

# Brand på en fabrik för produktion av nitroföreningar.

920921 MARS 1992\_23

Olyckan inträffade i en s.k. Meissner-fabrik för produktion av nitrotoluenföreningar av olika slag. Resterna från huvudprocessen samlades upp och destillerades för att återvinna användbar nitrotoluen. Tjära hade ansamlats i uppsamlingsstråget genom åren så att destillationsprocessen gick långsammare. Tråget var närmare 8 m långt och hade en diameter på 2,7 m. Tråget rengjordes med metallskrapor samtidigt som man värmdes på det med ånga av 180°C för att göra tjärresterna lätthanterligare. Efter tre timmar, kl 13:25, slog en jetflamma ut ur manluckan förbi en ställning i trä och svepte in kontrollrummet i lågor. Två anställda avled omedelbart. Ytterligare två dog senare av skadorna. Man fann en femte person en halvtimme senare. Denna, en ung kvinna, hade troligen överväldigats av rökutvecklingen och avlidit i en hjärtattack. Då jetlågan flammade ut skyndade företagets interna brandkår att börja bekämpa branden. Larmet gick i nära anslutning till olyckan och räddningstjänsten och polisen hade larmats. Fabriken nödstoppades. Ledningen hade inte utvecklat säkerhetsrutiner för hantering av gammal utrustning som inte rengjorts på många år. Tjären innehöll ämnen som var kraftigt termiskt instabila. Jetflamman varade i ca 25 sekunder och avgav en effekt på ungefär 1MW/m<sup>2</sup>.

## Inblandade ämnen och mängder

	CAS Nr.	Mängd
reaktionsblandning		totalt 4000 kg
mononitrotoluen		
dinitrotoluen		
nitrocresol-föreningar		

## Skador:

Människor:	5 anställda omkom i branden. Ytterligare minst 3 personer fördes till sjukhus. Ett par av dessa led av svår chock. Ett par dagar efter branden drabbades ett ansevärt antal av brandmännen av symptom som ögon och hudirritation, förutom nausea, diarré och uppkastningar. Vid närmare undersökning tillskrevs symptomen ett virus, inte toxiska kemikalier.
Materiella:	Omfattande skador på anläggningen.
Miljö/ekologi:	Inga effekter rapporterade.
Infrastruktur:	Polisen spärade av vägarna kring fabriken.

Erfarenheter redovisade (Ja/Nej): Nej

## Report Profile

### Identification of Report:

country: FA ident key: 1992\_023\_01

reported under Seveso I directive as major accident reports: SHORT

### Date of Major Occurrence: Time of Major Occurrence

start: 1992-09-21 start: 13:00:00

finish: finish:

### Establishment:

name:

address:

industry: - not applicable -

Chemical factory producing aromatic nitro compounds & associated products. 900

employees

**Seveso II status: not applicable: Yes art. 6 (notification): No**

**art. 7 (MAPP): No**

**art. 9 (safety report): No**

**Date of Report:**

**short: full:**

**Authority Reporting:**

**name:**

**address:**

**Authority Contact:**

**rep\_cont\_name:**

**rep\_cont\_phone:**

**rep\_cont\_fax:**

**Additional Comments:**

a) - not applicable -

b) - not applicable -

c) - not applicable -

d) - not applicable -

e) - not applicable -

## Short Report

**country: FA ident key: 1992\_023\_01**

**Accident Types:**

**release: No explosion: Yes**

**water contamination: No other: No**

**fire: Yes**

**description:**

At 13.22hrs a jet flame erupted from the front manhole of a 7.9 m long, 2.7 m diameter still base that was being cleaned out by operators using a metal rake. For about 3 hours before and whilst raking was taking place heat was applied throu... see Appendix Short Report / description of accident types

**Substance(s) Directly Involved:**

**toxic: Yes explosive: Yes**

**ecotoxic: No other: No**

**flammable: Yes**

**description:**

Mononitrotoluene residues containing Dinitrotoluene and Nitroresols.

EEC Nos 609-006-00-3 and EEC 609-007-00-9,

Involved mass about 4000 kg.

**Immediate Sources of Accident:**

**storage:** No **transfer:** No

**process:** Yes **other:** No

**description:**

Nitrotoluene Isomers were produced in a continuous Meissner plant. Residues from this process were collected in a still base and crystallisations. These residues were distilled in a still base to recover usable nitrotoluene.... see Appendix Short Report / description of immediate sources

**Suspected Causes:**

**plant or equipment:** No **environmental:** No

**human:** Yes **other:** No

**description:**

Management failure to provide a safe system of work for removal of potentially unstable highly energetic residue from a vessel which had not been opened and cleaned for many years. These failings were characterised by a number of errors inc... see Appendix Short Report / description of suspected causes

**Immediate Effects:**

**material loss:** Yes

**human deaths:** Yes

**human injuries:** Yes **community disruption:** No

**other:** No

**ecological harm:** No

**national heritage loss:** No

**description:**

Approximately 200 persons were exposed... see Appendix Short Report / description of immediate effects

**Emergency Measures taken:**

**on-site systems:** Yes **decontamination:** No

**external services:** Yes **restoration:** No

**sheltering:** Yes **other:** No

**evacuation:** No

**description:**

Internal fire crew responded to extinguish fires at the still base and the control cabin after the jet had subsided. The on-site fire alarm was sounded, the emergency services were called and employees followed the company's fire evacuation... see Appendix Short Report / description of emergency measures taken

**Immediate Lessons Learned:**

**prevention:** Yes **other:** No

**mitigation:** No

**description:**

Immediate shutdown of the Meissner Plant. The new operations director strengthened area production management to ease the workload of middle managers. Risk management consultants were brought in to review changes proposed to the Meissner pl... see Appendix Short Report / description of immediate lessons learned

## **Appendices for the FA / 1992\_023\_01 report**

### **Appendix Short Report / description of accident types:**

At 13.22hrs a jet flame erupted from the front manhole of a 7.9 m long, 2.7 m diameter still base that was being cleaned out by operators using a metal rake. For about 3 hours before and whilst raking was taking place heat was applied through an internal steam battery that was submerged below the tarry residue. The steam supply was at about 135 psig corresponding to a steam temperature of approximately 180 oC.

When the jet flame erupted it impinged on a nearby control building of wooden construction and a large brick built office behind. The jet consumed the control building in its path killing 2 employees instantly. Two others in the control building later died from burns. The jet caused a fire in the office block which produced smoke and fume.

A young female employee was found in the building approximately 30 minutes after the initiating event. She had been overcome by fume and had suffered a heart attack from which she did not recover. 3 other employees sustained reportable injuries. One was detained in hospital with 15% burns and a number of other employees suffered psychological effects resulting from trauma and shock.

Fire damage was confined to the site and water used to extinguish fires at the still base, control cabin and office block were contained and did not contaminate the river and canal which run through and around the factory site. There were no injuries to persons or damage to property off-site. The HSE investigation concluded that the incident resulted from self heating and runaway exothermic decomposition of thermally unstable residues in contact with heated steam pipes. This led to a jet flame with a surface emissive power of about 1000kw/m<sup>2</sup> which lasted approximately 25 seconds.

### **Appendix Short Report / description of immediate sources:**

Nitrotoluene Isomers were produced in a continuous Meissner plant. Residues from this process were collected in a still base and crystallisations. These residues were distilled in a still base to recover usable nitrotoluene.

The still base had accumulated tarry residues that were slowing the rate of distillation. The vessel was opened and residues were heated via an internal steam battery. This led to self-heating and deflagration of the unstable residues.

Vessel provided with a temperature probe which did not extend into the heated residues. Once self heating commenced it escalated rapidly to deflagration.

### **Appendix Short Report / description of suspected causes:**

Management failure to provide a safe system of work for removal of potentially unstable highly energetic residue from a vessel which had not been opened and cleaned for many years. These failings were characterised by a number of errors including:-

- i) Failure to test the residue and atmosphere inside the vessel;
- ii) Application of heat to the residue;
- iii) Use of a metal rake;
- iv) Failure to blank off an inlet before the work commenced, etc.

### **Appendix Short Report / description of immediate effects:**

Approximately 200 persons were exposed

- 5 persons killed by fire;
- 1 was hospitalized;
- Material damage: total loss of the control building. Extensive fire damage to the internal fabric of the main office building. Amount: 1.25 millions Pounds.

### **Appendix Short Report / description of emergency measures taken:**

Internal fire crew responded to extinguish fires at the still base and the control cabin after the jet had subsided. The on-site fire alarm was sounded, the emergency services were called and employees followed the company's fire evacuation and assembly procedure.

Roads around the factory were sealed by the police and 22 units from the Fire Service attended. They concentrated on the office block fire and carried out a search and rescue for missing persons. After the female casualty was found she was transferred to hospital by a police helicopter. The fire service took water from the nearby river to fight blazes on site. Within days of the incident a significant number of fire service personnel reported sick with a variety of symptoms including eye and skin irritation, nausea, diarrhoea and vomiting.

The public Health Department investigation that followed looked at 2 possible causes, ie toxic and gastro intestinal effect. No evidence was found to implicate toxic chemicals arising from the fire but a viral source was identified for the outbreak of gastro intestinal problems. This may have been associated with food and drink consumed at the site.

### **Appendix Short Report / description of immediate lessons learned:**

Immediate shutdown of the Meissner Plant. The new operations director strengthened area production management to ease the workload of middle managers. Risk management consultants were brought in to review changes proposed to the Meissner plant before start up. The main office block was taken out of use.

The implications with regard to off-site emergency planning have been reviewed.

External to the Establishment:

As above. Risk assessment consultants have also been commissioned to review all other chemical manufacturing processes on the site.