IRAQI MINISTRIES

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NEW EDEN MASTER PLAN

FOR INTEGRATED WATER RESOURCES MANAGEMENT IN THE MARSHLANDS AREA

Volume III

Implementation plans

Book 7

Water and Sanitation Assets

Annex I

International standards for disinfectants/ disinfection by-products, organic contaminants, and radionuclides

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INTERNATIONAL STANDARDS FOR DISINFECTANTS/DISINFECTION BY-PRODUCTS, ORGANIC CONTAMINANTS, AND RADIONUCLIDES

DISINFECTION BY-PRODUCTS

Contaminant	EPA		WHO	Potential Health Effects from Ingestion of Water	Sources of Contaminant in Drinking Water
	MCLG (mg/L)	MCL or TT (mg/L)	Guideline value (mg/L)		
Bromate	0	0.010	0.010*	Increased risk of cancer	By-product of drinking water disinfection
Chlorite	0.8	1.0	0.7*	Anemia; infants & young children: nervous system effects	By-product of drinking water disinfection
Haloacetic acids (HAA5)	dichloroacetic acid = 0; trichloroacetic acid= 0.3; Monochloroacetic acid= NA; bromoacetic acid= NA; dibromoacetic acid=NA	0.060 (sum)	dichloroacetic acid = 0.05*; trichloroacetic acid= 0.2*; Monochloroacetic acid= 0.02*; bromoacetic acid= 0.005*; dibromoacetic acid=0.001*	Increased risk of cancer	By-product of drinking water disinfection
Total Trihalomethanes (TTHMs)	Bromodichloromethane = 0; bromoform = 0; dibromochloromethane = 0.06	0.10 (sum)	The sum of the ratio of the concentration of each to its respective guideline value	Liver, kidney or central nervous system problems; increased risk of cancer	By-product of drinking water disinfection

Contaminant	EPA		WHO	Potential Health Effects from Ingestion of Water	Sources of Contaminant in Drinking Water
	MCLG (mg/L)	MCL or TT (mg/L)	Guideline value (mg/L)		
	Chloroform is regulated with this group but has no MCLG.		should not exceed 1		
Note: * = provisional guide value,					

Table 1: USEPA and WHO standards for Disinfection by-products in drinking water

DISINFECTANTS

Contaminant	EPA		WHO	Potential Health Effects from Ingestion of Water	Sources of Contaminant in Drinking Water
	MRDLG (mg/L)	MRDL (mg/L)	Guideline value (mg/L)		
Chloramines (as Cl_2)	4.0	4.0	5.0	Eye/nose irritation; stomach discomfort, anemia	Water additive used to control microbes
Chlorine (as Cl_2)	4.0	4.0	5.0*	Eye/nose irritation; stomach discomfort	Water additive used to control microbes
Chlorine dioxide (as ClO_2)	0.8	0.8	0.4 – 0.7	Anemia; infants & young children: nervous system effects	Water additive used to control microbes

Note: **Maximum Residual Disinfectant Level (MRDL)** - The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG) - The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

* = For effective disinfection, there should be a residual concentration of free chlorine of 0.5 mg/litre after at least 30 min contact time at pH <8.0.

Table 2: USEPA and WHO standards for Disinfectants in drinking water

ORGANIC CHEMICALS

Contaminant	EPA		WHO	Potential Health Effects from Ingestion of Water	Sources of Contaminant in Drinking Water
	MCLG (mg/L)	MCL or TT (mg/L)	Guideline value (mg/L)		
Acrylamide	0	TT*	0.0005	Nervous system or blood problems; increased risk of cancer	Added to water during sewage/wastewater treatment
Alachlor	0	0.002	0.02	Eye, liver, kidney or spleen problems; anemia; increased risk of cancer	Runoff from herbicide used on row crops
Atrazine	0.003	0.003	0.002	Cardiovascular system or reproductive problems	Runoff from herbicide used on row crops
Benzene	zero	0.005	0.01	Anemia; decrease in blood platelets; increased risk of cancer	Discharge from factories; leaching from gas storage tanks and landfills
Benzo(a)pyrene (PAHs)	zero	0.0002	0.0007	Reproductive difficulties; increased risk of cancer	Leaching from linings of water storage tanks and distribution lines
Carbofuran	0.04	0.04	0.007	Problems with blood, nervous system, or reproductive system	Leaching of soil fumigant used on rice and alfalfa
Carbon tetrachloride	0	0.005	0.004	Liver problems; increased risk of cancer	Discharge from chemical plants and other industrial activities

Contaminant	EPA		WHO	Potential Health Effects from Ingestion of Water	Sources of Contaminant in Drinking Water
	MCLG (mg/L)	MCL or TT (mg/L)	Guideline value (mg/L)		
Chlordane	0	0.002	0.0002	Liver or nervous system problems; increased risk of cancer	Residue of banned termiticide
Chlorobenzene	0.1	0.1	0.08	Liver or kidney problems	Discharge from chemical and agricultural chemical factories
2,4-D	0.07	0.07	0.03	Kidney, liver, or adrenal gland problems	Runoff from herbicide used on row crops
Dalapon	0.2	0.2	0.04	Minor kidney changes	Runoff from herbicide used on rights of way
1,2-Dibromo-3-chloropropane (DBCP)	zero	0.0002	0.001	Reproductive difficulties; increased risk of cancer	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards
o-Dichlorobenzene	0.6	0.6	1	Liver, kidney, or circulatory system problems	Discharge from industrial chemical factories
p-Dichlorobenzene	0.075	0.075	0.3	Anemia; liver, kidney or spleen damage; changes in blood	Discharge from industrial chemical factories
1,2-Dichloroethane	0	0.005	0.03	Increased risk of cancer	Discharge from industrial chemical factories
1,1-Dichloroethylene	0.007	0.007	0.03	Liver problems	Discharge from industrial chemical factories

Contaminant	EPA		WHO	Potential Health Effects from Ingestion of Water	Sources of Contaminant in Drinking Water
	MCLG (mg/L)	MCL or TT (mg/L)	Guideline value (mg/L)		
cis-1,2-Dichloroethylene	0.07	0.07	0,05	Liver problems	Discharge from industrial chemical factories
trans-1,2-Dichloroethylene	0.1	0.1	0.03	Liver problems	Discharge from industrial chemical factories
Dichloromethane	0	0.005	0.02	Liver problems; increased risk of cancer	Discharge from drug and chemical factories
1,2-Dichloropropane	0	0.005	0.04	Increased risk of cancer	Discharge from industrial chemical factories
Di(2-ethylhexyl) adipate	0.4	0.4	Occurs in drinking-water at concentrations well below those at which toxic effects may occur	Weight loss, liver problems, or possible reproductive difficulties.	Discharge from chemical factories
Di(2-ethylhexyl) phthalate	0	0.006	0.008	Reproductive difficulties; liver problems; increased risk of cancer	Discharge from rubber and chemical factories
Dinoseb	0.007	0.007	Occurs in drinking-water at concentrations well below those at which toxic effects may occur	Reproductive difficulties	Runoff from herbicide used on soybeans and vegetables
Dioxin (2,3,7,8-TCDD)	0	0.00000003	0	Reproductive difficulties; increased risk of cancer	Emissions from waste incineration and other combustion; discharge from chemical factories

Contaminant	EPA		WHO	Potential Health Effects from Ingestion of Water	Sources of Contaminant in Drinking Water
	MCLG (mg/L)	MCL or TT (mg/L)	Guideline value (mg/L)		
Diquat	0.02	0.02	-	Cataracts	Runoff from herbicide use
Endrin	0.002	0.002	0.0006	Liver problems	Residue of banned insecticide
Epichlorohydrin	0	TT	0.0004	Increased cancer risk, and over a long period of time, stomach problems	Discharge from industrial chemical factories; an impurity of some water treatment chemicals
Ethylbenzene	0.7	0.7	0.3	Liver or kidneys problems	Discharge from petroleum refineries
Ethylene dibromide	0	0.00005	0	Problems with liver, stomach, reproductive system, or kidneys; increased risk of cancer	Discharge from petroleum refineries
Lindane	0.0002	0.0002	0.002	Liver or kidney problems	Runoff/leaching from insecticide used on cattle, lumber, gardens
Methoxychlor	0.04	0.04	0.02	Reproductive difficulties	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock
Oxamyl (Vydate)	0.2	0.2	-	Slight nervous system effects	Runoff/leaching from insecticide used on apples, potatoes, and tomatoes
Pentachlorophenol	0	0.001	0.009	Liver or kidney problems; increased cancer risk	Discharge from wood preserving factories

Contaminant	EPA		WHO	Potential Health Effects from Ingestion of Water	Sources of Contaminant in Drinking Water
	MCLG (mg/L)	MCL or TT (mg/L)	Guideline value (mg/L)		
Simazine	0.004	0.004	0.002	Problems with blood	Herbicide runoff
Styrene	0.1	0.1	0.02	Liver, kidney, or circulatory system problems	Discharge from rubber and plastic factories; leaching from landfills
Toluene	1	1	0.7	Nervous system, kidney, or liver problems	Discharge from petroleum factories
Vinyl chloride	0	0.002	0.0003	Increased risk of cancer	Leaching from PVC pipes; discharge from plastic factories
Xylenes (total)	10	10	0.5	Nervous system damage	Discharge from petroleum factories; discharge from chemical factories

Table 3: USEPA and WHO standards for Organic Chemicals in drinking water

RADIONUCLIDES

Contaminant	EPA	WHO	Potential Health Effects from Ingestion of Water	Sources of Contaminant in Drinking Water
	MCL	Bq/L		
Alpha particles	15 picocuries per Liter (pCi/L)	0.5	Increased risk of cancer	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation
Beta particles and photon emitters	4 millirems per year	1.0	Increased risk of cancer	Decay of natural and man-made deposits of certain minerals that are radioactive and may emit forms of radiation known as photons and beta radiation
Combined radium-226/-228	5 pCi/L (1976)	Ra 226 = 1 Ra 228 = 0.1	Increased risk of cancer	Erosion of natural deposits
Uranium	30 µg/L (2000)	235U = 1 236U = 1 237U = 100 238U = 10 230U = 1 231U = 1000 232U = 1 233U = 1 234U = 10	Increased risk of cancer, kidney toxicity	Erosion of natural deposits

Table 4: USEPA and WHO standards for Radionuclides in drinking water