International Journal of ChemTech Research
CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555
Vol.10 No.2, pp 697-702, 2017

Evaluation of Rapid Assessment of Some Industries in the Middle and Southern Region of Iraq by Using Rapid Environmental Impact Assessment Tool

Mohammad AbidMoslim AL-Tufaily[1], Ahmed Hashim Abass Al-Edamy[2]

[1]Faculty of Engineering, University of Babylon, Environmental Department, Iraq
[2]Faculty of Engineering, University of Babylon, Civil Department, Iraq

Abstract : Rapid environmental impact assessment (REIA) was used to evaluate the pollution loads and concentrations which resulted from the industries in the middle and southern region of Iraq at Basra, Diwaniyah, Muthana, Najaf, Babil, Baghdad, Dhi- Qar, Karbala, Maysan, and Wasit. The expert system (using a computer program) can be considered as a simple tool which contained REIAcapable of assessing Industrial activities and estimatingthe number of released pollutants. It characterized by easiness, saving time and flexibility in use and update. The results of water pollution by REIA showed that concentrations of liquid pollutants in term of working such as BOD_5, TSS, Oil, Cr, Phenol, Zn, Ni, Cu, Sulfide, and Hg were: 44%, 81%, 27%, 14%, 100%, 29%, 36%, 4%, 71%, and 100% respectively of factories in this study did not comply with WHO effluents limits.
Keywords : Rapid environmental impact assessment (REIA), Expert System, WHO, Thermal Power Station (T.P.S), Gas Power Station (G.P.S).

Introduction:

In recent years there is a rapid development of industrial activity which characterized by danger on environment media and human health. The industries in developing countries suffering from absence the treatment of waste, and to provide information about the impacts on the environment, there is a tool or a way used to identify and prioritize potential environmental impact as a result of various activities which called Rapid Environmental Impact Assessment (REIA).

The rapid environmental assessment was firstly adopted by World Health Organization (WHO) in 1982 and updated in the past years[1]. Rapid assessment technique was used in assessment and evaluation of pollution loads for industries in Spain and Italy. They built a computer program to calculate the environmental pollution[2].Therapid pollution assessment factors of air, water and solid waste inventory and control model were updated[3]. At the other hand, [4]also used the rapid assessment techniques to calculate the pollution loads for the industrial activity in Iraq. He constructed an expert system to apply the calculation by taking the governmental factories in Iraq as a case study.Also[5]has constructed an expert system (designated as rapid assessment expert system (RAES))for the calculations of the environmental pollution (air pollution and liquid waste) of the industrial activities by application of the Rapid Assessment Inventory Techniques (WHO; 1993), and by taking the situation of the industrial activities of the city of Baghdad (private sector) as a case study. The rapid assessment method was used to calculate the pollution loads for Panganiriver in Tanzania. The main pollution sources to Pangani River are, domestic waste, agricultural and industrial wastewater occurring in Arusha and

Kilimanjaro[6]. While[7] evaluated the pollutants resulted from the industrial activities in the middle Euphrates region at Babylon, Al-Najaf and Kerbela governorates using REIA tool with an expert system, by applying Rapid Assessment Inventory Techniques which dependent by WHO, 1993.

Methodology

The rapid assessment procedure allows for quickest imation of releases of pollutantsto the environment. These data are multiplied by pre determined waste load factors to provide estimates of the generated loads for each pollution type[3].

The methodology consists of:

1. Collect information needed to assess environmental impacts.
2. Provide steps to sort and analyze the information to identify important issues through the questionnaire and local research and investigations.
3. Organizing results of the analysis in tables and makes a comparison with the standards limits and discusses it.

Study Area Description

The industrial activities were distributed around the basins of Tigris and the Euphrates and their branches down to the Shatt al- Arab, where the study region in middle and southern region of Iraq at Basra, Diwaniyah, Muthanna, Najaf, Babil, Baghdad, DhiQar, Karbala, Maysan, and Wasit. The industrial activities including in this study are 28 power station, 8 textile factor, 2 sugar factory, 1 fertilizer factory, 1 dairy factory, 3 rubber factory, 7 petroleum refineries, 2 paper factory, 3 chemical factory, and 3 vegetable oil factory, and the study region as shown in figure (1).

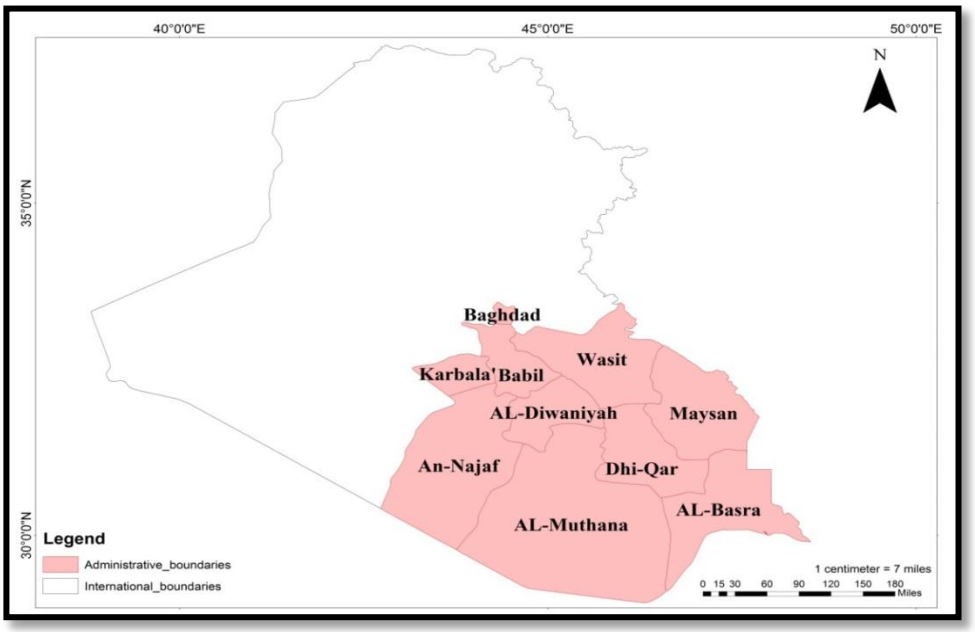

Fig (1) Study Area

The Expert System Description

The expert system (using a computer program) was designed by visual basic (version 6.0) software to calculate the pollution loads and concentrations of the industries by using rapid environmental impact assessment (REIA) tool. These calculations depending on the type of industrial activity, which can be classified by united standard industrial classification. Moreover, the results obtained from the calculations will check with standard limit WHO. All data in the expert system that including production capacity of industries, waste load factors, and standard limits characterized by flexibility in update according to the change at any time. Also, there has the possibility of addition industries to assess the pollution loads and concentrations in the expert system.

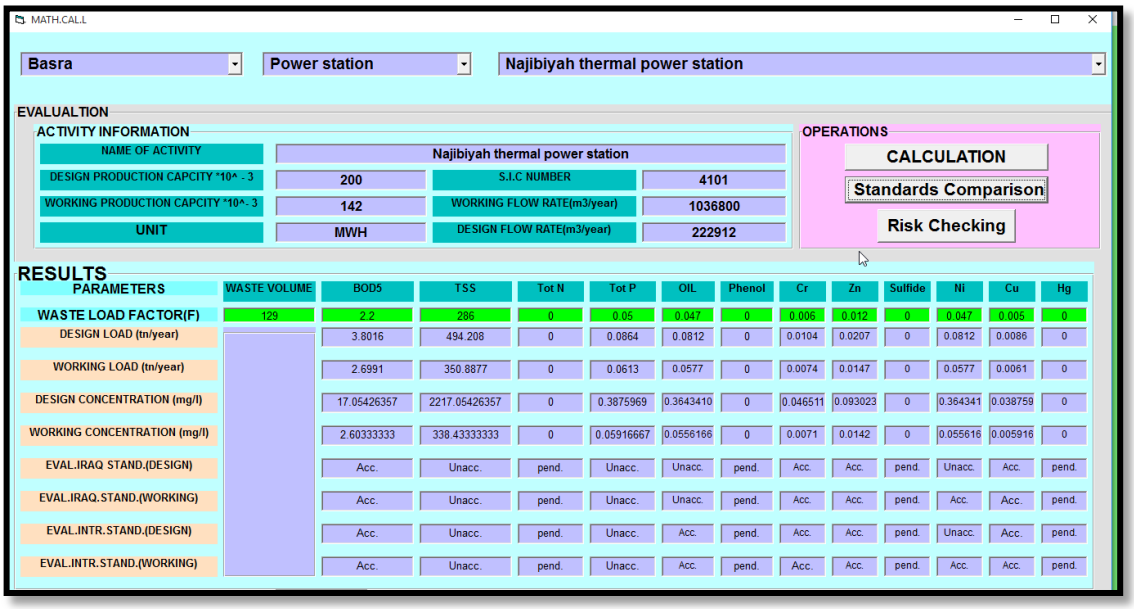

Fig (2) Calculations of pollution loads and concentrations by REIA.

Results and Discussions

The pollutants were released from industries in this study includingBOD_5, TSS, Tot -N, Tot-P, Oil, Cr, phenol, Zn, Ni, Cu, and Hg. These pollutants were calculated according to WHO Rapid Technique, 1993. Concentrations of these pollutants comprised with WHO standards limits to showthe compatibility with these limits[6-11]. The tables (1to8) were showed results of both design and working concentrations of wastewater resulted from industrial activity.

Table(1): Design and Working Pollution Concentrations of Liquid Pollutants for Textile Factories

Source	U	BOD_5		TSS	
		D.C	W.C	D.C	W.C
Diwaniyah					
Diwaniyah textile factory	tn	847.25	35333.3	330.82	13796.3
Najaf					
Men's Knits factory	tn	847.25	1536.23	330.82	599.839
Babil					
Hilla textile factory	tn	847.25	1948.53	330.82	760.825
Baghdad					
Medical Products Factory	tn	847.25	1536.23	330.82	599.839
Alkhiam sewing factory	tn	847.25	72345	330.82	28247.9
Kadhimiya woolen factory	tn	847.25	17666.7	330.82	6898.15
DhiQar					
Nasiriyah textile factory	tn	847.25	73140	330.82	28558.3
Wasit					
Wasit textile factory	tn	847.25	2650	330.82	1034.72

Table(2): Design and Working Pollution Concentrations of Liquid Pollutants for Sugar Factories

Source	U	BOD_5		TSS	
		D.C	W.C	D.C	W.C
Babil					
Al-etehad sugar factory	tn	869.565	13029.1	3260.87	48859.14
Maysan					
Maysan sugar factory	tn	869.565	6613.76	3260.87	24801.59

Table(3): Design and Working Concentration Liquid Pollutants for Fertilizers Factories

Source	U	BOD_5	
		D.C	W.C
Basra			
General Company for Southern Fertilizers / Urea	tn	41666.7	8125
Total		41666.7	8125

Table(4): Design and Working Pollution Concentrations of Liquid Pollutants for Dairy Factories

Source	U	BOD_5		TSS		TotN		TotP	
		D.C	W.C	D.C	W.C	D.C	W.C	D.C	W.C
Diwaniyah									
Diwaniyah dairy factory	tn	2069.8	170.5	389.23	32.06	146.43	12.063	78.38	6.456

Table (5): Design and Working Pollution Concentrations of Liquid Pollutants forRubber Factories

Source	U	BOD_5		TSS		Oil	
		D.C	W.C	D.C	W.C	D.C	W.C
Diwaniyah							
Diwaniyah rubber factory	tn	10.81	0.9863	27.027	2.4658	3.24	0.296
Najaf							
Najaf rubber factory (1)	tn	10.81	1	27.027	2.5	3.24	0.3
Najaf rubber factory (2)	tn	10.81	1	27.027	2.5	3.24	0.3

Table(6): Design and Working Pollution Concentrations of Liquid Pollutants for Paper Factories

Source	U	BOD_5		TSS	
		D.C	W.C	D.C	W.C
Basra					
Basra paper factory	tn	44	72.18	84	137.81
Maysan					
Maysan paper factory	tn	44	72.187	84	137.81

Table(7): Design and Working Pollution Concentrations of Liquid Pollutants for Chemical Factories.

Source	U	BOD_5		Hg	
		D.C	W.C	D.C	W.C
Babil					
HarirSadda chemical factory	tn	4666.67	1329.69	125	35.62
Baghdad					
Babil batteries factory (1)	tn	4666.67	1728.4	125	46.3
Babil batteries factory (2)	tn	4666.67	1728.4	125	15.56

Table(8): Design and Working Pollution Concentration of Liquid Pollutants for Vegetable Oil Refining Factories.

Source	U	BOD_5		TSS		Oil	
		D.C	W.C	D.C	W.C	D.C	W.C
Baghdad							
Al-amin oils factory	tn	3661.76	24900	3617.65	24600	4132.35	28100
Al-rasheed oils factory	tn	3661.76	240008	3617.65	237116.7	4132.35	270852.7
Maysan							
Mutasim oils factory	tn	3661.76	116891.7	3617.65	115483.3	4132.35	131913.8

Conclusions

Conclusions are obtained from this study can be summarized as follow:

Concentrations of BOD_5 in terms of design and working states and working concentrations of TSS for all textile factories inconsistent with WHO limits, while for concentrations of TSS in design state comply with limits except (Nasriyah and Wasit) textile factories. BOD_5, and TSS in design and working concentrations for sugar factories were unaccepted with WHO limits. General company for southern fertilizers (urea) showed incompatible limits in terms of design and working states when compared with WHO limits. Diary product factory was accepted with limits in (BOD_5 and TSS) except BOD_5 in design state. All of the rubber factories were satisfied with WHO limits. All of the petroleum refineries in terms of design concentrations were accepted

with limits of (BOD_5, TSS, Phenol, Cr, and Sulfide) except Daura refinery, while in working concentrations of (BOD_5, TSS, Phenol, Cr, and Sulfide) were inconsistent with WHO standards except Basra and Muthana refinery in (BOD_5, TSS, and sulfide). Basra paper factory did not satisfy WHO limits in design and working concentration of (BOD_5, and TSS), while Maysan paper factory comply with WHO limits. All of the Chemical factories did not satisfy WHO limits in TSS and mercury (Hg) in terms of design and working states. All of the vegetable oil factories released pollutants as BOD_5, TSS, and Oil was inconsistent with WHO effluent limits for design and working concentrations.

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