

Stor brand på ett lagerområde för fossila bränslen.

870602 MARS 1800_23

Olyckan inträffade på en anläggning för lagring av fossila bränslen (olja, bensin, gasol, etc) i närheten av Lyon. Området täckte ungefär 5000 kvadratmeter och omfattade ett sextiotal cisterner. Vid underhållsarbete strax efter klockan 13:00 på icke-strömförande elkablar uppstod en jetflamma i en pumpstation, följd efter 1 minut av en explosion. Tio minuter senare, klockan 13:15, exploderade den första större tanken - en 250 kubikmeters tank som sköts som en raket upp i luften 200 m. Den föll ned 60 m utanför området och branden spred sig omedelbart till ungefär en tredjedel av hela området. Ytterligare fem tankar exploderade. Klockan 13:18 larmades lokalamyndigheter per telefon. En första ledningsplats sattes upp av räddningstjänsten klockan 13:23. Klockan 13:28 anlände räddningstjänsten med 40 man och fyra fordon tillsammans med tre läkare och en ambulans. Arbetet med att isolera branden påbörjades. Klockan 13:40 stängdes all trafik kring området av och all personal evakuerades. På platsen fanns då 8 läkare, 5 ambulanser, 2 återupplivningsfordon och 18 sängplatser för skadade. Klockan 13:55 fanns 117 poliser närvarande; ytterligare ca 80 poliser anlände inom en halvtimme. Klockan 14:10 påbörjades nedkylning av tankarna med vattenkanoner (2000 m³/h). Nedkylningen fortsatte till dess att branden var helt släckt. Klockan 14:30 befann sig 150 personer från räddningstjänsten, 200 poliser och 25 läkare och sköterskor på platsen. Klockan 14:45 aktiverades den lokala katastrofplanen och all verksamhet ställdes under den lokala myndighetens direkta kontroll. Klockan 17:00 hade branden spridit sig till hela området trots vattenkylning. Klockan 17:25 gjordes ett första försök att släcka branden med hjälp av 9 kanoner och 100 000 liter skum. Klockan 18:32 inträffade en ny stor explosion där sex personer från räddningstjänsten skadades. En tank på 1000 m³ kokade över och exploderade, vilket resulterade i en 450 m hög och 200 m bred eldboll. Branden spred sig till ett närliggande lagerområde och till flera byggnader. Ytterligare 72 000 liter skum användes för bekämpning av branden. Under natten fattade två tankar i det angränsande området eld. Klockan 06:35 på morgonen den 3e juni genomfördes ett andra försök att släcka branden med 17 skumkanoner som använde 200 000 liter skum. Särskilt effektiva var två kanoner med extra stor flödeskapacitet om 6000 liter/min. Klockan 07:30 hade branden i lagerområdet släckts. Klockan 09:00 släcktes det mesta av branden med hjälp av 140 000 liter skum. Klockan 13:48 var branden helt släckt. Kylning av tankarna fortsatte i två dygn. Förorenat släckningsvatten och oförbrända kolväten samlades i bästa mån upp och transporterades till ett petroleumraffinaderi för behandling. Ungefär 10 000 m³ kvarstod i miljön.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
xylén	1330-20-7	okänt
polyisobutylén		okänt
diesel oil/gasol	8008-20-6	2000 ton
gasoline	8006-61-9	1300 ton
blyfria bränsletillsatser		600 ton
svaveldioxid	7446-09-5	12 ton
blyföreningar		600 kg

Skador:

Människor:	2 döda, 14 skadade, varav 3 lindrigt.
Materiella:	10 tankar totalförstördes, liksom stora delar av anläggningen. Inga kostnadsuppskattningar förekommer.
Miljö/ekologi:	Många av förbränningsprodukterna är giftiga: svaveldioxid, blyföreningar, ofullständigt förbrända kolväten. Enligt ursprungsrapporten kunde inga miljöeffekter noteras. Dock kvarstod att utvärdera effekten av det förorenade släckningsvattnet och skummet.
Infrastruktur:	Trafiken spärrades av och närboende evakuerades.

Erfarenheter redovisade (Ja/Nej): Ja

Se "Incendie du Depot Petrolier SHELL Port Edouard Herriot - Lyon les 2 et 3 Juin 1987"

Report Profile

Identification of Report:

country: FA ident key: 1800_023_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 02/06/1987 start: 13:00:00

finish: finish:

Establishment:

name:

address:

industry: 2008 wholesale and retail storage and distribution (incl. LPG bottling & bulk

distrib., more: F1!)

Storage Activities

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_023_01

Accident Types:

release: Yes explosion: Yes

water contamination: Yes other: No

fire: Yes

description:

SAFETY SYSTEMS OR OPERATORS INTERVENTION:... see Appendix Short Report / description of accident types

Substance(s) Directly Involved:

toxic: Yes **explosive:** Yes

ecotoxic: No **other:** No

flammable: Yes

description:

No data are available about the amount of xylene (C.A.S. CODE: 1330-20-7) and polyisobutylene vapours mixture involved in the first explosion.... see Appendix Short Report / description of substances involved

Immediate Sources of Accident:

storage: Yes **transfer:** No

process: No **other:** No

description:

The accident occurred in a storage installation for different fuels (fuel oil, gasoline, gasoil, additives, ecc.) in port Edouard-Herriot near to Lyon. The SHELL depot, built in 1948 and with following modifications in 1954, 1961, 1969 and ... see Appendix Short Report / description of immediate sources

Suspected Causes:

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

human: No **other:** Yes

description:

CAUSES:

When the Original Report was prepared, the causes of the accident were still under investigation.

Immediate Effects:

material loss: Yes

human deaths: Yes

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

other: No

ecological harm: Yes

national heritage loss: No

description:

EFFECTS ON PEOPLE:... see Appendix Short Report / description of immediate effects

Emergency Measures taken:

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

external services: Yes **restoration:** No

sheltering: No **other:** No

evacuation: Yes

description:

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

Immediate Lessons Learned:

prevention: No **other:** No

mitigation: Yes

description:

MEASURES TO MITIGATE THE EFFECTS OF THE ACCIDENT:... see Appendix Short Report / description of immediate lessons learned

A Occurrence Full Report

country: FA **ident key:** 1800_023_01

1 Type of Accident

remarks: A flash fire in a storage installation occurred followed by an explosion in the area (codes 1204 and 1307). It was followed by the explosion (code 1307) of some tanks (a gasoil tank exploded [code 1303] creating a fire-ball [code 1205]) an... see Appendix Full Report A / type of accident

2 Dangerous Substances

remarks: During the fire were released into the environment sulphur dioxide, lead compounds and particulate produced by the combustion of hydrocarbons. The amount of sulphur dioxide and lead compounds released during the accident (about 24 hours) ha... see Appendix Full Report A / dangerous substances

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred in a storage installation (codes 2008 and 3202) for different fuels (fuel oil, gasoline, gasoil, additives, ecc.) in port Edouard-Herriot near to Lyon. The SHELL depot, built in 1948 and with following modifications in... 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: No wind when the fire occurred.

5 Causes of Major Occurrence

main causes

technical / physical 5501 other: not identified

- not applicable -

- not applicable -

- not applicable -

- not applicable -

human / organizational - not applicable -

- not applicable -

- not applicable -

- not applicable -

- not applicable -

remarks: When the Original Report was prepared the causes of the accident were still under investigation.

6 Discussion about the Occurrence

- not applicable -

Type of Accident country: FA ident key: 1800_023_01

event:

major occurrence - not applicable -

initiating event - not applicable -

associated event - not applicable -

event:

major occurrence 1202 fire: pool fire (burning pool of liquid, contained or uncontained)

initiating event 1307 explosion: VCE (vapour cloud explosion; supersonic wave front)

associated event 1404 other: firewater runoff into ground

event:

major occurrence 1102 release: fluid release to ground

initiating event 1204 fire: flash fire (burning vapour cloud, subsonic flame front)

associated event 1401 other: combustion products into air

Dangerous substances

country: FA ident key: 1800_023_01

a) total establishment inventory

CAS number: identity: Xylene

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): -1

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: -1 **potential quantity:** -1

c) substance belongs to relevant inventory indirectly involved: No

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

a) total establishment inventory

CAS number: identity: Unleaded Petroluem Additives

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): 600

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 600 potential quantity: 600

c) substance belongs to relevant inventory indirectly involved: No

actual quantity: -1 indir_pot_quant: -1

a) total establishment inventory

CAS number: 7446-09-5 identity: Sulphur Dioxide

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): 12

use of substance as: ABNORMAL PRODUCT

b) substance belongs to relevant inventory directly involved: No

actual quantity: -1 potential quantity: -1

c) substance belongs to relevant inventory indirectly involved: Yes

actual quantity: 12 indir_pot_quant: 12

a) total establishment inventory

CAS number: identity: Polyisobutylene

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): -1

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: -1 potential quantity: -1

c) substance belongs to relevant inventory indirectly involved: No

actual quantity: -1 indir_pot_quant: -1

a) total establishment inventory

CAS number: identity: Particulate

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): -1

use of substance as: ABNORMAL PRODUCT

b) substance belongs to relevant inventory directly involved: No

actual quantity: -1 potential quantity: -1

c) substance belongs to relevant inventory indirectly involved: Yes

actual quantity: -1 indir_pot_quant: -1

a) total establishment inventory

CAS number: identity: Lead Compounds

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): 0,6

use of substance as: ABNORMAL PRODUCT

b) substance belongs to relevant inventory directly involved: No

actual quantity: -1 potential quantity: -1

c) substance belongs to relevant inventory indirectly involved: Yes

actual quantity: 0,6 indir_pot_quant: 0,6

a) total establishment inventory

CAS number: 8006-61-9 identity: Gasoline

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): 1300

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 1300 potential quantity: 1300

c) substance belongs to relevant inventory indirectly involved: No

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

a) total establishment inventory

CAS number: 8008-20-6 **identity:** Gasoil & Diesel Oil

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): 2000

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 2000 **potential quantity:** 2000

c) substance belongs to relevant inventory indirectly involved: No

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

Source of Accident - Situation **country:** FA **ident key:** 1800_023_01

situation

industry

initiating event 2008 wholesale and retail storage and distribution (incl. LPG bottling & bulk distrib., more: F1!)

associated event 2008 wholesale and retail storage and distribution (incl. LPG bottling & bulk distrib., more: F1!)

activity/unit

major occurrence 3202 storage: distribution-associated (not on-site of manufacture)

initiating event 3202 storage: distribution-associated (not on-site of manufacture)

associated event 3202 storage: distribution-associated (not on-site of manufacture)

component

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

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

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

B Consequences Full Report

country: FA **ident key:** 1800_023_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 The fire damaged some vehicles parked outside the storage installation. The indu... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk 350

immediate fatalities 2

subsequent fatalities

hospitalizing injuries 5 6

other serious injuries 3

health monitoring

remarks Inside the establishment, 2 people working in the storage installation were kill... see Appendix

Full Report B / people

3 Ecological Harm

pollution/contamination/damage of:

- **residential area (covered by toxic cloud)** not applicable

- **common wild flora/fauna (death or elimination)** not applicable

- **rare or protected flora/fauna (death or elimination)** not applicable

- **water catchment areas and supplies for consumption or recreation** not applicable

- **land (with known potential for long term ecological harm or not applicable**

preventing human access or activities)

- **marine or fresh water habitat** not applicable

- **areas of high conservation value or given special protection** not applicable

remarks During the fire were released into the environment sulphur dioxide, lead compoun... 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 More than ten tanks in the storage area N° 1 and 3 were completely destroyed (ta... see Appendix

6 Disruption of Community Life

establishment/plant evacuated disabled/unoccupiable destroyed

- nearby residences/hotels No No No

- nearby factories/offices/small shops Yes 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 The traffic road in the area was interrupted and the personnel in the industrial... see Appendix

7 Discussion of Consequences

Ecological Components involved

country: FA **ident key:** 1800_023_01

type: 6201 freshwater: freshwater reservoir

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

C Response Full Report

country: FA **ident key:** 1800_023_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

These measures will be defined... 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 / 1800_023_01 report

Appendix Short Report / description of accident types:

SAFETY SYSTEMS OR OPERATORS INTERVENTION:

Fire alarm by telephone.

OTHER SYSTEMS INVOLVED AND OPERATING CONDITIONS:

Modification works at the electrical network of the welding posts was carrying out nearby the tanks. This may have had a possible relation with the explosion.

ENVIRONMENTAL AND ATMOSPHERIC CONDITIONS:

No wind when the fire occurred.

ACCIDENT CASE HISTORY DESCRIPTION:

During modification works on non-energized electrical cables, at 13:05 a flash fire in the pumping station occurred followed after 1 minute by an explosion in the area. Ten minutes later, at 13:15 the first tank (250 m³ storage capacity for additives) exploded, and fired like a rocket up to about 200m, falling down 60 m away outside the storage area and spreading the fire to about 1/3 of the depot. The explosion of 5 other tanks followed. At 13:18 the local authorities were alarmed by telephone and, at 13:23, a first control center was made up by the fire brigade. At 13:28 the fire brigade (42 men and 4 fire-trucks) arrived on-site and started the procedures to isolate the storage installation; at the same time arrived the first medical service (3 doctors with an ambulance). At 13:40 the traffic road in the area was interrupted and the personnel in the industrial area was evacuated. On-site there were 8 doctors, 5 ambulances and 2 re-animation vehicles. 18 beds for injured people were available. At 13:55, 117 policemen were present (200 at 14:20). At 14:10 the cooling of tanks (about 2,000m³/h by means of 25 monitors) was activated (it was carried out until the fire was extinguished). At 14:30, 200 policemen, 150 firemen, 20 doctors and nurses were present on-site. At 14:45, the Particular Emergency Plan was activated and the organization of emergency was under the direct control of the local Prefect. At 17:00 the fire spread all over the depot despite the water cooling. At 17:25 a first attempt to extinguishing the fire was carried out by means of 9 guns using 100,000 litres of foam. At 18:32 the explosion of another tank occurred and 6 firemen were wounded. The fire extended. The medical staff was reinforced. The explosion was due to boil-over of a tank containing 1,000 m³ of gasoil which created a fire-ball nearly 450m high and 200m wide. The fire spread to the neighbouring storage area and to various buildings inside the installation. At that time, about 72,000 litres of foam were used. During the night 2 floating roof tanks in the near storage area caught fire. At 06:35 of June 3rd, a second attempt to extinguish the fire was carried out by means of 17 guns (2 of which with a large flow) using 200,000 litres of foam. The use of foam monitors with large capacity (6,000 litres/min) had proved really efficient. At 07:30 the fire in the storage area was extinguished. At 09:00 the fire was extinguished using 140,000 litres of foam during the second attempt (there was still a small leak at the bottom of a tank). At 13:48 the fire was completely extinguished. The cooling of the tanks continued for the following two days (4 and 5), using a limited amount of foam as a preventive measure. On June 6th-7th, a small quantity of foam was used, as a preventive measure, during the draining of some tanks. Polluted fire fighting water and unburned hydrocarbons that could be contained (about 10,000 m³ remained in the parks and drains) were collected and transferred by barges and wagons to a petroleum refinery for treatment.

Appendix Short Report / description of substances involved:

No data are available about the amount of xylene (C.A.S. CODE: 1330-20-7) and polyisobutylene vapours mixture involved in the first explosion.

- Diesel Oil & Gasoil (C.A.S. CODE: 8008-20-6): amount involved = 2,000,000 kg (about 2,200 m³).

- Gasoline (C.A.S. CODE: 8006-61-9): amount involved = 1,300,000 kg (about 1,500 m³).

- Unleaded Petroleum Additives: amount involved = 600,000 kg.

During the fire were released into the environment sulphur dioxide (C.A.S. CODE: 7446-09-5, C.E.E. CODE: 016-011-00-0), lead compounds and particulate produced by the combustion of hydrocarbons. The amount of sulphur dioxide and lead compounds released during the accident (about 24 hours) had been estimated, respectively, in 12 tonnes and 600 Kg but no data are available about the amount of particulate released. Also, no data are available about the amount of hydrocarbons and additives that polluted the superficial and the underground waters.

Appendix Short Report / description of immediate sources:

The accident occurred in a storage installation for different fuels (fuel oil, gasoline, gasoil, additives, ecc.) in port Edouard-Herriot near to Lyon. The SHELL depot, built in 1948 and with following modifications in 1954, 1961, 1969 and 1971, had a whole volumetric capacity of 42,000 m³. Over a surface of about 5,000 m² there were about 60 storage tanks, both with little and medium capacity. When the accident occurred, the 14 tanks involved in the fire were containing gasoline, fuel oil, gasoil and petroleum additives. In the storage installation there were also a loading station; a two floors office building; a laboratory building; two hangars for the conditioning, storage, forwarding and archives separated by oil drums storage areas and loading stations. The lay-out of the installation is shown in the document "Incendie du Depot Petrolier SHELL Port Edouard Herriot - Lyon les 2 et 3 Juin 1987" attached to the Original Report. The storage installation was located in an industrial area with civil houses 750m away.

Appendix Short Report / description of immediate effects:

EFFECTS ON PEOPLE:

Inside the establishment, 2 people working in the storage installation were killed and 8 (3 slightly) people injured in the fire. 6 firemen were injured by the explosion of a tank.

MATERIAL LOSS:

More than ten tanks in the storage area N° 1 and 3 were completely destroyed (tanks N° 6, 12, 14, 55, 56, 57, 58, 59, 59.1, 20 and 22) or damaged in such a way to make impossible their use. Also, the loading stations, the office building, some vehicles parked nearby and other components in the storage installation were destroyed. No data are available about the cost of the material damages.

ECOLOGICAL HARM:

During the fire were released into the environment sulphur dioxide, lead compounds and particulate produced by the combustion of hydrocarbons. The amount of sulphur dioxide and lead compounds had been estimated, respectively, in 12 tonnes and 600 Kg. No data are available about the amount of particulate released. In the document attached to the Original Report the observed environmental pollution was not significant.

When that document was prepared, the risk of pollution of underground waters due to the infiltration of hydrocarbons in the soil was not yet completely resolved and the control of the water bearing stratum had to carry out.

MAP OF THE ACCIDENT AREA AND MAX. DENSITY OF POPULATION:

The map of the accident area together with the extents of the effects of the accident are shown on the document "Incendie du Depot Petrolier SHELL Port Edouard Herriot - Lyon les 2 et 3 Juin 1987" attached to the Original Report.

Appendix Short Report / description of emergency measures taken:

INTERNAL TO THE ESTABLISHMENT:

When the accident occurred, the local authorities were alarmed by telephone. The first fire brigade (42 men and 4 fire-trucks) arrived on-site and started the procedures to isolate the storage installation. The traffic road in the area was interrupted and the personnel in the industrial area was evacuated. The cooling of the tanks was carried out by means of 25 guns employing about 2000 m³/h over 24 hours. The extinguishing of the fire was carried out, during the first attempt, with 9 guns employing 72,000 litres of foam. During the second attempt were used 17 guns and 140,000 litres of foam. After the fire was extinguished, the cooling of the tanks continued for the following two days, using a limited amount of foam as a preventive measure. On June 6-7, a small quantity of foam was used, as a preventive measure, during the draining of some tanks. Polluted fire fighting water and unburned hydrocarbons that could be contained (about 10,000 m³ remained in the parks and drains) were collected and transferred by barges and wagons to a petroleum refinery for treatment.

EXTERNAL TO THE ESTABLISHMENT:

When the accident occurred, the local authorities were alarmed by telephone and, soon after, a first control center was made up by the fire brigade. The first fire brigade (42 men and 4 fire-trucks) arrived on-site and started the procedures to isolate the storage installation. The traffic road in the area was interrupted and the personnel in the industrial area was evacuated. The Particular Emergency Plan was activated. Fire fighting operations required the intervention of more than 150 firemen for about 24 hours. About 200 policemen were employed to control the road traffic, evacuate the personnel in the industrial area and transport the foam during the night. 25 people (13 of them were doctors) give medical help (18 beds for injured people and 11 operating rooms were prepared).

Appendix Short Report / description of immediate lessons learned:

MEASURES TO MITIGATE THE EFFECTS OF THE ACCIDENT:

These measures will be defined when the results of the investigations will be available. In any case, a revision of technical regulations for hydrocarbons storage areas was foreseen. The main conclusions were the following:

- 1- fixed-roof tanks without weak seam for roof-to-shell attachment are very dangerous because in case of overpressure (which may occur during a fire) the collapse will happen at their bottom part (hence, the released product can spread around feeding the fire);
- 2- the application of cooling water is not very effective. Use of foam was very effective;
- 3- need for special suitable foams for polar hydrocarbons storage;
- 4- old regulations for storage installations were not adequate;
- 5- concrete dikes do not guarantee resistance for a sufficiently long period of time in case of fire and, hence, earth bund walls are preferable.

Appendix Full Report A / type of accident:

A flash fire in a storage installation occurred followed by an explosion in the area (codes 1204 and 1307). It was followed by the explosion (code 1307) of some tanks (a gasoil tank exploded [code 1303] creating a fire-ball [code 1205]) and the spreading of fire in the whole storage area (code 1202). During the fire, pollutants were released into the environment (code 1401). The pollution of underground waters due to the infiltration of hydrocarbons in the soil also occurred (code 1404).

Appendix Full Report A / dangerous substances:

During the fire were released into the environment sulphur dioxide, lead compounds and particulate produced by the combustion of hydrocarbons. The amount of sulphur dioxide and lead compounds released during the accident (about 24 hours) had been estimated, respectively, in 12 tonnes and 600 Kg but no data are available about the amount of particulate released. Also, no data are available about the amount of hydrocarbons and additives that polluted the superficial and the underground waters.

Appendix Full Report A / source of accident - remarks:

The accident occurred in a storage installation (codes 2008 and 3202) for different fuels (fuel oil, gasoline, gasoil, additives, ecc.) in port Edouard-Herriot near to Lyon. The SHELL depot, built in 1948 and with following modifications in 1954, 1961, 1969 and 1971, had a whole volumetric capacity of 42,000 m³. Over a surface of about 5,000 m² there were about 60 storage tanks (code 4003). The location and the lay-out of the installation are shown in a document attached to the Original Report.

Appendix Full Report B / area concerned - remarks:

The fire damaged some vehicles parked outside the storage installation. The industrial area was evacuated. During the fire were released into the environment sulphur dioxide, lead compounds and particulate produced by the combustion of hydrocarbons but in the document attached to the Original Report the observed environmental pollution was not significant.

Appendix Full Report B / people:

Inside the establishment, 2 people working in the storage installation were killed and 8 (3 slightly) people injured in the fire. 6 firemen were injured by the explosion of a tank. Fire fighting operations required the intervention of more than 150 firemen for about 24 hours. About 200 policemen were employed to control the road traffic, evacuate the personnel in the industrial area and transport the foam during the night. 25 people (13 of them were doctors) give medical help.

Appendix Full Report B / ecological harm:

During the fire were released into the environment sulphur dioxide, lead compounds and particulate produced by the combustion of hydrocarbons but in the document attached to the Original Report the observed environmental pollution was not significant. When that document was prepared, the risk of pollution of underground waters due to the infiltration of hydrocarbons in the soil was not yet completely resolved.

Appendix Full Report B / material loss:

More than ten tanks in the storage area N° 1 and 3 were completely destroyed (tanks N° 6, 12, 14, 55, 56, 57, 58, 59, 59.1, 20 and 22) or damaged in such a way to make impossible their use. Also, the loading stations, the office building, some vehicles parked nearby and other components in the storage installation were destroyed. No data are available about the cost of the material damages.

Appendix Full Report B / disruption of community life:

The traffic road in the area was interrupted and the personnel in the industrial area was evacuated.

Appendix Full Report C / lesson learned - prevent:

These measures will be defined when the results of the investigations will be available. In any case, a revision of technical regulations for hydrocarbons storage areas was foreseen. The main conclusions were the following:

- 1- fixed-roof tanks without weak seam for roof-to-shell attachment are very dangerous because in case of overpressure (which may occur during a fire) the collapse will happen at their bottom part (hence, the released product can spread around feeding the fire);
- 2- the application of cooling water is not very effective. Use of foam was very effective;
- 3- need for special suitable foams for polar hydrocarbons storage;
- 4- old regulations for storage installations were not adequate;
- 5- concrete dikes do not guarantee resistance for a sufficiently long period of time in case of fire and, hence, earth bund walls are preferable.