BU ETINU INSTITUTU UI PO ITE NIC DIN IAŞI
P b a
U a a T ă A a Iaş
T VI X Fa . 010
S ţ a
CONSTRUCŢII. ĂR ITECTURĂ

ENVIRONMENTAL IMPACT OF WATER FROM WASTEWATER TREATMENT PLANTS

BY

P. MIHAI, RĂZVAN GIUŞCĂ, BOGDAN ROŞCA
and VLADIMIR COROBCEANU

Abstract. T a a a a a a a . T a a a a a R a a a . T a a a a a 1 a . A a a a b a a a a a a a b a a a a a a R a a a a ba a a . T a a a a a a a a a a a ab a . T a a a a a a a a a a a : b a a a a a a a a . T a a a a a a b a a a a .

Key words: a a ; a a ; a a a a ; .

1. Introduction

U ba a a a a a a . D a a a a a b a a : b a a a a a a a b a a a a [1]. T a a a a .

T b a a a a a a .

A a a a a a b a a : a b a a a a . T

a a a a a a a
a a b a . T
a a : a b a a b a . I
a b a a a a
b a b a . O
a a a b ba a b a a
: a a a a a a a a ba a a
a a a a
a a .
B a a a a a b a
a b a a b . T ba a a
a a a a a b a
a a . a b a a a
a a a a a a
a . W a a a a a
a a b ba a a a a
a a b a a a a
a a a a a . B ab
a b a a a a a a
a a a . N a a a a a
a a a b a a b ba a.
B a a a b a a a
a a a a a a
a b a : a a a a
a a ab a
a a. F
b a a a :
a a a a a a
a a a a a a a a
a b .

2. Quality and Origin of Used Water

T a a a a a a
ba a a
a a .
T a a a a 1
a a a a a a a R a
a a a ba a a a NTPA *002*/ 00 :
a a b a a CCO C a CBO_5
a a a a a a a a
a b a a
a a a
a a a . I

a a b CBO_5 b a
b a b a
a a a a . T
a a ab a
ba a a .
CCO C a a a
a a a a . T
b CCO C a CBO_5 a a
a a .
Wa a a a a a 1
a a a a a 0 a a a
a a a a
a *A* a a a a a a
a a a ;
b *B* a a a ; a a a a
b a b a
a a ;
C a b
a a ;
D a *E* a b a a a
a a a b a a a a a
a a a a a.
N a 00… 50 / a a a a a
a a a a a a
A a . T a a a:
a a a a b b a
a . a a
a . T a a a
A a a a Tab 1
a .

Table 1

Physical-Chemical Features of Water within A Pipe

Q a a a	D a
S a [/]	11 .5
CBO_5 [/]	7 .0
A a [/]	1.
S [/]	1.0
A a [/]	0.

T a a a a a a *A*
a a a a Tab 1. T
a a a a ab a a a
a a a : a a a a
a a

a ba a a a a
a a a a a a a
a . T a a a a
a a a a a b .
a a a a 0. 5 .
a a a *A* a a a
a a ab a a a ab a a
a Tab .

Table 2

Heavy Metals Present in the Sewage from A Sewer Main

N .	Q a a a	A a a		1 [/]		Ma a ab a
		1 a b		a b		
		1 00... 00	700...1 00	1 00... 00	700...1 00	
1	a	0.0005	0.0005	0.00 5	0.00	0.5
	Ca	0.0005	0.0005	0.001	0	0.1
	T a	0	0	0.001	0.00	
	T a	0	0	0.001	0.00	1
5	a a	0	0	0	0	0.1
	C	0	0	0.001	0.001	0.1
7	N	0.0	0.0	0	0	1.0
	Z	0.01	0	0.0	0.01	1.0
	Ma a	0	0.015	0.01	0.01	1.0
O a		0.051	0.0	0.05 5	0.057	1.0

I a a a a a a a
a a a a a a ab a a
a 1 / . O a a a a
a a a ab a MAC .
a a a a b
1 a a a a a
a a a a a a
a a a a a Tab .
B a a 1 0... 00 / a a a
a a b a a
a . T a a a a
b a a a a a a
a a a b a a a a a
b a b . . T a a
a a . T a a a a a a
a a Tab .

Table 3
Excess Values of A Sewer Pipe Compared to the Maximum Allowable Concentration (MAC)

C a	P a	MAC a
	1 a	a
		1 0
A a		1
	10	00

Table 4
Discharge Conditions of Wastewater from B Sewer

F /	S a /	CBO_5 /	S /	P /
00	00	00	0.5	0
00	00	00	0.5	0

T a a a a a a a a a *B* a a a a Tab 5 a .

Table 5
Physical-Chemical Features of Water from B Sewer

Q a a a	A a a	Ma a ab a
S a [/]	0.	00
CCO C [O /]	775. 1	500
CCO M [O /]		
CBO_5 [O /]	5 . 5	00
A a [N /]	10. 5	0
S S [S /]	10. 7	0.5
A a [/]	0.0	0

Table 6
Values over MAC for B sewer

Q a a a	P a		MAC a
		A a	
CCO C	7	55.1	117.
CBO_5			5. 5
S a			15.
S	1 1 0	1	7
S	0	51.	55
E a b b a			1

A a *B* a a
a . T a a a a a a a a
a ab a a a
a a a a a .
C a a a a a
b a a a
a a . T a a
b MAC a a a ab =
= .5... .5 . T a a a a
a a a a b
. T a a ab 7.5 / b .5
a a a 1 .5 / a 1.1 a
a b MAC a 00 / .
O a a a a CCO C a
a a b a
a
a a 1.1 a a
a ;
b a a a 1.5 a
a a ;
a .1 a a
a a .
T a a a CBO_5 a a
a a a a a a 1.5 a
a a a b a .
T a MAC a [ ]:
a a a a a a a a
a a a a ;
b a a a a
b a 1 a a a a a
;
a a a a a a a 1
a a a a .
T a *B* a b a
a a a b a a a .
S a a a a a a a a a a
a a a a a . C a a
b a a a a a a
a a a . D B *et*
al. 00 .
T a a *B* a a
a a a a a
a b b a a 1 / a a b
Tab 7.

Table 7

Heavy Metal Content in Treated Water of B Sewer

N	Q a a a	A a a 1 [/]				Ma a ab a
		1 a b		a b		
		1 00… 00	700…1 00	1 00… 00	700…1 00	
1	a	0.001	0.001	0.00	0.00	0.5
	Ca	0	0	0.00	0.00	0.1
	T a	0.0005	0 00 5	0.001	0.005	
	T a	0.0005	0.00 5	0.001	0.005	1
5	a a	0	0	0	0	0.1
	C	0.0005	0.00 5	0.00	0.00	0.1
7	N	0.0 5	0.1	0.0	0.00	1.0
	Z	0.0	0.0 5	0.0	0.0	1.0
	Ma a	0.01 5	0.0 5	0.0	0.01	1.0
	O a	0.1	0. 15	0.0	0.115	1.0

T *C* a a 50… 00 / a a a a a a . T a a a a a a a Tab . T a a a a a a a a a a ab a a a a .

Table 8

Heavy Metal Content in Treated Water of C Sewer

N	Q a a a	A a a 1 [/]				Ma a ab a
		1 a b		a b		
		1 00… 00	700…1 00	1 00… 00	700…1 00	
1	a	0.0015	0.001	0.00	0.00	0.5
	Ca	0.0005	0.0005	0.00	0.00	0.1
	T a	0.00	0.0005	0.0011	0.01	
	T a	0.00	0.0005	0.0011	0.01	1
5	a a	0	0	0	0	0.1
	C	0	0.0005	0.001	0.011	0.1
7	N	0.10 5	0.107	0	0.005	1.0
	Z	0.0	0.05	0.0	0.0	1.0
	Ma a	0.00 5	0.00 5	0.01	0.00	1.0
	O a	0 1 7	0.1	0.07	0.117	1.0

T a a a MAC a : a b a CCO C CBO_5 a a a a a a a . I a a

a a MAC a a a b
a a a 1 / .
T MAC a a a a a a
a a a a a a a a a a ; MAC a
a a a a a a a :
a a a 1 a
a a ;
b b a 1 a
a a .
T a MAC a a a a
a a Tab .

Table 9
Values of MAC for C Sewer

Q a a a	D a	P a 1 a	MAC a a
S	a a	7	77 0
A a			.
P b a			1.5

T a a ab
a a a . F a
a a a a a a a 1 a
a a a a a
a a a a 7 a . *D E* a a a
a a 50… 00 / a a a a a
a a a a. T a
: a
a a a ab a
a a a a a a a a a
. T a a a a a a a a
a *D E* a a
a a Tab 10 a 11.

Table 10
Values of MAC for D and E Sewers

Q a a a	Y a a	P a 1 a	MAC a a
A a			.
S	a a	0 5	

Table 11
Heavy Metal Content in Treated Water of D + E Sewers

N	Q a a a	A a a 1 [/]				A a a 1 /
		1 a b		1 a b		
		1 …	7…1	1 …	7…1	
1	a	0.0015	0.001	0.00	0.00	0.5
	Ca	0.0005	0	0.00	0.00	0.1
	T a	0	0	0.00	0.001	
	T a	0	0	0.00	0.001	1
5	a a	0	0	0	0	0.1
	C	0	0.01	0.00	0.00	0 1
7	N	0.107	0.0	0	0	1.0
	Z	0.015	0.01	0.0	0.015	1.0
	Ma a	0	0.00 5	0.00	0.00	1.0
	O a	0.1	0.0575	0.0	0.0	1.0

A a a a b a a MAC a : a b a CCO C CBO_5 a a a b a a a a a a a a .

Ra a a MAC a a a a a :

a a a 1 a ;

b 1 a .

T a a a a a MAC a a b a 1 / a a ab a . S a a a a a a a a a a a 5 .0 a a 7 .17 a a .

3. Impact on Air Quality

W b b a a b

a a a a ;

b a a a a a a a ;

a a a a a a a.

T a a a a a :

a a a a a ;

b a a ab ;

a a a a a
a a a a a ;
a a a
a b a a a a .
a a b a b
a b a ;
b a a ;
a a .
T a a a a a
a a a a b
a a b a b a a a . T a
a a a a a a
a a a b a a a ab
a a a . T a a
a a a a : a
a a . F a a a a a
a a a VOC a . D a a
a a a . D
VOC a a a a a a . O a
a a a a a ba a b
a a a .
C a a a a a a
a ab b a a . I a
a 0. …5. / a a . S a
a a a a a a a a
5.7 / a a a a 0.7 0 / . T a
a a a a b b a a .
C b a a a a a a a
a a a a .0 .
T a a a a b a a a a
a . I a
a b a a . M a
a b a a a a . I
b a a a a a a b a
a a a a 1 0 / a
a a / a a 15 / a . T a a
a a : SO NO
a b CO a
a a .
I a a a a a a
a a SO 5.1 /N. a
1 700 /N. a a a . T a
a a a a .
I a a a a a b

a a a a a a a a a
a a a a a a a . T a
a a a a a
a b a
a *et al*. 005 a a b a a
a a a a a .

4. Conclusions

Wa a a a b
a a / a a a a a
a a a a a a . U a a
a a a a b a a a
a a .

T a a a a a a
a a b a a
a a a a b a a
a b a a a a a a
a a a [ ].

I a a a a a a
a a a b a a .
T a a a a a a
a a b a a a [ ].

T a a a b R a a. T U.S.
E a P A a a a a
a U.S. a a a a a a a a
b E S a B a
Ma S a a . A a a 00 a
U S a A a a a a a a b
a [5].

Received, September 6, 2009

„Gheorghe Asachi" Technical University of Iaşi,
Department of Concrete Structure, Building
Materials, Technology and Management
e-mail: a @ a .

R E F E R E N C E S

1. Ma a D.D. S P.A. B a U.J. Ca R.M. *Health Risks in Wastewater Irrigation: Comparing Estimates from Quantitative Microbial Risk Analyses and Epidemiological Studies*. J. Wa a a **5** *1* 50 007 .

. S .P. M a D. S a S. Da a R. *Impact Assessment of Treated/Untreated Wastewater Toxicants Discharged by Sewage Treatment Plants on Health, Agricultural, and Environmental Quality in the Wastewater Disposal Area*. C **55** *2* 7 55 00 .

. Ta b A. D R. . *Pollution Loads in Urban Runoff and Sanitary Wastewater*. S . T a E . **327** *1-3* 175 1 00 .
. b R.O. *Statistical Methods for Environmental Pollution Monitoring*. J W a S NY 1 7.
5. D a M. *et al. Swimming in Sewage. The Growing Problem of Sewage Pollution and how the Bush Administration is Putting our Health and Environment at Risk*. E . I P a. Na a R . D C F b a 00 :// . . / a / / a / a . .

IMPACTU ASUPRA MEDIU UI AMBIANT A APE OR UZATE DINTR O STAȚIE DE EPURARE

R a

S ă a a a a a aț a a a ă . a a a ă a a a a a a a a a R . P b a a a a ş l ă a a . T a b a a a a a bț a a a a a a a a a . S a a a ăş a a a a a ț a ț a a a a a a a a a ă a ş a b . D a a ă ş ța a a a a a a ăț a a a ă a a a a a ă a a : b ş a a a. I a a ă a a ă a a a ă a ț aț a a a .