Petrochemical Enterprises Sudden Environmental Pollution Accident Emergency Monitoring Research

Yu Gao[1, a], Hongbo Pan[2, b]

[1] Liaoning Environment Impact Assessment center, Shenyang, Liaoning, 110161, China

[2]Liaoning Environmental monitoring and Experiment center, Shenyang, Liaoning, 110161, China

[a]gaoyu1000@163.com, [b]45012905@qq.com

Key words: petrochemical enterprises, sudden environmental pollution accident, emergency monitoring.

Abstract. According to the characteristics of petrochemical enterprises, introduces the purpose, the job requirements, monitoring items and method, the stationing and monitoring frequency of sudden environmental pollution accident emergency monitoring, and puts forward of the related suggestions of petrochemical enterprise sudden environmental pollution accidents.

Introduction

Petrochemical enterprises has the characteristics of high temperature and high pressure, inflammable and explosive, toxic and harmful, the particularity of enterprise easy to induce sudden environmental pollution accidents, especially of toxic and harmful chemicals leakage accident, caused great harm to the environment [1]. Environmental pollution accident occurs, the petrochemical enterprise environmental monitoring system should be fast start corresponding emergency monitoring and disposal system. Through the emergency monitoring, timely and accurate judgment of the concentration of the pollutant, pollution range and may cause harm, in a timely manner to understand the development situation of an emergency, to predict the influence of the accident. Facilitate managers take different control measures for pollution accident types, as soon as possible to control or reduce accident harm [2].

Emergency monitoring purposes

Provide the necessary information for emergency command and relief work. Through sampling, monitoring and analysis, give a qualitative, semi-quantitative and quantitative results of the monitoring analysis, determine the harmful levels and the scope of the pollution of the environment emergency accident, provide sufficient information for environmental emergency command department, ensure the decision-making departments make the effectively to emergency decision-making and response in sudden environmental pollution accident. According to the development, and constantly revised emergency countermeasures.

Provide necessary data to assessment for emergency environmental accidents. Because of the environmental emergency monitoring has been monitoring and analysis at the scene of the sudden environmental pollution accident, understand the situation, so a review of the whole incident has bigger voice. Such as the cause of the accident, development situation, emergency measures for emergency control function, effectiveness, the environmental impact and hazards of emergency, etc.

Provide adequate information and data for the recovery plan of emergency environmental accidents. Through the emergency monitoring can determine the concentration of the main pollutants and the diffusion range in environmental pollution accident, thus provide adequate basis for the later environmental recovery plan.

Emergency monitoring requirements

After receiving emergency information, according to the reports judging the possible pollution factor, and immediately organize relevant personnel, making preparations for a field monitoring and laboratory analysis, respectively. Monitoring staff after receiving emergency information must be arrived at the scene sampling and sent to the laboratory as soon as possible. The Analysts must complete samples rapidly and accurately, timely issue the data, and keep the samples. When lack of monitoring means on a certain pollutants, shall be immediately call for backup, monitoring data report emergency headquarters at fastest speed by telephone or written form. Emergency monitoring should be from the processing of the accident until the accident put an end to the whole process of monitoring, monitoring frequency to reduce the losses and can satisfy the production recovery requirements after the accident.

Emergency monitoring items and method

After receiving emergency information, according to the reports judging the possible pollution factor, and immediately organize relevant personnel, making preparations for a field monitoring and laboratory analysis, a petrochemical enterprise emergency monitoring plan is shown in Table 1. According to the type of emergency and the types of dangerous substances involved, judged produce kinds of pollutants possible, select some or all of the items in table 1. If monitoring project in line with the field monitoring conditions, then in the field monitoring, for the monitoring project is not in conformity with the field monitoring conditions, will monitor sample sent to lab for analysis.

Table1 emergency monitoring plan

classification	monitoring points	monitoring variables	monitoring frequency instructions
water environment	rainwater drains	pH、COD_{Cr}、NH_3-N、petroleum oils	According to the nature of the pollutants, diffusion direction monitoring, determine monitoring points and monitoring variables. According to the development trend of events and the environment influence degree, determine the frequency of monitoring.
	total sewage outfalls		
	groundwater well reserved		
ambient air	the scene of the accident	NMHC、CO	
	factory bound under the wind recently		
	residential areas under the wind recently		
	control point in the windward		

According to the dangerous chemicals properties of a petrochemical enterprises, formulate emergency monitoring scheme, makes the corresponding provisions of the monitoring items and monitoring method, specific is shown in Table 2.

Table2 emergency monitoring method

number	monitoring variables	analysis method	Methods the source
1	NMHC	Stationary source emission-Determination of nonmethane hydrocarbons-Gas chromatography	HJ/T38-1999
2	CO	Air quality-Determination of carbon monoxide-Non-disperisive infrared spectrometry	GB 9801-1988
3	pH	Water quality-Determination of pH value-Glass electrode method	GB/T 6920-1986
4	COD_{Cr}	Water quality-Determination of the chemical oxygen demand-Dichromate method	GB/T 11914-1989
5	NH_3-N	Water quality-Determination of ammonia nitrogen-Nessler's reagent spectrophotometry	HJ535-2009
6	petroleum oils	Water quality- Determination of petroleum oils and animal and vegetable oils- Infrared spectrophotometry	HJ637-2012

Emergency monitoring points and monitoring frequency

After emergency environmental accidents, petrochemical enterprises should quickly start corresponding emergency monitoring and disposal system, timely and accurately determine pollutants concentration, pollution range and may cause damage through the emergency monitoring, facilitate managers take different control measures for pollution accident types, as soon as possible to control and reduce the accident harm [3].

Surface water pollution: According to the wastewater discharge to trace monitoring of polluted water body pollution condition, set monitoring point in the company's total outfalls and rainwater drains. When monitoring sampling, need adopt parallel samples, a sample at the scene, another sample after the fixative sent to the laboratory analysis as soon as possible.

Groundwater pollution: According to the groundwater discharge, monitoring polluted underground water pollution, set monitoring point in the company's groundwater well reserved. When monitoring sampling, need adopt parallel samples, a sample at the scene, another sample after the fixative sent to the laboratory analysis as soon as possible.

Atmospheric pollution: According to the wind direction, wind speed, judge harmful gas diffusion speed and scope, tracing monitoring atmospheric environment. At the scene of the pollution, downwind factory community and neighborhood recently set air pollution monitoring stations, respectively. At the same time set control point in the windward of the scene of the accident. Monitoring process should pay attention to wind direction changes, timely adjustment of sampling point location. The field monitoring timely report the accident emergency leading group.

Soil pollution: According to different pollutants determine scoping and sampling distance and depth. If the accident occurred in a relatively open area, Sampling should be taken from the surface of the deep 10cm of topsoil. Usually in the range of 10m×10m, methods adopt quincunx putting or serpentine points method according to the terrain, sampling points not less than five, in addition to collect unpolluted area as a control sample. Samples must be saved until after the emergency operations can be abandoned.

Emergency monitoring frequency: Emergency monitoring frequency according to the time of the accident, according to the condition of the pollutants, should increase the emergency monitoring

frequency the early of the incident, sample not less than 1 hour, after being clear pollution laws can be appropriately reduced, sample not less than 6 hour, sample not less than 24 hour after the termination of emergency, until influence completely eliminate to stop sampling.

Conclusions and problems Analysis

Petrochemical enterprises should improve hardware technology such as emergency monitoring methods, instruments and equipment, and strengthen the monitoring personnel emergency monitoring technology training, to improve the quality of emergency monitoring data and the strain capacity [4].

Enterprises of sudden pollution accident emergency monitoring system, and to form a professional emergency monitoring team, according to the petrochemical enterprise pollution factor is equipped with the necessary emergency monitoring instrument, and organize regular technical training and emergency monitoring practice, to strengthen emergency response capabilities and improve the level of emergency monitoring[2].

References

[1]HE Zhaohua. Anhui chemical industry.Vol. 40(2014), p.56（In Chinese）

[2]LIU Hongwei, YE Lihong. Safety health & environment. 2006(6): 32-34（In Chinese）

[3]NI Guicai. Chemical Industry times. 2008(1):72-73（In Chinese）

[4] Technical specifications for emergency monitoring in abrupt environmental accidents(HJ589-2010) （In Chinese）