

Bensenutsläpp från en petrokemisk anläggning.

921107 MARS 1992_21

Olyckan inträffade i en petrokemisk anläggning för produktion av många olika kemikalier ur kolväteföreningar. Olyckan inträffade vid en pir förbunden med en förrådstank med kolväten. Klockan 02:00 kände en operatör lukten av bensen i närheten av en pump. När han undersökte saken närmare fann han ett bensenläckage från en slang kopplad till en ventil som var halvöppen. Operatören stängde ventilen genast. En ansevärd mängd vätska, förmodad vara en blandning av vatten och bensen fanns under rörledningen. Ledningen informerades och man fann att läckaget runnit vidare och samlats i en pumpgrop. Marken runt omkring hade sugit åt sig tämligen stora mängder av utsläppet. Företagets interna brandkår hade larmat och stod beredda om något allvarligt skulle inträffa. Utsläppet täcktes med skum. För säkerhets skull stängdes en närbelägen ugn av. Bensenångorna fann ingen tändande gnista. Hade ångorna antänts skulle det ha lett till en allvarlig katastrof. En utredning av orsakerna visade att slangtappen placerats av de operatörer som hade i uppgift att ta prover på bensenflödet i röret. De reglementsensliga provtagningsstationerna bedömdes som krångliga varför man agerat på egen hand för att få en bekväm provstation. Ledningen kände inte till detta förhållande som varat i några månader. Det är osäkert om förmannen kände till det. Denna kväll hade man efter provtagning kl 20:00 inte stängt ordentligt efter sig. Läckaget hade varit tillräckligt långsamt för att inte upptäckas på kontrollpanelen, särskilt som ett skepp lastat bensen under kvällen.

Inblandade ämnen och mängder

| | CAS Nr. | Mängd |
|--------|---------|-----------|
| bensen | 71-43-2 | 19 000 kg |

Skador:

| | |
|----------------|---|
| Människor: | Inga. |
| Materiella: | Inga. |
| Miljö/ekologi: | Marken där bensenen runnit ut kontaminerades. Inga effekter rapporterade. |
| Infrastruktur: | Inga. |

Erfarenheter redovisade (Ja/Nej): Ja

Mycket kortfattat anges förebyggande åtgärder.

Report Profile

Identification of Report:

country: FA ident key: 1992_021_01

reported under Seveso I directive as major accident reports: SHORT+FULL

Date of Major Occurrence: Time of Major Occurrence

start: 1992-11-07 start: 02:00:00

finish: finish:

Establishment:

name:

address:

industry: 2002 petrochemical, refining, processing

Petrochemical (Hydrocarbons Processing)

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_021_01

Accident Types:

release: Yes explosion: No

water contamination: No other: No

fire: No

description:

ENVIRONMENTAL AND ATMOSPHERIC CONDITIONS:... see Appendix Short Report / description of accident types

Substance(s) Directly Involved:

toxic: Yes explosive: Yes

ecotoxic: No other: No

flammable: Yes

description:

- Benzene (C.A.S. CODE : 71-43-2): amount involved = 19,000 kg.

Immediate Sources of Accident:

storage: No transfer: Yes

process: Yes other: No

description:

The accident occurred in a petrochemical industry manufacturing a variety of chemicals by processing of hydrocarbons. The accident involved the pipeline connecting a jetty with its tank farm, where a variety of hydrocarbon products were sto... see Appendix Short Report / description of immediate sources

Suspected Causes:

plant or equipment: No environmental: No

human: Yes **other:** No

description:

INITIATING EVENT AND CONSEQUENCES:... see Appendix Short Report / description of suspected causes

Immediate Effects:

material loss: Yes

human deaths: No

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

other: No

ecological harm: Yes

national heritage loss: No

description:

ECOLOGICAL HARM:... see Appendix Short Report / description of immediate effects

Emergency Measures taken:

on-site systems: Yes **decontamination:** Yes

external services: Yes **restoration:** No

sheltering: Yes **other:** No

evacuation: No

description:

INTERNAL TO THE ESTABLISHMENT:... see Appendix Short Report / description of emergency measures taken

Immediate Lessons Learned:

prevention: Yes **other:** No

mitigation: Yes

description:

MEASURES TO PREVENT ANY RECURRENCE OF SIMILAR ACCIDENTS:... see Appendix Short Report / description of

immediate lessons learned

A Occurrence Full Report

country: FA **ident key:** 1992_021_01

1 Type of Accident

remarks: Due to a valve not properly closed after a sampling operation, about 19,000

kg of benzene were released over a period of six hours until the leak was

detected (code 1102). No people were affected by benzene fumes and no

ignition occurred.

2 Dangerous Substances

remarks: The total establishment inventory and the potential directly involved

inventories of benzene refer to the whole capacity of the tank joined with

the pump involved in the accident. The actual inventory directly involved of

benzene (19 tonne... see Appendix Full Report A / dangerous substances

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred in a petrochemical industry (code 2002) manufacturing a variety of chemicals by processing of hydrocarbons. The accident involved a pipeline connecting a jetty with its tank farm, where hydrocarbon products were stored... see Appendix Full Report A / source of accident - remarks

4 Meteorological Conditions

precipitation none: fog: rain: hail: snow:

No No No No No

wind speed (m/s):

direction (from):

stability (Pasquill):

ambient temperature (°C):

remarks: Light wind from jetty to tank farm. The temperature was slightly above freezing (around the freezing point of benzene). The ground was wet due to recent rains.

5 Causes of Major Occurrence

main causes

technical / physical - not applicable -

- not applicable -

- not applicable -

- not applicable -

- not applicable -

human / organizational 5301 organization: management organization inadequate

5303 organization: organized procedures (none, inadequate, inappropriate, unclear)

5304 organization: training/instruction (none, inadequate, inappropriate)

5305 organization: supervision (none, inadequate, inappropriate)

5401 person: operator error

remarks: The accident occurred because of an operator error (code 5401) that failed to fully close the valve installed on the spare pressure gauge connection on a pump. The "cap" was removed to take a quality control sample of benzene but this process... see Appendix Full Report A / causes of major occurrence

6 Discussion about the Occurrence

- not applicable -

Type of Accident country: FA ident key: 1992_021_01

event:

major occurrence 1102 release: fluid release to ground

initiating event 1102 release: fluid release to ground

associated event - not applicable -

Dangerous substances

country: FA ident key: 1992_021_01

a) total establishment inventory

CAS number: 71-43-2 identity: Benzene

name from Seveso I Directive: - not applicable -

name from Seveso II Directive: - not applicable -

category from Seveso II: - not applicable -

other hazards (1): - not applicable -

other hazards (2): - not applicable -

maximum quantity (tonnes): 5500

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 1,9 potential quantity: 5500

c) substance belongs to relevant inventory indirectly involved: No

actual quantity: -1 indir_pot_quant: -1

Source of Accident - Situation country: FA ident key: 1992_021_01

situation

industry

initiating event 2002 petrochemical, refining, processing

associated event - not applicable -

activity/unit

major occurrence 3304 transfer: loading/unloading activities (transfer interfaces)

initiating event 3304 transfer: loading/unloading activities (transfer interfaces)

associated event - not applicable -

component

major occurrence 4007 machinery/equipment (pump, filter, column separator, mixer, etc.)

initiating event 4007 machinery/equipment (pump, filter, column separator, mixer, etc.)

associated event - not applicable -

B Consequences Full Report

country: FA ident key: 1992_021_01

1 Area concerned

affected

extent of effects installation: Yes

establishment: Yes

off-site; local: No

off-site; regional: No

off-site; transboundary: No

illustration of effects - not applicable -

remarks The path of the benzene's leak is shown on a map attached to the Original Report... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk 8 20

immediate fatalities

subsequent fatalities

hospitalizing injuries

other serious injuries

health monitoring

remarks Though it has been estimated that the benzene concentrations in air in the proxi... see Appendix

Full Report B / people

3 Ecological Harm

pollution/contamination/damage of:

- residential area (covered by toxic cloud) Suspected
- common wild flora/fauna (death or elimination) Suspected
- rare or protected flora/fauna (death or elimination) Suspected
- water catchment areas and supplies for consumption or recreation Suspected
- land (with known potential for long term ecological harm or Suspected preventing human access or activities)
- marine or fresh water habitat Suspected
- areas of high conservation value or given special protection Suspected

remarks No significant environmental harms occurred, except the soil contamination along... see Appendix

Full Report B / ecological harm

4 National Heritage Loss

effects on:

- historical sites not applicable - historic monuments not applicable
- historic buildings not applicable - art treasures not applicable

remarks No data available.

5 Material Loss

establishment losses off site losses

costs (direct costs to operator) (social costs)

in ECU ECU

material losses

response, clean up, restoration

remarks No data are available about the cost of removal and disposal as a waste of the c... see Appendix

Full Report B / material loss

6 Disruption of Community Life

establishment/plant evacuated disabled/unoccupiable destroyed

- nearby residences/hotels No No No

- nearby factories/offices/small shops No No No

- schools, hospitals, institutions No No No

- other places of public assembly No No No

interruption of utilities etc. no / yes duration

- gas No

- electricity No

- water No

- sewage treatment works No

- telecommunications No

- main roads No

- railways No

- waterways No

- air transport No

significant public concern none local level national level

- off site populations Yes No No

- media interest No No No

- political interest No No No

remarks In the Original Report there is no evidence of significant effects outside the e... see Appendix

7 Discussion of Consequences

C Response Full Report

country: FA ident key: 1992_021_01

1 Emergency Measures

taken - on site - not applicable - - not applicable -

- not applicable - - not applicable -

- not applicable - - not applicable -

- **off site** - not applicable - - not applicable -

- not applicable - - not applicable -

- not applicable - - not applicable -

still - on site - not applicable - - not applicable -

required

- not applicable - - not applicable -

- not applicable - - not applicable -

- **off site** - not applicable - - not applicable -

- not applicable - - not applicable -

- not applicable - - not applicable -

continuing contamination or danger

-**on site** not applicable

-off site not applicable

remarks - not applicable -

2 Seveso II Duties

pre-accident evaluation

Article item not due yet not done done/submitted evaluated

6 notification No No No No

7 policy (MAPP) No No No No

9 safety report No No No No

9, 10, 11 update No No No No

11 internal plan No No No No

11 external plan No No No No

13 informing public No No No No

9, 12 siting policy No No No No

post-accident evaluation

Seveso II duty was actual were actual compared with actual

contingency consequences consequences, the

addressed? addressed? predicted extent was?

Article item

7 policy (MAPP) not applicable not applicable not applicable

9 current safety report not applicable not applicable not applicable

11 internal plan not applicable not applicable not applicable

11 external plan not applicable not applicable not applicable

13 informing public not applicable not applicable not applicable

9, 12 siting policy not applicable not applicable not applicable

evaluation of safety organisation

organisational element element existed did element relate to actual circumstances of

yes / no no / partly / yes adequate?

- written policy objectives No

- specified management No

structure

- specified responsibilities No

- specified working procedures No

- specified procedures for No

assessment/auditing of

management system

- specified procedures for No

review and update of

management policy

- specified general training No

procedures

- specified emergency No

training procedures

evaluation of ecological impact control

organisational element element existed did element relate to actual circumstances of

yes / no no / partly / yes adequate?

- ecological status review No

before incident

- potential ecological No

consequences assessment

- ecological impact review No

after incident

- ecological restoration No

procedures

- subsequent review of No

restoration success

remarks - not applicable -

3 Official Action Taken

legal action

- not applicable -

other official action

- not applicable -

4 Lessons Learned

measures to prevent recurrence

After the accident, it was est... see Appendix Full Report C / lesson learned - prevent

measures to mitigate consequences:

Inside the establishment, the ... see Appendix Full Report C / lesson learned - mitigate

useful references:

- not applicable -

5 Discussion about Response

- not applicable -

Appendices for the FA / 1992_021_01 report

Appendix Short Report / description of accident types:

ENVIRONMENTAL AND ATMOSPHERIC CONDITIONS:

Light wind from jetty to tank farm. Temperature slightly above freezing (around the freezing point of benzene). Ground wet due to recent rains.

ACCIDENT CASE HISTORY DESCRIPTION:

At 02:00 hours an operator detected a smell of benzene in the proximity of pump P-104. On investigating, he detected liquid escaping from a hose attached to a valve on the pump (this valve was found to be half open and was immediately closed). A sizeable quantity of liquid, thought to be a benzene/water mixture, was observed in the pipetrack. Management was alerted. No other people were working in the vicinity of the leak. It was found that the liquid was flowing along the pipetrack to the jetty and the jetty manager was informed by telephone. A considerable quantity of liquid was found to have collected in a sump on the jetty premises (this was part of the jetty pipeline containment system but not intended to collect liquid from the jetty tank farm). There was considerable soil contamination round this jetty tank farm pipeline (this pipeline did not have a proper containment system). On investigating, it was found that plant instrumentation detected and recorded a slow leak from the tank associated with this pipeline between 20:00 hours the previous evening and 02:00 hours. The leak was too slow to show up on the control panel display and was also masked by a ship loading benzene for part of the time. No people were affected by benzene fumes and no ignition occurred. It is estimated that benzene levels in the vicinity of the leak and along the pipetrack to the sump were likely to exceed the occupational exposure standard. An ignition would have had major consequences.

Appendix Short Report / description of immediate sources:

The accident occurred in a petrochemical industry manufacturing a variety of chemicals by processing of hydrocarbons. The accident involved the pipeline connecting a jetty with its tank farm, where a variety of hydrocarbon products were stored and transferred to/from jetty (operated by separate but associated companies) for ship loading/unloading. The component involved was a pump used to transfer through pipeline benzene from the storage tank to the nearby jetty.

Appendix Short Report / description of suspected causes:

INITIATING EVENT AND CONSEQUENCES:

The leak of benzene involved the pump used to transfer benzene from the storage tank to the nearby jetty. Since the valve on a spare pressure gauge of the pump was not fully closed after a sampling operation, about 19,000 kg of benzene were lost over a period of six hours until the leak was detected.

CAUSES:

In order to allow the operators to take a quality control sample of the product immediately prior to ship loading, sampling points were provided on the tanks. For the benzene tank, due to security fencing, the access route to the sampling points was circuitous and the operators had got into the practice of taking a sample at the "degassing" point on the pump. This practice was apparently not known to management (probably including foreman). A hose was left attached to the connection point to facilitate this operation. The practice had been on-going for some months. In this occasion the operator failed to fully close the valve. The pump was banded, but the length of hose extended beyond the bunding and the end was lying at the pipetrack. No equipment defects or failures were involved in the leak. Underlying cause was failure of management control and supervision, together with inadequate training and failure by operator to follow operating procedures.

Appendix Short Report / description of immediate effects:

ECOLOGICAL HARM:

No significant environmental harms occurred, except the soil contamination along the pipeline track containment and in the area where the leak of benzene occurred.

MATERIAL LOSS:

No data are available about the cost of removal and disposal as a waste of the contaminated soil.

Appendix Short Report / description of emergency measures taken:

INTERNAL TO THE ESTABLISHMENT:

After the valve was closed, the internal company fire services were called out. They covered the spillage with "light water foam". Measurements of benzene concentration were taken and the area around the accident was cordoned off. The furnace of a nearby process plant was shut-down. The on-site emergency plan was not activated.

EXTERNAL TO THE ESTABLISHMENT:

The adjacent jetty premises were informed but the off-site emergency plan was not activated. Arrangement was made to empty the sump that collected the spillage of benzene.

Appendix Short Report / description of immediate lessons learned:

MEASURES TO PREVENT ANY RECURRENCE OF SIMILAR ACCIDENTS:

After the accident, it was established to improve the training of the operators and supervision.

MEASURES TO MITIGATE THE EFFECTS OF THE ACCIDENT:

Inside the establishment, the soil decontaminate as soon as possible by flooding area with water, draining the spillage into gullies and pumping it out. The soil will be removed and disposed as contaminated waste. Outside the establishment, the pipeline track containment system decontaminated by water washing.

Appendix Full Report A / dangerous substances:

The total establishment inventory and the potential directly involved inventories of benzene refer to the whole capacity of the tank joined with the pump involved in the accident. The actual inventory directly involved of benzene (19 tonnes) was released over a period of six hours until the leak was detected.

Appendix Full Report A / source of accident - remarks:

The accident occurred in a petrochemical industry (code 2002) manufacturing a variety of chemicals by processing of hydrocarbons. The accident involved a pipeline connecting a jetty with its tank farm, where hydrocarbon products were stored and transferred to/from jetty (operated by separate but associated companies) for ship loading/unloading (code 3304). The component involved was a pump used to transfer benzene from the storage tank to the nearby jetty (code 4007).

Appendix Full Report A / causes of major occurrence:

The accident occurred because of an operator error (code 5401) that failed to fully close the valve installed on the spare pressure gauge connection on a pump. The "cap" was removed to take a quality control sample of benzene but this procedure was apparently not known to management above foreman level. Underlying causes were therefore the management failure in control and supervision (codes 5301 and 5305), together with an inadequate operator training (codes 5304 and 5303).

Appendix Full Report B / area concerned - remarks:

The path of the benzene's leak is shown on a map attached to the Original Report. The release involved the nearby jetty but in the Original Report there is no evidence of significant effects outside the establishment.

Appendix Full Report B / people:

Though it has been estimated that the benzene concentrations in air in the proximity of the leak and along the pipetrack to the sump were likely to exceed the occupational exposure standard, no people were affected by benzene fumes.

Appendix Full Report B / ecological harm:

No significant environmental harms occurred, except the soil contamination along the pipeline track containment and in the area where the leak of benzene occurred.

Appendix Full Report B / material loss:

No data are available about the cost of removal and disposal as a waste of the contaminated soil.

Appendix Full Report B / disruption of community life:

In the Original Report there is no evidence of significant effects outside the establishment.

Appendix Full Report C / lesson learned - prevent:

After the accident, it was established to improve the training of the operators and supervision.

Appendix Full Report C / lesson learned - mitigate:

Inside the establishment, the soil decontaminate as soon as possible by flooding area with water, draining the spillage into gullies and pumping it out. The soil will be removed and disposed as contaminated waste. Outside the establishment, the pipeline track containment system decontaminated by water washing.