



2007 EMAS Eco-Management and Audit Scheme Environmental report

Health, Environmental and Safety
Reporting on 2006 performance

Hydro Polymers AS
Norway



KONTROLLERT INFORMASJONREG.
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1 INTRODUCTION



Nils Eirik Stamland

The year 2006 saw Hydro Polymers AS surpass yet another important milestone when the new chlorine plant was finalised and a new chlorine line was rendered operational. Pursuant to the plans, this new chlorine line became operational on 9 October, and this, within the financial framework allotted to the project. The renovation of the chlorine plants means that all chlorine production at Rafnes is now carried out according to BAT. Modernisation means that much less energy is required to produce each unit – both in terms of reduced electrical and steam consumption. If a comparison were to be made between the use of electricity per ton of chlorine and caustic soda produced prior to and after the refurbishment, the results this far would show a reduction of almost 15%. During this same period, the steam consumption used to increase the caustic soda concentration stemming from the electrolysis cells has been reduced by almost 70% per ton of caustic soda produced. Besides the fact that this contributes to a more cost-effective process, it is also an extremely important contribution towards a more sustainable production.

Hydro Polymers AS is ISO 14001 and EMAS certified. This entails that the company's environmental management systems must fulfil requirements outlined in the ISO standard and that the company is obliged to publish its environmental results. These results are published through this EMAS environmental report which has been verified by Det Norske Veritas Certification. One of the most important parts of the ISO 14001 standard is that the company shall identify all of the environmental aspects pertaining to our operations and evaluate which of these are most significant. The ISO 14001 certification also entails that the company is duty-bound to work for continuous improvements within its environmental achievements. This is done by *inter alia*, setting concrete goals for improvement for several of our significant environmental aspects. Hydro Polymer AS also sets internal environmental goals which prove demanding to achieve and it is for this reason that the company is unable to reach all of its goals every year, but despite this, these goals for improvement stimulate efforts. The results for 2006 are comprehensively detailed and discussed in the account that follows.

All emissions, with the exception of one excess emission of sodium chlorite from the Chlorine/VCM plant, were lower than the 2006 annual emission limits granted by the authorities. All in all the Chlorine/VCM plant had 21 short-term deviations from emission permits compared to nine deviations in 2005. Of these short-term deviations, there were nine cases of pH deviations in the runoff water from the Chlorine plant and eight cases of elevated sodium chlorite emissions. Even though none of these short-term deviations are considered to have had any negative effects in the fjord worth mentioning, the company is nonetheless not satisfied with the total number of deviations experienced in 2006. It is for this reason that Hydro Polymers AS has already made improvements to the Chlorine plant in order to facilitate the adjustment of the pH value, and technical solutions are being worked on to reduce the sodium chlorite emissions. The PVC plant had no emission limit deviations in 2006, compared to three in 2005.

No complaints concerning the plants' operations from the neighbouring community were registered in 2006.

Recording and treatment of incidents and near-incidents is crucial towards ensuring the improvement of SHE results. In 2006, 459 incidents were reported. In addition to this, 520 observations were made of worker behaviour on the work site. These observations are an important part of the company's preventive SHE work. The objective is to carry out all work as safely as possible, by learning correct work practices and by removing all possible hindrances in the way of ensuring safe work safety. All incidents and near-incidents occurring in the plants receive a risk classification. In 2006 a near accident was recorded which was classified in the highest risk category. This "near incident" was the unexpected breakage of several bolts in a flange coupling in the VCM plant. This event caused injury/damage to neither workers nor the environment but could have led to leakage of combustible substances had it not been discovered in time. Preventive actions have been taken to ensure that similar incidents will not occur in the future.

2006 saw two injuries that required medical treatment, so-called TRI injuries (Total Recordable Injuries). No injuries were recorded among our contractors in 2006. The two TRI injuries resulted in a TRI value for our own employees of 3.6, a figure which is the best result in the company's history. The TRI value is the number of TRI injuries per million hours worked.

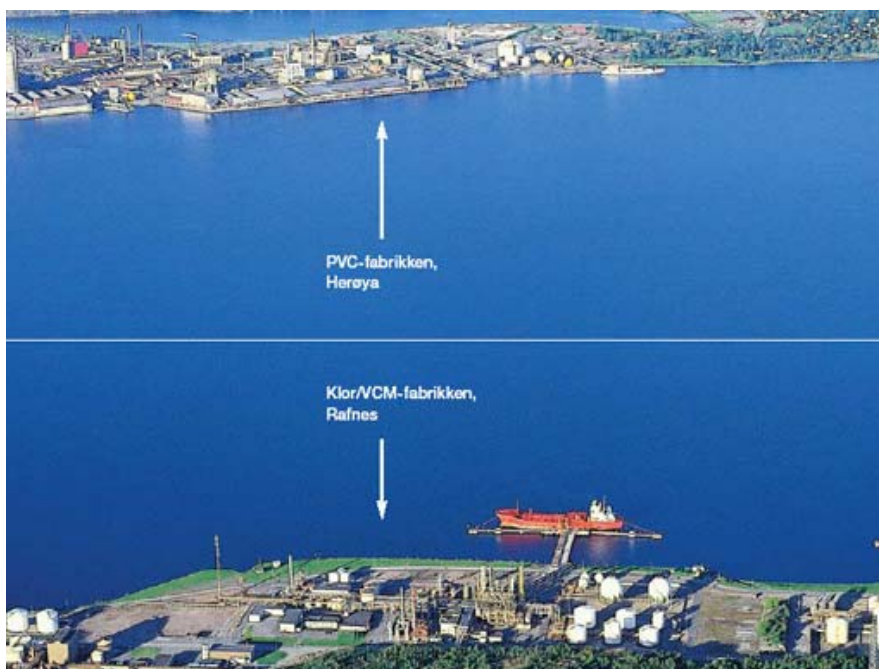
It is extremely positive to note that the company's absence due to illness fell from 5.4% in 2005 to 4.7% in 2006. This translates into a reduction of more than 10%. A fact that is especially positive is that long-term worker absences have been reduced throughout the past year.

Rafnes, May 2007

Nils Eirik Stamland
Managing Director

2 ABOUT US

Hydro Polymers AS is a wholly owned subsidiary within Hydro Polymers Sektor. Our main product consists of Polyvinyl chloride, PVC, which is a plastics raw material produced at the PVC plant in the Herøya Industrial Park at Herøya. The Chlorine/VCM plant is located on the Rafnes Industrial Site and produces chlorine, caustic soda and Vinyl Chloride monomers, VCM. The VCM is transported to the PVC system through pipelines in a tunnel in the Frierfjord. We are Norway's sole producer of PVC. Hydro Polymers AS has its head office at Rafnes and in 2006 employed 361 individuals, including 22 apprentices/trainees, whereof 158 worked in the Chlorine/VCM plant and 93 in the PVC plant. The plant also has an R&D and technical service department.



Hydro Polymers was established as a proper company on 1 May 2000. However, the company's history goes way back. Hydro has produced PVC at Herøya since 1951 and the chlorine/VCM production has been ongoing since 1978. Hydro Polymers has associated companies in Stenungsund, Sweden and in Aycliffe, England and these three plant sites form an integrated system, both in terms of production and in terms of the product market.

In 2006, Hydro Polymers enjoyed a turnover of NOK 4.4 billion. Together, the two Norwegian plants produced a total of 752,000 tons of finished products (caustic soda, VCM and PVC), of which approximately ninety percent was exported abroad. Scandinavia and Western Europe are the most important markets for our products.

Hydro Polymer's three PVC plants are responsible for between 8 and 10% of the total European PVC production.

Hydro Polymers Management System

The quality and environmental management system (refer to page 6) form an integral part of the Management system within Hydro Polymers AS. The company adheres to quality management requirements pursuant to ISO 9001:2000, where process orientation, continuous improvement and customer focus are central elements. These elements are ensured through close-knit relations and internal revisions within Hydro Polymers Sektor and the business units of Polymer Business and Monomer Business, so that the entire value chain leading up to the customer is covered. The company received NS-EN ISO 9001:2000 certification in 2003.

3 ENVIRONMENTAL MANAGEMENT SYSTEM

The SFT - Norwegian Pollution Control Authority and the DSB - Directorate for Civil Protection and Emergency Planning have issued Hydro Polymers an emissions permit and an operating permit. The operating permit applies to the production of chlorine, caustic soda, VCM and PVC and the approval to store and use inflammable products.

The Chlorine/VCM and PVC plants are ISO 14001:2004 and ISO 9001:2000 certified.

Since approval and registration pursuant to EMAS, a shared SHE rapport has been issued for the entire company. The company has received honourable mention for this report on several occasions. In 2005 and 2006 the EMAS report was deemed the best in its category in Norway and competed for the European EMAS award.

SHE work is carried out through the company's plans of action, internal control systems as well as internal reviews. SHE documentation is integrated along with documentation pertaining to quality in the Hydro Polymers Management System.

Hydro Polymers Sektor is a member of ECVM, which is a union of European VCM/EDC and PVC producers.

ECVM has established limit values and technological descriptions (BAT- "Best Available Technology") along with corresponding emission values. These data are drawn up in a binding document, a type of charter, with corresponding BAT descriptions for EDC/VCM and suspension PVC (S-PVC). The company satisfies the ECVM charter and applicable limit values provided in the BAT documents. In 2005, this was confirmed by an independent organisation, *Det norske Veritas* through a verification of all European EDC/VCM producers.

ECVM also has a charter and appurtenant BAT descriptions for P-PVC production. *Det norske Veritas* verified all affected P-PVC plants belonging to the ECVM against the P-PVC charter in terms of emission and production data for the last six months of 2004. This check showed that the PVC plant at Herøya satisfied all necessary applicable requirements.

Hydro Polymers' largest VCM customer is Hydro Polymers Ltd. in Aycliffe located in the north-eastern part of England, near Newcastle. Hydro Polymers Ltd. is a major producer of Suspension PVC and together with another PVC producer in England (EVC), has agreed to adhere to a new charter called the "UK Eco-Efficiency Code of Practice for the Manufacture of Suspension PVC". This charter, which in many areas is much stricter than current limit values, was prepared together with major English retailers and the British Pollution Control Authority. Within the charter, all emissions including those from EDC/VCM production are linked to each ton of PVC that is produced. Since Hydro Polymers Ltd. produces its PVC based on VCM from Rafnes, the chlorine/VCM plant also falls under the guidelines of this charter.

Deviation recordings

The company trains all employees to report conditions and events that may lead to incidents and accidents. The reporting and analysis tool SYNERGI is applied. This system also treats complaints from neighbours. The reports stemming from this system provide the basis for further involvement in the areas of safety, health, and the environment.

Environmental review

The Management Team carries out regular environmental reviews based on the results obtained as compared to the defined recordable objectives. The system status and objectives are evaluated in terms of environmental demands. An assessment is also made of how changes to the framework conditions within business affect these goals and objectives.

Training

It is crucial that all employees are informed of the company's environmental aspects and training is therefore an important part of this environmental work. Training takes place within the various departments and is a part of the company's organisational development programme. The departments develop SHE plans pursuant to the important environmental aspects and the goal is to apply these plans to practical functions linked up to the daily work carried out. The company's intranet makes the follow-up of objectives and results more easily available to all company employees.

4. ENVIRONMENTAL POLICY

Hydro Polymers' policy

- We shall commit ourselves to adhere to all of the framework conditions determined by the authorities, owners and customers alike. Our work form is based on facts. We shall work on the continual simplification and improvement of our processes, deliveries and products. We shall meet our strategic goals through co-operation and teamwork.
- We shall be aware of our customers' needs and expectations. We want our customers to recommend us as a supplier because of the fact that our deliveries occur as agreed upon with respect to time, price and quality. We shall make use of suppliers that support and strengthen our policy.
- We shall establish first class work processes and expertise that will in turn form the basis for an effective organisation. We intend to become sought-after in the work market.
- Our prioritised goal is that the company shall operate without injuries to people, nature and material.
- We shall work towards ensuring continuous improvements to our environmental results.
- We operate so that we can live up to the expectations of society, our employees and our business partners.
- Hydro Polymers will actively contribute towards the further development of a sustainable process industry in the Grenland region.
- We shall operate so that our customers, employees, owners and neighbours are satisfied.

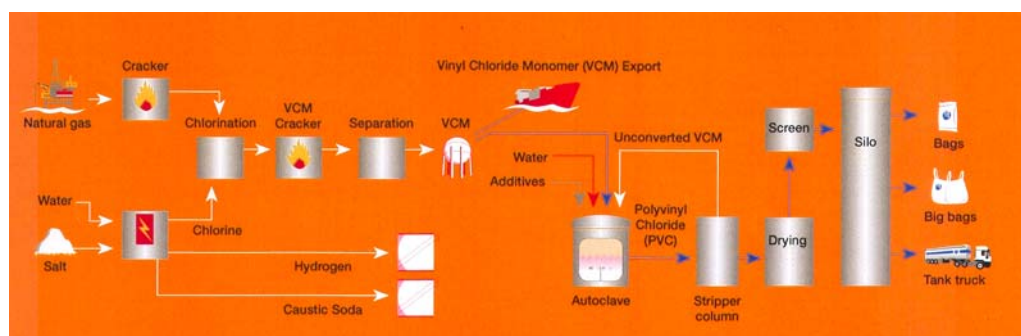
5. OUR PRODUCTS

Hydro Polymers' main sales products are caustic soda and PVC. Our main product is the plastics raw material PVC that is used in numerous useful products, especially within the construction industry. Pipes, cables, windows and flooring made from PVC boast a long lifespan and are maintenance-free. Another important market for our product is the health sector where PVC is used in surgical gloves, tubes and blood-bags.

PVC is produced by processing oil and gas, which are natural resources, together with salt and energy. While most other plastics have an oil/gas content of 100%, PVC consists of only 43% oil/gas and the remaining 57% consists of chlorine from salt.

Ethylene is produced from oil and gas while chlorine and caustic soda are produced from salt. Ethylene is delivered from Noretyl AS at Rafnes. In the chlorine plant, salt is mixed with water to form salty brine and this brine is then converted to chlorine gas in the electrolysis cells. This process results in hydrogen and caustic soda. The caustic soda undergoes reduction evaporation to 50%, which is then sold. The product is shipped to customers by tank or boat. The hydrogen enters the fuel gas net and is used for energy. This results in a hydrogen-enriched fuel gas with lower CO₂ emissions per unit of energy. In the VCM plant, the ethylene and chlorine react to form an intermediary EDC product or dichloroethane. EDC is transformed to VCM, (Vinyl Chloride Monomer). The VCM is piped to the PVC plant or exported by boat. The VCM production produces chlorinated hydrocarbons as by-products. These are transformed to hydrochloric acid through combustion in the hydrochloric acid facility.

Flowchart illustrating the Chlorine/VCM and PVC process



In the PVC plant, the VCM molecules are linked together to form long molecular chains (PVC). This process is known as polymerisation and occurs under pressure in large autoclaves or pressure tanks. The product is then dried, screened and transformed to a powder, which is sent to the silos. PVC is sold in bags or in bulk (tank/container) and is distributed to customers in Norway and abroad. The world-class technology applied within the PVC plant has in part, been developed within the plant. PVC production does not produce any by-products.

Two kinds of PVC are produced: suspension PVC (S-PVC) and paste PVC (P-PVC). S-PVC looks like fine sugar while P-PVC resembles icing sugar or finely ground flour. The additives (chemicals) that are added contribute towards determining the characteristics of the PVC products. The PVC plant also produces PMMA (Polymethyl methacrylate). In PVC standards, this unit is not big, but it is probably the biggest in the world in terms of mono-disperse polymer particles, that is to say particles of the same size. This new technology renders it possible to polymerise plastics other than VCM. The raw material is MMA (Methyl methacrylate) and the reaction occurs in methanol. The methanol is used repeatedly before being treated as special waste.

PVC – The product



S-PVC powder and products

P-PVC powder and products

When our customers process the PVC resin into finished products, additives such as stabilisers, softeners, lubricants, fillers, colour, etc. may be used. These additives contribute towards creating numerous tailor-made PVC products. These products are machined in injection moulding machines, extruding presses, rotating moulds or calendaring machines using heat (melting process).

The two PVC types have many different areas of application and the products may either be stiff or flexible, isolating, coloured, transparent or impenetrable to light.

PVC has proven to be the best type of material for medical equipment such as blood bags and dialysis tubes.

The nineties saw a good deal of criticism aimed at PVC products and their additives, both in the production process and in the machining process carried out by our customers. At the time, a “cradle to grave” analysis was carried out on PVC and its finished products. The analysis was carried out by Hydro but was based on independent research reports, to which reference was made in the final report. The conclusion was that there are no products that can replace PVC within most of the application areas and that even if most of the controversial additives were to be phased out, PVC would still be much preferred over other products. The energy consumption figure for one metre of PVC piping is no more than one third that needed to produce a similar length of steel piping. PVC production also requires less energy than other plastics.

Other products from the Chlorine/VCM plant

Caustic soda (NaOH)

One of the most important applications for caustic soda is within paper/cellulose production. It is also used in various other industries such as the smelting industry where it is applied to remove sulphur from emission gases. Caustic soda is used in the production of detergents, for cleaning in the food industry and it is also widely used in the chemical industry for glue and paint production, in textile production and to regulate pH levels in potable water and in sewage plants. Caustic soda is delivered to important customers in tank ships in Norway and abroad as well as to our terminals in Europe and in the USA. Tank trucks are used to deliver NaOH to medium and small-sized companies in Europe and the USA while medium-sized and small companies in Norway receive the caustic soda in IBCs (intermediate bulk container) with an approximate capacity of 1,200 kg or in 30 kg cans.

Hydrochloric acid

Hydrochloric acid is an acid used in various applications in the chemical industry. These applications include the production of water treatment chemicals, acidification of products in the

food processing industry, surface treatment in the metal industry and asphalt production. Hydrochloric acid is delivered to large customers by tankers, while tank trucks and IBCs deliver 1000 kg or 30 kg cans to medium size and small customers.

Sustainable development

Hydro Polymers has a cooperative agreement with the environmental group *The Natural Step* (hereafter referred to as "TNS". This has led us to define the most important challenges that lie in being able to contribute towards PVC becoming as sustainable a product as possible. Within the framework of sustainable development, Hydro Polymers is working on concrete measures to ensure the following:

- Reduce greenhouse gas emissions
- Reduce emissions of persistent chlorinated organic compounds
- Reduce the amount of waste
- Find more environmentally-friendly additives and softeners for PVC

The most important implementations carried out involve the installation of so-called adiabatic reactors on the cracker furnaces in the Chlorine/VCM plant. These installations shall contribute to reduced fuel gas consumption and reduced CO₂ emissions during VCM production. Adiabatic reactors have been installed on all three cracker furnaces. The sum of all of the measures implemented has led to a 10% reduction in CO₂ emissions since the year 2000. In the same period, the CO₂ emissions per ton of PVC have been reduced by 25%. *Refer to Part 2: Environmental Improvement Programme.*

Vinyl 2010

European PVC producers and producers of phthalates, stabilisers and plastic manufacturers have reached an agreement concerning the establishment of an environmental action plan. The programme is based on the chemical industry's programme "Responsible Care".

Vinyl 2010 is now in its seventh year and ongoing work to ensure more sustainable PVC continues to bring in results. This voluntary agreement covers the entire EU area and Norway as an EEA country also participates. This agreement concerns first and foremost the reduction of environmental effects through the collection of, the recycling of used PVC products. Until now, results have shown that the objectives set work in practice. The latest status report shows that PVC recycling has doubled. In addition to this, the phasing out of lead stabilizers in PVC has continued and lead stabilizers are no longer found in most of the EU's old member states. Norway has not used lead stabilizers for many years now. In certain sectors, the new EU member countries will require a longer period of adaptation to this environmental programme. More information on this subject is published in the progress report issued by Vinyl 2010. The industry issues a yearly progress report available at www.vinyl2010.org.

ENVIRONMENTAL / SAFETY CONDITIONS AND RESULTS 2006

6. ENVIRONMENTAL CONDITIONS

Chlorine plant expansion project – the significance for Safety, Health and the Environment.

The completion of the chlorine expansion in the autumn of 2006 has resulted in the following improvements to health, the environment and safety:

- A more energy-efficient plant through, *inter alia*, reduced power consumption per ton of chlorine produced as well as reduced steam use.
- Reduced CO₂ emissions as a result of reduced energy consumption
- An end to the import and use of asbestos in the electrolysis cells
- A reduced amount of hazardous waste
- Reduced risk to the surrounding environment as a result of a significant reduction in the amount of liquid chlorine in the plant

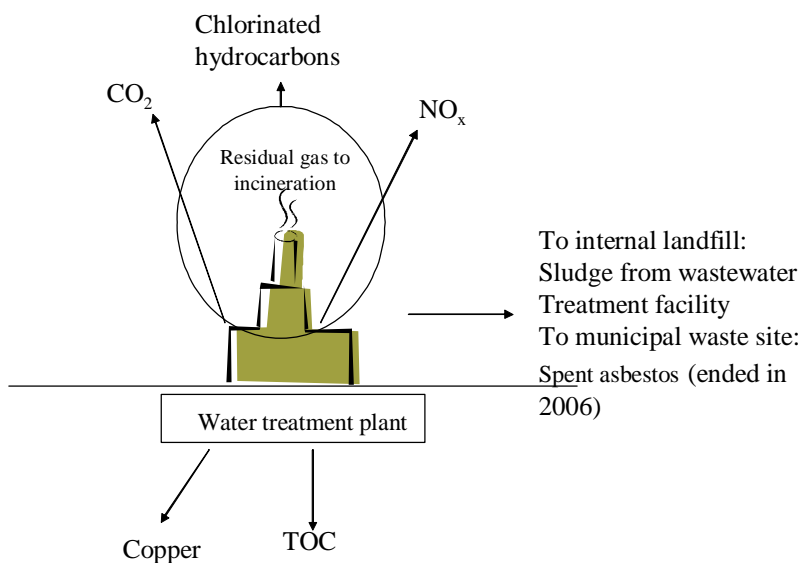
Emissions

The production of VCM and PVC involves emissions to the air and to the water. Emission permits issued by the SFT, determine the emission limit values and the company continually monitors emissions using a comprehensive monitoring programme.

From the Chlorine/VCM plant:

The cracker furnaces in the VCM plant produce CO₂ and some NO_x. Chlorine and VCM production also produces minor dioxin emissions. The most important emissions are the following:

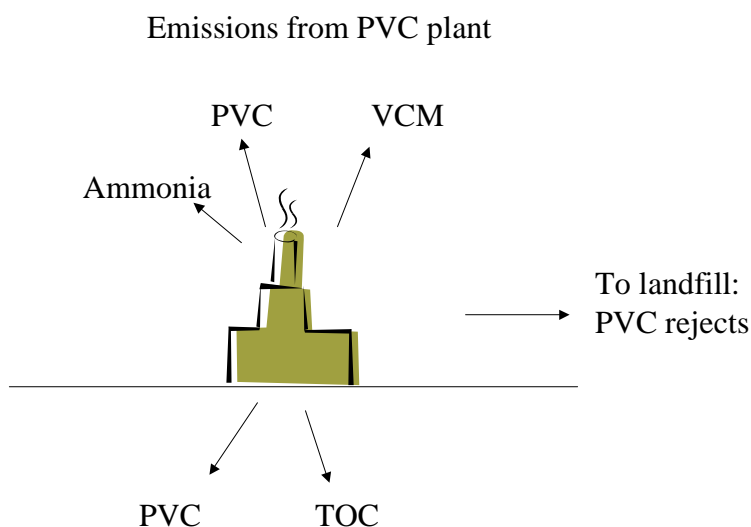
- CO₂, NO_x and chlorinated hydrocarbons (to the air).
- Copper and TOC (to the water).



From the PVC plant:

In addition to the raw material VCM that is used to produce PVC, a good number of additives also contribute to emissions from the PVC-plant. These chemicals mainly consist of initiators (peroxides) to activate the polymerisation reaction, surface reagents (emulsifying agents and suspension agents) as well as acids and bases. The most important emissions are:

- VCM and PVC (to the air)
- Chemicals and PVC particles (to the water)



Energy and cooling water

The plants employ electrical and thermal energy as well as steam. The greatest consumption of electrical energy occurs in the chlorine production where electrical power is used in the electrolysis process. With the new technology available (membrane process) the current efficiency is around 97.5 to 98% as compared to an earlier current efficiency of about 96%. Current efficiency expresses how efficiently the electricity consumed is applied, and our result is among the best in the field. Thermal energy is released during fuel gas combustion, mostly in the cracker furnaces, but the waste gas burners (incinerator) as well as the flare in the VCM plant also use fuel gas. In addition, chlorinated by-products from the VCM production in the hydrochloric acid plant are also burned. Much of the thermal energy is directly transferred to the process, for example, to the cracker furnaces, while a certain amount is used to generate steam that acts as an energy carrier in the process plants.

In the chlorine/VCM plants, steam is used to evaporate water from the weak NaOH and to heat up various flows in the process plant. Application of new technology to evaporate water from weak NaOH has reduced steam consumption by approximately 65%.

In the PVC plant, this steam is used to dehydrate PVC. Use of thermal energy including steam is limited due to the fact that various process flows exchange heat within the plant.

Large amounts of cooling water are needed for the processes. Hydro in Grenland has its own water supply from Fjærekilen in Norsjø. The greatest energy loss from the plants occurs in the

form of heated cooling water issuing from the Chlorine/VCM plant, which is released into the fjord. The cooling water is clean and has a temperature around 20°C. The cooling water from the PVC plant is sent to the Svenska Minerals plant at the Herøya Industrial Park.

Waste

All waste is registered and sent to approved waste sites. Waste sent to be recycled consists of wood, paper and metals. The plants have environmental stations to sort hazardous waste on a rather small scale. This hazardous waste (oils and other chemicals) is sent to approved waste sites for disposal. Other ordinary consumer waste is delivered to municipal waste sites.

The old chlorine plant had asbestos in the electrolysis cells. Spent asbestos was wrapped and sent to an approved landfill. The old chlorine plant has now been replaced by a new one and the use of asbestos became obsolete by the end of 2006. A project has been started to look into how to best dispose of spent asbestos.

In the chlorine/VCM plant, sludge is formed in the plant's wastewater treatment unit. This sludge may be deposited in an onsite landfill, on the condition that the total amount of contaminants is lower than the limits determined in the emission permit. If not, it is sent to external hazardous waste sites. Leachate from the deposits is monitored and purified in the plant's water purification unit. In connection with the cleaning of process equipment that is to be controlled and serviced in the Chlorine/VCM plant, the company regularly removes waste containing coke, which is sent off for destruction to off-site incinerator plants specifically designed for incineration of hazardous waste.

Electrical and electronic waste (EE waste) is sorted in specially marked waste containers and sent to approved waste deposits. This includes, i.e., fluorescent lamps, batteries, electrical cables, computers, etc. A good number of computers are re-utilised. Norsk Hydro is a member of RENAS (the waste collection company for business and consumer electro products).

The amount of waste is carefully monitored and work is ongoing to reduce the total amount produced. In addition focus is placed on waste sorting so that as much as possible may be recycled or reused.

Noise

Sources of noise are identified and mapped both in the internal and external environments. Recordings and calculations for noise stemming from the PVC plant in 2006 show that the company is within emission limits.

Regular recordings are made at set points round the plants at Rafnes. In 2006, four series of recordings were made. Recordings made in the nearby residential area under normal operations were under the limit value of 42 dBA.

Suppliers

Hydro Polymers AS makes SHE demands of its suppliers in terms of raw materials and services and carries out random samples/revisions to ensure that supplies take place pursuant to applicable company standards. As a part of its programme for sustainable development, Hydro Polymers has involved itself in various projects together with customers and suppliers in an attempt to find more stable additives for PVC. For many years, Hydro Polymers has worked on various projects to eliminate asbestos as an input factor in the production of chlorine at Rafnes. In February 2005, it was decided that the renovation of the plant would involve the end of the import of asbestos after 2006. As a result of this renovation, the total transport requirements within Hydro Polymers Sektor will also be reduced as EDC no longer needs to be transported from Stenungsund to Rafnes.

Raw materials purchasing

Hydro Polymers ensures the purchase of its raw materials by collecting pertinent information about the products/chemicals and the suppliers thereof. Environmental evaluations are just one of the factors involved in the supplier approval process.

Purchasing services

Hydro Polymers evaluates and approves service suppliers through a set approval system. This system addresses issues connected with the suppliers' SHE policies and environmental profile. Regular SHE meetings are held with the suppliers.

Transport

The work activities linked to Hydro Polymers involve a great deal of transport, mainly related to the supply of raw materials for the production process and the delivery of finished products to the customers.

Wet gas/ethane which are the raw materials used for ethylene production at Noretyl AS, are delivered by ship, mostly from the Karstø facilities and from the Teeside terminal. Hydro Polymers is responsible for the purchase and transport of wet gas and ethane which Noretyl AS converts to, *inter alia*, ethylene and propylene. In 2006, Hydro Polymers transported approximately 480,000 tons of raw materials to Noretyl AS.

Salt is the raw material required for the chlorine plant at Rafnes and it is transported to the plant by ship. The salt is mainly imported from the Netherlands and a typical load amounts to slightly less than 9,000 tons/transport at a typical distance of 585 nautical miles (approximately 1,090 km) per transport, one way. Approximately 45 such shiploads arrived at Rafnes in 2006, totalling around 430,000 tons of salt. This is a significant increase from 2005, because of the chlorine plant's increased capacity. At maximum capacity, the Chlorine/VCM plant, the annual amount of salt imported will increase to approximately 475,000 tons.

EDC is the intermediate product stemming from the VCM production process and has, since both chlorine production and chlorine import at Herøya were halted in the 1980s, been imported to Rafnes by ship. Most of the EDC has come from Hydro Polymers AB in Stenungsund. In 2006, 23 shiploads arrived at Rafnes each carrying a typical load of approximately 3,000 tons. The distance from Stenungsund to Rafnes is 117 nautical miles (approximately 215 km). The collective import of EDC in 2006 amounted to approximately 80,000 tons which is in fact less than in earlier years as the production of EDC on the Rafnes site has increased in keeping with the increase in chlorine production. The import of EDC will be almost completely phased out once the chlorine plant at Rafnes achieves full capacity (assuming there is no change to the VCM production figures).

PVC is delivered in bags or in bulk form. Bag pallets in containers are shipped to our overseas customers. Bulk containers or tank trucks deliver PVC to Scandinavian and European customers. In 2006, 73,000 tons were hauled by truck to Nordic customers and to the continent. Approximately 42,000 tons were sent from the harbour in Brevik or Larvik on board container ships to England and the rest of the continent. From the harbours in England and on the European continent, the PVC is transported to the customers by truck. Approximately 20,000 tons of PVC was shipped in containers from Brevik to harbours on the continent before being shipped further overseas. 16,000 tons were first shipped from Herøya by ship to Estonia and then by rail to Russia and the Ukraine.

VCM from Rafnes is sent to the PVC plant at Herøya through a pipeline in the Frierfjord. The remainder of the VCM produced is shipped by boat to the PVC plants in Stenungsund and

Aycliffe. In Stenungsund the end-terminal is located at the same site as the PVC plant, whereas the terminal for import to Aycliffe is located at Teeside. In 2006, approximately 355,000 tons of VCM were shipped from Rafnes. A typical load weighed slightly less than 3,000 tons and the average distance shipped was approximately 450 nautical miles (+/- 830 km).

Caustic soda from Rafnes is transported by truck and ship depending on the amount in question and the receiver. In 2006, 130 shiploads of caustic soda from Rafnes were sent to destinations in the domestic market and on the continent. The amount totalled approximately 500,000 tons (liquid). Every day, five tank trucks each carrying 30 tons of caustic soda leave Rafnes and travel a typical distance of 200 to 400 km to the customers.

Hydrochloric acid is transported to the customers by truck and ship. A normal week sees two to four 30 ton loads of HCl leaving Rafnes. In addition to this, in 2006 Hydro Polymers sent twelve shiploads totalling 10,000 tons to Denmark. This is less than the previous years and in a few years no hydrochloric acid will leave Rafnes as it will be used internally within the chlorine process.

The other chemicals used in the Chlorine/VCM and PVC production are mostly brought in by tank truck. Some chemical additives, such as for example, organic peroxides, are deemed hazardous materials pursuant to the Norwegian Road Traffic Act. The suppliers are responsible for their transport, but Hydro Polymers has its own safety advisor for dangerous goods and provides consultancy services which the authorities or any others may contact in case of accidents involving hazardous materials within Norway.

We make stringent demands, even more stringent than those imposed by the authorities, on the suppliers of land and water-based transport services. This involves an evaluation of the carrier's SHE and quality system pursuant to the applicable evaluation systems (land: Safety and Quality Assessment System/ water: Chemical Distribution Institute), prepared by the CEFIC (European Chemical Industry Council).

Biodiversity

Hydro has issued its own biodiversity policy. This policy recognises the risks that Hydro's work activities pose to biological diversity and that the company wants to contribute towards maintaining this biodiversity wherever it is located. Hydro Polymers prepared a status report and a list of actions to be taken in 2006. The company will chart these actions during the course of 2007.

7. SIGNIFICANT ENVIRONMENTAL ASPECTS

In connection with ISO14001 certification, the plants have identified their environmental issues and prioritised them. These environmental aspects are selected from requirements issued by authorities, their significance to the environment and the probability for accidental emissions. The most important are classified "Significant environmental aspects". These aspects are evaluated by management on a yearly basis.

The company has prepared an action plan to deal with these issues, the focus being to reduce the negative environmental effects of the following sixteen environmental aspects for 2006:

FOR THE CHLORINE/VCM PLANT:

- Fugitive emissions from the Chlorine/VCM plant (chlorinated hydrocarbons)
- Firing of cracker furnaces in the Chlorine/VCM plant (NO_x emissions)
- Firing of cracker furnaces in the Chlorine/VCM plant (CO₂ emissions)
- Flaring in Chlorine/VCM plant (release of HCl)
- Waste treatment (sludge from the purification plant in VCM to landfill) and minimisation/correct waste treatment in general.
- TOC emissions to water from the water treatment plant in the Chlorine/VCM plant
- Copper emissions to water from the water treatment plant in the Chlorine/VCM plant
- Chlorinated hydrocarbon and dioxin emissions in the Chlorine/VCM plant
- Specific power consumption in the plant and general maintenance with power in other units.
- PCBs in the lighting fixtures, Rafnes
- Ground pollution (EDC/chlorinated hydrocarbons in groundwater), Rafnes
- Sodium chlorate emissions from the Chlorine/VCM plant

FOR THE PVC PLANT:

- VCM to air from PVC plant
- Total Organic Carbon (TOC) from the PVC plant.
- External noise from PVC plant
- PVC particles (SS) to water (especially from P-PVC production) in the PVC plant

The company also has indirect environmental aspects linked to the following:

- The manufacture and supply of raw materials and chemicals used in the production process.
- The purchase of supplier services
- The transport of raw materials, additives, products and waste.
- Use and subsequent refining of products.

The indirect environmental aspects are aspects that Hydro Polymers has no direct control over, yet the company may affect these aspects through the way it does business, such as for example, the company's choice of suppliers. Hydro Polymers would look to select a supplier that operates in an environmentally friendly fashion than another supplier does, and in this way it is hoped that both suppliers will be encouraged to place more focus on the environment as it means a lot to us as a customer.

8. ENVIRONMENTAL IMPROVEMENT PROGRAMME

THE CHLORINE/VCM PLANT



Environmental measures carried out in 2006:

- Improved the water purification unit
- Measures implemented to reduce dioxin production and energy consumption in the new chlorine plant
- Replaced light fixtures containing PCBs
- Installed more chlorine detectors – improved safety in case of emissions
- Worked on concrete environmental improvement plans at departmental and unit levels.

Goals/investments by 2008:

- Install a new sedimentation basin (possibly a flotation basin) for the precipitation of chemical sludge in the wastewater treatment.
- Purification plant to reduce sodium chlorate emissions
- Improve control of dioxin emissions from the chlorine plant
- New water stripper column
- Upgrade hydrochloric acid unit
- Improve routines to prepare equipment for use

THE PVC PLANT



Environmental measures carried out in 2006:

- Connected waste water treatment plant to the process control system to ensure improved operations and the reduction of SS emissions.
- Container waste sent to be recycled
- Waste stripper for P-PVC

Goals/investments by 2008:

- Start-up/optimisation of waste stripper for paste PVC
- Minimise waste
- Participate in Herøya Industrial Park's ENØK project to reduce utilities consumption

Total investments in environmental measures at Hydro Polymers. Figures in millions of NOK.

2004	2 005	2006	2007*	2008*	2009*
19.7	10.6	17.1	14.4	29.1	30.5

* Budget

Internal improvement goals for significant environmental aspects, status 2006 and goal for 2007

Hydro Polymers has set its own internal improvement goals applying to several of the significant environmental aspects that extend much further than those issued by the authorities. Among the 16 significant environmental aspects, quantitative improvement goals have been set for seven.

Environmental improvement goal	Goal 2006 ≤	Achieved 2006	Goal 2007 ≤
VCM emissions to the air from S-PVC	70 g/ton S-PVC	26 g/ton PVC	30 g/ton S-PVC
VCM emissions to the air from P-PVC	850 g/ton S-PVC	807 g/ton PVC	800 g/ton P-PVC
TOC to fjord from PVC plant	280 g/ton PVC	321 g/ton PVC	280 g/ton PVC
PVC to fjord (suspended matter)	250 g/ton PVC	152 g/ton PVC	200 g/ton PVC
CO2 to air from Chlorine/VCM plant	220 kg/ton VCM	199 kg/ton VCM	212 kg/ton VCM
Flaring from Chlorine/VCM plant	375 kg HCl/month	120 kg HCl/month	375 kg HCl/month
TOC to fjord from VCM plant	15 kg/day	18 kg/day	15 kg/day

These goals will be followed up in the same fashion as other important results within the company.

In 2006, the goals of the **PVC plant** first and foremost consisted of achieving that which is referred to as BAT levels for the emission of VCM to the air stemming from the Paste PVC production as well as the emissions of organic compounds to the water. The BAT figure for VCM emissions to the air is 900 grams of VCM per ton of P-PVC, not including fugitive emissions. This goal was first achieved in 2005 when the average emission value amounted to approximately 790 grams of VCM per ton of paste PVC and remained at approximately the

same level in 2006. The internal improvement goal was changed from 850 to 800 grams for 2007. The figure for organic matter to the water recorded as TOC was 280 g/ton PVC. This goal was not achieved in 2006, yet the emission limit of 14 kg/hour was met with a good margin.

The most important internal environmental improvement goals in the Chlorine/VCM plant

In 2006 the goals for the **Chlorine/VCM plant** were first and foremost connected to the further reduction of CO₂, flaring and a reduction of TOC emissions. TOC emissions per ton of VCM were reduced by nine percent in 2006. Hydro Polymers was issued 92,483 quotas (tons) and the actual emission figure was 88,699 tons. This difference is due to improved control of the firing inside the cracker furnaces.

The goal was achieved for the flaring while the TOC emissions to the fjord were slightly more elevated than the internal goal, yet clearly lower than the emission value.

The Chlorine/VCM plant has a general aim to ensure an improvement figure of 5 to 10% annually and to lie 20% below the demands issued by the authorities. In addition to the areas of environmental improvement listed in the table above, the Chlorine/VCM plant has special focus on the following:

- Ensure continued low fugitive emission levels
- Find a solution for the deposit of sludge from the water purification plant
- Reduce the total number of short-term deviations

Fugitive chlorinated hydrocarbon emissions in 2006 were higher than in 2005, yet well under the emission limit. Emissions are recorded twice a year and one of the recordings made in 2006 was more elevated than normal. No exact reasons have been found to explain this fact and the explanation may indeed be the uncertainty linked to the recording method.

During the course of 2006, the decision was made to get rid of the internal landfill during the first six months of 2009 and that plans for the closure and follow-up operations of the landfill will be established in 2007. The number of short-term deviations was 21 which is higher than in the previous years. The main cause of this increase is the start-up of the new chlorine plant.

9. ENVIRONMENTAL EFFECTS/EMISSIONS/WASTE

9.1 Emissions in general

All emission levels from the company, with the exception of an excess sodium chlorite emission from the Chlorine/VCM plant were lower than the limit values for 2006 set by the authorities for the plants. Of these 21 cases, there were nine instances of pH deviations in the waste water from the chlorine plant and eight cases of elevated sodium chlorate emissions. Even though none of these short-term deviations are deemed to have had any mentionable negative effect, the company is nonetheless dissatisfied with the number of deviations that occurred in 2006. For this reason, improvements have already been made to the chlorine plant in order to better be able to adjust the pH level and technical solutions are being worked on to reduce sodium chlorate emissions. In 2006, the PVC plant had no emission deviations.

Hydro Polymers received no complaints from neighbouring sites or communities resulting from plant operations. There was one serious SHE incident in 2006 as compared to four in 2005. This particular incident did not result in any serious consequences but had the potential to have done so.

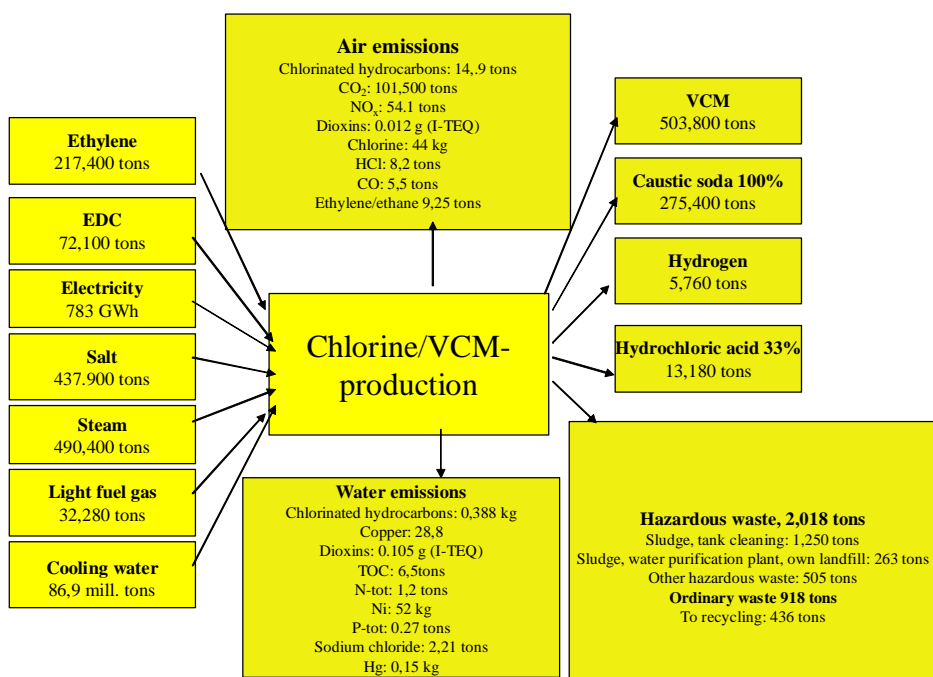
2006-03-07 A small leak occurred in a flange on a pipe that contained EDC/VCM and hydrochloric acid (HCl). The leak occurred because of a break in the bolts that held the flange together. An investigations committee was formed which concluded that the bolts delivered were made of the wrong material. A larger leak could have ignited and resulted in a major fire.

Inspections and audits

In 2006, 14 audits were carried out by authorities, customers and internal groups and these audits concerned the external environment.

- The SFT carried out a revision on the reporting of CO₂ emissions and where focus was placed on the calculation of uncertainties pertaining to the amount and volume of raw materials. The maintenance of calibration and maintenance recording instruments inside the Chlorine/VCM plant were evaluated.
- Norsk Akkreditering carried out the audit and approved Hydro Polymers AS' auditing programme pursuant to the regulations governing combustible or substances under pressure (DSB) and ISO 17020.
- The DSB carried out inspections pursuant to the convention governing the Prohibition of Chemical Weapons (OPCW) and reporting routines pursuant to the Chemical Weapons Conventions (CWC). The inspection showed that the annual reports to the OPCW are correct and that the only chemicals produced are those that are reported.

9.2 RAW MATERIAL/ENERGY CONSUMPTION, EMISSIONS AND WASTE FROM THE CHLORINE/VCM PLANT



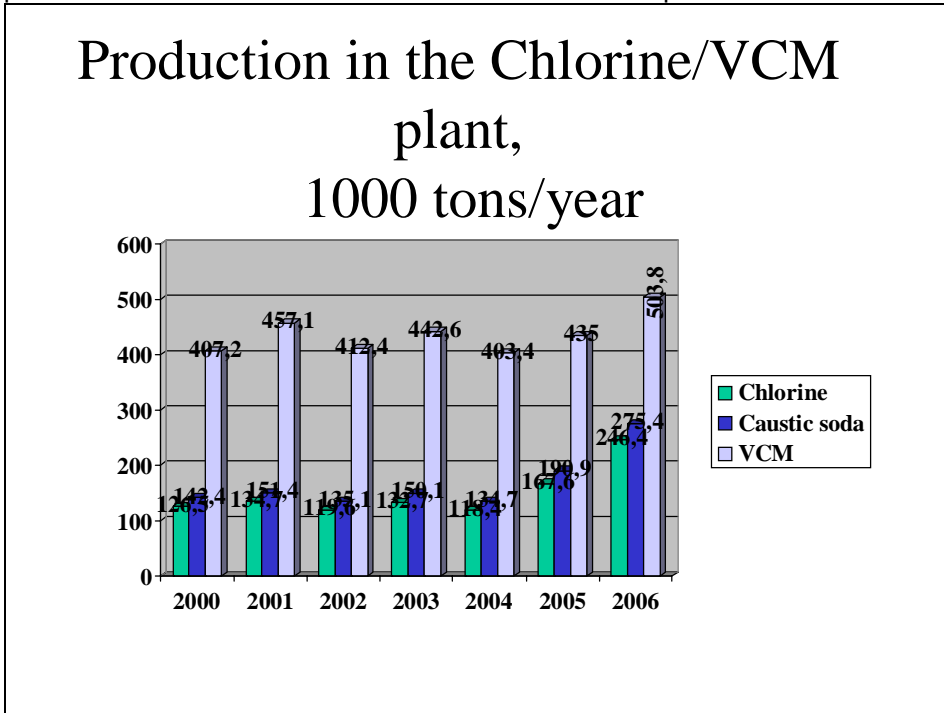
* Emission numbers also include accidental emissions.

EMISSIONS TO THE AIR FROM THE CHLORINE/VCM PLANT

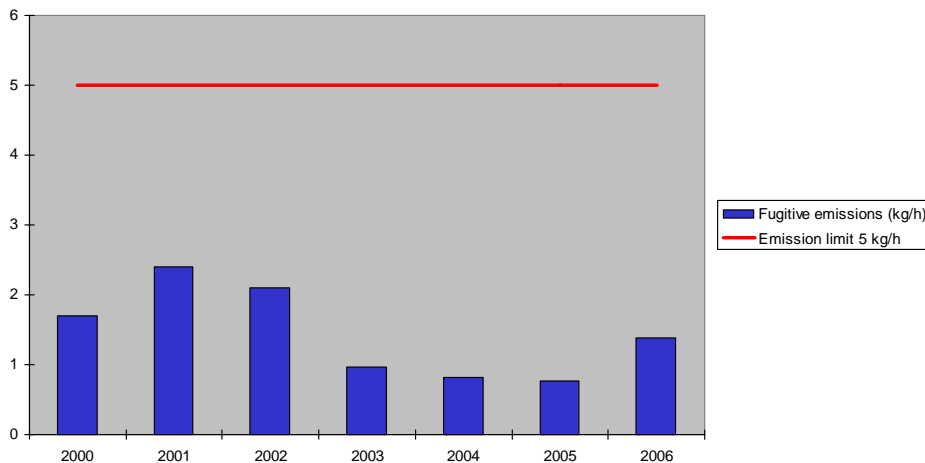
CO₂ and fugitive emissions of chlorinated hydrocarbons represent the most significant emissions from the plant. Chlorinated hydrocarbon emissions to the air make up the greatest share of the collective emissions of these types of compounds from industry in Norway. Over the past few years, the amount of fugitive emissions of chlorinated hydrocarbons has been reduced because of systematic improvement measures. The CO₂ emissions value increased by approximately 2% from 2005 to 2006. This increase was the result of increased production, but is more than compensated for by the fact that the CO₂ emissions per ton of VCM produced was reduced by approximately 9% during the same period. NO_x emissions were slightly lower in 2006 than in 2005, even with the production increase. This means that the NO_x emissions per ton of VCM produced were reduced by approximately 14% in 2006. These emission reductions have been achieved as a result of more effective use of fuel gas.

The estimated emissions to the air were at about the same level as in 2005 or slightly more elevated. There are no specific process-related conditions to explain this increase and the estimates can most probably be attributed to the uncertainty in the calculations themselves and/or normal process variations.

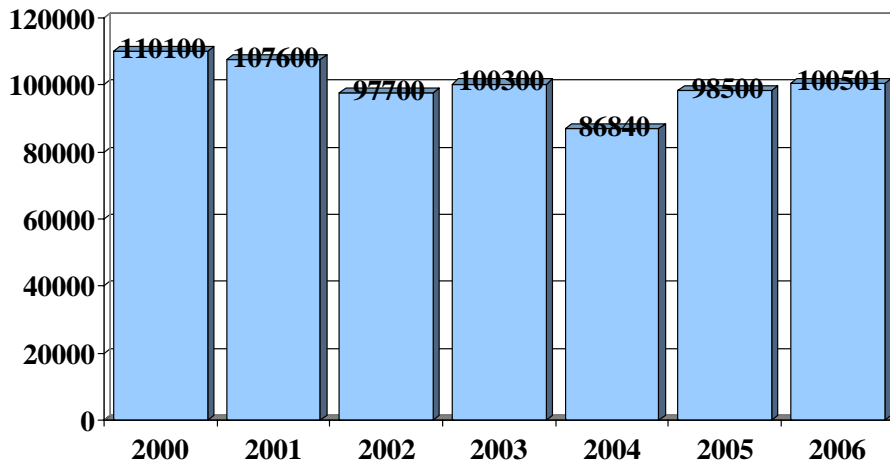
Production in the Chlorine/VCM plant has increased as a result of a doubling of the production capacity in the chlorine plant starting around 1 June 2005 when the new chlorine plant was rendered operative. VCM production also increased in 2006 as a result of stable operations.



Fugitive hydrocarbon emissions to the air, kg/h



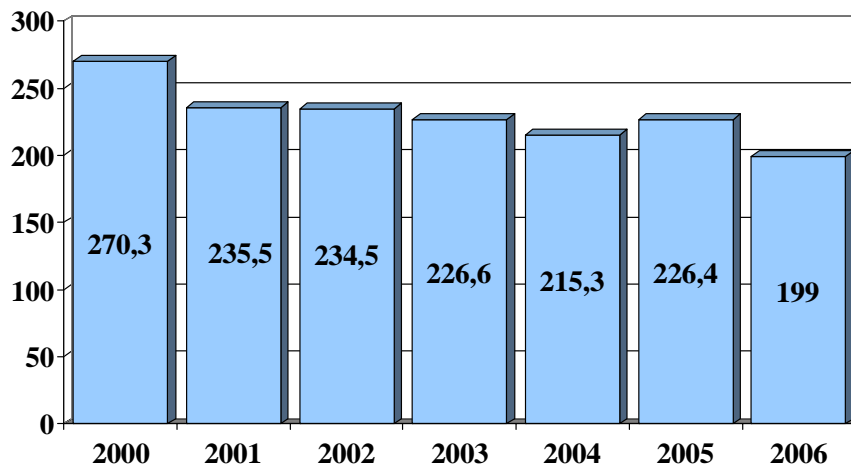
CO₂ to air, tons/year



In 2005 a quota system was implemented and the emission limit no longer applies..

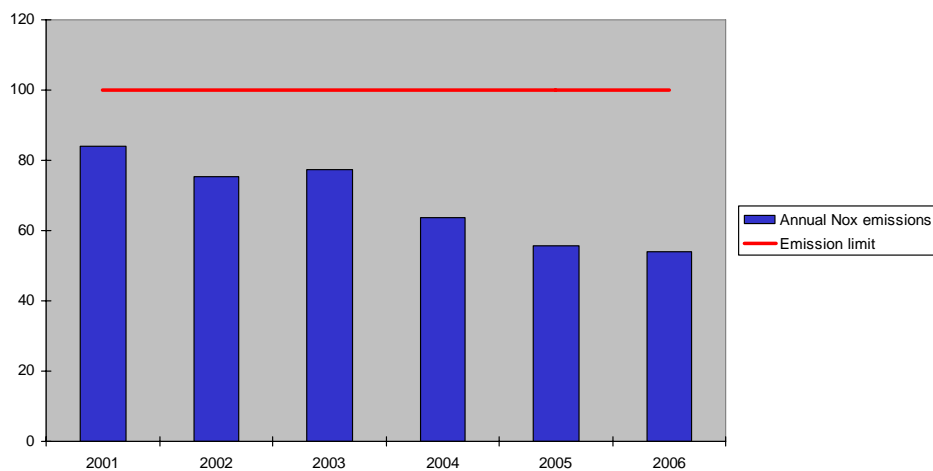
CO₂ to air, kg CO₂ per ton VCM

Applies only to the VCM plant at Rafnes



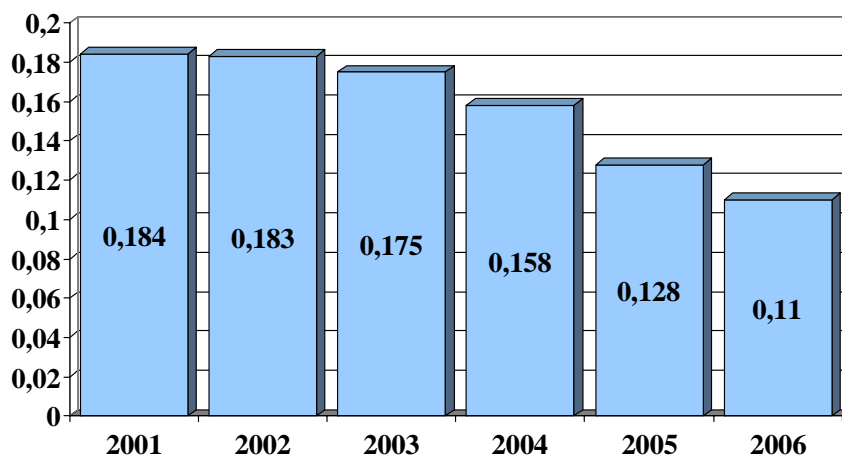
In 2005 the emission limit for CO₂ was replaced by quotas.

NO_x to air, tons/year

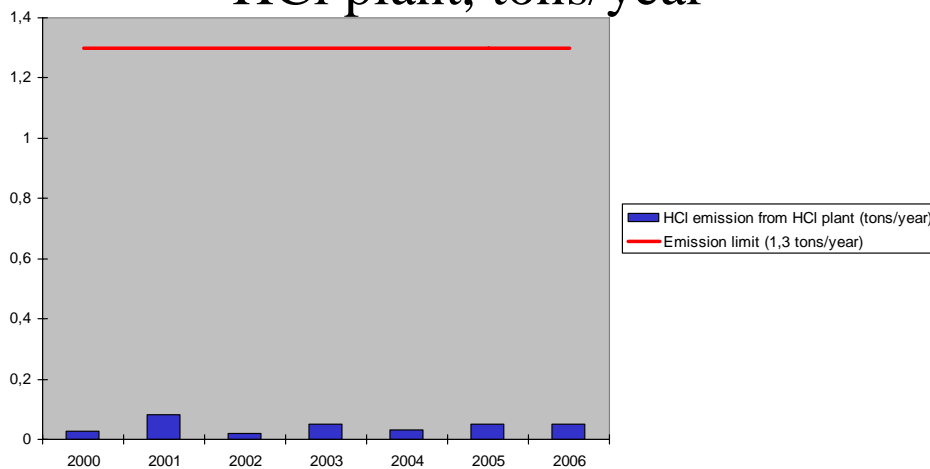


NO_x to air, kg NO_x per ton VCM

Applies only to VCM plant at Rafnes



HCl to air from HCl plant, tons/year



EMISSIONS TO WATER FROM THE CHLORINE/VCM PLANT

The company releases the following into the water: organic matter termed TOC (Total Organic Carbon), copper, nickel and chlorinated hydrocarbons (mostly EDC and chloroform). Very small amounts of dioxins are also released into the water. In addition the company has an emissions permit for sodium chlorate from the chlorine plants.

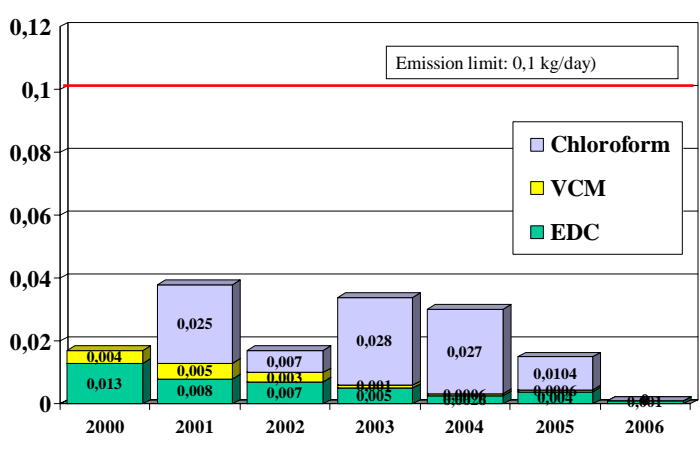
There were very few changes to the regular emission levels to water in 2006, but the total emissions of sodium chlorate and dioxins increased somewhat.

Dioxin emissions are normally recorded over a two-week period once every year. In 2006 recordings were also made to verify the anticipated emission reduction from the chlorine plant. Dioxin recordings from April/May show more elevated levels than normal. Had these values been representative for the entire year, the result would have been a violation of the emission limit. Therefore, new recordings were carried out in July and the values obtained were normal. Hydro's Research Centre has explained that the aforementioned emission increases resulted from the detachment of dioxin contaminated particles that had gathered in the old section of the chlorine plant. These particles were released when operating conditions were modified as a result of the start-up of the new plant. Lower emission values are expected in 2007.

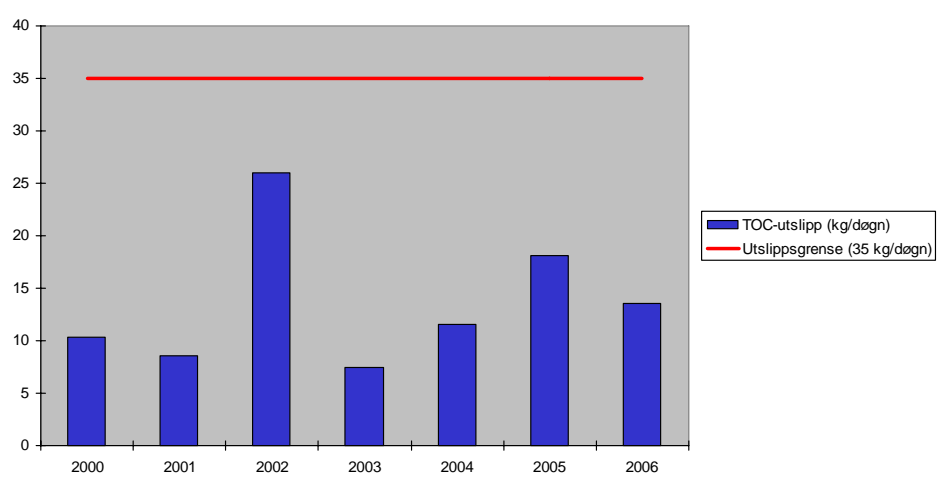
After the new chlorine plant became operative, it was discovered that the emission of excess brine to the fjord, (which is a part of the process requirements for the operation of a chlorine plant based on membrane technology) would result in sodium chlorate emissions in addition to the salt and sulphate normally found in the fjord. Investigations were launched immediately with the help of outside experts to determine whether emissions calculated at up to 20 kg/h on average could have negative environmental consequences in the Frierfjord and if previous sodium chlorate emissions had adversely affected the area around the emission site. The Norwegian Institute for Water Research (NIVA) carried out tests in the Frierfjord as well as the theoretical environmental evaluations. The conclusion was that the emissions will have no mentionable effect on the fjord and there were no signs that earlier emissions had had an adverse effect on the fjord. Based on this, the company has applied to the SFT for permanent permission to emit up to 20 kg/h of sodium chlorate with a value of 30 kg/hour as a maximum 24 hour average. However, the prognoses that were presented for the new permit were inadequate. Sodium chlorate emissions increased more than anticipated by the company's technology supplier Uhde. This in turn led to several violations of short-term limits. During the course of 2006 it became clear that a new purification plant was necessary to ensure the limit value and a temporary increased

emission limit value was applied for. The plan is to apply for a temporary emission limit for 2007 and install a new purification plant in 2008.

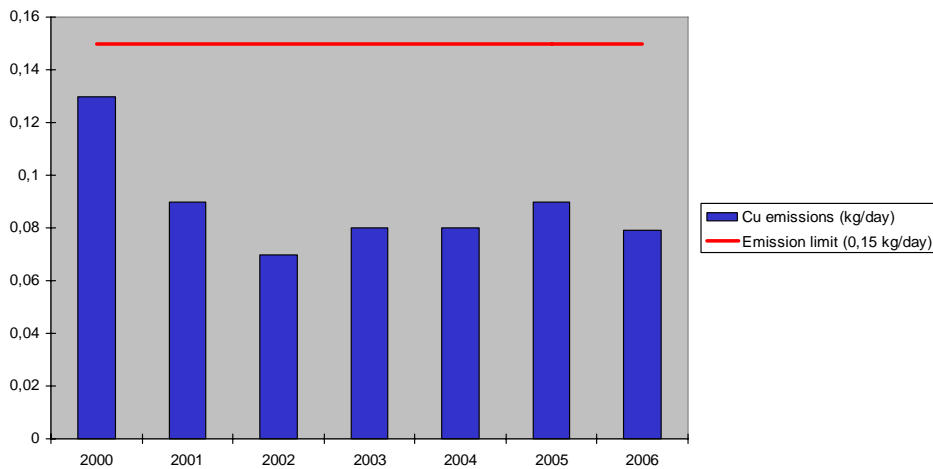
Chlorinated hydrocarbons to water, kg/day



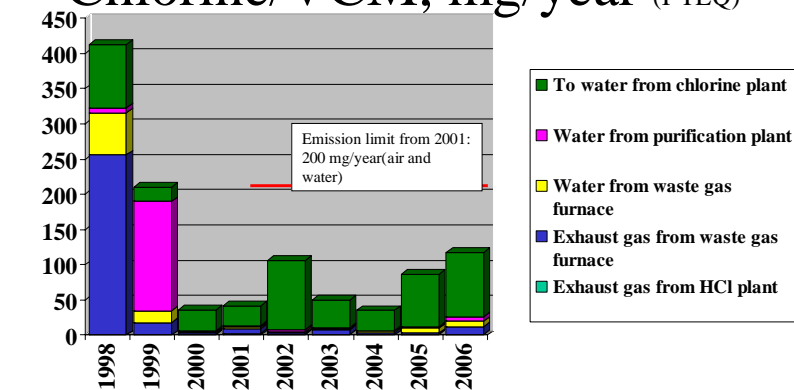
TOC to water, kg/day



Copper to water, kg/day



Collective dioxin emissions to the air and water from Chlorine/VCM, mg/year (I-TEQ)



I-TEQ: International model to calculate to toxicity equivalent
Undetectable dioxin generators are set at 0 when calculating TEQ -

WASTE FROM THE CHLORINE/VCM PLANT

Hazardous waste from the Chlorine/VCM plant mainly stems from the cleaning of process equipment and tanks. Such cleaning activities take place periodically and this means that the amount of hazardous waste will vary on an annual basis.

Every year the plant produces from 10 to 12,000 tons of chlorinated by-products are produced. These by-products are used as raw materials in the production of hydrochloric acid, which is sold. The amount of by-products in storage in 1990 was more than 20,000 tons and is now, reduced to a normal operative level of 2 to 4,000 tons. However, over the past few years, the amount stored has increased temporarily to approximately 8,000 tons as a result of internal logistics. In 2002, the company was granted permission to import chlorinated

by-products from Hydro Polymers AB in Stenungsund, Sweden. In 2006, slightly more than 900 tons of light by-products were imported as raw material in the production of hydrochloric acid together with by-products from the company's own VCM production. The by-products stemming from the plant in Stenungsund contribute positively to operations on the Rafnes site.

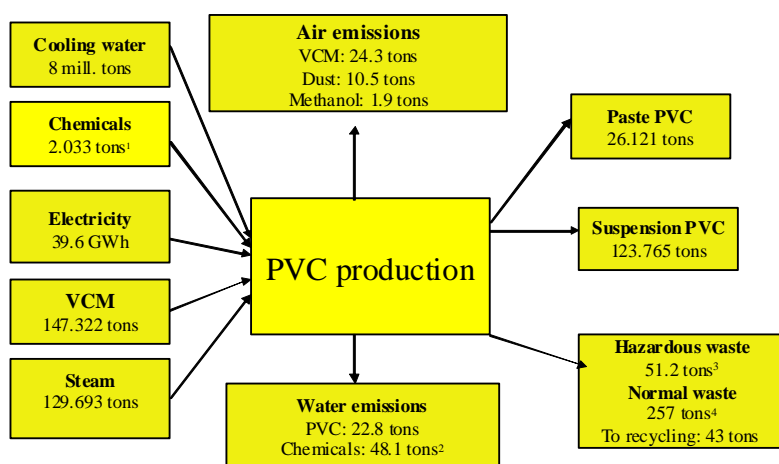
The amount of hazardous waste stemming from the Chlorine/VCM plant amounted to approximately 1,755 tons in the year 2006. The amount of normal, non-hazardous waste from the Rafnes site was approximately 436 tons which were recycled (material or energy recycling). The amount of normal waste stemming from the Rafnes site increased from 2005 to 2006.

9.3 RAW MATERIAL/ENERGY CONSUMPTION

EMISSIONS AND WASTE FROM THE PVC PLANT

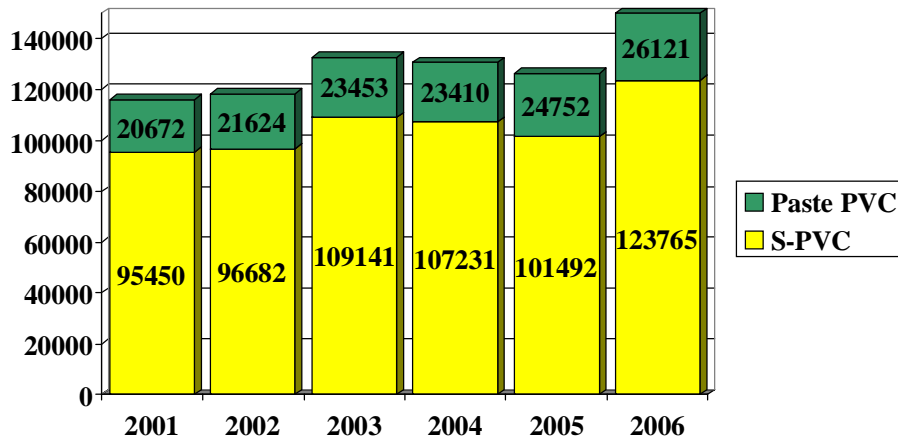
In 2002, the PVC plant was issued a new emissions permit with more stringent requirements pertaining to, *inter alia*, VCM emissions to the air as well as suspended particle emissions (SS = PVC particles). This emission limit became effective in 2004, but dispensations granted by the SFT, gave the company a 1 to 2 year delay to reach the new limit values for PVC particle emissions to the water. The VCM emissions limit to the air was satisfied when a stripper column for P-PVC latex containing VCM became operative.

A new environmental risk analysis for the PVC plant was carried out in 2005 to chart all of the potential sources of acute water, air and ground pollution that could result in health damage or environmental damage, both on the industrial site and outside of it. It was discovered that one of the chemicals, 2-merkptoetanol is stored in such an amount that an emission of the entire volume of 2.8 m³ per over one hour could result in elevated concentration levels at the outlet of the main sewer which could in turn have negative environmental consequences in a limited area. However, it was also determined that there was very little probability of this ever occurring as the storage tank containing this chemical is not under pressure and that even very tiny leaks would soon be discovered because of the substance's foul odour. Therefore it was decided that there was no need for increased emergency preparedness measures to protect against acute emissions, other than those already in existence to protect from acute VCM emissions which first and foremost are fire and explosion hazards.



1. Chemicals (incl. Water in solutions, only estimate)
2. Chemicals recorded as TOC
3. 48.5 tons are a methanol/water mixture from the PMMA plant sent to be incinerated at an external site
4. 127 tons discarded PVC to internal landfills following cleaning

Production: PVC plant, tons/year



The production of both S-PVC and P-PVC was record high in 2006. This applies especially to S-PVC which had a production increase of approximately 20%.

Emissions to the air from the PVC plant

The PVC plant emissions permit includes a demand concerning the monitoring and reporting of VCM and PVC dust released to the air. Moreover, the PVC plant has received permission to emit one ton of ammonia per month.

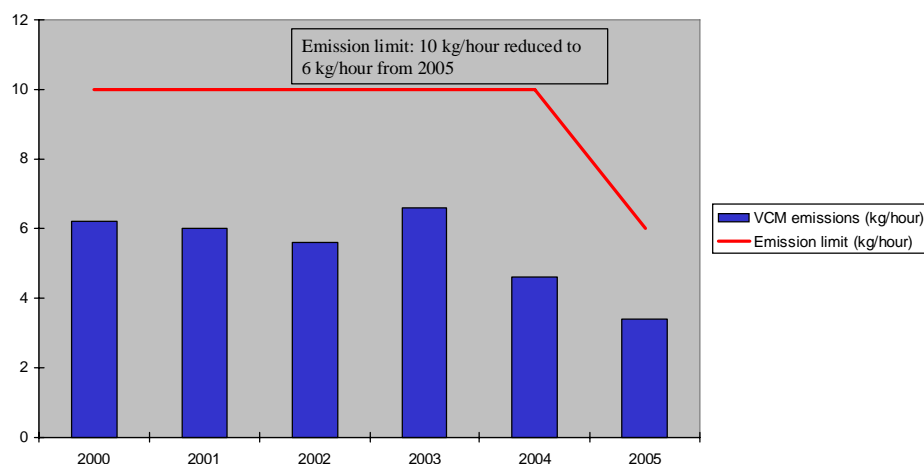
After the new P-PVC stripper column became operative in the spring of 2004, the VCM emission value has been reduced. The average emissions value of VCM to the air from the PVC plant was 2.8 kg/hour in 2006. This is the lowest level ever recorded inside the plant. Once in the atmosphere, VCM rapidly decomposes in a photochemical process to form CO₂ and hydrochloric acid.

The calculated dust emission figures amounted to 1.20 kg/hour, which is lower than the corresponding figure of 1.65 kg/hour the previous year.

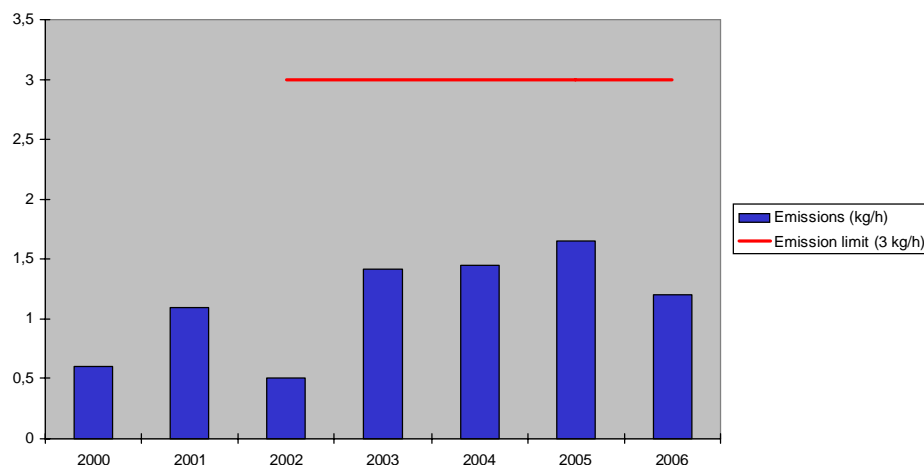
Ammonia emissions for 2006 were the same as for 2005.

The PVC plant has no significant greenhouse gas emissions but uses steam as energy to dry PVC. The steam is delivered to Rafnes from Yara.

VCM to air, kg/hour



PVC to the air, kg/h



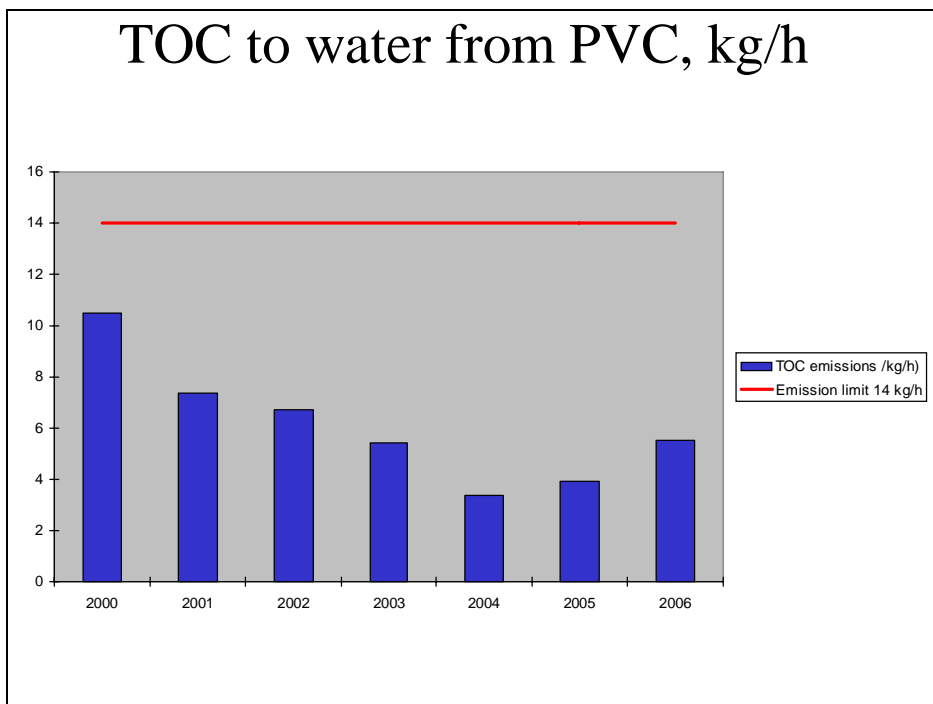
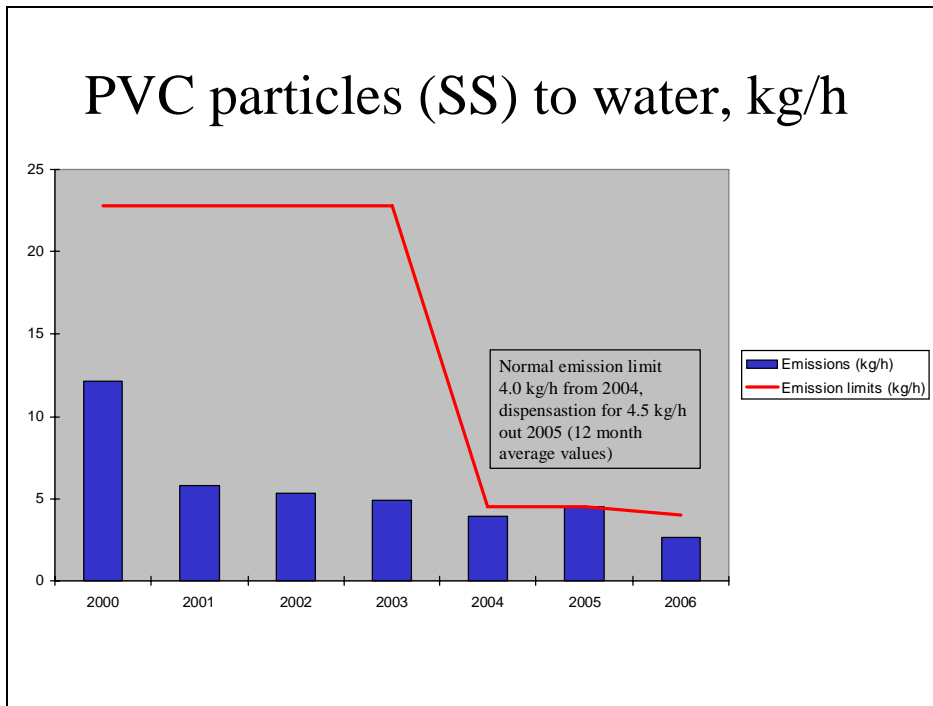
Emissions to the water from the PVC plant

Suspended solids (SS) in the form of PVC particles are released to the water. Systematic work is ongoing within the plant to reduce these SS emissions. 2006 saw an annual average reduction from 4.5 kg/h in 2005 to 2.9 kg/h. The normal emission limit value from 2004 is 4 kg/hour. The goal for 2006 was to have reduced the annual average emissions value to below 4.0 kg/hour.

PVC particle emissions have no known negative effects on the environment except for the fact that elevated concentrations may result in cloudy water.

Emissions of chemical agents are monitored by measuring the total amount of organic carbon (TOC) in the water released into the fjord. A connection has been determined, a correlation factor of 2.5 between the total organic and chemical oxygen demand (COD) which is another parameter used for emissions of organic material to the water. The emission value recorded as TOC has more than halved since the year 2000,

because the company has, *inter alia*, gone over to a new initiator. However, there was a slight increase from 3.9 kg/hour to 5.5 kg/hour from 2005 to 2006. Investigations carried out by The Norwegian Institute for Water research (NIVA report 1993) have shown that PVC plant emissions have no effect on water organisms. The matter released is easily biodegradable.



Waste from the PVC plant

Normally, very little hazardous waste is produced in the PVC plant.

Waste from the PVC plant also comprises a methanol/water mixture, which is used in the production of PMMA where methanol is used as a solvent. This mixture is sent to incineration at an approved site.

In 2006, the PVC plant produced approximately 75 tons of hazardous waste, of which 72 tons consisted of a methanol/water mixture. This is less than in 2005. The amount of ordinary waste produced amounted to 257 tons in 2006, a figure that was slightly higher than in 2005. 127 tons consisted of scrap and approximately 43 tons were recycled.

10. SAFETY AND EMERGENCY PREPAREDNESS

The follow-up of incidents and accidents is one of the company's most important work processes to ensure continuous improvement in the area of SHE. In 2006, a total number of 459 incidents were reported whereas the corresponding figures for 2005 and 2004 were 642 and 788 respectively.

Both plants are guarded 24 hours a day. Regular emergency drills are carried out for handling emissions, fires and explosions at both plant sites. Each of the plants also has its own emergency drills to deal with various emergencies that may occur on site.

Process safety

Proactive preventive maintenance will ensure even and stable operations in all production sectors. The plants' technical condition is monitored with the help of an exhaustive and systematic recording programme. Hydro Polymers AS is participating in a development project under the direction of the Hydro Group to further improve their "technical safety level" indicators. The T-rate consists of three elements: a barrier indicator, an inspection indicator and an override indicator. The work on the T-rate began in 2002 and was tested out in the VCM plant. The T-rate is now recorded monthly in the Chlorine/VCM plant and in the PVC plant. In the autumn of 2006, Group management decided to implement the T-rate at all of Hydro's installation round the world.

Since 2003, the company has used its own Key Performance Indicators (KPI) for serious incidents. Incidents that represent the greatest risk are classified as serious incidents. A risk evaluation is carried out for all incidents and this means that both the frequency of recurrence and the possible consequences are evaluated. In 2006 there was one serious incident (a so called "red zone" incident). The corresponding figure for 2005 was 4.

The incident in 2006 could have led to a major leak with a great possibility for fire when breaks were uncovered in several bolts in a flange coupling. During operations, these bolts are subjected to extremely elevated temperatures and it was discovered that the bolts used had received a surface treatment that is not intended for elevated temperatures and could lead to breaks, which was the case here.

The company follows up on numerous personnel safety indicators. The main indicator is the TRI value (Total Recordable Injuries) that indicates the total number of personnel injuries per one million work hours. All injuries leading to absences or resulting in the employee becoming unable to carry out his job, receive alternative work or medical treatment are included. Norsk Hydro has prepared guidelines as to how each injury should be classified and these guidelines form the basis for the statistics.

In 2006, there were two TRI injuries among our own workers. One worker fell from his bike and injured his forehead, while the other broke his wrist when he fell from a ladder on a wheel loader. These two TRI injuries gave a TRI value of 3.6, which is the best result since Hydro Polymers was founded in the year 2000.

TRI values – Our own workers:

2000	9.7
2001	5.8
2002	6.6
2003	5.4
2004	5.3
2005	5.3
2006	3.9

TRI values – Contractors:

2000	30.8
2001	8.8
2002	4.5
2003	15.3
2004	26.7
2005	10.0
2006	0

Total number of near accidents recorded:

2000	800
2001	730
2002	931
2003	694
2004	788
2005	642
2006	459

Behavioural Accident Prevention Process (BAPP)

Since 2005, a work method known as Behavioural Accident Prevention Process has been applied (BAPP). This method stems from Behavioural Science Technology (BST).

Thirty-nine employees have been trained in its use and work as BAPP observers in the production and maintenance sectors. Starting in 2007, more observers will be trained.

In 2006, 520 BAPP observations were made. 86% of the time the work execution proved safe according to the BAPP observations made.

BAPP observations are carried out to prevent near incidents and accidents.

11. HEALTH AND WORK ENVIRONMENT

The company has 361 employees comprising 295 men and 66 women. The average age of the workers is 48, that is, 49 for men and 46 for women.

Absence due to illness

In 2006, short-term absences amounted to approximately 4.7% where short-term absences accounted for slightly more than 1%. This translates into a slight decrease from 2005.

Absence due to illness (%)

2000	5.2%
2001	5.6%
2002	5.7%
2003	5.0%
2004	5.2%
2005	5.4%
2006	4.7

IWL Agreement

The company entered into an agreement with the National Insurance Service's industrial centre – a centre for including work life – in “a work agreement on a more including work life”, and considers that more flexible arrangements allowing the employees to report their own illness and measures to ensure improved management at all levels have contributed to a reduction in employee absence due to sickness to a level lower than that of the national average for our type of industry.

In 2006, the company continued work on individual follow-up plans for all workers absent for more than 8 weeks. The company has various health programmes, among these, company-sponsored exercise, and a special programme for workers with muscle/skeletal problems. This involves monitored training on special equipment (therapy master) during work hours under careful monitoring by the company health services.

The follow-up of long-term leaves due to sickness along with the company health services, the primary physician and the National Insurance Service has had very good results. Long-term worker absences of more than 8 weeks have dropped significantly over the past few years; from 2.86% in 2003 to 1.1% in 2005 and a further decrease to 0.8% in 2006.

The Work Environment Committee was encouraged by the worker unions to start a new work group for reduced absences due to illness. The group comprises individuals from worker unions, management and the SHE department. It has planned an exercise room in both the Chlorine/VCM plant and in the Administration building. The PVC plant already has a well-used exercise room and in 2006 a sauna was built as an annex to the changing room.

Intoxicating substances

Hydro Polymers places focus on SHE and productivity in all areas. The use of intoxicating substances amongst employees could have a great negative impact on safety in the workplace, and can contribute to undesirable behaviour, inattentiveness and reduced work performance. The company has a procedure to drug-test new employees, trainees and summer temps. This is approved in advance by these individuals.

Charting the work environment

The company charts health and work environment satisfaction based on guidelines issued by Hydro. The company carries out annual management recordings and team building activities. This work is a part of the company's organisational development programme.

Exposure to levels of VCM and EDC over the administrative norm

In the Chlorine/VCM plants, continuous recordings are made of employee exposure to VCM and EDC. The total number of cases of employees exposed to VCM in the PVC plant has been too high earlier and administrative and technical measures have been implemented to remedy this situation. The most important measure implemented by the company was the start-up of the new paste PVC stripper column, but also the great focus that was placed on the use of personal protective equipment for operations involving potential exposure has given positive results. This has resulted in a reduction of the number of recordings of VCM over the administrative norm of 1 ppm from 5.5% in 2003 to 1.7% in the PVC plant. For the company as a whole, the total number of recordings exceeding the administrative norms for EDC and VCM has been reduced from approximately 3% to approximately 1.5% over the past 4 years.

The following table sums up results over the norm (1 ppm) of EDC/VCM exposure values for 2002-2006:

	<u>Total number of recordings</u>	<u>Total number of exposures (%)</u>	
		VCM	EDC
2002	2915	2.6	1.1
2003	3665	2.1	0.4
2004	5098	0.7	1.0
2005	5536	1.2	1.0
2006	4448	0.8	0.8

12. THE COMPANY'S SOCIAL RESPONSIBILITIES

Relations with neighbouring communities/groups

Hydro Polymers, the Rafnes Industrial area and the Herøya Industrial park work together with partners within the community and have regular contact with local politicians, environmental groups, schools and neighbours alike.

Focus is placed on visits and meetings and whenever necessary, information is issued to the communities. The company has partnership agreements with several schools.

Hydro Polymers – a regional perspective

Hydro Polymers participates actively in the Grenland Industrial Cluster (hereafter referred to as "ICG"). The ICG works to make use of shared resources through new collaborative forms so that both industry and the region will be strengthened. Collaborative areas are, *inter alia*, emergency preparedness, company health services, plant maintenance as well as apprenticeship programmes. ICG is anchored in the Value Creation Programme 2010 through the Research Council of Norway. This programme is a national programme intended to contribute to innovation, both within the companies and the network of companies. The purpose is to reap the benefits within the areas of productivity, innovation, expertise, and the work environment in a collaborative effort involving the companies and researchers.

The Work Research Institute (AFI), the Norwegian Confederation of Trade Unions (LO), and the Confederation of Norwegian Business and Industry (NHO) all collaborate with ICG.

Hydro Polymers AS participates in the Telemark Gassforum and other networks.

New hydrogen station at Herøya

Hydro Polymers is involved in the HyNors project in Grenland. This project involves transporting industrially produced hydrogen from the chlorine plant through an existing pipeline located between Rafnes and Herøya to a new hydrogen station at Herøya. The station will open in the spring of 2007. As far as we know this station will be the only one in the world that is commercially run and is linked to a major industrial installation. The hydrogen-driven automobile milieu in Grenland will be the second largest in the world with a fleet of nine cars. Hydro Polymers sponsors one of these cars.

Financial contributions


Hydro Polymers is very much involved in the local community through sponsorship deals and support. It is the goal of the company that sponsorship deals will support teamwork. The main target groups for these resources are the following:

- Children and youths involved in sports and other leisure activities
- Institutions of culture
- Special events in the local community
- Schools at all levels

	TERMINOLOGY AND ABBREVIATIONS
Asbestos	The name of a group of minerals with a fibrous structure that is resistant to heat and most chemicals. Asbestos was used in the electrolysis cells in the chlorine plant until 2006. Breathing in asbestos dust is noxious. It is for this reason that all work with asbestos takes place in closed systems and under special work conditions with complete personal protection equipment.
Autoclave	Closed container wherein chemical reactions take place under pressure. The autoclaves are equipped with a system for stirring. PVC is produced in autoclaves.
BAPP	Behavioural Accident Prevention Process, (see BBS).
BAT	Best Available Technology
BBS	Behavioural Based Safety. Work method to prevent incidents and injuries.
BST	Behavioural Science Technology, supplier of the method to ensure safety based on worker behaviour, (see BAPP and BBS).
Catalyst	A substance that accelerates a chemical reaction. In the VCM plant copper is used as a catalyst.
Caustic Soda	NaOH is produced in the electrolysis cells in the chlorine plant. It is used i.a., in the pulp wood industry, the aluminium industry and in the production of various chemicals.
CDI	Chemical Distribution Institute
CEFIC	Conseil Européen de l'Industrie Chimique / European Chemical Industry Council. www.cefic.org
Chlorinated hydrocarbons	A common term for VCM, EDC, chloroform, carbon tetrachloride, 1,1,1, trichlorethane and 1,1,2 trichlorethane.
Chlorine	Cl ₂ – A chemical element that can be extracted from salt through chemical or electrochemical processes. Used as a raw material for the production of VCM, which is the raw material used to produce PVC. Used also in the production of, i.a., pharmaceuticals and disinfectants in potable and bathing water.
CO	Carbon monoxide, a toxic gas consisting of unburned hydrocarbons
CO₂	Carbon dioxide, this gas has a greenhouse effect and contributes to global warming
COD	Chemical Oxygen Demand: a measure of the degree of pollution in water.
Copper	Heavy metal, environmental poison. Used as a catalyst in the VCM plant
Cracking	The cracking process breaks up molecules. Cracking takes place in cracker furnaces at very elevated temperatures. VCM is produced through the cracking of EDC.
Dichloroethane, EDC	C ₂ H ₄ Cl ₂ , an intermediate product in the production of VCM. EDC is produced through a reaction between chlorine and ethylene. Liquid at normal pressure and temperature. EDC is carcinogenic and has an exposure limit value in the work environment.
Disaster regulations	Regulations to prevent and limit the damage of disasters in companies where hazardous chemicals are found. This regulation demands that information be provided to the general public concerning safety measures.
DSB	Directorate for Civil Protection and Emergency Planning, http://www.dsb.no
ECVM	European Council of Vinyl Manufacturers www.ecvm.org

EDC	See dichloroethane
Environmental aspect	An environmental aspect is an activity, product or service that affects or may affect the environment. A significant environmental aspect is an activity, product or service that may have or has a significant affect on the environment.
Ethylene	$H_2C=CH_2$, the simplest unsaturated hydrocarbon that has two carbon atoms linked with a double bond. Ethylene is a raw material used to produce polyethylene and vinyl chloride, VCM
Exposure	Term used for noxious substances in the work environment
Fuel gas	A gas such as methane or hydrogen used as a source of energy
Fugitive emissions	Fugitive emissions are gases that leak out from closed process equipment for example, because gaskets may begin to leak over time. Leakage tests are carried out regularly in order to keep these types of emissions under control.
HCl	Hydrochloric acid. Acid that consists of a solution of hydrogen chloride in water.
Hydrocarbons	Chemical compounds that are composed of carbon and hydrogen.
Hydrochloric acid	See HCl
Hydrogen	H_2 , odourless gas produced in the electrolysis cells in the chlorine plant. Hydrogen is used as fuel gas. In the summer of 2007, the hydrogen resulting from chlorine production at Rafnes will be used as a fuel in Hydro's new hydrogen station at Herøya.
HyNor	This new hydrogen station at Herøya with hydrogen from Rafnes is a part of the planned "hydrogen route" in Norway. In 2009 it will be possible to drive hydrogen-powered vehicles between Stavanger and Oslo. See www.hynor.no
IBC	Intermediate Bulk Container
ICG	IndustriClusteret Grenland, a network for process industries in Grenland, http://www.icg.no/
Initiator	Additive that starts the polymerisation reaction in the autoclaves
ISO 14001	Environmental management system. This standard requires that the company shall adopt an environmental policy, chart significant environmental aspects and work toward continuous improvements in the company's environmental achievements. ISO14001 is directed at the external environment.
ISO 9001	Quality management system. The ISO 9001:2000 standard was developed by ISO (International organisation for standardisation) to determine international requirements for a system of management for quality control. This standard is process-oriented and focuses on continuous improvements and customer satisfaction. It is adapted to all processes that affect quality. The most important elements are the following: <ul style="list-style-type: none"> - Quality management system - The responsibility of management - Resource management - Product sales - Recording, analyses and improvements
KPI	Key Performance Indicator
Landfill	Storage site for waste

Latex	A paste PVC in water containing unused additives.
Membrane	A synthetic filter used in electrolysis cells in chlorine production. Membrane technology is Best Available Technology (BAT).
NIVA	Norwegian Institute for Water Research, http://www.niva.no
NO_x	Nitrogen oxides are a group of chemical substances of which certain contribute to the formation of smog and others to acid rain.
OPWC	Organisation for the Prohibition of Chemical Weapons, http://www.opcw.org
PCB	Polychlorinated biphenyl. Toxic, used earlier in, <i>inter alia</i> , lighting fixtures
Petrochemistry	Chemical production based on oil/gas
pH	The measure of a liquid's acidity value.
Phthalate	A type of softener used as an additive for PVC
PMMA	Polymethyl methacrylate, plastics raw material
Polymer	A compound consisting of a long chain of branching molecules.
Polymerise	Bond molecules together in long chains.

P-PVC	Pasta-PVC, PVC-type
PVC	(-CH ₂ - CHCl-) _n , Poly Vinyl Chloride , plastics raw material  PVC molecule
SFT	Norwegian Pollution Control Authority http://www.sft.no
Sodium Chlorate	NaOCl ₃ , chemical compound between sodium, chlorine and oxygen which is formed in the electrolysis cells in the chlorine plant.
Softeners	Substances that are mixed in with polymers, such as PVC to make them softer and more flexible.
S-PVC	Suspension PVC, PVC type
SQAS	Safety and Quality Assessment System
SS	Suspended matter, PVC particles
Stabiliser	Additive for PVC used to affect the plastic's properties for use
TOC	Total organic carbon. TOC is used to measure the organic material content in a water sample.
Toxic	Poisonous, that is to say that which can hurt living organisms.
TRI-value	Total Recordable Injuries. The sum of the days absent due to injury involving medical treatment and alternative work assignments per million hours worked.
Utilities	Required factors in production such as for example steam, electricity, water and compressed air.
VCM	CH ₂ =CHCl, a colourless gas (Vinyl Chloride Monomer) produced by chlorine and ethylene used as a raw material in PVC. VCM is carcinogenic and there is an exposure limit value within the working environment.
Vinyl 2010	Vinyl 2010 Vinyl 2010 is an international non-profit organisation based in Brussels which includes the European PVC producers and the Phthalate stabiliser and plastics manufacturing industry. The purpose of Vinyl 2010 is to implement the voluntary, binding environmental programme the industry entered into in March 2000 http://www.vinyl2010.org .