

INVESTIGATION OF IMPURITY PARAMETERS AND NATURAL RADIOACTIVITY OF NIF RIVULET

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INTRODUCTION

The Nif Rivulet is the only flowing fountain in the region of Kemalpaşa, originating from Besyol Village and flowing in to the river Gediz through Kemalpaşa territories (D.S.I., 1979). The region has been losing properties of an agricultural area due to the increase in the number of recently established industrial settlements in the region. Since the region does not have a proper drainage system and some industrial establishments haven't got treatment system, the Nif Rivulet has been an area where all waste waters discharged (Ç.D.M.Y., 1996).

In this study, the parameters determined according to the water quality standards in the water samples taken in the duration of twelve months from the seven separate places of the Nif Rivulet is classified in the fourth class water category as scheduled under the organic parameters and in the second class water category for heavy metal pollution.

EXPERIMENTAL

Table 1. Analyses and Equipments to Analyze of Water and Soil

Analyses	Methods and Equipment
PH	pH Meter
Conductivity (μS)	Conductivity Meter
Saltness (mg/L)	Hydrometer
Total Hardness (Fr)	Titrimetric Analysis (EDTA)
Calcium (Ca) (mg/L)	Titrimetric Analysis (EDTA)
Magnesium (Mg) (mg/L)	Titrimetric Analysis (EDTA)
Chloride (mg/L)	AgNO_3 Titrimetric Analysis
Organic Parameters	
Organic Content (mg/L O_2)	KMnO_4 Titrimetric
KOI (mg/L)	Bichromate-Condenser Method
Dissolved Oxygen (mg/L O_2)	Winkler Titration Method
Nitrite(NO_2) (mg/L)	Spectrofotometric Analysis

Heavy Metals	
Iron (Fe) (µg/L)	A.A.S.
Copper (Cu) (µg/L)	A.A.S.
Zinc (Zn) (µg/L)	A.A.S.
Lead (Pb) (µg/L)	A.A.S.
Chromium (Cr) (µg/L)	A.A.S.
Nickel (Ni) (µg/L)	A.A.S.
Cadmium (Cd) (µg/L)	A.A.S.
Mercury (Hg) (µg/L)	A.A.S.
Radioactivity Measurements	
(cps)	Survey Meter
(µR/h)	Dose-Rate
Uranium (Water) (µg/L)	Laser Fluorimetric Uranium Analyser
eU ²³⁸ (soil) (mg/L)	Multichannel Gamma Analyser
eTh ²³² (soil) (mg/L)	Multichannel Gamma Analyser
K ⁴⁰ % (soil) (mg/L)	Multichannel Gamma Analyser

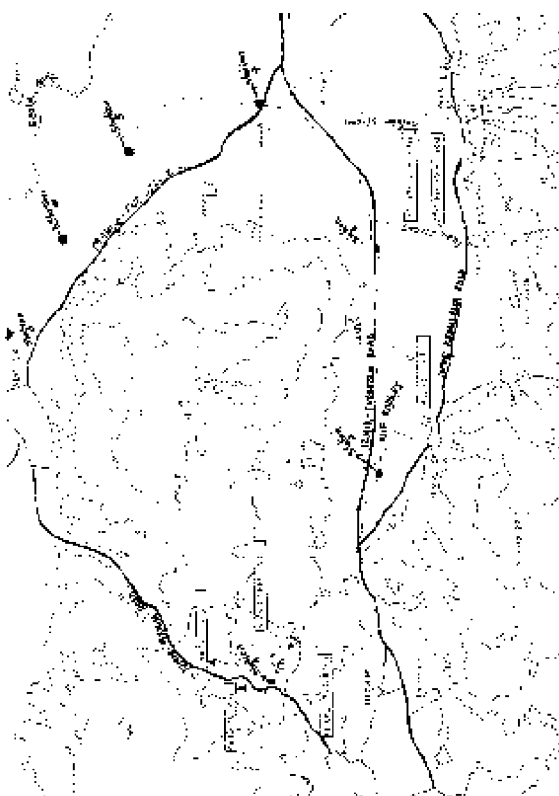


Figure 1: Nif Rivulet and the sample stations.

RESULTS AND DISCUSSION

In this study, the water and soil samples taken from the Rivulet Nif, (Izmir-Turkey) were analysed in terms of Water Pollution Control Rule Standards. For this purpose, seven stations were selected along the rivulet from origin to where the river meets the River Gediz. The measurements made during site studies were also used.

Looking at the station two, in the part of the rivulet from the town, Ulucak to the station two, due to the existence of intensive industrial activities, water samples are classified as the third class water and it has been understood that this area is the most polluted part of the rivulet. The rate of pollution changes from the second class to the third class water category in the stations 3, 4, 5, 6 and 7.

When considered parameters belonging to the seven stations in 12 months, in terms of physical and in organic chemical parameters, the average water values of the Nif Rivulet falls into the first class water category. The rivulet has some upper values of the fourth class water with organic matter 745 mg/L O₂, KOI 190 mg/L, dissolved oxygen 3.0 mg/L, nitrite 0.04 mg/L from organic parameters shows that there is heavy sewage disposal area along the valley.

Looking at radioactivity measurements, it has been seen that surface gamma measurements are between 58-82 cps; the average is 68 cps and are between 10-19 µR/h and average is 12µR/h. The uranium concentration in water determined by using laser fluorimetric uranium analyser is between 7.6-14 µg/L and average is 13.1 µg/L. It is advisable that areas should be researched in terms of radioactivity in detail. But it should also be considered matrixes have important effect. eU²³⁸ concentration in the soil samples is between 1.4-3.2 mg/kg and average 2.4 mg/kg, eTh²³² is between 8.5-11.4 mg/kg and average is 9.5 mg/kg, K⁴⁰ % is between 1.4-2.4 and average is 1.8 mg/kg and these values are in the limits of natural radioactivity.

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Table 2. Results of Seasonal and Twelve Months Average of the Nif Rivulet

Physical and Inorganic Chemical Properties	Averages of Autumn	Averages of Winter	Averages of Spring	Averages of Summer	Averages of Twelve Months	Water Quality
PH	7.4	7.4	7.4	7.2	7.4	I. class
Conductivity (µs)	21	33	14	16	21	I.
Saltyness (mg/L)	8	6	6	7	6	II.
Total Hardness (Fr)	16	18	13	18	14	II.
Calcium (mg/L)	36	31	31	41	32	I.
Magnesium (mg/L)	23	22	14	20	19	I.
Chloride (mg/L)	159	170	182	181	167	II.
Organic Parameters						
Organic Content (mg/L O ₂)	1070	577	741	658	745	IV.<
KOI (mg/L)	252	158	204	161	190	IV.<
Dissolved Oxygen (mg/L O ₂)	3	3	4	3	3	III.
Nitrite (NO ₂)(mg/L)	0.04	0.04	0.04	0.04	0.04	II.
Heavy Metals						
Iron (µg/L)	987	852	640	2422	1070	III.
Copper (µg/L)	22	23	20	44	29	II.
Zinc (µg/L)	222	86	102	113	126	I.
Lead (µg/L)	10	7	9	14	9	I.
Chromium (µg/L)	33	17	12	22	21	II.
Nickel (µg/L)	27	19	13	19	23	II.
Cadmium (µg/L)	<1	<1	<1	<1	<1	I.
Mercury (µg/L)	<1	<1	<1	<1	<1	II.
Radioactivity Measurements						
Survey Meter (cps)	67	70	69	67	68	Among Natural Limits
Dose-Rate (µR/h)	14	11	10	10	12	
Uranium (water) (µg/L)	6.7	23.4	5.2	11.0	13.1	
EU ²³⁸ (soil) (mg/L)	2.2	2.3	2.6	2.4	2.4	
ETh ²³² (soil) (mg/L)	9.7	9.5	9.5	9.5	9.5	
%K ⁴⁰ (soil) (mg/L)	1.7	1.8	1.8	1.6	1.8	