Datum vytištění: 6. 1. 2023

Rozsah platnosti:

ORLEN Unipetrol RPA s.r.o. (bez odštěpných závodů)

SAFETY REPORT OF Unipetrol RPA s.r.o. – establishment in Litvínov

Information to employees and other bodies present inside of the establishment under consent of the operator according to Article (2) § 15 Act No 224/2015 of Czech Act Coll

Approved by: Director of H&S Division

Effective since: 1. 12. 2022

Prepared by: ORLEN Unipetrol RPA s.r.o. – H&S Division - OPBE

Table of Contents

1 Introduction

Safety Report (updated version) **was elaborated in 2022** in cooperation of ORLEN Unipetrol RPA s.r.o. employees and an external company TLP, spol. s r.o., which elaborated Assessment of Major-Accident Hazards of ORLEN Unipetrol RPA s.r.o., establishment in Litvínov. T**he Assessment of Major-Accident Hazards is an inseparable part of the Safety Report.** The Safety Report was updated in compliance with Act No 224/2015 of Czech Act Coll. (Major Hazard Accident Prevention Act) concerning erection of a new pyrolysis furnace BA 111 at the Steam Cracker Unit and a new Dicyclopentadiene Production Unit organizationally incorporated into Agro Unit. The update consisted particularly from merge, recalculation and reassessment of Major-Accident Hazards (concerning establishment in Litvínov) relevant to the new units and implementation of their technological description. **The Safety Report has been approved by decision of Regional Authority of Ústí Region, which came into force on November 5, 2022**. The Assessment of Major-Accident Hazards was done according to the internationally recognized method (Purple Book). All information and data are presented within the Safety Report in the simplest way (pure texts, tables, schemes, pictures, maps, references to Annexes). All information and data compiled in the Safety Report were split into public part and part protected by statute of "specific facts" according to Crisis Act (Act No 240/2000 of Czech Act Coll.). The part of the Safety Report marked as "specific facts" lays down detail data on technologies, which could be misused by unauthorized personnel, and therefore could not be made public in order to protect ORLEN Unipetrol RPA s.r.o. interests.

This Information to employees and other bodies present inside of the establishment under consent of the operator according to Article (2) § 15 Act No 224/2015 of Czech Act Coll. replaces former Information to Employees and other bodies present inside of the establishment under consent of the operator from March 17, 2020.

2 Safety Report Summary

The Safety Report is split into **seven parts**, each part is focused on specific information required by Ministry of Environment Decree on Requisites of Safety Documents and Range of Information Provided to Expert Opinion Processor. **As the most important part** of the Safety Report we could consider Part III – **Assessment of Major-accident Hazards**, which selects major-accident hazards (MaH) within the company, analyses probability of major accidents on selected major-accident hazards, assesses their consequences and sets their acceptability with regard to the societal risk.

Part I of the Safety Report (hereinafter "SR") sets basic information on the establishment, data on carried out activities within the establishment and employees.

Part II of the SR states description and informational data about our company. This part is split into two parts, of which one part is facilitated in the regime of "specific facts" and is not made public. Part II focuses on division of the establishment, states list and quantity of dangerous substances present in the establishment/installations and details on used technologies (specific facts), and states activities and processes connected with major-accident hazards. Part II also specifies internally and externally provided services and information on the environment.

Part III of the SR describes major-accident hazards and their selection for Quantitative Risk Assessment (QRA). The selection was carried out according to the Guidelines for Quantitative Risk Assessment - CPR 18E (Purple Book). Used method takes into account characteristics and quantity of a dangerous substance present in an installation as well as the process conditions. Based on this framework Major-accident Hazards were selected (individual installations/equipment) for the Quantitative Risk Assessment (QRA). Assessment of Major-accident Hazards identified 800 hazards – individual equipment. Selection procedure defined **22 major-accident hazards** (see Table 1: Selected Major-accident Hazards) for QRA. Majority of them are seated on a Petrochemical and Refinery sites. **Flammable (liquefied) gases** (ethylene, ethane, propylene, propane, C_4 fraction, 1-butene, isobutene, LPG) **(14 Major-accident Hazards) prevail**, flammable liquids (diesel, crude oil, virgin naphtha) (**4 Major-accident Hazards)** and **in four cases** there were **substances** assessed **due to their acute toxicity** (ammonia, hydrogen sulphide) concerning dangerous substances. With regard to **type of equipment** or process we can divide it as follows**: loading/unloading of rail tank cars/tank trucks (5 Major-accident Hazards), process units (8 Major-accident Hazards), tanks/drums (5 Major-accident Hazards) and pipelines (4 Major-accident Hazards).**

Description of selected Major-accident Hazards and their parameters and other relevant information is done in the article No 1.3 of the Assessment of Major-accident Hazards and in more detail in the Annex II marked as "specific facts".

Part III of the Safety Report describes procedures and outcomes concerning identification of the initial events, scenarios of major accidents, their causes and consequences and selection of the representative scenarios. Representative initial Events for the purposes of the Assessment of Major-accident Hazards were chosen in compliance with recommendation in expert literature CPR 18E (Purple Book).

Table 1: Selected Major-accident Hazards

MaH code	MaH – Position	Building No	Location MaH	Dangerous Substance	MaH No
2/01 2/02	Loading TC (20 t)	7151	Loading Tank Cars by Ethylene, building No 7151 (20/10 t)	Ethylene	1
2/08	Tank TK 301	7166	Tank TK 301, building No 7166 (C_4 fraction)	C_4 fraction	2
2/09	Tank TK401	7162	Tank TK 401, building No 7162 (LPG)	LPG	3
2/12+3b/82	Pipeline DN 200	From building No 7176 to building No 8808	Pipeline DN 200 from tank TK 201 to tank H01 – Propylene	Propylene	4
2/13/+3b/73	Pipeline DN 150	From building no 8808 to building No 7176	Pipeline DN 150 from tank H01 to tank TK 201 – Propylene	Propylene	5
3a/34	Ethylene Purification	7583	Ethylene Purification Line, building No 7583	Ethylene	6
3a/36	Reactor C4001	7592	Reactor C 4001 (Ethylene)	Ethylene	7
3a/93 3a/94	Loading RTC	5805 a 5806	Rail Tank Car (train = 8 RTCs (Ammonia - H) Rail Tank Car (train = 8 RTCs (Ammonia - T)	Ammonia	8
3b/05	Unloading RTC	8855	Rail Tank Car unloading (track No 234), building No 8855 (Butene)	Butene	9
3b/06	Unloading RTC	8857 Track No 234	Rail Tank Car unloading (track No 234), building No 8855 (LPG)	LPG	10
3c/02	Splitting Row 1a	8501	Splitting Row 1a, (DA 401, DA 403, DC 401, DA 402, DA 302) (C2 fraction g+l)	C_2 fraction	11
3c/04	Splitting C_3 fraction a)	8523	Splitting C3 (DA406 + facilities) (Propane+Propylene g+l)	Propylene	12
3c/06	Propylene Loop a)	8512	Propylene Loop a), (FA 505, FA 504, FA 503, FA 502, FA 501) (Propylene g+l)	Propylene	13
3c/17–28	Pipeline DN 300/350 C303-JRLI DN 300/350	from POX to Claus	C 303-JRLI, Pipeline DN 300/350, l = 220/1700 m (H2S)	Hydrogen Sulphide Rich Gas (45% Hydrogen Sulphide)	14
1320 (3/1320 (T+H) a 4/1320)	Separator with a pump and reactors	1371	3/1320 Reactos R01, R02, exchangers E07, E08, E10, E06, E05, E04, E09, E03, E02, E01, coolers W01, separators H03 – H2, H2S, HCVD	CnHn Mixture	15
1322	MDEA Regeneration	1381	1/1322 MDEA Regeneration, Absorber C02, striper C01 – H2S, uhl.	H_2S	16
2/4314 (T+H)	Claus 4 – H_2S (416 kg) – reactor	4314	2/4314 Claus 4 – H_2S	H_2S	17
5520	Loading RTC/TC	5526	Track No 151 RTC loading – propane Track No 151 RTC loading – propane-butane Track No 151 RTC loading – butane Track No 151 RTC unloading – butane (C4)	Propane, butane (C_4), propane-butane	18
6510/ TRF	Tank	6515	1/6510 Tank TRF – diesel	Diesel	19
6720/TRA,TRB,TRC,TRD	Tank + pipeline – 4×	6734-A, 6734-B, 6734-C, 6734-D	1/6720 Tank TRA – crude oil 2/6720 Tank TRB – crude oil 3/6720 Tank TRC – crude oil 4/6720 Tank TRD – crude oil	Crude Oil	20
6730/TSA,TSB,TSC	Tank – 3×	6738-A, 6738-B, 6738-C	1/6730 Tank TSA – virgin naphtha 2/6730 Tank TSB – virgin naphtha 3/6730 Tank TSC – diesel	virgin naphtha, diesel	21
3c/42	Pipeline DN 150 from Steam Cracker to Refinery		Pipeline DN 150 from Steam Cracker to Refinery – Propylene	Propylene	22

Position of Major-accident Hazards on the premises of ORLEN Unipetrol RPA s.r.o. indicates Illustration No 1.

Part III of the SR describes as well assessment of consequences concerning selected major accident scenarios including criteria used for numerical expression of such consequences. Effects, version 4.0 and 8.1.8, as a software tool was used for consequence modelling (product of TNO Company from the Netherlands) as well as procedures set by expert literature. From the calculations, which were **focused on assessment of consequences to life, consequences of blast wave and consequences of thermal radiation outside the company´s premises is clear**, that the most hazardous areas concerning the selected major-accident hazards are: **Low Temperature Tank Farm, Steam Cracker Unit, RTC loaded with ammonia and a fuel tanks of Refinery Litvínov Unit.**

Consequences to livestock (no consequences due to industrial character of the surroundings) and environment are described as well. For the purposes of Assessment of Consequences to Environment **representative substances were chosen from substances dangerous to environment** – which could potentially damage environment (Hazard Category E1 and E2 in compliance with Directive (EC) No 1272/2008 = CLP). Here are the representatives:

- Ammonia – RTC loaded with ammonia ZR 3a/94.
- Naphthalene Concentrate – tank H07, building No 8826 – ZR 3b/71.
- Pyrolysis Fuel Oil – tanks FB 1402 A/B, building No 9811 – ZR 3b/15.
- Diesel - tanks 6510-TRF, ST 01 and tanks 6730/TSC, ST 03.
- Crude Oil - tanks 6720/TRA,TRB,TRC,TRD, ST 01-ST 04.
- Virgin Naphtha - tanks 6730/TSA, TSB, ST 01-ST 02.

According to the carried out assessment of the major-accident hazards to environment is clear, with regard to construction solution, operational and emergency equipment, that **they do not represent a serious hazard to environment.**

Within conclusion of the Part III of the SR Human Reliability Analysis is done in connection with selected Major-accident Hazards. This part is protected by the institute of „specific facts “. Positions ensuring operation of selected Major-accident Hazards are analysed.

From the calculations made within the Part III of the SR it is clear, that **selected Major-accident Hazards within ORLEN Unipetrol RPA s.r.o., which were analysed, exhibit acceptable societal risk.**

Part IV of the SR is focused on description of Major-accident Prevention rules, aims and policy. All these items form an inseparable part of within company implemented Integrated Management System (IMS), which is described more precisely by IMS Policy.

Part V of the SR describes **Safety Management System**. Duties and responsibilities of employees, head employees and set provisions concerning Safety Management System including Major-accident Prevention are set by:

- Job Descriptions according to the internal Directive 920 (Description of Job Functions),
- Work Rules, Rules of Organization and other organizational and management internal regulations, in contracts on services,
- operational documents (Operational Manuals, Handling Rules, Work Procedures) elaborated according to internal Directive 842 (Operational and Technical Regulations), Directive 845 (Handling Rules) and Directive 824 (Working, Laboratory and Calibration Procedures),
- emergency documents (emergency and evacuation plans, emergency instructions) according to the Directive 430 (Accident Prevention and Crisis Management) and Directive 430 (Crisis Management and Major-accident Prevention),
- in organizational and management standards concerning occupational health and safety according to the Directive 401 (Basic Regulation in the Field of Occupational Health and Safety and Safety of Technical Equipment), Fire Safety according to the Directive 403 (Fire Safety Basic Regulation) and major accident prevention according to the Directive 405 (Basic Regulation for the Field of Major Accident Prevention and Crisis Management).

Duties and responsibilities of contractor employees and visitors in those fields cited hereinbefore are set in Directive 402 (Safety Rules for Workers of other Organizations), which is available on intranet and company web presentation.

Part VI of the SR details safety provisions for elimination or mitigation of major accidents or their consequences. Safety devices/equipment/installations with regard to major-accident prevention include but are not limited to:

- control systems including back-up systems and locking devices,
- systems of fire and explosion protection,
- equipment limiting loss of primary containment of dangerous substances,
- alarm systems including gas detection systems,
- emergency pits and adequate pumping devices,
- remotely controlled valves, safety valves, membranes, backflow preventers,
- level, temperature and pressure measuring and control, inert atmosphere,
- field burners,
- CCTV,
- access control system on site.

Except of safety devices providing accident prevention **other safety measures** are implemented decreasing the probability of major accident occurrence and limiting consequences include but are not limited to:

- regulations framework,
- measures to protect tank farms with dangerous substances,
- quick shut-down and other emergency procedures,
- preventive maintenance and repair of equipment,
- safety zone around the company premises.

Fire safety devices include e.g. smoke flaps, fireproof or smoke-tight doors, fire or evacuation lifts, emergency lighting, safety and alarm devices, systems and elements increasing fire resistance of load bearing structures or fire retardants, water and steam curtains, fireproof screens and plugs etc.

The most important intervention team for intervention and consequence management of major accidents is Company Fire Brigade (ORLEN Unipetrol RPA s.r.o. Fire Brigade), which is furnished for all types of accidents and incidents. It is a professional fire brigade with needed equipment and non-stop operation 24/7. Control room of the fire brigade includes also civil protection panel, if needed instructions are handed over to intervention unit of a security agency.

Part VI of the SR further describes in detail warning and alarm systems. Concerning communication devices, dispatching system MODIS A30, is mentioned. Concerning warning and alarm system especially „Warning and Alarm System of Petrochemical Site is mentioned “ (SVV) for the case of hydrocarbons leakage/release and Warning and Alarm System at the borders of the Zone of Emergency Planning. Since 2005 the premises are equipped with an alarm sound system (intelligent horns), where direct input of spoken word in real time is enabled in order to hand over supplemental instructions and information. The alarm sound system has two control stations (company´s dispatching, Fire Brigade control room). All those systems provide alarm and warning not only to employees, but also to public within the Zone of Emergency Planning (e.g. road, tram and railway traffic around the premises). Those systems significantly mitigate consequences of possible major accidents as information to interested/potentially affected are handed over in a timely manner and avoid entrance of the Zone of Emergency Planning after accident and rise of alarm. Such devices are periodically tested.

3 Conclusion

Overall, from the point of view of the operator of an establishment with dangerous substances and with regard to content of the Safety Report, it could be stated, that implemented integrated management system (including Major Accident Prevention System and Safety Management System), carried out Assessment of Major-accident Hazards, set and implemented preventive measures, ensured intervention powers and devices are adequate to identified Major-accident Hazards and assessment of societal risk acceptability have significant influence on reduction of probability of major accidents occurrence and in case of their occurrence on mitigation of their consequences.

We could say based on the supplemented texts into updated version of the SR (concerning new units) including reviewed Assessment of Major-accident Hazards, that those changes do not bring any major changes into safety. The new Steam Cracker Furnace BA 111 and the new Dicyclopentadiene Production Unit are erected and will be operated and secured in accordance with the latest knowledge in the field of safety and health at work, process safety, fire

protection and environmental protection. All selected major-accident hazards are still assessed as acceptable from the point of view of the societal risk.

An inseparable part of Major Accident Prevention System forms each employee of the company. Each employee ensures accomplishment of the system by the following way. She/he matches qualification criteria, has appropriate competence and medical fitness, follows set valid procedures and obeys valid internal regulations, in case of indisposition or detected non-compliance notifies them, carries out work in a safe manner, insists on safe work performance from his/her colleagues and contractors.

Major Accident Prevention System accomplishment means employees protection as well as protection of the company including company´s reputation!

.

Illustration No 1: Major-accident Hazards Position