Brand bland tunnor med vit fosfor på ett kemikalielager.

900801 MARS 1990_20

Olyckan inträffade på ett lager i en industri för produktion och lagring av vit fosfor. Fosforn lagrades i tunnor om 200 kg. En brand uppstod då luft kom in i en tunna med vit fosfor. Sannolikt kom luften in i tunnan på grund av att förseglingen släppt. Det är möjligt att extrema skillnader mellan dag och nattemperaturer varit det bakomliggande skälet. Luft, vatten och fosfor bildade troligen fosforsyra som frätt hål på tunnan. Den vita fosforn har självantänts och branden utbrutit. Tillgänglig personla kallades in att bekämpa branden tillsammans med räddningstjänsten.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
vit fosfor	7723-14-0	33200 kg

Skador:

Människor:	Inga.
Materiella:	Byggnaden brandskadades.
Miljö/ekologi:	Inga effekter rapporterade.
Infrastruktur:	Allmänheten uppmanades att stanna inomhus tills brandröken skingrats. Allmänheten uppmanades också att skölja trädgårdsfrukter och grönsaker väl inna de tillagades.

Erfarenheter redovisade (Ja/Nej): Ja

Kortfattat anges förebyggande åtgärder.

Report Profile

Identification of Report:

country: FA **ident key:** 1990_020_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 1990-08-01 **start:**

finish: finish:

Establishment:

name:

address:

industry: 2001 general chemicals manufacture

General Chemical (Phosphorus Distillation and Storage)

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:** 1990_020_01

Accident Types:

release: Yes **explosion:** No

water contamination: No **other:** No

fire: Yes

description:

A fire was caused because of spontaneous ignition of white phosphorus as a result of air admission in a drum. Most likely, the seal of the drum failed allowing drum "breathing" during unusually extreme day/night temperature changes. Air tha... see Appendix Short Report / description of accident types

Substance(s) Directly Involved:

toxic: No **explosive:** No

ecotoxic: No **other:** No

flammable: Yes

description:

- White Phosphorus (C.A.S. CODE: 7723-14-0): amount involved = 33,200 kg (166 drums of 200 Kg each).

Immediate Sources of Accident:

storage: Yes **transfer:** No

process: Yes **other:** No

description:

The accident occurred in a drum storage building of an industry for the distillation and the storage of white phosphorus. The storage building contained 166 drums of white phosphours of 200 kg each. The building was a single storey steel fr... see Appendix Short Report / description of immediate sources

Suspected Causes:

plant or equipment: Yes **environmental:** Yes

human: No **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:** Yes

other: No

ecological harm: No

national heritage loss: No

description:

MATERIAL LOSS:... 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: No

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:** 1990_020_01

1 Type of Accident

remarks: The phosphoric acid produced inside a drum containing white phosphorus, caused by air entry, led to the corrosion of the drum itself and to the release of the contained liquor (code 1104). The released white phosphorus immediately self-igni... see Appendix Full Report A / type of accident

2 Dangerous Substances

remarks: The total establishment inventory of white phosphorus refers to the amount in the drum storage building (166 drums, each with a capacity of 200 kg) involved in the fire.

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred in a drum storage building (code 3201) of an industry for the distillation and storage of phosphorus (code 2001). The components involved were the drums containing white phosphorus (code 4003) in the

storage building. ... 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: - not applicable -

5 Causes of Major Occurrence

main causes

technical / physical 5102 operation: component/machinery failure/malfunction

5104 operation: corrosion/fatigue

5107 operation: unexpected reaction/phase-transition

5201 environment: natural event (weather, temperature, earthquake, etc.)

- not applicable -

human / organizational 5303 organization: organized procedures (none, inadequate, inappropriate,

unclear)

5314 organization: testing/inspecting/recording (none, inadequate,

inappropriate)

- not applicable -

- not applicable -

- not applicable -

remarks: Due to the failure of the seal (codes 5102), the drum "breathed" during unusually extreme

day/night temperature changes (code 5201). The unexpected physicochemical reaction (code

5107) of air, water and phosphorus caused the production of p... see Appendix Full Report

A / causes of major occurrence

6 Discussion about the Occurrence

- not applicable -

Type of Accident **country:** FA **ident key:** 1990_020_01

event:

major occurrence 1201 fire: conflagration (a general engulfment fire)

initiating event 1104 release: solid release to ground

associated event - not applicable -

Dangerous substances

country: FA **ident key:** 1990_020_01

a) total establishment inventory

CAS number: 7723-14-0 **identity:** White Phosphorus

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): 33,2

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 33,2 **potential quantity:** 33,2

c) substance belongs to relevant inventory indirectly involved: No

actual quantity: -1 **indir_pot_quant:** -1

Source of Accident - Situation **country:** FA **ident key:** 1990_020_01

situation

industry

inititating event 2001 general chemicals manufacture

associated event - not applicable -

activity/unit

major occurrence 3201 storage: process-associated (stockholding, etc. on-site of manufacture)

inititating event 3201 storage: process-associated (stockholding, etc. on-site of manufacture)

associated event - not applicable -

component

major occurrence 4003 container; non-pressurised (hopper, tank, drum, bag, etc.)

inititating event 4003 container; non-pressurised (hopper, tank, drum, bag, etc.)

associated event - not applicable -

B Consequences Full Report

country: FA **ident key:** 1990_020_01

1 Area concerned

affected

extent of effects installation: Yes

establishment: Yes

off-site; local: Yes

off-site; regional: No

off-site; transboundary: No

illustration of effects - not applicable -

remarks Two maps were attached to the Original Report, both showing the plume path. As t... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk 4 24

immediate fatalities

subsequent fatalities

hospitalizing injuries

other serious injuries

health monitoring

remarks Two crews of the local fire brigade (10 people from Avonmouth and 14 from Oldbur... see Appendix

Full Report B / people

3 Ecological Harm

pollution/contamination/damage of:

- residential area (covered by toxic cloud) Yes

- 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 - not applicable -

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 the structural damages to the storage bu... 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 No Yes No

- media interest No No No

- political interest No No No

remarks Local inhabitants were advised to stay indoors and not to eat vegetables from ga... see Appendix

7 Discussion of Consequences

Ecological Components involved

country: FA **ident key:** 1990_020_01

type: 6102 inland: urban development

threatened: not applicable **affected:** not applicable

C Response Full Report

country: FA **ident key:** 1990_020_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, the follow... see Appendix Full Report C / lesson learned - prevent

measures to mitigate consequences:

- not applicable -

useful references:

- not applicable -

5 Discussion about Response

- not applicable -

Appendices for the FA / 1990_020_01 report

Appendix Short Report / description of accident types:

A fire was caused because of spontaneous ignition of white phosphorus as a result of air admission in a drum. Most likely, the seal of the drum failed allowing drum "breathing" during unusually extreme day/night temperature changes. Air that entered the drum could have caused the production of phosphoric acid by oxidation of floating phosphorus on water surface followed by hydrolysis. Eventually phosphoric acid corroded drum releasing liquor and allowing self-ignition of white phosphorus causing a great fire inside the storage building.

Appendix Short Report / description of immediate sources:

The accident occurred in a drum storage building of an industry for the distillation and the storage of white phosphorus. The storage building contained 166 drums of white phosphours of 200 kg each. The building was a single storey steel frame with brick and concrete infill and asbestos-cement roof.

Appendix Short Report / description of suspected causes:

INITIATING EVENT AND CONSEQUENCES:

Spontaneous ignition of white phosphorus resulting of the liquor leakage from a storage drum.

CAUSES:

The failure of the seal allowed storage drum "to breath" during unusually extreme day/night temperature changes. The unexpected physicochemical reaction of air, water and white phosphorus caused the production of phosphoric acid that corroded the drum, releasing liquor and allowing ignition. Operating procedures about inspection and material storage were inadequate.

Appendix Short Report / description of immediate effects:

MATERIAL LOSS:

Structural damages to storage building caused by the fire. No data are available about the cost of the damages.

COMMUNITY DISRUPTION:

As the fume cloud was high, no smoke fume was reported at ground level although some smella was detected in a specific area outside the calculated plume path. Local inhabitants were advised to stay indoors and not to eat vegetables from gardens without first washing them well.

MAP OF THE ACCIDENT AREA:

The plume path is shown on two maps attached to the Original Report.

Appendix Short Report / description of emergency measures taken:

INTERNAL TO THE ESTABLISHMENT:

4 operators on shift and others were called in to assist in fight the fire together with a fire team of 10 from Avonmouth and another team of 14 from Oldbury with their chemical emergency response vehicle. Hand held extinguishers and 3/4" hose reels were used to fight the fire.

EXTERNAL TO THE ESTABLISHMENT:

Local inhabitants were advised to stay indoors and not to eat vegetables from gardens without first washing them well.

Appendix Short Report / description of immediate lessons learned:

MEASURES TO PREVENT ANY RECURRENCE OF SIMILAR ACCIDENTS:

After the accident, the following measures were established:

1- drum filling method to be clearly specified and suppliers procedures approved;

2- tight head lacquer lined drums to be used;

3- water in drums to be buffered;

4- drums to be stored under water in medium/long term storage;

5- if outside, drums to be on pallets 1 high; pallets to be 0.6 metres apart;

6- if inside, pallets to be no more than 2 high, 2 wide with 6 metres clearance between stacks;

7- on receipt, drums to be physically examined, opened and water pH checked and buffered if low; level to be topped up;

8- closed circuit TV to be installed.

Appendix Full Report A / type of accident:

The phosphoric acid produced inside a drum containing white phosphorus, caused by air entry, led to the corrosion of the drum itself and to the release of the contained liquor (code 1104). The released white phosphorus immediately self-ignited causing a great fire inside the storage building (code 1201).

Appendix Full Report A / source of accident - remarks:

The accident occurred in a drum storage building (code 3201) of an industry for the distillation and storage of phosphorus (code 2001). The components involved were the drums containing white phosphorus (code 4003) in the storage building. The building was a single storey steel frame with bricks and concrete infill and asbestos-cement roof. The location of the industry is shown on two maps attached to the Original Report.

Appendix Full Report A / causes of major occurrence:

Due to the failure of the seal (codes 5102), the drum "breathed" during unusually extreme day/night temperature changes (code 5201). The unexpected physicochemical reaction (code 5107) of air, water and phosphorus caused the production of phosphoric acid that corroded the drum (code 5104) and released its contents. The procedures about inspection and material storage were insufficient (codes 5303 and 5314).

Appendix Full Report B / area concerned - remarks:

Two maps were attached to the Original Report, both showing the plume path. As the fume cloud was high, no smoke fume was reported at ground level although some smell was detected in a specific area outside the calculated plume path. However, local inhabitants were advised to stay indoors and not to eat vegetables from gardens without first washing them well.

Appendix Full Report B / people:

Two crews of the local fire brigade (10 people from Avonmouth and 14 from Oldbury) arrived to fight the fire. They were assisted in fight the fire by 4 operators on shift and by others called in. No people were injured during the accident.

Appendix Full Report B / material loss:

No data are available about the cost of the structural damages to the storage building caused by fire.

Appendix Full Report B / disruption of community life:

Local inhabitants were advised to stay indoors and not to eat vegetables from gardens without first washing them well.

Appendix Full Report C / lesson learned - prevent:

After the accident, the following measures were established:

- drum filling method to be clearly specified and suppliers procedures approved;

- tight head lacquer lined drums to be used;

- water in drums to be buffered;

- drums to be stored under water in medium/long term storage;

- if outside, drums to be on pallet 1 metres high;

- if outside, pallets to be 0.6 metres apart;

- if inside, pallets to be no more than 2 high, 2 wide with 6 metres clearance between stacks;

- on receipt, drums to be physically examined, opened and the water pH checked and buffered if low; level to be topped up;

- close circuit TV to be installed.