

## Vätefluoridutsläpp från en kemikaliefabrik.

971007

En läcka uppstod i en rörledning som förband ett processkärl med ett vakuumsystem. Processkärlet var en reaktor i en elektrokemisk fluorineringsprocess som normalt innehöll vattenfri vätefluorid. Underhållsarbete pågick på kärlet. Det hade rengjorts och trycktestats med kvävgas. Läckan uppstod omedelbart efter trycktestet då kvävgasen leddes ut i vakuumsystemet. Undertrycket i vakuumsystemet åstadkoms med hjälp av vattenånga under högt tryck. Kvävgasen och vattenångan blandades i vakuumsystemet och bildade en spraykondensor. Därmed kom vattenhaltig vätefluorid att korrodera en svetsfog som brast och vätefluorid släpptes ut. Kärlet som brast var gjort i kolstål som är fullt tillräckligt för att innesluta vattenfri vätefluorid, men inte vattenhaltig vätefluorid. De två underhållsarbetare som befann sig i lokalen blev förgiftade med vätefluorid. De fördes till sjukhus inom 30 minuter efter att ha givits första hjälpen. Ytterligare 12 underhållsarbetare utsattes för vätefluoriden i en luftsluss som kontaminerats med vätefluorid.

### Inblandade ämnen och mängder

	CAS Nr.	Mängd
vattenfri vätefluorid	7664-39-3	några kg

### Skador:

**Människor:** De 14 underhållsarbetarna fördes alla till sjukhus. Två av dem befann sig i den byggnad där läckan uppstod och blev förgiftade med vätefluorid. De resterande 12 utsattes för vätefluoriden i en luftsluss som kontaminerats med vätefluorid.

**Materiella:** Inga skador.

**Miljö/ekologi:** Inga effekter rapporterade.

**Infrastruktur:** Inga effekter.

### Erfarenheter redovisade (Ja/Nej): Ja

## Report Profile

### Identification of Report:

country: FA ident key: 1800\_135\_01

reported under Seveso I directive as major accident reports: SHORT

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

start: 07/10/1997 start: 09:45:00

finish: 07/10/1997 finish: 10:45:00

### Establishment:

name:

address:

industry: 2001 general chemicals manufacture

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:** 1800\_135\_01

### Accident Types:

**release:** Yes **explosion:** No

**water contamination:** No **other:** No

**fire:** No

#### **description:**

A leak in pipeline caused the release of hydrogen fluoride in a compartment of a process building. 2 contractors, doing a painting job in this compartment, were directly affected. When the two painters left the compartment, some hydrogen fl... see Appendix Short Report / description of accident types

### Substance(s) Directly Involved:

**toxic:** Yes **explosive:** No

**ecotoxic:** No **other:** No

**flammable:** No

#### **description:**

SUBSTANCE: Hydrogen Fluoride (Anhydrous)... see Appendix Short Report / description of substances involved

### Immediate Sources of Accident:

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

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

#### **description:**

The leak occurred in a line that connected a process vessel with a vacuum system. The process vessel was a reactor in an electrochemical fluorination process, normally containing anhydrous hydrogen fluoride. The vessel was out of use for ma... see Appendix Short Report / description of immediate sources

### Suspected Causes:

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

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

**description:**

The leak was caused by corrosion near a weld, due to presence of water. The pipes were constructed of carbon steel, which is a satisfactory material for anhydrous hydrogen fluoride. However, it cannot resist hydrogen fluoride contaminated ... see Appendix Short Report / description of suspected causes

**Immediate Effects:**

**material loss:** No

**human deaths:** No

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

**other:** No

**ecological harm:** No

**national heritage loss:** No

**description:**

ON-SITE: ... see Appendix Short Report / description of immediate effects

**Emergency Measures taken:**

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

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

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

**evacuation:** Yes

**description:**

ON-SITE: ... see Appendix Short Report / description of emergency measures taken

**Immediate Lessons Learned:**

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

**mitigation:** No

**description:**

When hydrogen fluoride can be contaminated by water, carbon steel is not an acceptable construction material.

... see Appendix Short Report / description of immediate lessons learned

## Appendices for the FA / 1800\_135\_01 report

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

A leak in pipeline caused the release of hydrogen fluoride in a compartment of a process building. 2 contractors, doing a painting job in this compartment, were directly affected. When the two painters left the compartment, some hydrogen fluoride spread into a passage way, which served as an air lock. When the building was evacuated 12 other contractors passed through the air lock, and were possibly exposed to hydrogen fluoride.

### Appendix Short Report / description of substances involved:

SUBSTANCE: Hydrogen Fluoride (Anhydrous)

CAS: 7664-39-3

EEG: 009-002-00-6

QUANTITIES: a few kilograms of fumes were released, containing mainly nitrogen and hydrogen fluoride

The leak occurred in a vent stream, coming from a vessel, normally containing anhydrous hydrogen fluoride, that had been purged and pressure tested with nitrogen. The leak occurred in a line that connected a process vessel with a vacuum system. The process vessel had been purged and pressure tested with nitrogen. The leak occurred after the pressure test, when the nitrogen was being diverted to the vacuum system.

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

The leak occurred in a line that connected a process vessel with a vacuum system. The process vessel was a reactor in an electrochemical fluorination process, normally containing anhydrous hydrogen fluoride. The vessel was out of use for maintenance. It had been purged and pressure tested with nitrogen. The leak occurred after the pressure test, when the nitrogen was being diverted to the vacuum system. The vacuum was created by a high pressure steam jet. The steam and the vent gases were mixed in the vacuum system and led to a spray condensor.

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

The leak was caused by corrosion near a weld, due to presence of water. The pipes were constructed of carbon steel, which is a satisfactory material for anhydrous hydrogen fluoride. However, it cannot resist hydrogen fluoride contaminated with water.

The water originated from the vacuum system, which had two possible sources of water: steam under high pressure and the water used in the spray condensor.

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

ON-SITE:

14 people (all third parties doing maintenance work) were brought to the hospital. 2 of them were in the compartment of the process building in which the leak occurred and they were intoxicated with hydrogen fluoride. They were brought to the hospital 30 minutes after the exposure.

During evacuation 12 men passed through an air lock that was contaminated with hydrogen fluoride when the door of the affected compartment to this air lock was opened by the escaping workers in it. Exposure to hydrogen fluoride could not be excluded, and therefore these men were brought to the hospital for observation. One hour after the release every one was sent to the hospital.

OFF-SITE:

none

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

ON-SITE:

Alarm was given, the process was shut down. By shutting down the pulsation and keeping the extraction of air, the ventilation system created an underpressure. The ventilated air was sent to a scrubber. The building was evacuated. The two workers most exposed were given first aid.

OFF-SITE:

none

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

When hydrogen fluoride can be contaminated by water, carbon steel is not an acceptable construction material.

The company will use piping with a protective teflon lining.

The concept of the vacuum system was not optimal. A better alternative for the spray condensor is a closed condensor. A closed condensor will not serve as a source of water (humidity).

The company was aware of the risk of corrosion due to water contamination. The company intended to replace the carbon steel pipes by pipes with a protective lining.