International Fertilizer Industry Association

IFA Technical Conference

The Hague, The Netherlands
6-8 October 1992

ENVIRONMENTAL IMPROVEMENTS AT A UK FERTILISER PLANT

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SUMMARY

Fertiliser production at Ince commenced in 1969, following construction of an integrated fertiliser complex on a green field site. The early years of site operation were associated with a range of environmental problems caused by technical, design, and operating difficulties. The level of public complaint was rather high. Application of proven technology and systematic problem solving has been necessary to ensure a balanced development between the site and the environment.

The site was acquired by Kemira in 1988.

The site now has a very good environmental performance.

The paper highlights the relevant features of the individual plants and the measures taken to achieve this objective.

1. DESCRIPTION OF SITE

1.1 As Built

Kemira Ince has been in operation since 1968 when a complete and integrated fertiliser complex was constructed on a green field site over a 2-3 year period. The plants included a single stream ammonia plant, two single high mono-pressure nitric acid plants, two ammonium nitrate solution plants, an ammonium nitrate prilling plant, three NPK plants, and bagging and despatch facilities designed on the basis of no intermediate bulk storage.

Most fertiliser product leaves the site as bagged product (50 kg + 500 kg) via road and rail transport.

The feedstock for the ammonia plant was originally intended to be desulphurised naphtha from the adjacent Shell Refinery located 3 km to the west. Within two years of start-up the ammonia plant was converted to natural gas operation, producing 900 TPD with some of the by-product carbon dioxide exported to an external carbon dioxide liquefaction plant. Apart from the ammonium nitrate produced in the downstream units, the remaining fertiliser products are NPK formulations requiring the import of phosphoric acid and potash.

The plant clarifies water from River Dee 15 km away, supplied to the local industrial complex, and employs mixed-bed demineralisation for 100 bar boiler feed water supply. The site operates two major cooling towers.

The topography of the location is that it is situated on reclaimed marsh land, 1 km north west of the village of Helsby which is built against an escarpment rising to 150M. A high percentage of the prevailing winds are from a north westerly direction.

All liquid effluents and surface water are collected and discharged as a single flow by pipeline to the Mersey Ship Canal which is eventually discharged into the River Mersey.

1.2 Further Developments

After establishment of the original complex in 1969, the next development took place with the Phase 2 expansion project in 1980, comprising an additional nitric acid plant, an ammonium nitrate solution plant and effluent treatment plant associated with the ammonium nitrate operations.

The ammonia plant was revamped in 1984 to reduce energy consumption. Purge gas hydrogen recovery plant was installed in 1987, and the plant was again uprated in 1992 to further improve efficiency.

Further developments were replacement of the original ammonium nitrate prill tower with a new tower and plant in 1985, and uprating of the Phase 2 nitric acid plant in 1986. Development in the NPK fertiliser plants included installation of pipe reactors on the blunger granulation units (1983/86) and installation of dry dust filtration in place of wet scrubbing on all three NPK plants in 1990 and 1991.

Current site capacities are:

Ammonia	1000 tpd
Nitric Acid	1800 "
Ammonium Nitrates Solutions	2300 "
Ammonium Nitrate Prills	1800 "
NPK fertiliser product	1800 "

2. AMMONIA PLANT

The reliable operation of a large single-stream ammonia plant results in very few emissions of process components to air other than flue gases and carbon dioxide. Unreliable or unstable operation can change this significantly - resulting in environmental consequences of air, liquid and noise pollution.

The early history of this plant required particular attention to these areas, notably:-

1. Redesign and/or separation of process and storage relief valve and vent systems.

2. Investigation and installation of mechanical solutions to problems of fugitive emissions from compressor and pump seal systems.

3. Investigation and application of noise suppression on process, air and steam vents, reformer burners, and air intakes.

4. General improvement to plant reliability to reduce demands on vent and relief systems.

2.1 Relief Vent Systems

One of the earliest introductions to the sub-micron has potential of ammonia compounds, was the consequence of location of an ammonia vent line adjacent to the flue gas stack of an oil fired boiler. The occasional combination was significant visually, and the situation resolved relatively quickly.

In general and with that exception, the ammonia plant has not provided cause for complaints of this type. However, another early incident in the history of the plant resulted in the rationalisation and installation of a new vent system for the relieving devices of the refrigeration system and site storage/export system. There are separate systems for liquid and vapour duty, and the liquid system is based on collection in knockout pots which contain level alarms. Although rarely used, it does provide for collection and pumped return, avoiding discharge to the air or drain.

2.2 Fugitive Emissions

A variety of seal devices are used on compressors and pumps to achieve very low levels of losses to atmosphere. Oil film shaft seals, twin stem packing and tandem mechanical seals are amongst the techniques used. Systems have been installed to recycle all the seal gases from the ammonia and synthesis compressors. All ammonia relief valves are duplicated with on-line change-over systems to allow maintenance to any passing relief valves. There are no persistent problem areas of this sort at Ince.

2.3 Noise Suppression

The original NH plant as built provided, particularly under start up conditions, a wide variety of noise sources. These included the main process gas vents, air-surge blow-off vents, air compressor intakes, convection section burners, an induced-fan turbine, and even a boiler feed water control valve. Detailed noise analysis enabled the db attenuation required at specific frequencies to be specified accurately. Wet process gas venting was a particular problem, requiring installation of a vent silencer, full line size bellows, acoustic lagging and elimination of sharp edges/restrictions to eliminate discrete frequencies.

Modified silencers and acoustic lagging were installed to piping and attached structures.

3. NITRIC ACID PLANTS

The three nitric acid plants at Ince employ two-stage catalytic combustion for abatement of the NOx from the absorber. The two original nitric acid plants were designed to utilise a desulphurised raffinate/low boiling point hydrocarbon as combustor fuel. The effluent standard in 1969 was less than 1000 ppm NOx and colourless.

Although the "colourless" criteria was easily achievable, the combustor performance was not reliable under full abatement conditions. The catalyst employed used palladium - which led to coke formation under reducing conditions and consequent catalyst bed damage on some occasions.

Arising from ~~this and dissatisfaction with the liquid fuel operation,~~ the plants were modified to utilise purge gas from the ammonia plant as an alternative fuel. The operating advantages of this fuel are well documented in the literature. However, there was insufficient purge gas for both streams under all conditions and alternatives were considered.

Although the reservations of natural gas for catalytic combustion were documented in the USA literature, and there was limited European experience, the subsequent availability of this fuel on site resulted in detailed review. The first conversion to natural gas was carried out on 'A' stream in 1978. From detailed studies, the existing catalyst L/D ratio and space velocities were known to be potentially limiting, and the conversion entailed modification to the catalyst baskets within the constraints of the existing vessels. Subsequent operation was satisfactory and the experience was reflected in the detail design for the third nitric acid plant (C stream) constructed and commissioned in 1981.

Revamp of the design and formal uprating of C stream was carried out in 1986, to a capacity increase of 130% of original design. This also required modifications to the catalyst baskets and installed volume. The installation and subsequent operation was satisfactory.

The final development was the decision to apply purge gas recovery for hydrogen on the ammonia plant. This resulted in conversion of the final plant (B stream) to natural gas in 1987.

Summarising, all nitric acid plants are now operating with catalytic combustors based on natural gas fuel. The plants discharge into a common stack with a weighted average NOx of 250-450 ppm, depending on the age of the catalyst. The key points to satisfactory installation and operation are:-

1. Adequate fuel/tail gas mixing.

2. Adequate gas inlet temperature control for ignition.

3. Adequate catalyst and bed design and space velocities.

Start up to colourless is achieved in 20-25 minutes.

NOx analysis is carried out using a chemiliminescent instrument. One instrument is used to serve the three streams under the control of a TCS 6366 controller which provides sample switching and signal handling functions.

This type of instrument operates under vacuum, which necessitates the use of pumps, a maintenance item. Other maintenance requirements are the periodic replacement of the carbon catalyst, and the cleaning of the window in the reaction chamber. The cleaning interval can be lengthened by ensuring that sample temperatures remain high thus eliminating condensation.

Continuous recording of the results is made, and the retained instrument chart is subject to inspection by the statutory authority.

4. AMMONIUM NITRATE SOLUTIONS

This is produced by reaction of 57% nitric acid and ammonia, under 3.3 bar pressure, in three plants (A, B & C streams) - total capacity 2300 te/d. The original A/B plants built in 1968 employed single-stage neutralisation in a thermosyphon concentric draught-tube arrangement. C stream, constructed in 1981, also uses single-stage neutralisation but the reaction proceeds in a loop system, the thermosyphon recirculation rate being controlled by an internal butterfly valve. All three reactors employ titanium components in the well-known corrosion areas of spargers and reaction zones.

The inputs to the plants are 57% nitric acid, gaseous ammonia from site air conditioning systems and local vaporisation, and recycled ammonium nitrate remelt liquor from the AN prill plant. The former are ratio-controlled with pH trim, and the latter is flow controlled. Since there is less reactor control of the original A/B units, the majority of the recycle from the AN prill plant is fed to C stream neutraliser, which also employs a more sophisticated dropcatcher.

The single stage neutralisation is carried out at a relatively high pH 5.0-5.5, compared with others in the industry. This arises from the original and continuing concern about the safety aspects of ammonium nitrate, particularly at higher melt temperatures. An added concern was the return of remelted fines and oversize from the AN prill plant, instead of return to granulation plants as noted generally in the literature.

The local plants utilise the steam generated in the neutraliser:-

1. As the energy source for the next stage to produce 92% ammonium nitrate solution.

2. As a contaminated steam utility for ammonium nitrate solution transport jacketing.

3. As the energy source for the stream-stripping section of the effluent treatment plant.

Prior to the construction of an external treatment plant coincident with C stream in 1981, the aerosol and droplet formation in the rigorous two-phase reaction conditions within the A/B draught tube was apparent.

Considerable trial work was done to reduce these losses within the constraints of the design. All three units have also been optimised via plant trials for performance with respect to overhead losses for a variety of site throughput conditions.

5. AMMONIUM NITRATE PRODUCT

The prilling process for 34.5% N has been used at Ince since the site commenced production in 1968. The original process did not provide for treatment of particles and fume from the prill tower, and the environmental impact was evident internally on site, and responsible for a high proportion of public complaint. The former arose from particulate ammonium nitrate, the latter from the fume discharged from the prill tower, particularly evident in certain weather conditions. In addition, the combined air-swept dehydrator fume and rotary cooler exit air was treated in a Peabody Scrubber. The final scrubber effluent gas was discharged as a highly visible saturated vapour adjacent to the tower air discharge points.

Following increased production in 1981, the visible tower plume was responsible for a high level of public complaint, against the background of increasing environmental awareness in the public community.

Required production increases, in excess of the existing tower capacity, resulted in total replacement in 1985. Technical developments had been followed closely for a number of years and were incorporated into the process design. During the same period, an internal Ammonium Nitrate Code of Practice was also developed as a result of the initial experiences of ammonium nitrate production at Ince. Partial collection of ammonium nitrate prill tower fume and particulates had been noted in the literature but the visual benefits were known to be incomplete. Accordingly, the new ammonium nitrate prill tower built in 1985 was designed to treat the complete tower outlet effluent gases. The process flow layout is shown in Figure 1.

The fume scrubber treats:-

1. The total tower exit air.

2. The hot air/fume from the air swept dehydrator.

3. Ammonium nitrate dust from the fluid bed cooler cyclones.

4. Process tank vapours.

Hot air from the dust free section of the fluid bed cooler is added to the final outlet gas from the scrubber to eliminate the otherwise visible saturated plume. The fume scrubber (Figure 2) contains two treatment sections:-

1. A lower demister pad section sprayed from above and below with recirculated 40% ammonium nitrate solution.

2. Filter candle elements sprayed with demineralised water.

Although the technology is not new there are a number of features that have required detailed attention to ensure and maintain the high performance standards of the unit.

5.1 Flow Distribution

Satisfactory gas flow distribution across large units is not new in the industry and it is not easy to obtain perfect aerodynamic distribution in (relatively) crude geometry. For the unit under discussion, this potential problem was recognised and appropriate deflector arrangements fitted to the air inlet section. Although there have been no particular problems arising from this design, after seven years operation it is possible to distinguish the possibility of slight mal-distribution of the inlet gas mixture and preferential flow to some candle units. Work is in hand to confirm the extent of this and the justification for any modification.

5.2 Candle Fibre Condition

The installed candle units utilise very fine glass fibre as the filter medium and is susceptible to corrosion/attack by ammonia. The potential problem of alkaline attack was recognised, and acidic pH control of the recirculating liquor was installed at the design stage, based on pH measurement of the scrubber recirculation liquor. After two years satisfactory operation, an incident of candle failure was investigated and showed inadequate wetting of some sections of the demister pad due to blocked sprays, resulting in NH_3 breakthrough and alkaline attack of candles. Improved filters were installed and regular spray-cleaning implemented. The investigation also suggested that under certain plant conditions, the ammonia loading from the subsidiary flows to the scrubber system and the pH measuring system lag could result in longer periods of alkaline operation than originally considered. pH measurement and control was applied to the sump return flow.

It is known, however, that glass can be weakened by acid attack as well as alkali.

Acid - leaching of Na^+ and K^+ ions resulting in mechanical stresses in surface layers and hence embrittlement.

Alkali - loss of Si ions, dissolution, loss of material fibres.

Accordingly, the operational pH control is between very close limits - pH 1.7 to 2.5.

Notwithstanding these problems the unit has made an important contribution to the local environment. Even during the period of minor candle failure mentioned previously the overall performance did not merit complaint. The actual discharge performance figures are well below 15 mg/m^3.

From 1976, deposit gauge measurements had been taken at fixed positions from the old tower and demonstrated the high loss of ammonium nitrate from the prilling operation. A significant proportion of this contributed to the site liquid effluent discharge. Following installation of the new plant and fume scrubber these losses were insignificant.

The final feature of the plant with respect to environmental control is that all drainings (tanks, sampling) are all collected in a local drain system and pumped to the effluent treatment plant.

6. NPK

The main areas of environmental concern are:-

1. Gaseous emissions to air.

2. Liquid and solid losses/spillages that result in liquid effluent.

6.1 Gaseous Emissions to Air

The most important improvements here have been made as a consequence of installation of pipe reactors on each of the three NPK streams. Development and installation were carried out systematically in-house, based on the UKF pipe reactor. Although the use of pipe reactors in rotary granulators was established, the significant feature for Ince was the application of the technique to the blunger granulator of the original Dorr Oliver plants.

Trials commenced in 1981, though the first full scale unit was not installed until 1984, the two remaining streams being completed in 1986 and 1989.

Prior to the use of pipe reactors it had been necessary, in some fertiliser grade production scenarios, to export excess scrubber liquor via a liquid fertiliser sales outlet, with even occasional dumping. The initial pipe reactor trials and successful installation allowed a more rational approach.

The immediate consequences of pipe reactor installation was the reduction in ammonia emissions for most grades of fertiliser produced at Ince.

An extension to this work was the installation of ammonia monitors in the final effluent stacks for each of the three plants - which has enabled better plant control.

The installed monitor is an infra red absorption type instrument. There are several across-stack instruments available on the market, but vibration and alignment can be a problem. The particular unit selected for Ince avoids this because it houses source and detector in one compartment, and is constructed as a probe surrounded by a porous tube through which the stack permeates. The analyser is fitted with an external heater to inhibit condensation under the very wet conditions. Calibration is achieved by purging the tube with certified gas mixtures, thus displacing the stack sample.

Following initial problems with condensation, the instruments have performed well and are stable with good repeatability.

6.2 Losses to Liquid Effluent

The major concern in this area was the total inability of the NPK plants to consume the water in incoming raw materials, together with the site utility water required to maintain satisfactory scrubber performance without blockage. The imbalance on occasions required transfer of material to a liquid fertiliser sales outlet and even dumping in some instances.

As part of an uprating project for one of the three NPK streams, detailed plant investigations indicated that a considerable dust loading improvement could be obtained by modification to the scrubber duty.

The dust load to the wet scrubber was substituted by dry dust extraction. A new dry dust collection system was installed in two separate systems, the pulveriser and equipment local to the recycle conveyor, and the primary and secondary screen areas.

The new screening duty was carried out by two reverse jet-back pulse filters. (Figure 3). From the literature and discussions with other users, these fabric filters were specified with a filter face velocity compatible with the nature of the dust to be filtered. In addition the units were supplied with a warm up/shut down heating set to cater for the hygroscopic material and avoid the obvious problems, well documented in the literature. The overall success of the units has resulted in identical modifications to the remaining two NPK streams.

The final improvement to management control systems is the application of dust monitors to these units and similar units where these have been installed on recent projects.

Dust monitors are installed on many bag filter exhausts. These consist of a light source and detector mounted across a duct, but, whereas dust meters usually work on obscuration, this instrument operates by measuring the flicker which occurs when dust is present. This system is claimed to be more tolerant of lens fouling, and as this has not been a problem in over 18 months operation, we have no reason to doubt this.

The response of the equipment is dependant on the physical characteristics of the dust, and so iso-kinetic sampling is required to calibrate the instrument initially, and subsequently if the dust is changed.

The performance of the fabric filters is monitored by measuring the dust concentration upstream of the filters and in the exhaust gas stream. In practice the bag filters were so successful that it was necessary to allow a slip stream of dust in order to calibrate the system to provide an alarm in the event of bag failure. Since the units were installed in December 1989, there have been no such failures to date.

The production of scrubber liquor is reduced and is now within the plant water balance so that there is no surplus liquor exported from the plant.

6.3 Housekeeping

For any NPK process plant the role of housekeeping in pollution control can be significant. As part of the original evaluation of pipe reactor installation and strategy the remaining contribution of other plant practices was considered. Wet cleaning was eliminated by reconsideration of facilities, and casual hose pipe usage using site utility water was eliminated.

7. LIQUID EFFLUENT

Apart from the general considerations of the many possible substances that can be passed to drain in an integrated fertiliser complex, the main areas of concern to Ince and the statutory authorities have been:-

1. the ammonia content of effluent and total losses;

2. containment of site waters to avoid contamination of local watercourses;

3. pH control of effluent.

In addition there are the specific responsibilities in respect of each of the components of our "Consent to Discharge" - which is the basis for statutory control of our single effluent discharge. Apart from NH_3, P_2O_5 and heavy metals, it also contains limits on temperature, suspended solids, oxygen demand and other factors.

7.1 Ammonia

The toxicity of ammonia to fish and marine life is well documented and for a number of years, this was the single and dominant consideration for Ince. The potential sources were numerous, but the main origin was the ammonium nitrate solutions plants and ammonium nitrate prill plant.

In 1981, an effluent treatment plant was constructed devoted entirely to the collection and treatment of site ammonia and ammonium nitrate liquors and contaminated waters. This included the surface waters from selected process areas.

Steam stripping at elevated pH is carried out, and the resulting high concentration NH_3 liquor is further rectified under pressure to provide NH_3 vapour which is used on the NPK fertiliser plants.

Even with this facility, it was also noted that other controls and disciplines would be required in the long term. These ranged from additional hardware projects such as recovery of air conditioning blowdown, to improved procedures such as dry cleaning of equipment.

The progress in reducing the ammonia loss from site is shown in Figure 4.

7.2 Site Water and Drains - Containment and Monitoring

When the site was constructed, only process waters were collected and directed to the collection ponds - for treatment on a batch basis. Surface waters arising from rain water falling on roofs, storage areas, site roads and non-process areas could run off into surrounding water-courses.

This unsatisfactory situation was recognised very early in site operation - and the external connections sealed. All site water now passes through the collection ponds.

In conjunction with this, the site drain system, laid out in symmetrical grid format, was used as a basis for continuous monitoring. Samples from key points are permanently supplied to the laboratory which, by continuous analysis and monitoring, can immediately highlight any unusual losses from any particular plant area for action by plant supervision.

Information from this system is reviewed and reported for performance, and any infringements of internal and external limits. A comprehensive monthly report is issued.

7.3 pH Control

As site development proceeded, the buffer capacity of the combined effluent was reduced. Minor quantities of acid or alkaline waters would result in infringement of the pH limits.

Coincident regeneration sequences of the demineralised water plant and system capacity became insufficient to ensure compliance. A DMW plant regeneration liquor neutralisation pond was constructed. Automatic operation provides for thorough pond mixing prior to steady discharge with minimum impact on final outlet pH.

7.4 Suspended Solids

As noted in the site description, the site is responsible for clarification of 9000 te/day river water for site requirements. In addition to the corresponding sludge - blowdown from the site cooling towers and surface solids are passed into the final collecting ponds.

Historical inputs of phosphate, which were precipitated and settled in the ponds - are no longer a feature of site operation. Phosphate control recovery on site includes collection and return, via a breaktank, of the small quantities in the connection hoses between the rail tanker and discharge pump.

The collecting ponds employ box weirs to enhance settling characteristics and settling capacity and are arranged for removal of sludge. This sludge was formerly removed and filtered, via rotary vacuum filters, using filter aid involving manual operation. This was replaced in 1987 by a continuous vacuum belt filter. Sludge from the ponds is treated with lime on an automatic batch cycle and dewatered to a filter cake (5% moisture). The composition of this material is such that Ince has a licence to tip this on an internal tip, subject to impromptu and regular statutory inspection to ensure compliance with the terms of the licence.

Site "Consent to Discharge" limits are reviewed by the authorities every two years. The previous Statutory Authority was the Water Authority who had overall responsibility for water supply, control and discipline of the effluent discharge, and the quality of the receiving water. To remove any potential conflict for the responsibility for checking, compliance has been changed under the Water Act to the National Rivers Authority (NRA).

Summarising - Kemira Ince manufactures and exports 1.0M tonnes/annum of AN and NPK products from the site by road or rail transport. The liquid and solid raw materials for the products (including the suspended solids in the incoming raw water) result in annual discharges of:

Ammonia (NH4-N)	120 tes/annum
Phosphate (P205)	7 "
Potash (K20)	39 "
Suspended Solids	74 tes/annum
Chemical Oxygen Demand	120 "

8. PUBLIC LIAISON AND RESPONSIBLE CARE

A particular feature of Ince development was the statutory application in 1975 for an extension of the Ince works - Phase III. This concerned a possible additional ammonia plant.

Between the original site development from 1965 to 1975 there were significant changes in UK planning legislation and the planning and environmental aspects of the proposal were subjected to detailed examination. The original site construction was unwelcome byresidents and the environmental performance of the site in the early years was poor. The expectations of the original planning inquiry in 1965 were not met and the public complaint level was high. Although the outcome of the planning application was successful, the environmental and planning issues raised have since been used as a standard study material for the Environmental Studies course of the Open University of the UK.

In retrospect, the additional efforts required for a successful outcome provided a significant frame work for subsequent environmental management of the site.

A community liaison committee was established combining elected representatives of the local areas, formal officers of the local councils and a representative of the statutory body concerned with pollution control.

Management reporting systems include a public complaint report which is distributed to managing director level. Environmental incidents are reported daily on the same basis as reporting plant performance. There are monthly data reports and an annual environmental report covering all aspects including waste disposal, which is copied to the Head Office. In 1991, and anticipating the consequences of the Environmental Protection Act in the UK requiring public disclosure, information on all aspects of Ince environmental performance was made public in an Environmental Report to all staff and interested parties outside Kemira Ince.

The consequences of the physical improvements and management systems employed at Kemira Ince are reflected in the public complaint record (Figure 5).

The combined efforts noted in this paper, together with on site IS 9000 activities, are seen to be a sound basis for Responsible Care elements (Figure 6) leading to future ECO-Audit requirements.

However, the main consequence is the transformation of a situation of high public complaint, poor liquid effluent performance and visible plumes, into an environmentally sound site with a recognised high level of performance.

FIGURE 1

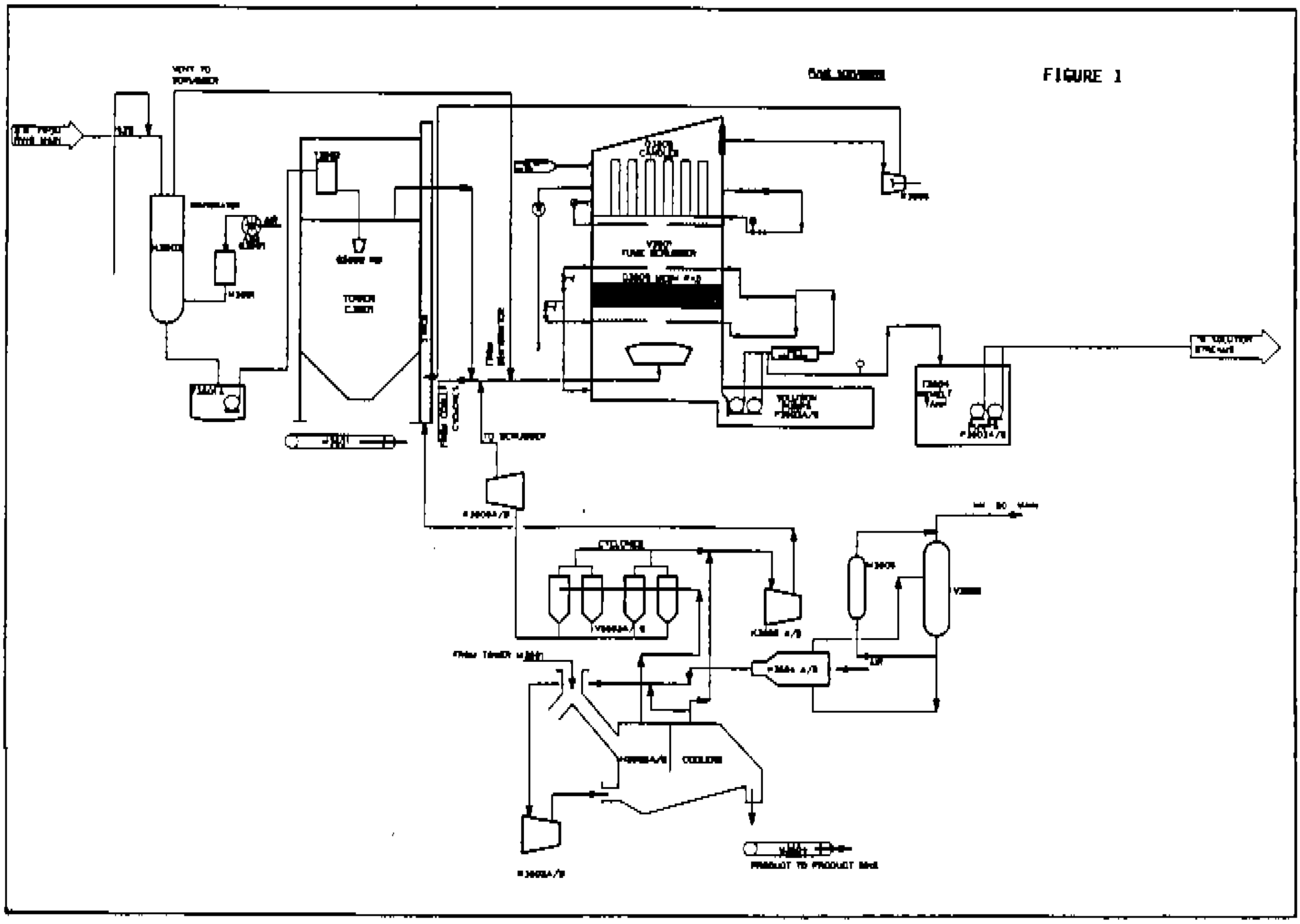


FIGURE 2 FUME SCRUBBING

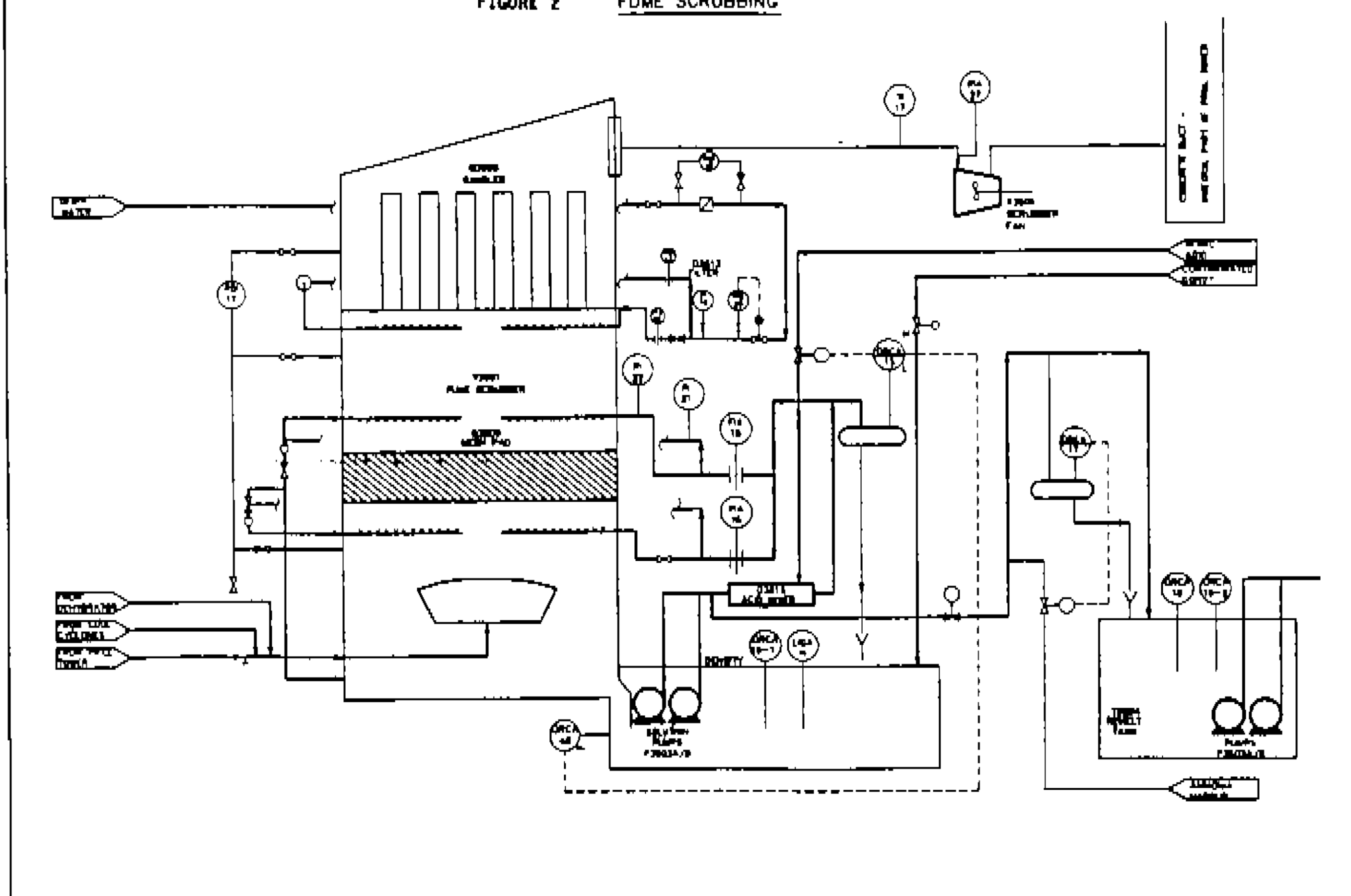
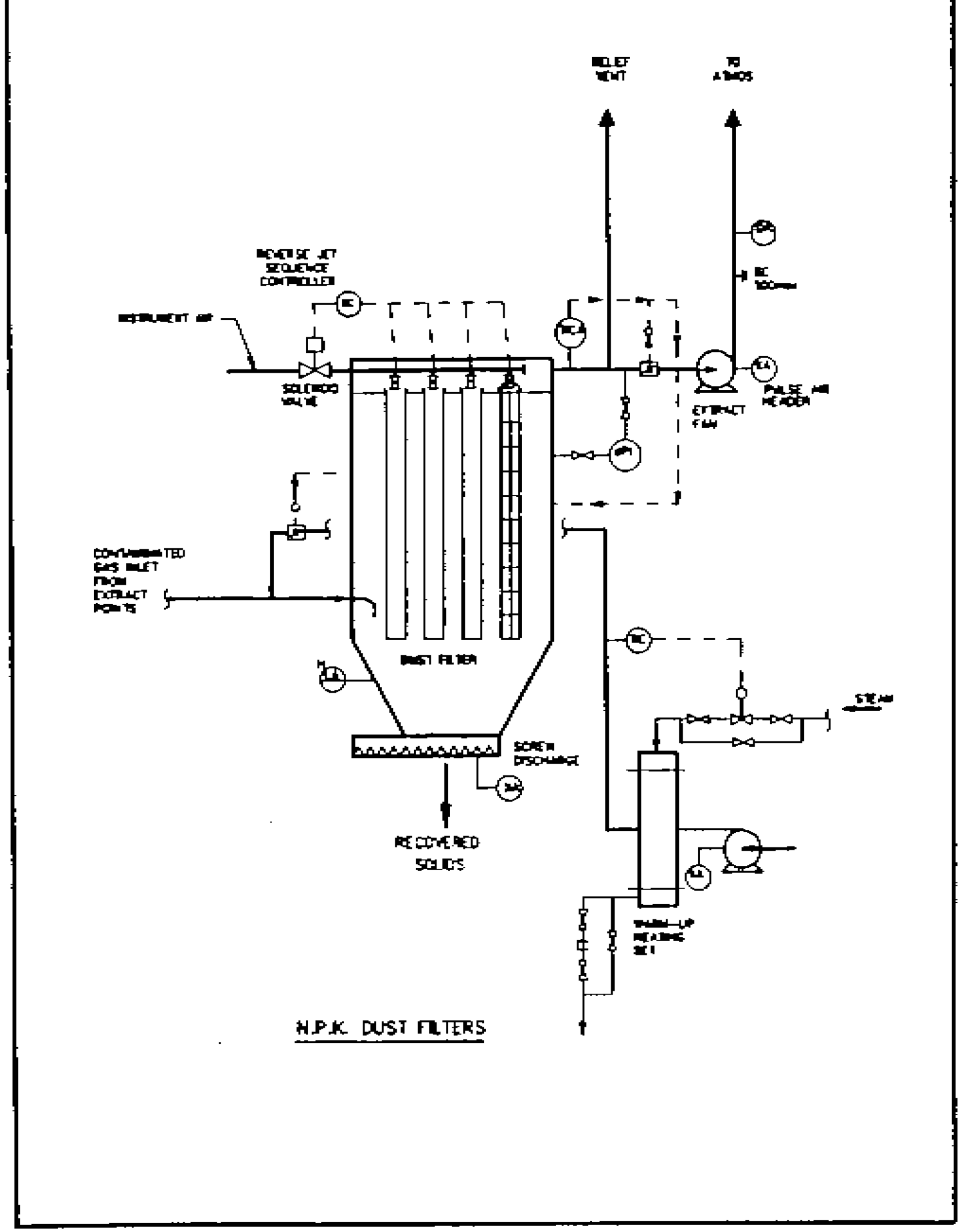


FIGURE 3



N.P.K. DUST FILTERS

Kemira Ince

Ammonia NH4-N
Liquid Effluent Losses

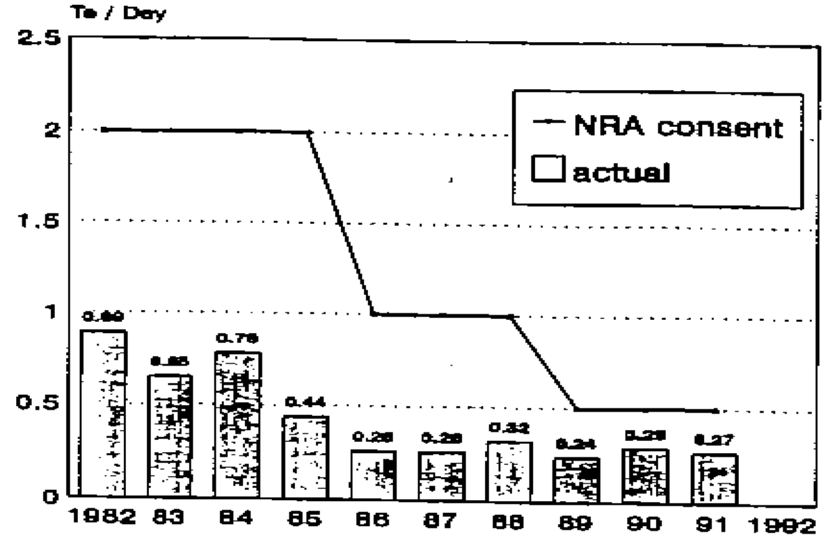


FIGURE 5 Public Complaints

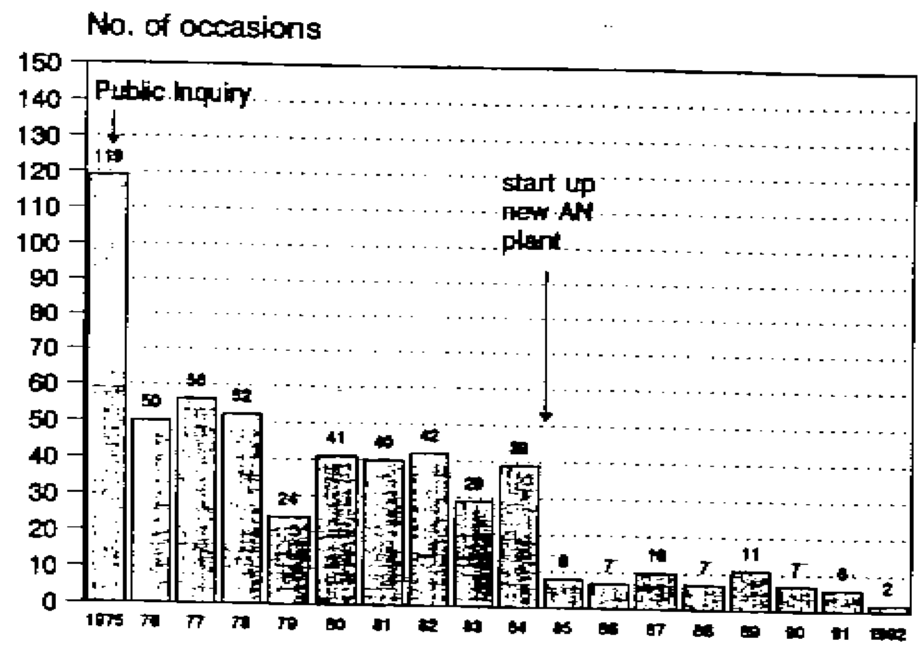


FIGURE 6

CHEMICAL INDUSTRIES ASSOCIATION REASONABLE CARE GUIDING PRINCIPLES	CHEMICAL INDUSTRIES ASSOCIATION ENVIRONMENTAL OBJECTIVES	KEMIRA INCE RESPONSIBLE CARE ACTIVITIES
1. Companies should ensure their health, safety and environment policy reflects the commitment and is clearly seen to be an integral part of their overall business policy.	1. Preparation and regular review of company environmental policies, including procedures for their implementation.	1. Environmental Policy and Safety Policy.
2. Companies should ensure that management, employees at all levels and those in contractual relationships with the Company are aware of their commitment and are involved in the achievement of their policy objectives.	2. Maintaining an awareness amongst employees at all levels of importance of environmental issues and providing training appropriate to their responsibilities. Maintaining an awareness of the environmental effects of operations, supported by monitoring as appropriate.	2. Management systems and reporting. Planning for Responsible Care, including Questionnaires. Monitoring of the environment.
3. All Company activities and operations must be conducted in accordance with relevant statutory obligations In addition, Companies should operate to the best practices of the industry and in accordance with Government and Association guidance.	3. Using, as far as is economically practicable, processes and procedures that minimise the production of waste. Taking fully into account any guidance on specific environmental issues provided by Government and other appropriate bodies.	3. Waste disposal - Duty of Care. CIMAH Safety Cases.
4. Companies should assess the actual and potential impact of their activities and products on the health and safety of employees, customers, the public and environment.	4. Assessment in advance of the environmental effects of new processes and products and taking of steps to reduce the environmental effects to a practicable minimum. Having special regard for the effects of activities on rare or endangered species of flora or fauna. Requiring contractors to operate in accordance with legal requirements and acceptable environmental practices.	4. Accidents and incidents - review and analysis. Risk analysis. Nuisances and complaints procedures - noise, smells. Health surveillance under COSHH.
5. Where appropriate, companies should work closely with public and statutory bodies in the development and implementation of measures designed to achieve an acceptably high level of health, safety and environmental protection.	5. Co-operation with the relevant control authorities in developing specific requirements which enable the statutory provisions to be met.	5. Emergency Planning - company and geographic area. Liaison with local authorities and inspectors. Liaison with Statutory Bodies in development of legislation and BATNEEC guidance notes.
6. Companies should make available to employees, customers, the public and statutory bodies, relevant information about activities that affect health, safety and the environment.	6. Participation in the assessment of environmental issues so that a proper balance may be maintained between care for the environment and the benefits to society provided by the industry. Provision of the necessary information to enable products to be stored, transported, used, handled and disposed of without unacceptable effects on the environment. Provision of information necessary to enable the public to understand the environmental aspects of an operation except only where commercial confidentiality is absolutely essential.	6. Running of Open Days. Information to the public. Sharing of safety and environmental experience for similar types of processes. Media activity and special topics of local concern. Public Environmental Report. Product Health and Safety Data Sheets to customers. Product Handling Process Codes of Practice. Community Liaison Committee.