

ASSESSMENT OF CONTRIBUTION OF POLLUTANTS BY SEVEN SELECTED KHALS INTO THE RIVER KARNAFULLY

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ABSTRACT

The Karnafully is the biggest and important tidal river in the south eastern part of Bangladesh. During its course to the Bay of Bengal, the river receives a lot of canals, tributaries and small river, which has been played a dominant role on the hydrobiology of the Karnafully River, contributing large amount of contaminated water, solid wastes, sewage etc. At present the river is under severe pollution threat. To investigate water quality of Karnafully River, water samples were collected from 200m upstream & 200m downstream of Syed Khal to Siriar Khal in flood tide and ebb tide. Water samples were analysed for ten different water quality parameters, i.e, pH, Color, Turbidity, Hardness, TDS, DO, BOD, Salinity, Alkalinity & Iron. The highest value of Color (47 Pt-Co Unit) and BOD (3.83 mg/l) was found in GID Khal whereas the highest value of Turbidity (8.6 JTU) was found in Kada Khali Khal. The highest value of TDS (53.5 mg/l) was found in Syed Khal. The Hardness, Salinity & Iron values were in acceptable limit for drinking in all sampling locations. All parameter values are compared with Bangladesh standard for wastewater discharge to inland surface water as per ECR 1997.

Keywords: Karnafully River; pollutants; selected khals; contaminated water

INTRODUCTION

Bangladesh is a land of rivers. Around 230 rivers flow through the country including 53 international rivers. Urbanization is the main reason of pollution for these rivers and other water bodies (DoE, 2001). Several studies (DoE, 1993) (Hossain, 2001) showed that surface water quality of the rivers of the country is highly polluting day by day. Industrial wastes are known to adversely affect natural life by direct toxic action or indirectly through qualitative alterations in the character of the water as well as that of the stream bed (Ahmed, 2000). Incongruously, growing urban population is producing greater loads of urban waste, and the industries that need so much clean water are throwing out their effluents directly or indirectly into Karnafully (Majid, *et. al.*, 1999) Rahman et al. studied of the water quality of the Chittagong region, it can be concluded that the condition of the Karnafully River is critical and Halda River may be affected by the polluted Karnafully River water. Karnafully is the largest and an important river in Chittagong. Thousands of industries and factories are situated on the bank of the Karnafully River or very close to the river system and they do not have any waste treatment facilities. They discharge the untreated waste into the nearest water bodies, which finally reach into the Karnafully River through different canal systems. So the study is done to assess the pollution level of 7 different khals of karnafully river and to determine whether the water of those khals are suitable for drinking, domestic purpose, irrigation or not.

METHODOLOGY

A survey work was conducted for identifying sampling spots and the current quality conditions for a large part of the rivers, lakes and groundwater sources of the this region. For the Karnafully River, seven sampling spots at different distances from the river mouth, such as the river Kalurghat bridge (0 km), Syed khal (3.6 km), GID khal (4 km), Walong khal (5.5 km), Hodh khal (6.8 km), Vhandal jhuri khal (9.2 km), Kada khali khal (9.7 km) and Siriar khal (15.6 km) at different distances from the river mouth of the Karnafully River were selected. The Karnafully water samples were collected from 200m up stream & 200m down stream of selected khals at high and low tide according to the tide table collected from the Department of Hydrography, Chittagong Port Authority. Statistical methods of sampling were used for collecting samples. Multiple samples were collected from the same spot at

different tide conditions. The surface water samples were collected in the boat if possible in the middle of the flow. The water samples were collected within 3-9 inches from the surface of the water.

Table1: Syed khal Test report (physical/chemical analysis of surface water sample)

SL. No.	Water Quality Parameters	Unit	Concentration Present (flood tide-200 m down stream)	Concentration Present (flood tide-200 m up stream)	Concentration Present (ebb tide-200 m down stream)	Concentration Present (ebb tide-200 m up stream)
01	PH	-----	6.3	6.35	6.39	6.45
02	Color	Pt-Co	46	34	39	37
03	Turbidity	JTU	3.4	3.5	7.99	7.76
04	Iron (Ee)	mg/l	0.10	0.12	0.05	0.07
05	DO	mg/l	7.6	7.67	6.1	6.1
06	Total Hardness (as CaCo3)	mg/l	50	48	53	54
07	BOD	mg/l	3.6	3.62	3.4	3.55
08	Salinity	./.	0.04	0.04	0.03	0.02
09	TDS	mg/l	45.8	44.7	53.5	53.6
10	Temperature	°C	25	25	25	25
11	Alkalinity	Mg/L	31.2	32	31.4	32.2

RESULTS AND DISCUSSIONS

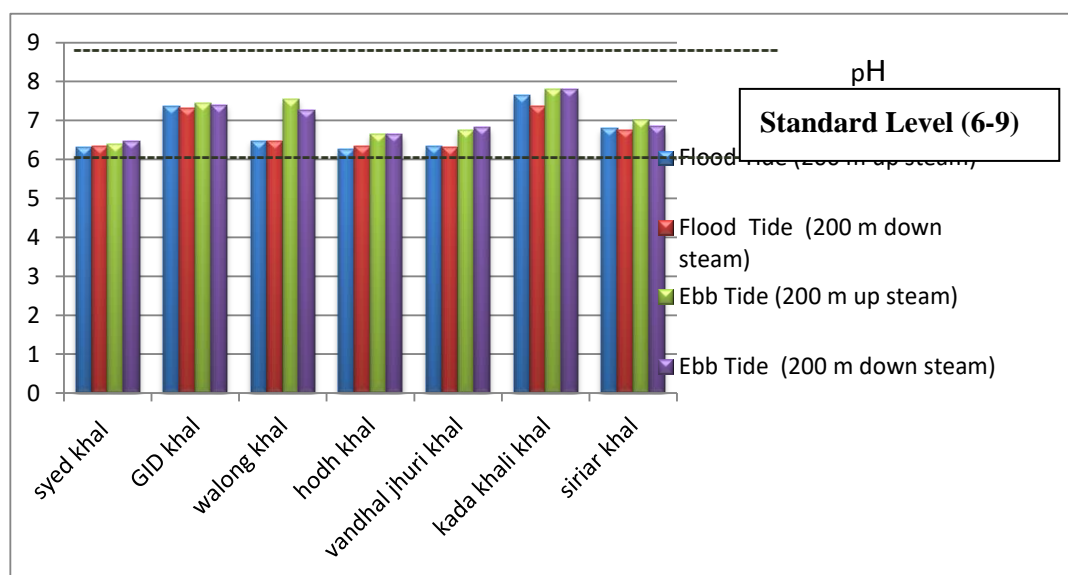


Fig. 1: pH of the Karnafully River Water

pH

According to EPA, pH for fresh water is 6.5-8.5. Most of the samples were found in the alkaline pH range i.e. within the allowable limit. The highest value (7.8) of pH was found in Kada Khali Khal

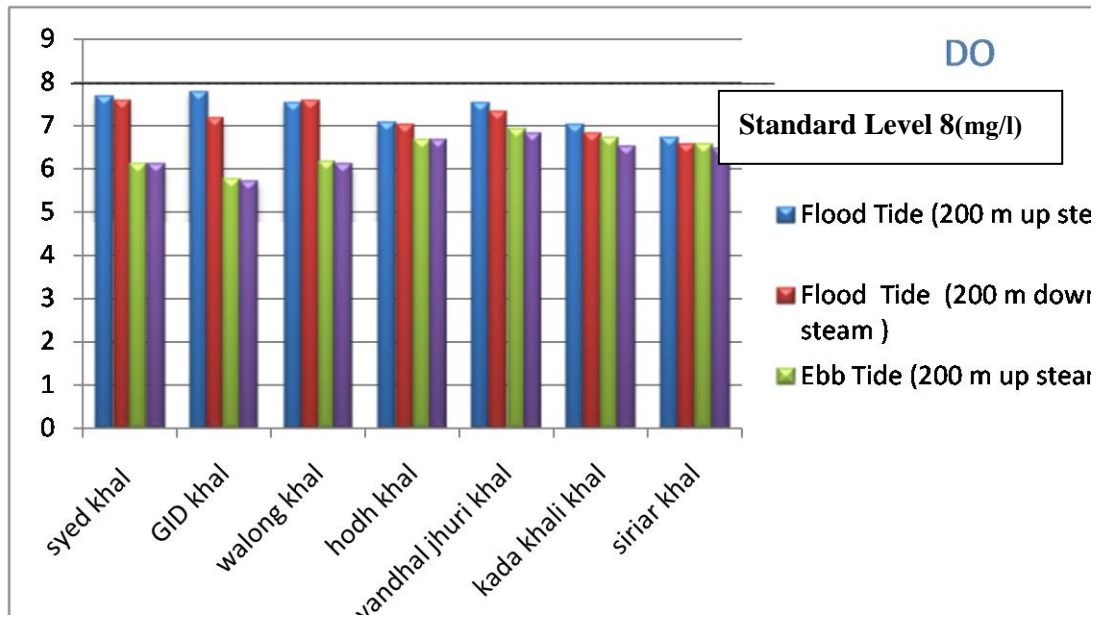


Fig. 2: Dissolved Oxygen of the Karnafuli River Water

DO

In case of dissolve oxygen, standard for sustaining aquatic life is 4 mg/l, whereas for drinking purpose it is 6 mg/l. The dissolved oxygen was higher in all khals during flood tide than ebb tide. The maximum DO (7.8 mg/l) was found in GID khal in flood tide whereas the minimum value was found in that khal in ebb tide.

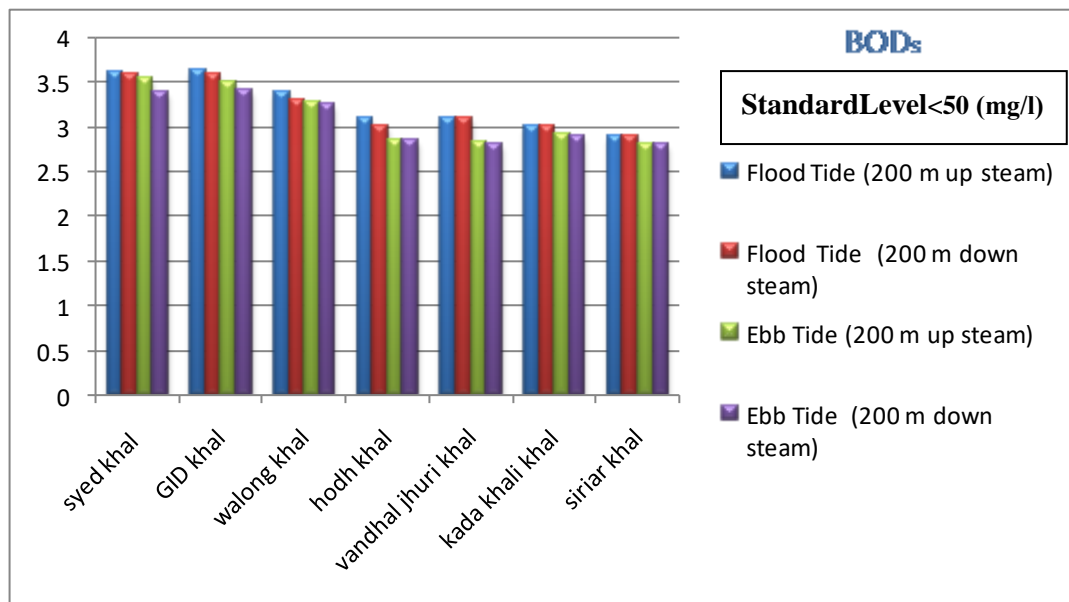


Fig. 3: BOD of the Karnafuli River water

BOD

BOD standard for inland surface water is 2 mg/l but all of samples had BOD value up to 3.63 mg/l which exceed water quality standard. The highest value was found in ebb tide at GID khal where the lowest value was found in ebb tide at Siriar Khal.

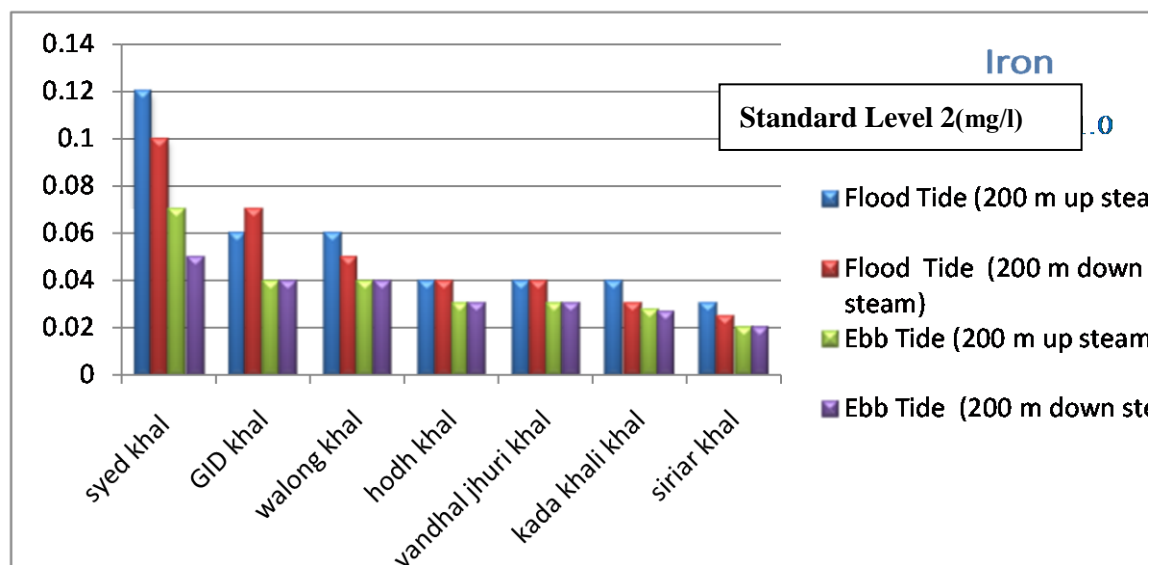


Fig. 4: Iron of the Karnafuli River water

IRON

The concentration of Iron at all sampling location was below the acceptable limit (0.3-1.0) for drinking purpose.

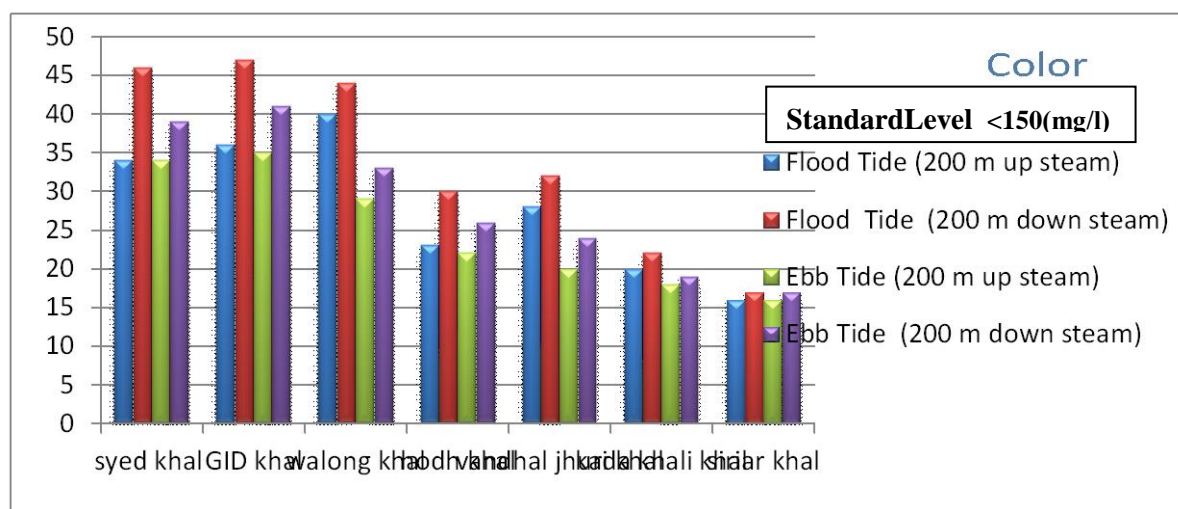


Fig. 5: Color of the Karnafully River water

COLOR

The standard value of Color is 15 Pt-co unit. Highest value (47Pt-co) was found at flood tide at Syed khal & GID khal point and lowest value (16 Pt-co) was found at flood tide also at Siriar khal point.

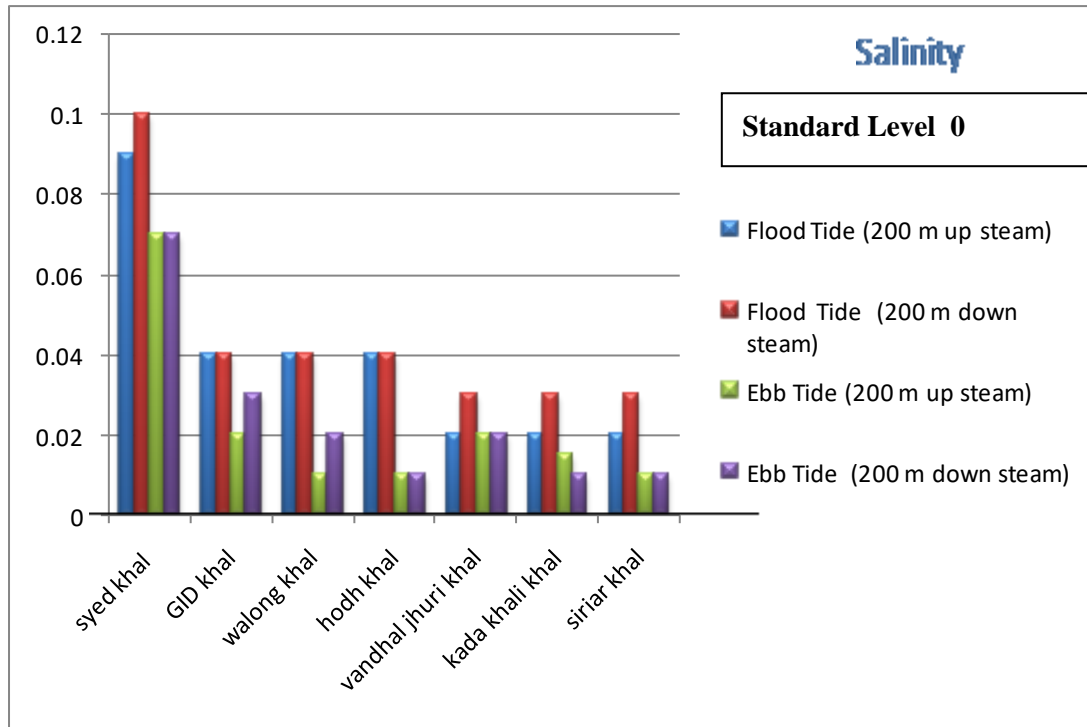


Fig. 6: Salinity of the Karnafuli River water

SALINITY

The samples have Highest value of Salinity (0.1) was found at flood tide at Syed khal karnafuli point. The lowest value (0.01) was found at Ebb tide at Siriar khal points.

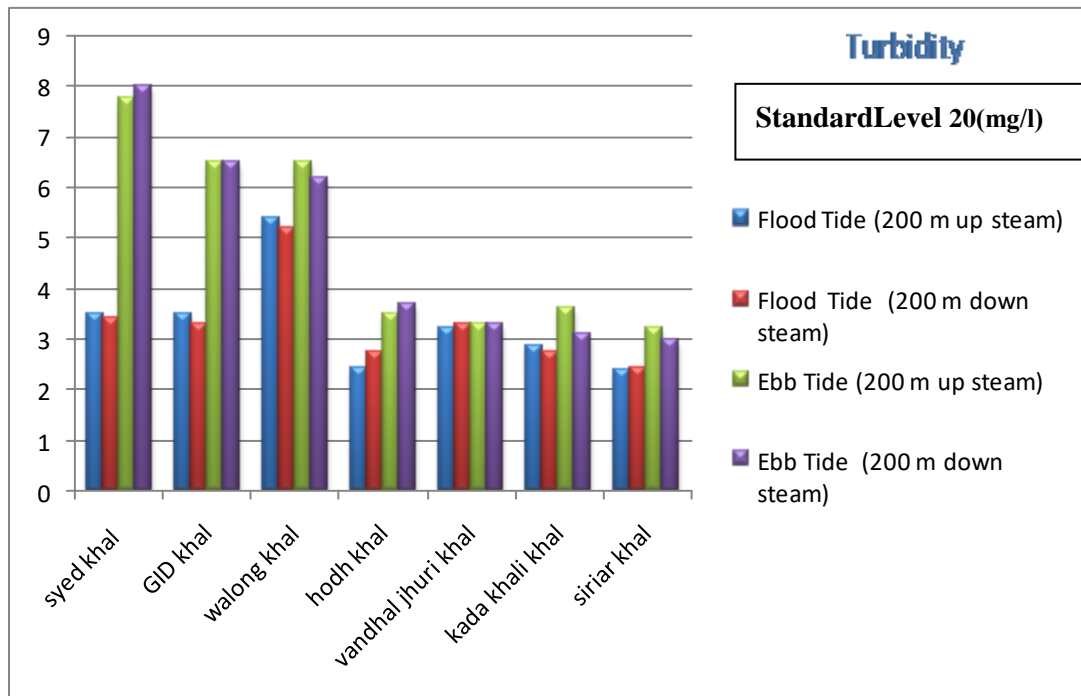


Fig. 7: Turbidity of the Karnafuli River water

TURBIDITY

Highest Turbidity value (7.99 JTU) was found at ebb tide at Syed khal karnafully points. The lowest value (1.48 JTU) was found at flood tide at Siriar khal karnafully points.

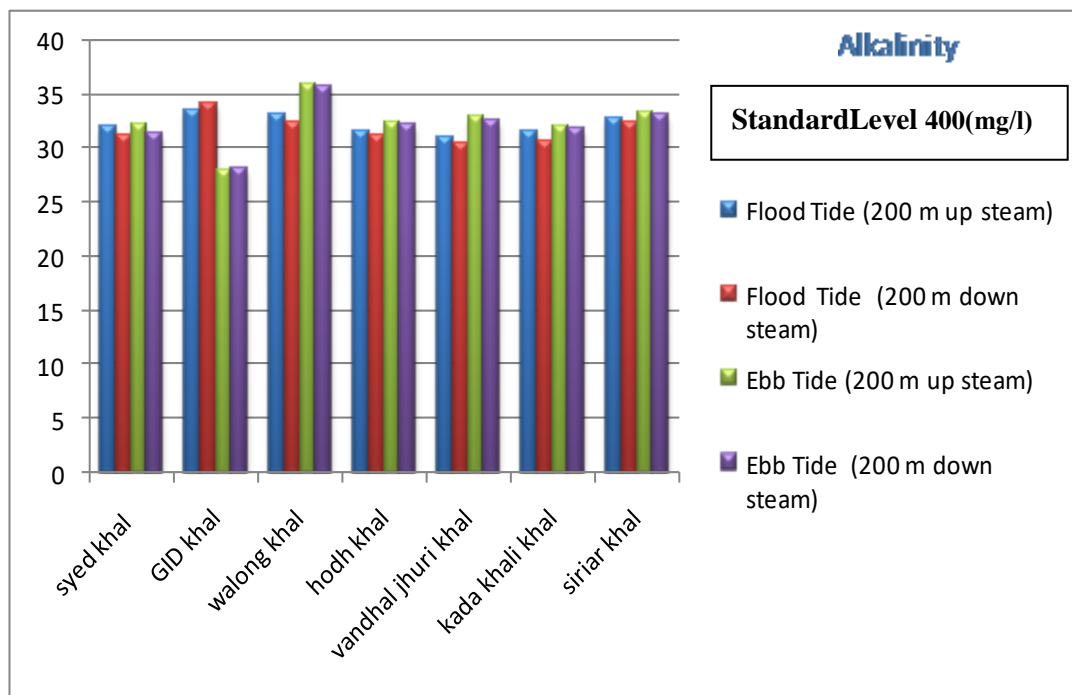


Fig. 8: Total Alkalinity of the Karnafully River water

Alkalinity

Highest Alkalinity value (35.85 Mg/L) was found at ebb tide at Walong khal points. The lowest value (28 Mg/L) was found at ebb tide at GID khal points.

CONCLUSIONS

The present study represent the water quality of seven canals such as syed khal to siriar khal which are situated after kaloorghat bridge and there are no industries at or near those canals. For this reason water quality of selected locations may be not so critical such as dissolved oxygen of all selected locations were above 6 mg/l and BOD value also lies between 3 to 4 mg/l. The color of all stations were above standard limit but the salinity & iron of water samples were negligible. So it can be concluded that the water is certainly unfit for drinking purposes without any form of treatment, but for various other surface water usage purposes like fisheries or irrigation purposes, it still could be considered quite acceptable.

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