

COMAH

Major Accidents Notified to the European Commission

England, Wales & Scotland 2000-2001

Report of the Competent Authority

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SYNOPSIS

The Control of Major Accident Hazards (COMAH) Regulations 1999 are implemented by a Competent Authority comprising of the Health & Safety Executive (HSE) working jointly with the Environment Agency (EA) & the Scottish Environment Protection Agency (SEPA).

This report covers the period April 2000 to March 2001 and provides details of 4 COMAH major accidents in England, Wales & Scotland notified to the European Commission (EC). The report describes the causes of the accidents, their consequences and the enforcement action taken by the Competent Authority (CA). In publishing it, the CA is aiming to show how the COMAH regime is working in an open and transparent way. The report will also enable lessons to be learned so that accidents can be prevented in the future.

This is the second report to be published in the series following the launch of the [report covering 1999/00](#). The CA intends to publish the report for the period 2001/2002 during 2003.

1 EXECUTIVE SUMMARY

The COMAH Regulations 1999 apply to approximately 1100 establishments that have the potential to cause major accidents because they use, or store, significant quantities of dangerous substances, such as oil products, natural gas, chemicals and explosives. The general duty of the regulations is that 'Every operator shall take all measures necessary to prevent major accidents and limit their consequences to persons and the environment'. The regulations are unusual in that they are implemented by a Competent Authority, comprising of the HSE working jointly with the Environment Agency and the Scottish Environment Protection Agency. This arrangement reflects the requirements to ensure the protection of both persons and the environment.

The CA is required to notify certain major accidents to the EC. The criteria include; the release of a specified quantity of a dangerous substance, specified harm to persons (e.g. 1 death), specified harm to the environment (e.g. significant damage to more than 10km of river) or in some circumstances a 'near miss' of particular technical interest. This report describes the 4 EC Reportable Accidents (ECRAs) that occurred during the period 2000/01, their consequences and enforcement action taken by the CA. A summary is provided in tabular form at [Appendix A](#).

The key points to note are that of the 4 accidents:

- 2 of the accidents occurred at top tier sites and 2 at lower tier sites.
- No fatal/serious injuries occurred.
- 1 accident resulted in minor injuries with 9 people (4x Fire fighters, 1x Police Officer and 4 local residents) being taken to hospital but not detained.
- 1 accident required 60 residents to be evacuated for 12 hours, with further evacuations taking place due to possible off-site effects.
- 1 accident resulted in on-site property damage in excess of 2 million ECU.
- 2 other accidents cost a total of £65,000 in on-site damage and losses.
- The CA investigated all 4 accidents. 1 investigation is still ongoing.
- 1 accident resulted in a prosecution with a fine of £750,000 imposed.
- Prohibition and/or Improvement notices were served in relation to 3 of the accidents. In one other case improvement was recommended without the need for formal enforcement.
- 1 accident has led to the preparation of a public report to be published on the HSE Internet website early in 2003.

The principal conclusions are:

- There were 4 ECRAs in 2000/01. This is similar to the average number of major accidents that were reported each year under the previous CIMAH regulations.
- Whilst recognising that it is difficult to draw conclusions from such a small sample, ECRAs can be used as a crude measure of safety performance. The Accident Frequency Rate (AFR) for the period April 2000 to March 2001 is 3.6 ECRAs per thousand COMAH establishments per annum. Alternatively this can be expressed as 1 ECRA per 277 COMAH establishments per annum.
- There is concern at the magnitude and frequency of these accidents and at the repeated underlying causes of major accidents. The CA will continue to use the COMAH Regulations as the vehicle for improving corporate governance of major hazard sites.

2 INTRODUCTION

In April 1999 the Control of Major Accident Hazards (COMAH) regulations came into force in England, Wales and Scotland, replacing the CIMAH regulations that had been in place since 1984.

One of the changes introduced by COMAH, is greater public access to information relating to major accident hazards. For example, the intention is that safety reports and notifications submitted by Operators are placed onto public registers, which are located in Environment Agency offices. These measures are required by the 'Seveso II' directive and are in line with UK government policy to improve public access to information on safety and the environment. However, there is currently a Direction from the Secretary of State suspending this arrangement until national security considerations have been agreed with the appropriate authorities.

The COMAH regulations require the CA to notify the EC of certain major accidents. This is a continuation of the CIMAH requirements and there have typically been an average of 4 such accidents in the UK each year. The EC uses the data to inform its decisions on future changes to legislation regarding major accident hazards. The data is also made publicly available, including on the Internet, so that it can be used to learn lessons from the past and help to prevent accidents in the future.

This report provides details of the 4 COMAH major accidents notified to the EC between April 2000 and March 2001. It is the second report to be published following the launch of the series with the [report covering 1999/00](#). The CA intends to publish the report for the period 2001/2002 during 2003.

3 REGULATORY BACKGROUND

The first European Council directive concerned with controlling major accident hazards involving dangerous substances was adopted in 1982. Known as the 'Seveso' directive, (82/501/EEC), it was incorporated into UK law by means of the Control of Industrial Major Accidents Hazards Regulations 1984 (CIMAH). In 1996, the 'Seveso II' directive (96/82/EC) superseded the earlier Directive. The principal changes were a broadening of scope to include a wider range of dangerous substances and enhanced requirements to protect the environment. Most of the requirements of 'Seveso II' have been implemented by the COMAH Regulations 1999.

The general duty of the COMAH regulations is that 'Every operator shall take all measures necessary to prevent major accidents and limit their consequences to persons and the environment'. The regulations apply to over 1100 establishments in England, Wales and Scotland. Approximately 750 are 'lower tier' sites, where operators must prepare a Major Accident Prevention Policy. The remaining 350 sites with larger inventories of dangerous substances are classified as 'top tier' and are subject to additional requirements. These include submitting a safety report to the CA to demonstrate how they are preventing or limiting the consequences of a major accident and providing information to local authorities to enable off-site emergency plans to be developed.

4 EC NOTIFICATION PROCEDURE

COMAH Regulation 21 requires the CA to notify the EC of any major accident meeting certain criteria. The criteria and the information to be provided are given in Schedule 7 of the regulations. Part 1 is reproduced as [Appendix B](#) of this report.

The notifications are sent to the Major Accident Hazards Bureau of the European Commission Joint Research Centre, based at Ispra in Italy. The Bureau gives support to Directorate General XI (Environment, Nuclear Safety and Civil Protection) of the European Commission. There are 2 forms provided for the purpose; the short form is for immediate notification of an accident and provides basic information, the long form is to be sent later when the investigations have been completed and the causes of the accident have been established.

The data is entered onto the Major Accident Reporting System (MARS). The names and addresses of the Operators are removed before the data is made available to the public on the JRC website <http://mahbsrv.jrc.it>. Data searches and analyses can also be carried out on-line. For further information contact Michalis Christou, European Commission, Joint Research Centre, TP 670, I-21020 Ispra (Va), Italy. Email: michalis.christou@jrc.it or by fax: +39 0332 78 9007.

5 EC REPORTABLE ACCIDENTS 2000 – 2001

4 major accidents were reported to the EC because they satisfy one of the criteria given in paragraph 1 of Schedule 7 of the COMAH regulations.

The 4 accidents are listed below in chronological order. Details are provided against each accident on the causes, consequences, the emergency response and the action taken by the CA.

5.1 BP AMOCO, Part of BP Grangemouth Petrochemicals Complex, Falkirk *Incident Date – 10 June 2000*

This is a COMAH top tier site which stores and processes flammable and toxic substances in connection with petroleum refining. A fire broke out on the 10 June 2000 at the light-ends section of the Fluidised Catalyst Cracking Unit (FCCU) where cracked petroleum products are separated through a series of distillation columns.

The incident occurred during start up of the unit. A redundant 3-inch branch to the main transfer line between two columns failed, releasing flammable hydrocarbons (Naptha) at elevated temperature. This ignited almost immediately leading to the loss of 13 tonnes of highly flammable liquid and vapour, and significant fire damage to the plant.

Both on-site and external fire brigade personnel attended the scene. There were no serious injuries to on-site personnel or injuries to members of the public, however the plant area was contaminated with asbestos from vessel and pipework insulation. The asbestos had to be kept wet to prevent fibre uptake into the air. An Improvement Notice was served under the Management of Health & Safety at Work Regulations 1999.

This was an ECRA as it resulted in a fire with the loss of more than 5% of the qualifying quantity of a dangerous substance, as set out in Part1 of Schedule7 of COMAH. It was subsequently found to have resulted in on-site property damage costs in excess of 2 million ECU.

The main cause of the incident was the failure to ensure the mechanical integrity of the 3-inch branch to the transfer line. The branch was found to be inadequately supported and vulnerable to vibration fatigue. This failure mode was later confirmed by forensic metallurgical examination. Fatigue had developed progressively during an extended period of abnormal service when numerous plant start-ups had occurred.

BP Oil Grangemouth Refinery Ltd was reported to the Procurator Fiscal (Public Prosecutor in Scotland) by HSE recommending alternative charges (a feature of Scottish Law) under COMAH Regulation 4 or Health and Safety at Work Act Section 2. An indictment under Section 2 resulted in a guilty plea and on the 18 January 2002 the company was fined £750,000.

The extent of public and political concern about a series of accidents at the complex, culminating in the FCCU incident, resulted in HSE announcing that it would prepare a public report. It is expected to be published on the HSE Internet website early 2003. Important lessons on process safety management for all COMAH operators will be included.

Other issues/factors relevant to the incident:

- Impact on plant integrity of repeated plant start-ups and abnormal service conditions on plant designed for steady state operation;
- Inspection strategy for redundant drains and dead-legs on process plant and pipework;
- Inclusion of vibration and shock loading as failure modes in risk assessments;
- Remotely operated shut-off valves on significant inventories of flammable hydrocarbons;
- Human factors: alarm overload on operators.

5.2 UNIQEMA (trading as ICI Chemicals+Polymers Ltd), Wilton, Middlesbrough *Incident Date – 6 October 2000*

This is a chemicals manufacturing and distribution site, which stores and distributes large quantities of dangerous substances, including ethylene oxide (EO). It is a COMAH top tier site. On 6 October 2000, 4 tonnes of the highly flammable and toxic liquid EO at approximately -5°C was released into a storage bund during the loading of a road tanker from a refrigerated bulk storage facility. The release was detected by a high level alarm at a knock out (KO) pot in the vent system and by a local gas detector alarm. It was treated by controlled dilution with water before safe disposal via the main site drainage system.

There was no fire, injury, plant damage or environmental harm caused by the release and no involvement by the off-site emergency services. Material losses amounted to approximately £25,000.

This was an ECRA as it resulted in the loss of more than 5% of the qualifying quantity of a dangerous substance, as set out in Part1 of Schedule7 of COMAH.

Investigation indicated that the most likely cause of the release was failure of a hand operated spring-action valve on the EO transfer system, though the fault condition could not be reproduced. Failure of the valve in the open position allowed liquid EO to pass into the vent system to a KO pot during the tanker loading operation. The KO pot was not designed to handle large quantities of liquid and therefore overflowed to the storage tank bund.

The company was given written advice to reduce reliance on manual intervention at this operation, for example, by fitting an automatic trip to the EO transfer pumps on detection of high level in the vent KO pot. The CA did not take formal enforcement action in relation to this accident.

Other issues/factors relevant to the incident:

- Communications between tanker loading operators and plant/control room;
- Improved risk assessment to consider human factors (reliance on manual intervention) and demand/sizing of the KO pot from foreseeable scenarios.

5.3 CLEANSING SERVICES GROUP LTD, Upper Partington Works, Sandhurst, Nr Gloucester

Incident Date - 30 October 2000

This site is a waste transfer station involved in the treatment and storage of hazardous waste and was a COMAH lower tier site. The incident occurred during a severe storm in the early morning of 30 October 2000 when the site was unoccupied. A fire started in a storage area and spread rapidly throughout the transfer station causing violent rupture to numerous 205 litre drums and small aerosol cans. The fire blocked the only access road, preventing the fire service from gaining direct access to the site.

Although there were no injuries to site personnel, 9 people (4 fire service personnel, 1 police officer and 4 local residents) were taken to hospital as a result of the incident but not detained and 60 people were evacuated for 12 hours. Three days after the fire there was serious flooding in the area, which caused the site to be cut off for four days and only accessible by boat. The majority of the site was flooded to varying depths and action had to be taken to remove materials beyond the reach of the floodwater. The flooding caused local residents to be evacuated for a second time and they were concerned about possible health effects. There was a high level of media and political interest in the incident and the CA submitted [two reports to the Deputy Prime Minister](#) which are available on the HSE website. No effect on the local environment has been reported and environmental tests did not indicate any significant levels of contamination off-site.

This was an ECRA as it resulted in a fire with loss of more than 5% of the qualifying quantity of dangerous substances, as set out in Part1 of Schedule7 of COMAH and also resulted in the evacuation of persons for more than 500 person hours.

Investigation indicated the seat of the fire to be in an area where 12x1m³ plastic containers (Intermediate Bulk Containers – IBCs) of waste isopropyl alcohol and 60x205 litre drums packed with 'lab smalls' (various wastes from laboratories in small containers) were located. Approximately 180 tonnes of wastes were consumed in the fire.

The incident is still under investigation by the CA.

A COMAH prohibition notice was issued in relation to the safe storage of packaged dangerous goods. This has since been withdrawn when the company notified a reduction in inventory such that the COMAH regulations no longer applied at this site. A replacement improvement notice was issued requiring the introduction of suitable and sufficient arrangements for the safe storage of dangerous substances and a further improvement notice concerning the revision of arrangements for planning for emergencies has been extended to 03/01/2003.

Other emerging issues/factors relevant to the incident:

- Storage and segregation of incompatible chemical substances and wastes;
- Packaging of chemical waste to prevent damage;
- Procedures for receipt and classification of waste materials; and
- The risk of flooding at major hazard sites, many of which are located close to rivers and estuaries.

5.4 NIPA LABORATORIES, Ruabon Works, Wrexham

Incident Date – 13 January 2001

This site manufactures chemical intermediates and was a COMAH lower tier site. The incident involved the overfilling of a process feed stock tank and release of 13.8 tonnes of toxic liquid phenol to a bunded area. The released phenol solidified in the low ambient temperatures and was chiselled out by staff wearing full personal protective equipment. It was then drummed ready for disposal in accordance with waste disposal legislation. There were no injuries or environmental effects as a result of this incident. The cost of material losses, clean up and lost production amounted to £39,800.

This was an ECRA as it resulted in the loss of more than 5% of the qualifying quantity of a dangerous substance, as set out in Part1 of Schedule7 of COMAH.

The plant had two phenol stock tanks; a larger storage tank and a smaller process feed stock tank. The larger stock tank received road tanker deliveries and phenol needed for the process was transferred to the smaller (18 tonne) tank in 12 tonne lots. Process phenol was then continuously circulated between the manufacturing plant and the smaller tank.

Shortly after a tanker delivery, the smaller (18 tonne) tank was topped up and the transfer system was set up by an operator to circulate phenol for the process. However the circulation was incorrectly set. This resulted in closure of the 18 tonne tank outlet and pumping of phenol from the larger storage tank to the plant then back into the smaller tank, which gradually overflowed into the bund. The investigation found that the mix of automated and manual systems for controlling pump mode, switching and valve settings was vulnerable to human error.

An improvement notice was served under Regulation 4 of COMAH requiring the company to implement improvements to the safety related control systems on the plant as a whole. This has since been complied with. The control system for the phenol storage and process feeds was redesigned to include direct level measurements and hard-wired interlocking to the transfer pump.

6 CONCLUSIONS

There were 4 ECRAs in 2000/01. This is similar to the average number of major accidents that were reported annually under the previous CIMAH regulations.

Whilst recognising that it is difficult to draw conclusions from such a small sample, ECRAs can be used as a crude measure of safety performance. The Accident Frequency Rate (AFR) for the period April 2000 to March 2001 is 3.6 ECRAs per thousand COMAH establishments per annum. Alternatively this can be expressed as 1 ECRA per 277 COMAH establishments per annum.

There is concern at the magnitude and frequency of these accidents and at the repeated underlying causes of major accidents. The CA will continue to use the COMAH Regulations as the vehicle for improving corporate governance of major hazard sites.

HSE is also working in partnership with the main chemical industry trade associations through the Chemical and Downstream Oil Industry Forum (a tripartite forum of HSE, industry and workforce representatives to discuss and set health and safety priorities and targets) to prevent major accidents and reduce the number of ECRAs by 20% by 2004, as part of the UK Revitalising Health and Safety Strategy. A national pipework inspection initiative has started involving nine refineries and will continue in 2003 with other complex top tier COMAH sites. The public report of the major accident at the BP Grangemouth Petrochemical Complex due to be published on HSE's website early in 2003 should assist learning for the COMAH sector on process management.

7 FEEDBACK

This is the second annual report that has been published, giving details of EC reportable accidents in England, Wales and Scotland. The CA believes it will provide an insight into the safety performance of industry and its own performance as a regulator. It will also enable lessons to be learned from past accidents, thus helping to prevent similar accidents occurring in the future.

The CA would welcome feedback on any aspect of this report. Any comments or requests for further information should be addressed to the following contacts:

Anton Wilson, Hazardous Installations Directorate, Chemical Strategy and Support Unit (Land Division), Health and Safety Executive, St Anne's House, Stanley Precinct, Bootle, Merseyside L20 3RA (email: anton.wilson@hse.gsi.gov.uk) or;

Andrew Hitchings, COMAH Policy Advisor, Environment Agency, Block 1, Government Buildings, Burghill Road, Westbury on Trym, Bristol BS10 6EZ (email: andrew.hitchings@environment-agency.gov.uk), or;

John Burns, Policy Advisor, SEPA Edinburgh Office, Clearwater House, Heriot-Watt Research Park, Avenue North, Riccarton, Edinburgh EH14 4AP (email: john.w.burns@sepa.org.uk).

8 REFERENCES

- 1 *The Control of Major Accident Hazards Regulations 1999, S.I. 1999 No.743, ISBN 0-11-082192-0, The Stationery Office £5.80.*
- 2 *The Control of Industrial Major Accident Hazards Regulations 1984, SI 1984 No. 1902, ISBN 0-11-047902-5, The Stationary Office.*
- 3 This document is located on the Internet under 'COMAH Major Accidents Notified to the European Commission England, Wales and Scotland 2001-2002' and can be accessed using the following address:

www.hse.gov.uk/hid → HID Activities → COMAH

APPENDIX A

Summary Details of COMAH EC Reportable Accidents 2000-2001

Operator, Location & Date	Accident Description & Dangerous Substances	Accident Consequences & ECRA Notification Criteria	Causes and Actions Taken
BP Amoco, Part of BP Grangemouth Petrochemicals Complex, Falkirk 10 June 2000	Release and ignition of 13 tonnes of extremely flammable hydrocarbons (Naptha) from Fluidised Catalyst Cracking Unit.	No serious injuries to site personnel or injuries to the public. No harm to the environment. Significant fire damage to plant. Loss of more than 5% of top tier threshold inventory. Property damage in excess of 2 million ECU.	Failure of a redundant 3" branch in main transfer line due to lack of support resulting in vibration fatigue. Prosecution taken & company fined £750,000. A public report of this accident is to be published on the HSE website early in 2003.
Uniqema (ICI Chemicals and Polymers Ltd t/a), Wilton, Middlesbrough 6 October 2000	4 tonnes of flammable and toxic liquid Ethylene Oxide at approximately -5°C released to a bund during filling of a road tanker.	No injuries, plant damage or harm to the environment. Approximately £25000 lost in material costs. Loss of more than 5% of top tier threshold inventory.	Overflow of vent knock out (KO) pot due to spring operated hand valve not closing. The CA recommended that a trip be fitted to transfer pump on high level in vent KO pot to reduce reliance on manual intervention.
Cleansing Services Group Ltd, Upper Partington Works, Sandhurst, Nr Gloucester 30 October 2000	Fire in the storage area of a chemical waste transfer station. Approximately 180 tonnes of flammable and toxic material consumed in the fire.	Minor injuries to 9 people (4 fire brigade personnel, 1 police officer and 4 local residents). Evacuation of 60 people for more than 12 hours. Loss of more than 5% of top tier threshold inventory and evacuation of persons for more than 500 person hours.	Accident is still under investigation by the Competent Authority. Precise cause not yet established. COMAH Prohibition Notice issued in relation to the safe storage of packaged dangerous goods- since withdrawn (COMAH no longer applies to the site). Replaced by 2 Improvement Notices concerning safe storage of dangerous substances and revision of emergency planning arrangements.
Nipa Laboratories, Ruabon Works, Wrexham 13 January 2001	14 tonnes of toxic Phenol released from storage tank into a bunded area.	No injuries, plant damage or harm to the environment. Losses & cleanup amounted to £39,800. Loss of more than 5% of top tier threshold inventory.	Incorrect manual setting of phenol transfer system caused a stock tank to overflow. Improvement Notice served resulting in re-design of safety control system.

APPENDIX B

COMAH Regulations 1999, Schedule 7, Part1

SCHEDULE 7 Regulation 21(1) and (2)

CRITERIA FOR NOTIFICATION OF A MAJOR ACCIDENT TO THE EUROPEAN COMMISSION AND INFORMATION TO BE NOTIFIED

PART 1

Criteria

(This part sets out the provisions of Annex VI to the Directive)

The criteria referred to in regulation 21(1) are as follows-

1. Any accident covered in sub-paragraph (a) or having at least one of the consequences described in paragraphs (b), (c), (d) and (e) must be notified to the commission-

a. substances involved:

any fire or explosion or accidental discharge of a dangerous substance involving a quantity of at least 5 per cent of the qualifying quantity laid down in column 3 of Parts 2 and 3 of schedule 1;

b. injury to persons and damage to property:

an accident directly involving a dangerous substance and giving rise to one of the following events:-

- i. a death
- ii. six persons injured within the establishment and kept in hospital for at least 24 hours,
- iii. one person outside the establishment kept in hospital for at least 24 hours,
- iv. dwellings outside the establishment damaged and unusable as a result of the accident,
- v. the evacuation or confinement of persons for more than two hours (person x hours): the value is at least 500,
- vi. the interruption of drinking water, electricity, gas or telephone services for more than two hours (person x hours): the value is at least 1,000;

c. immediate damage to the environment:

i. permanent or long term damage to terrestrial habitats:-

- 0.5 ha or more of a habitat of environmental or conservation importance protected by legislation,
- 10 or more hectares of more widespread habitat, including agricultural land;

ii. significant or long term damage to freshwater and marine habitats:

- 10 km or more of river or canal,
- 1 ha or more of lake or pond,
- 2 ha or more of delta,
- 2 ha or more of coastline or open sea;

iii. significant or long term damage to an aquifer or underground water:

- 1 ha or more;

d. damage to property:

- i. damage to property in the establishment of at least ECU2 million,
- ii. damage to property outside the establishment of at least ECU 0.5 million;

e. cross-border damage:

any accident directly involving a dangerous substance giving rise to effects outside the territory of the Member State concerned

2. Accidents or 'near misses'; which Member States regard as being of particular technical interest for preventing major accidents and limiting their consequences and which do not meet the quantitative criteria above should be notified to the Commission.