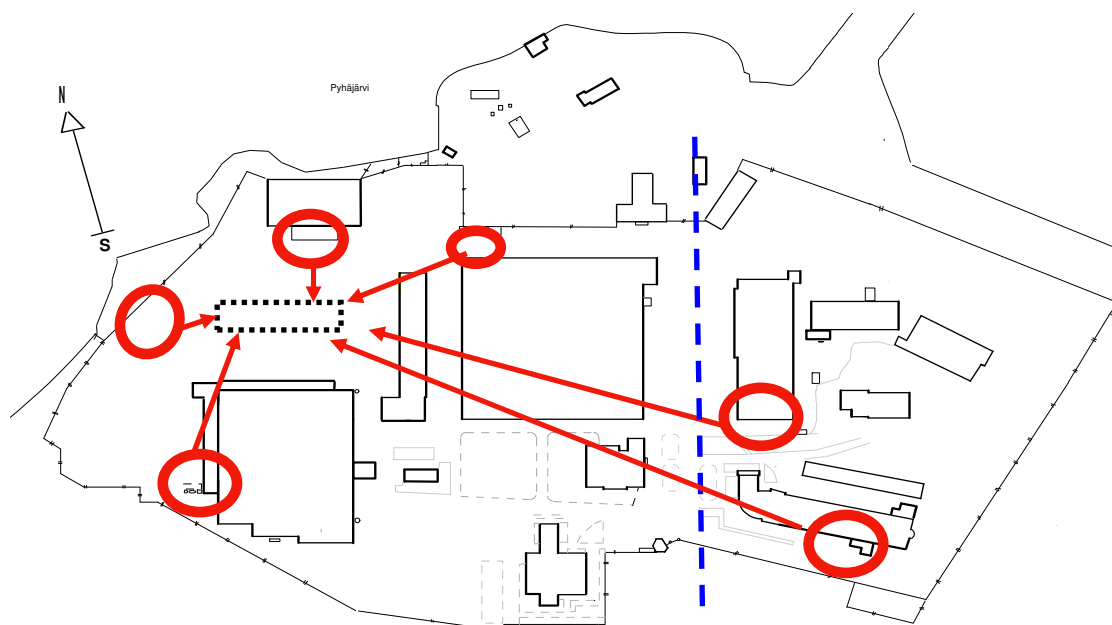


*Picture 4. Waste management in Ljungby, Sweden*

The idea is to gather the waste and chemicals that have been laying out side at the factory area to one unified space in a similar way that presented in picture 4.

The storage is canopied. The idea is to put a cardboard packer underneath and also traversing platforms for solid and combustible wastes.

The critical Points at the area today are shown in picture 5. These are the areas where production utilities are moving to another location or the areas need to be cleaned from wastes.



*Picture 5. The location of the storage and the main areas from where wastes and oils are moved to the storage.*

The blue line in picture 5 represents the new borderline of the factory premises. Office, production and storage facilities from the sold part need to be moved to the remaining area. Other parts are mainly cleared from outside storing.

The storage will contain the following substances and amounts:

Name of the chemical	Usage	max. Quantity
Shell spirax a 80W-90	transmission oil	2000 l
Shell Rimula X oil 10W-30, 15W-40	Diesel motor oil	2000 l
Shell Hydraulicoil TSN 37	Hydraulic oil	10 000 l
Glycoshell	non-freezing solution	2000 l
Shell tellus oil S22,32, 46, 68, 100	Hydraulic oil	10 000 l
Neste lubricant	lubricant	1000 kg
Shell Alavania EP(LF)0,1,2	lubricant	1000 kg
Shell Spirax ST 80W-90, 80W-140	transmission- and pinnion oil	2000 l
AT-2,	protection oil and lubricant	200 l
HSP 1400	lubricant	100 l

*Table 1. The new oils that will be storied in the storage*

Wastes are the smaller composition of the storage including mainly batteries, fluorescent lamps and empty barrels. Solid oils include the preservative materials and cloths and rags used in production.

Waste	Max. Quantity	Container size
batteries/fluorescent lamps	1000kg	0,5 m <sup>3</sup>
Empty barrels	20kpl	200 l
Solid oils	500kg	240 l
Solid paints	100kg	240 l

*Table 2. Storied wastes*

Some waste oils can be storied if needed.

All of the oil wastes that are stored come mainly from the storied new oils.

The storied oils are stored in the storage mainly in barrels and the waste oils in plastic 1000l containers.

The largest containers in the storage are these plastic 1000l containers.

Batteries are collected from all around the factory premises. Even though they are not stored outside they are kept in a container that is persistent to acids. This prevents leakages to the surroundings if the batteries brake.

The wastes and chemicals mentioned above are the main things storied. There can always be the possibility of changes in the production and new chemicals in the markets so the composition of the storage can change in time.

The storage area is separated between different production lines. Each line will have their own space that they can store their chemicals or wastes. There are also shared containers such as batteries and fluorescent lamps.

The layout of the storage will be made for Kalmar Industries as the shelves and rags are ordered.

The oils that at the moment are stored in the production lines are not moved in to this storage. They are collected every second week if the containers are full enough. It is no use to move the chemicals and wastes from one place to another. This would only create more risks of leakages to the ground when they are moved. It is also easier for the workers to collect the wastes at the production line as the amounts that are collected from the use are so small that it would be meaningless to start carrying them further to the storage.

The companies responsible for the collections of different wastes are informed of the changes made at the area. They are also provided new updated maps that will show the collection points. The maps are made during the spring 2007 when it is most current.

## **8. Guidelines**

These guidelines are made for Kalmar Industries Oy Ab for the use of their new oil and waste storage. The purpose of these guidelines is to ensure a safe working environment. These guidelines need to be followed when ever working or using the storage to prevent any misuse.

By these guidelines we also ensure the proper way to utilise the facilities preventing harm to human health and to the environment.

Guidelines need to be written down and kept in the database of the company so that everyone has an access to them. They will also be placed in to the storage.

### **Storage facilities**

The facilities need to cover the legislations and guidelines in force at all times. The storage need to be used in a way that it will not have any effects to human health or the environment.

### **Storing**

Stored substances include different new oils, oil wastes and other wastes.

Every production line has their own space reserved for them. Other wastes are put to the containers meant for the particulate substance.

With this storage the outdoor storing of oil barrels is prevented.

### **Locked space**

As we are dealing with chemicals and hazardous wastes it is very important to keep the storage locked. This also prevents the misuse of the storage.

If access is limited it is easier to control the use. We always know who has brought and what.

Every one working closely with the storage will have a key. Those who want to have a temporary access to the storage can get a key from the real estate office.

In order to get the key the activities in the storage needs to be marked down. It is important to know who has brought and what to the storage. This way people will not just place their wastes or chemicals where ever but will more easily follow the guidelines.

### **Documentation**

The law requires keeping a record of ones hazardous wastes. In the records there should clearly be found out what is storied and how much. It also should show what has been taken away and how much, the date of collection and the location they are taken to.

The recording can be done in various ways but the main thing is that one knows its wastes that have been produced. The records must be saved for three years.

The recording at Kalmar Industries is done by safety datasheets that are received every time the wastes are collected. These records are signed and kept in the real-estate office

### **Marking wastes**

Before wastes can be delivered forward it needs to be properly marked. This helps identification of the waste and it can be disposed to the right kind of waste treatment places.

Every one bringing wastes to the storage will see that the waste is properly marked or put to the right kind of containers. If there are no markings on the waste container there are pencils reserved in the storage for marking.



## **Tidiness**

Overall tidiness is very important in these kinds of storages. It helps ensuring a safe working area and prevents the risks of fires and other incidents.

All the exits need to be kept free to ensure a safe working area and also in a case of an accident or a fire the exits are not blocking the rescue ways from the storage and in to the storage.

The ways to the first aid and fire equipment need to be also clear.

Forklifts aren't parked in to the storage for a longer time or in the entrance of the storage. They have their own parking areas out side the storage.

## **Safety data sheets**

The safety data sheets needs to be found from every chemical storied so that their identification is easy as possible and the rescue operations fluent.

## **Collection**

The law requires hazardous waste storage to be emptied at least once a year if they are properly storied. This storage is included to the waste collection routes at Kalmar's factory premises and emptied when ever necessary.

## **Personal protection equipment**

PPE equipments are essential in some storage where there are certain substances stored. These equipments are a small measure that will ensure the work safety of the workers.

There are no such substances stored in the storage that would require special PPE equipment. Working time in the storage is very small and the substances don't require it.

Carefulness is still always needed in order to avoid excessive contact with the chemicals and wastes.

### **The responsible**

There will be many people using this new storage and every one is responsible for their own actions. Every one needs to be aware of the guidelines given concerning the storage.

Every line has their own person who takes orders in or moves them to their own places at the production lines. These people will also be responsible for the new chemicals that are brought in to the storage.

Every production line has a responsibility of actions of the workers and they also need to monitor the use of the storage.

Every storage needs a person that has the main responsibility of the storage. If there is no one pointed out or named the storage will most probably be a mess. The main responsible will take care of the over all condition of the storage, maintenance work and makes sure that the given instructions are followed.

He/she will also keep the final records of the wastes and chemicals storied.

The person responsible at Kalmar Industries is suggested to be the Maintenance and Environment manager.

These guidelines are translated to finish for the use of Kalmar Industries personnel and they can also be found in the appendixes of this report (appendix 1).

## **9. Risk assessment**

When ever dealing with wastes and chemicals they might oppose to health and environmental risks. These risks need to be noticed in order to manage them. Small things made and noticed before hand can save health, property and environmental damages.

Risk assessment is essential in a business to find out the possible risks a working environment might include. When the risks are identified they are easier to manage. The management needs to identify the potential risks that concern the specific working environment and plan according to those risks the methods that removes those risks entirely or minimises the possibility with appropriate methods.

Chemicals and storing goods may cause several different risks in a working environment. These include health and environmental risks also the possibility of fires and explosions damaging the owned property.

The employer needs to determine the potential risks that the chemicals in use may cause to the employees and to the environment. In a risk assessment hazards, the possible accident situations and exposures to the chemicals are determined and also the level of protection. For the bases of the assessment a list of chemicals in use is made and the properties of the chemicals. When determining the actual risks all the things mentioned above are utilised.

When the use of chemicals is small in range the conclusions can be made only with the use of safety data sheets.

(19,20,21)

### **9.1 Oil and waste storage risk assessment**

In my work a risk evaluation of the storage is made for Kalmar Industries and included to their own risk assessment program. The risk assessment is also included to this report in finish (see appendix 2).

Risks are looked at two different sides; the risks at the construction phase and risks at the usage.

Potential risks are listed and then determined the likelihood and severity of the risk. This gives us a good view on the most potential risks and the severity of the accidents.

As we are not fully aware of the possibility of risks in a new facility that has not been operating yet, we use the following formula to determine the risk value:

$$\textit{Likelihood} \times \textit{sevirety}^2$$

A scale 1-5 is used in determining both likelihood and severity as seen in table 3.

Likelihood of the harm	The severity of the harm		
	Slightly harmful	harmful	Extremely harmful
Highly unlikely	1. Trivial risk	2. Tolerable risk	3. Moderate risk
Unlikely	2. Tolerable risk	3. Moderate risk	4. Substantial risk
Likely	3. Moderate risk	4. Substantial risk	5. Intolerable risk

Table 3. Risk scale for the likelihood and severity of the risk. (20)

## Building project

The most significant risks in the building process came up where the risk of fire and accidents. A quite big risk value came also with noise and vibration. This is not that severe but happens often and makes the working environment quite unpleasant.

The machinery used in building processes are heavy and in case of accidents the consequences can be very serious. Also a lot of smaller accidents can occur.

The risk of fire is always present when using different machines and electrical appliances.

The risk value for traffic did not give that big of a risk value but is to my mind an important issue. The roads in side the factory area are very narrow and at the moment a lot of construction work is going on. The roads can easily be blocked and with large vehicles the accidents can be severe. The visibility might also not be good.

## **Usage**

The risk assessment of the usage was made together with the storage workers at Kalmar Industries Oy Ab. Together we listed the possible risks concerning the storage and its operations. The workers were taken to this risk assessment as they have many years of work experience in storing products and they have ideas that I could have not noticed by myself.

The Safety datasheets were also used to evaluate the possible risks caused to the workers when storing the chemicals. The main information of the chemicals are gathered to appendix 3.

The usage has a higher value to Kalmar as the storage is used all the time and the potential risks are present at all times.

The most relevant issues that came up in the interviews were the possibilities of fires, improperly loaded shelves and rags, traffic and over all tidiness.

It is important that storied goods are properly loaded to the shelves to so that there is no possibility of them to drop down, brake or hurt someone. The loading should also leave space between the lamps on the roof. This can cause the products/substances to over heat and set on fire.

Small spaces and bad visibility for loading create risks for damaging the property and increases the risks of accidents. Untidy spaces also give “more fuel” to fires.

The stored chemicals can have an effect to the environment if possible leakages are caused. They also have some effects to human health.

There are still no or very few substances that are e.g. flammable or that could cause very severe damages to human health. The time that workers spent with the chemicals is short.

### **9.3 Risk management**

According to the risk assessment a management program is made to evaluate how the risks will be reduced and who is in charge of control. The risks having the highest risk value will be observed more closely.

When making contracts with contractors it is important to choose people with adequate skills to perform the project. These issues can be taken up in contract meetings and afterwards in site meetings. It is very much dependent on the contractor and also the way things are monitored.

Risks of fire and dropping of containers/products has the most severe consequences and there for the highest risk values in usage. These are the most important issues that need to be taken care of.

There needs to be adequate instructions to the usage of the storage and placed so that they are easy to find and understandable. There also needs to be instructions in the storage itself; instructions for usage, loading, first aid and emergency situations.

The environmental effects are minimised by proper storing, adequate construction materials and solutions, suitable containers and with the carefulness of the workers. Health hazards are avoided also by the careful moving of the chemicals. Personal protection equipment isn't necessary in any of these chemicals if there is no direct risk of spilling.

The over all tidiness of the storage is also important as it has effects on several issues. Clean and tidy space will give a safe area where the risks of fires and accidents are minimised.

Emergency situations are easier to handle and manage if the exits are clear from different items.

It also gives the impression that the users and management takes good care of the facilities and are responsible in handling the chemicals and wastes.

Education is essential to the workers. Proper instructions of the usage reduce the miss use. Constant control of the storage is essential.

Finish management program for Kalmar Industries Oy Ab can be seen from appendix 4.

## 10. Subcontractors and tenants

The Factory area includes around 20 different subcontractors and tenants from which about ten has a more important meaning in producing wastes and actual manufacturing. These need to be taken into consideration when planning the storage.

These companies are obligated to follow the rules and guidelines concerning the environment given by the authorities but also those set by Kalmar. They need to follow the same rules as the workers of Kalmar. This is set in the contracts made. These are also monitored with internal audits.

Today the tenants pay a certain amount of money for Kalmar for the disposal of different kinds of wastes. The wastes are stored in the production lines and collected by companies that Kalmar has agreed upon.

Now when the new storage is built we need to determine the fact that will we give some space from the storage to these tenants.

If our aim is to reduce the amount of barrels and other wastes outside in the surroundings and trying to minimise the potential risks outside would it be wise to put also the tenants' wastes to the storage. If our own wastes are stored by the book we gain nothing if the wastes of other companies are lying outside.

There is also no possibility to recognise the wastes that are actually ours or someone else's if they are just lying outside.

As the amounts of stored substances can vary when the storage is taken into use and we see the actual storage potential, the issue with the tenants is decided.



## 11. Education/Training

In order for the storage to operate the way intended the personnel working with the storage needs to be given the necessary information concerning the storage and also guidelines how to use it. This will reduce the miss use of the storage.

The new employees that need to use the storage in their work will be given the training in the orientation period and manuals.

The line organisations will also be given the important information concerning the storage. This will help them to control their workers actions in the storage.

The training will be held during the spring 2007 and will include the following issues:

- Going through the guidelines
- the storied materials and chemicals and their characteristics
- other regulations concerning the use
- the first aid and fire equipment
- traffic arrangements
- personal protection equipment
- acting in emergency situations

The education will not only focus on the guidelines of the storage but it will include the basics of waste separation and management at the area.

Kalmar Industries has been keen on minimising the amount of waste and increasing their correct separation. This is an issue that will be focused on in the coming year and could naturally be included already in this education. It will also help to keep the storage tidy. Everything will be placed on the right places.

If the tenants and subcontractors are given space from the storage they will be also be given the needed training.

## 12. Kalmar in the future

Growth potential for Kalmar products are in heavy industry in the U.S and China, service operations and automation. Some sectors have been growing and so production increased. New companies have been bought and factories built in the past years.

Since 2003 Kalmar Industries Oy Ab has changed its operations to such that only ready made steel components are now purchased from subcontractors. This has decreased the usage of raw materials. Now instead of the focusing on the use of raw materials the meaning of machinery, spare parts, chemicals, lubricants, oils etc have increased.

When looking at Kalmar's eco balance (appendix 5.) we can see the growth of produced machine weights at the Tampere factory. A little decrease can be seen in year 2006 but other wise the weights has steadily increased since 2003. The same growth can be then seen with the solid wastes, diesel oils and lubricants.

If the same growth is expected in the coming years the amount of wastes will also increase. This is one focus point where things could be improved.

This new storage as such doesn't decrease the amount of wastes. It gives a good base for the waste management, storing chemicals and work safety but if environmental issues such as waste reduction is wanted other measures need to be taken to reduce them.

The amount of hazardous wastes hasn't come up with the increase of produced machinery wastes but the use of different oils has. If the rate is kept in production the storage capacity will possible increase.

There can always be bigger changes in the company area and production lines in the future. All these can have very different effects on the storied substances.

Kalmar also needs to be aware of the changing legislations and restrictions concerning the fields of chemicals and wastes. The storage condition needs at all times full fill the legislation in force.

As the environmental issues are important in Kalmar's own production it also needs to demand those same issues from its own customers and subcontractors. These issues should be taken into account when choosing suppliers.

(23, 24)

### 13. Conclusion

The environmental aspects in companies and products are becoming more and more important to people and there for to different companies.

The aims of companies of today are the minimisation of raw materials, energy and in the amount of waste produced in production. Also the polluting done with the produced goods is trying to be decreased.

Still what ever we produce we will produce wastes as side products. The amount is the key issue we need to be considering. The increase in production must not increase the amount of wastes produced. These are the key issues also at the Kalmar factory premises.

Different wastes are separated to the full extend and hazardous wastes and chemicals are stored in a proper manner to decrease the environmental impacts and to show the environmental awareness of the company.

The new storage will give Kalmar Industries Oy Ab a good chance to monitor their wastes and chemicals and also it gives a good ground for the protection of the environment. The risks of these substances are minimised and they are easier to control in a unified space.

The planning of the storage is just one phase in the storage but the use is the essential thing we need to take care of. Storage without any supervision and guidelines will be a disaster to the waste management and it can even increase the risks.

The possible changes in the premises and the production should be determined in an early stage and the fact that how does it concern the storage. The earlier the changes are noticed the better the situations can be handled.

Every worker in the factory premises has a responsibility in these issues. The users of the storage have a great responsibility in the usage of the storage and the management level has the greatest responsibility monitoring and guiding the use and showing their interest on the environmental issues. Not individuals alone but

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together with the management side Kalmar can keep the sustainable development going on.

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## ÖLJY- JA JÄTEVARASTON OHJEISTUS

- 1  
Yleistä Tämän ohjeen tarkoitus on antaa säännöt öljy- ja jätevaraston käyttöön, jotta varastossa toimitaan ohjeiden mukaisesti sekä turvallisesti.
  
- 2  
Tarkoitus Lähtökohtana on omien ja yleisten säädösten mukaan toimiminen sekä ympäristöasioidemme jatkuva parantaminen. Tarkoituksena on keskittää alueella varastoidut uudet öljyt sekä jätteet yhtenäiseen tilaan ja näin taata turvallinen ja asianmukainen varastointi.
  
- 3  
Varastotilat Varastotilojen tulee täyttää kulloinkin voimassa olevat viranomais määräykset. Varastoa tulee hoitaa ja käyttää niin, että sen toiminnasta ei aiheudu haittaa terveydelle, omaisuudelle sekä ympäristölle.
  
- 4  
Varastointi Varastossa tullaan säilyttämään ja varastoimaan erilaisia uusia öljyjä, jäteöljyjä sekä muita jätteitä. Kullekin osastolle on varastossa merkityt hyllyt joille öljyt/jätteet asetetaan.  
  
Jäteakut sijoitetaan niille varattuun astiaan.  
  
Ulkovarastointi poistetaan kokonaan uudella varastolla. Kaikki ulkona olevat jätteet ja tynnyrit sijoitetaan asianmukaisesti varastoon.
  
5.  
Avaimet Jokaiselle jotka työskentelevät varaston yhteydessä annetaan omat avaimet/kulkuoikeus varastoon. Muut joilla on tilapäistä asiaa varastoon hakevat avaimen kiinteistötoimistosta.
  
6.  
Dokumentointi Jokainen on vastuussa jätteiden/kemikaalien dokumentoinnista omalta osaltaan. Kaikki varastoitava on dokumentoitava. Tilapäiskäyttäjät dokumentoivat tuomansa öljyt/jätteet avaimen palautuksen yhteydessä.
  
7.  
Merkitseminen Varastoon tuodut jätteet tulee asianmukaisesti merkitä, että niiden luovutus on mahdollista. Jos astioissa ei ole valmiita merkintöjä



## Liite 1

varastosta löytyy merkkaukset, millä voi itse merkinnät tehdä. Merkinnoissa tulee ilmetä vähintään aineen laatu.

8.

### Siisteys ja järjestys

Yleisen siisteyden ja järjestyksen tarkoituksena on luoda turvallinen työympäristö varastoon. Jokainen huolehtii että varastointi tapahtuu ohjeiden mukaan ja tavarat sijoitetaan niille tarkoitetuille paikoille. Oviaukot pidetään tyhjänä sekä pääsy alkusammutus- ja ensiapuvälineiden tulee olla esteetön, jotta onnettomuuden sattuessa pelastustyöt on helppo suorittaa.

9.

### Käyttöturvallisuustiedotteet

Käyttöturvallisuustiedotteet tulee löytyä kustakin säilytettävästä kemikaalista varastossa, jotta niiden tunnistaminen ja hätätilanteissa toimiminen olisi mahdollisimman helppoa.

10.

Tyhjennys Ongelmajäte varastot tulee tyhjentää vähintään kerran vuodessa sen kunnosta riippuen. Varasto liitetään kuitenkin yleisiin jätteiden keräysreiteille ja tyhjennetään tarvittaessa.

11.

### Suojavälineet

Erillisiä suojarusteita ei tarvitse varastossa käyttää, sillä työskentely varastossa on vain pienimuotoista eivätkä varastoitavat aineet sitä vaadi. Huolellisuutta silti vaaditaan, ettei ylimääräistä kosketusta kemikaalien kanssa synny.

12.

### Vastuu

Jokainen varaston käyttäjä vastaa omasta toiminnastaan varastossa. Kalmarin tehdaspalvelupäälliköllä tai sen varahenkilöllä on kuitenkin kokonaisvastuu varaston yleisestä kunnosta sekä huoltotöistä.

Liite 2 Riskikartoitus

Kohde	Vaara	Tilanne/olosuhteet joissa onnettomuus on mahdollinen	Vaaratilanne/max	Ehkäisevät-/korjaavat Toimenpiteet	Toden- näköisyys	Vakavuus	Riskiarvo
Öljyvarasto/lipat	Tulipalo	Purkutöiden yhteydessä kipinöivien koneiden käyttö. LVI asennustyöt, jouttaminen ja hitsaus	Syntyy tulipalo, koko rakennus tuhoutuu	Kalmarin ohjeet, tulityölupa, suojaustoimenpiteet, työnaikainen vartiointi, omavalvonta, info, piirivartiointi. Varataan riittävän tehokas alkusammutuskalusto. Oman palokunnan valmius ja harjoittelu tilanteita varten.	2	4	32
	Sähkökatko	Sähköjen purku	Talon tietotekniikka häiriintyy	Käytetään asiantuntevaa purkajaa	2	2	8
	Tietoliikenne katkos	Sähköjen purku	Koko tehdasalueen tietoliikenne häiriintyy. Mahdollisesti myös tuotanto katkos	Selvitetään tietoliikenne kaapelit ja merkitään ennen purkutöitä	1	3	9
	Tapaturma	Rakennustyöt, isojen koneiden kanssa työskentely, putoamiset nostotöiden yhteydessä	Vakava tapaturma	Ammattitaitoinen työvoima ja perehdyttäminen, työsuojelutarkastukset	2	3	18
	Sähköisku	Sähkötyöt	Vakava tapaturma	Varmistetaan purettujen sähkölaitteiden jännitettömyys	1	3	9
	sisäinen liikenne	Ahtaat ajoväylät työmaan läheisyydessä	Vakava tapaturma tai kuolema. Esine vahinkoja	Kuljetuksen ohjeistus, kulkuluvat ja ajoreitit alueella	2	2	8
	Pöly	Purkutöiden yhteydessä syntyvä pöly. Asbestipurkutyöt	Pöly leviää koko rakennukseen	Ovien ja aukkojen tukkiminen, henkilökohtaisten suojavarusteiden käyttö, ammattitaitoinen työvoima	1	2	4
	Omaisuuksivahingot	Varkaus	Kalliit työkalut	Lukitukset, työmaa vartiointi	1	3	9
	Vesi ja kosteus	Putkirikot, suojaamattomat pinnat kostuu	Rakenteet kostuu , tietoliikenne häiriintyy	Osaavat ja ammattitaitoiset työntekijät, suojaus	1	3	9
	Melu ja värinä	Rakennustyöt, purkutyöt	Epämiellyttävä työympäristö	Henkilökohtaisten suojavarustusten käyttö, Työt pyritään tekemään normaalin työajan ulkopuolella.	3	2	12

Liite 2 Riskikartoitus

Kohde	Vaara	Tilanne/olosuhteet joissa onnettomuus on mahdollinen	Vaaratilanne/max	Ehkäisevät-/korjaavat Toimenpiteet	Toden- näköisyys	Vakavuus	Riskiarvo
Öljyvaraston	Tavaroiden putoaminen	Huonosti varastoidut tavarat	Tapaturma, omaisuus vahingot	Asianmukainen ja riittävä ohjeistus.	2	3	18
	Hyllyjen kaatuminen/ sortuminen	Vanhat rikkiäiset hyllyt, epätasapainoinen täyttö	Tapaturma, omaisuus vahingot	Varmistetaan hyllyjen kunto, hyllyjen asianmukainen kiinnitys sekä lattiapinnan kestävyys	1	3	9
	Liikenne	Trukki onnettomuudet, oviteiden ahtaus/tukkuminen	Tapaturma, omaisuus vahingot	Liikenne ohjeet, järjestyksen valvonta	2	4	32
	Siisteys ja järjestys	Epäsiistit tilat, varastointi ohjeiden puute sekä niiden noudattamisen puute	Edistää tapaturmien syntymistä	Ohjeistus varastoinnista, valvonta, siivoukset, työntekijöiden omat vastuut	3	2	12
	Tilan puute	Ahtaat tilat, huono näkyvyys	tapaturmat, ympäristöhaitat	Hyvä suunnittelu, järjestyksen ylläpitäminen	3	1	3
	pakkaus	Väärin pakatut tavarat	tapaturmat, omaisuusvahingot	Informaation kulku tavarantoimittajien ja Kalmarin välillä	2	2	8
	rakenteet	Huonosti rakennetut valuma- altaat	päästöt ympäristöön, terveysriskit	Asiantunteva rakennuttaja	1	3	9
	ohjeet	Ohjeiden puuttuminen voi aiheuttaa varastossa väärin käyttöä	Tapaturmat, omaisuusvahingot	Varmistetaan ohjeiden olemassaolo ja riittävyys			0
	Ympäristöriskit	Astioiden rikkoutuminen ja kemikaalien vuotaminen, ympäristöön	Terveysriskit, ympäristön saastuminen	varmistetaan että säilytysastiat ovat ehjät ja asianmukaiset, suojellaan trukkien törmäyksiltä	1	3	9
	Tulipalo	Tavaroita pakataan liian korkealle lamppujen läheisyyteen. Syttyvät kemikaalit	Rakennuksen tuhoutuminen	Kalmarin ohjeet, tulityölupa, suojaustoimenpiteet, työnaikainen vartiointi, omavalvonta, info, piirivartiointi. Varataan riittävän tehokas alkusammutuskalusto. Oman palokunnan valmius ja harjoittelu tilanteita varten. Tavaroiden pakkaus ohjeet	2	4	32
	Tapaturma	Kemikaaliastoiden rikkoutuminen	vakava tapaturma	Astioiden hyvä kunto sekä työntekijöiden varovaisuus	1	2	4

Liite 3 Kemikaaliluettelo

<b>Kauppanimi</b>	<b>Käyttötarkoitus</b>	<b>Vaarallinen ominaisuus</b>	<b>R-lausekkeet</b>		<b>Ympäristövaikutukset</b>	<b>Varastointi</b>
Shell spirax a 80W-90	vaihteistoöljy	Ei luokiteltu syttyväksi	R22, R23/24, R34, R43, R48/23, R50,	Xi, Xn, T	Ei nopeasti biologisesti hajoava	säilytettävä viileässä, kuivassa ja hyvin ilmastoidussa tilassa. Vältettävä suoraa auringonvaloa ja lämmön lähteitä
Shell Rimula X oil 10W-30, 15W-40	Diesel moottoriöljy	Ei luokiteltu syttyväksi	R38, R41, R51/53,	Xi, N	maaperän ja pohjaveden saastumisvaara. Ei ole nopeasti ja biologisesti hajoava. Biokertyminen mahdollista	säilytettävä viileässä, kuivassa ja hyvin ilmastoidussa tilassa. Vältettävä suoraa auringonvaloa ja lämmön lähteitä
Shell Hydrauliköl TSN 37	Hydrauliikkaöljy	Ei luokiteltu syttyväksi	R38, R53,	Xi	maaperän ja pohjaveden saastumisvaara. Ei ole nopeasti ja biologisesti hajoava. Biokertyminen mahdollista	säilytettävä viileässä, kuivassa ja hyvin ilmastoidussa tilassa. Vältettävä suoraa auringonvaloa ja lämmön lähteitä
Glycoshell jäähdytinneste	Jäähdytinneste	Ei luokiteltu syttyväksi	R22, R63,	Xn	merkittävä happikatoriski vesisysteemeissä	Astiat säilytetään tiiviisti suljettuina
Shell tellus oil S22,32, 46, 68, 100	Hydrauliikkaöljy	Ei luokiteltu syttyväksi			maaperän ja pohjaveden saastumisvaara. Ei ole nopeasti ja biologisesti hajoava. Biokertyminen mahdollista	säilytettävä viileässä, kuivassa ja hyvin ilmastoidussa tilassa. Vältettävä suoraa auringonvaloa ja lämmön lähteitä
Neste raamirasva	Voitelurasva		R36/38		maaperän ja pohjaveden saastumisvaara.	
Shell Alavanja EP(LF)0,1,2	Voitelurasva	Ei luokiteltu syttyväksi			Ei nopeasti biologisesti hajoava	säilytettävä viileässä, kuivassa ja hyvin ilmastoidussa tilassa. Vältettävä suoraa auringonvaloa ja lämmön lähteitä.

Liite 3 Kemikaaliluettelo

Shell Spirax ST 80W-90, 80W-140	Vaihteisto- ja vetopyöräöljy	Ei luokiteltu syttyväksi	R43,	Xi	maaperän ja pohjaveden saastumisvaara. Ei ole nopeasti ja biologisesti hajoava. Biokertyminen mahdollista	säilytettävä viileässä, kuivassa ja hyvin ilmastoidussa tilassa. Vältettävä suoraa auringonvaloa ja lämmön lähteitä.
AT-2, irtoaine	Suoja- ja voiteluaine	Palava neste	R65	Xn	Haitallista vesieliöille, voi aiheuttaa pitkäaikaisia haittavaikutuksia vesiympäristöissä	
HSP 1400	Voiteluaine	Erittäin helposti syttyvä	R11, R12, R38, R51, R53, R65, R67,	F+	Haitallista vesieliöille, voi aiheuttaa pitkäaikaisia haittavaikutuksia vesiympäristöissä	varastoitava alle 50 asteen lämpötilassa aerosolimääräyksen mukaisesti
AT-leikkuuöljy					Ei nopeasti biologisesti hajoava	kuiva tila, alle 50 astetta, varjeltava jäätymiseltä

## Liite 4

## Kalmar Industries Oy – Jäte/öljyvaraston hallintaohjelma 2007


Hallintaohjelma tehty merkittävien riskien tunnistamisen ja vaikutusarvioinnin pohjalta.

Toiminto/ Osasto	Riski	Huomautuksia	Raja- arvo	Tehtävät toimenpiteet	Vastuu/ aikataulu	Seuranta
<b>Varaston rakennus- projekti</b>	Tulipalo	Purkutöiden yhteydessä kipinöivien koneiden käyttö. LVI asennustyöt, joutaminen ja hitsaus	<b>32</b>	Kalmarin ohjeet, tulityölupa, suojaustoimenpiteet, työnaikainen vartiointi, omavalvonta, info, piirivartiointi. Varataan riittävän tehokas alkusammutuskalusto. Oman palokunnan valmius ja harjoittelu tilanteita varten.	A Vainio Alkaen	Jatkuva
	Tapaturma	Rakennustyöt, isojen koneiden kanssa työskentely, putoamiset nostotöiden yhteydessä	<b>18</b>	Ammattitaitoinen työvoima ja perehdyttäminen, työsuojelutarkastukset	A Vainio P. Puska	Työmaakokoukset
	Pöly	Purkutöiden yhteydessä syntyvä pöly. Asbestipurkutyöt	<b>12</b>	Ovien ja aukkojen tukkiminen, henkilökohtaisten suojavarusteiden käyttö, ammattitaitoinen työvoima	A Vainio Jatkuva	Työmaakokoukset
	Melu ja Tärinä	Rakennus- ja purkutyöt. Haitat työntekijöille ja naapureille	<b>12</b>	Henkilökohtaisten suojavarustusten käyttö, Työt pyritään tekemään normaalin työajan ulkopuolella.		
Varaston käyttö	Tulipalo	Tavaroita pakataan liian korkealle lampujen läheisyyteen. Syttyvät kemikaalit	32	Kalmarin ohjeet, tulityölupa, suojaustoimenpiteet, työnaikainen vartiointi, omavalvonta, info, piirivartiointi. Varataan riittävän tehokas alkusammutuskalusto. Oman palokunnan valmius ja harjoittelu tilanteita varten. Tavaroiden pakkaus ohjeet	Käyttäjien vastuu Yleisvastuu A. Vainio P. Puska	Jatkuva Sisäiset auditoinnit
	Liikenne	Trukki onnettomuudet, oviteiden ahtaus/tukkiminen	32	Liikenne ohjeet, järjestyksen valvonta	Käyttäjien vastuu Yleisvastuu A. Vainio P. Puska	Jatkuva Sisäiset auditoinnit
	Tavaroiden putoaminen	Huonosti varastoidut tavarat	18	Asianmukainen ja riittävä ohjeistus.		Ohjeistus koulutus

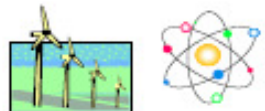


# Eco-balance 2003 - 2006


16.02.2005 Ava/KM




MATERIALS	2003	2004	2005	2006
Steel (t)	-	-	-	-




ENERGY (MWh)	2003	2004	2005	2006
District heating	10096	9180	8613	8261
Electricity	6377	5278	5934	6202
Fuel oil (t)	26	32	42	38



CHEMICALS (t)	2003	2004	2005	2006
Würth chemic.		7	10	13,9
Detergents (Workshop)	2,2	2	2	1,9
Propane	15	<1	<1	<1
Oxygen	18	<1	<1	<1
Argon	9	<1	<1	<1
Carbon dioxide	2,8	-	-	-
Acetylene	1,8	<1	<1	<1
Diesel oil	105	115	137	142
Lubricating oils	274	362	426	424
Antifreeze	-	24	33	33



WATER (m³)	2003	2004	2005	2006
	18480	19907	22808	17719



EMISSIONS (tons)	2003	2004	2005	2006
CO2-emissions	146	118	154	143



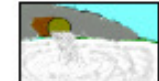
PRODUCTS	2003	2004	2005	2006
Weight total (tons)	13712	18716	27513	24991
Power total (kW)	90844	120350	178132	152608
Straddle Carriers, RTG, Reach and Log Stackers				
Terminal Tractors, Lift Trucks, Speders				(6953,6 t)



WASTES (t)	2003	2004	2005	2006
Mixed waste	217	187	197	223
Energy waste	88	112	120	138
Wood waste	250	408	556	411
Bio waste	12	19	28	17
Hazardous wastes	103	57	52	43



RECYCLING (t)	2003	2004	2005	2006
Board and paper	72	76	77	87
Iron Sg	246	124	64	49
Cutted iron	73	-	-	-
IT-scrap	283	-	-	2
Sheet-iron scrap	69	70	62	116



WASTEWATER (m³)	2003	2004	2005	2006
	18480	19907	22808	17719