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Water quality analysis of amreli steels limited Karachi, using water quality index

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Abstract
The activity has been conducted to assess the sustainability of the water samples collected in different time intervals from January 2019 to May 2019 of Amreli Steel Limited (ASL) facility. The activity was conducted in accordance with SEQS (SMART) Rules, 2014. All important aspects pertaining to the manufacturing process of the facility have been covered by the Environmental Monitoring activity. It is concluded that environmental status of ASL facility is in compliance with Sindh Environmental Quality Standards in the light of obtained results and facility does not pose any adverse impacts on the environment.

Keywords: surface water, water quality analysis, wqi, amreli steel limited

Introduction
Amreli Steel Limited (ASL) is one of the largest Steel manufacturing company in Pakistan. ASL plant uses one of the most modern hot re-rolling ilml technologies in the industry and is capable of continuously producing straight bars up to 35 tons per hour. This translates into an annual production capacity of 150,000 metric tons.The state-of-the-art equipment and high degree of automation enables ASL to produce high quality products that match well with established international standards. Amreli Steel Limited (ASL) is an environmentally conscious organization Facility intends to comply with all relevant environmental legislations. Research has been conducted environmental monitoring of their facility on Monthly basis and different water parametars have been collected on Monthly basis. For this purpose a team of researchers collected water samples at different time intervals and tested at laboratory. The World Steel Association identified water as the most important issue for a sustainable steel industry, following climate change and air quality [1, 7].

Area of Study
Amreli Steel Limited plant is located in Dhabeji 61.5 km away from the Karachi main city**.** Dhabeji (also known as Dhabeji Station), is a town and union council of Mirpur Sakro tehsil, Thatta District, Pakistan. It was previously in Thatta District, Sindh
It is near the suburbs of Karachi. As well being declared an industrial zone by the Government of Sindh.

Methodology and Data Analysis.
The methods followed for assessment of waters samles quality are given under the respective heading below.
This activity was aimed at achieving a common ground of understanding on various issues of the study.
The researchers followed best practices and standards as employed by international engineering community to complete this task within the pre-agreed scope of work. The following several steps of methodology were followed. In 1984, a national document for industrial water usage limitations was issued by the Ministry of Housing and Urban-Rural Development of China, which was recognized as a milestone for water saving in steel plants [2].

Site Visits
The team conducted a reconnaissance visit of the facility in the month of January 2019. Visit to the site was made by team members in order to collect necessary data pertaining to their respective areas of responsibility within this assignment. The team physically and visually observed the project site, noted existing environmental conditions. These visits also helped in verifying various pieces of information available in the secondary sources.

Laboratory Sampling and Analysis
The facility was visited and samples of

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Wastewater of the facility were taken samples were analyzed according to standard testing methods in the laboratory.

Data Collection
During the site visit data was gathered and observations were noted related to processes activity of the facility, its pollution

sources and status of the environmental compliance according to company by Sindh EPA.

Results and Discussions

In production process water is used in furnace skids to maintain the temperature and in quenching process which is collected, cooled through cooling towers and reused. There is no process related wastewater at facility, only waste water is domestic in nature. Domestic wastewater is discharged into industrial drain. Results Show that all the tested parameters are within SEQS limits.

Table 1: Physical Analysis

S. No	Parameter	Method	Unit	Results	Limit
01	Temperature	Digital Thermometer	Temp (^{0}C)	20.5 C	40 ≥ 3 ^{0}C
02	PH	ASTM D-1293	PH (H+)	8.59	6 to 9
03	TDS	APHA 2540-C	TDS mg/L	595	≤ 3500
04	TSS	APHA 2540-D	TSS (mg/L)	4	200

Table 2: Chemical and Wet Analysis

S. No	Parameter	Method	Unit	Results	Limit
05	Oil and Grease	ASTM D-4281	0 Gr (mg/L)	9.4	≤ 10
06	Chromium	HACH 8023	Cr^3 mg/L	0.01	≤ 1.0
07	Cadmium	Lab method	Cd mg/L	BDL	≤ 0.1
08	Iron	HACH 8008	Fe2 + mg/L	0.12	≤ 8.0
09	Chemical oxygen demand	ASTM D-1252	COD mg/L	43.7	≤ 150

Table 3: Physical Analysis

S. No	Parameter	Method	Unit	Results	Limit
01	Temperature	Digital Thermometer	Temp (^{0}C)	23	40 ^{0}C > 3 ^{0}C
02	PH	ASTM D-1293	PH (H+)	8.56	6 to 9
03	TDS	APHA 2540-C	TDS mg/L	781	3500
04	TSS	APHA 2540-D	TSS (mg/L)	3	200

Table 4: Chemical and Wet Analysis

S. No	Parameter	Method	Unit	Results	Limit
05	Oil and Grease	ASTM D-4281	0 Gr (mg/L)	9	≤ 10
06	Chemical oxygen demand	ASTM D-1252	COD mg/L	38.3	≤ 150
07	Chromium	HACH 8023	Cr^3 mg/L	0.01	≤ 1.0
08	Cadmium	Lab method	Cd mg/L	0.04	≤ 0.1
09	Iron	HACH 8008	Fe2 + mg/L	0.28	≤ 8.0

Table 4: Physical Analysis

S. No	Parameter	Method	Unit	Results	Limit
01	Temperature	Digital Thermometer	Temp (^{0}C)	32.0	40 ^{0}C ≤ 3 ^{0}C
02	PH	ASTM D-1293	PH (H+)	8.74	6 to 9
03	TDS	APHA 2540-C	TDS mg/L	718	≤3500
04	TSS	APHA 2540-D	TSS (mg/L)	19	200

Table 5: Chemical and Wet Analysis

S. No	Parameter	Method	Unit	Results	Limit
05	Oil and Grease	ASTM D-4281	0 Gr (mg/L)	8	≤ 10
06	Chemical oxygen demand	ASTM D-1252	COD mg/L	BDL	≤ 150
07	Cadmium	Lab method	Cd mg/L	0.01	≤ 0.1
08	Chromium	HACH 8023	Cr^3 mg/L	0.01	≤ 1.0
09	Iron	HACH 8008	Fe2 + mg/L	0.47	≤ 8.0

Table 6: Physical Analysis

S. No	Parameter	Method	Unit	Results	Limit
01	Temperature	Digital Thermometer	Temp (^{0}C)	38	40 ^{0}C ≤ 3 ^{0}C
02	PH	ASTM D-1293	PH (H+)	8.9	6 to 9
03	TDS	APHA 2540-C	TDS mg/L	711	3500
04	TSS	APHA 2540-D	TSS (mg/L)	11	200

Table 7: Chemical and Wet Analysis

S. No	Parameter	Method	Unit	Results	Limit
05	Oil and Grease	ASTM D-4281	0 Gr (mg/L)	7	10
06	Chemical oxygen demand	ASTM D-1252	COD mg/L	BDL	150

07	Chromium	HACH 8023	Cr^3 mg/L	0.01	≤ 1.0
08	Cadmium	Lab method	Cd mg/L	0.02	≤ 0.1
09	Iron	HACH 8008	Fe2 + mg/L	0.71	≤ 8.0

Table 8: Wastewater Analysis

S. No	Parameters	Units	Results	SEQS (into sea)
01	Temperature	^{0}C	34	40+ ≤ ^{0}C
02	Ph	pH	8.73	6-9
03	Total Dissolved Solids (TDS)	mg/L	673	3500
04	Total Suspended Solids (TSS)	mg/L	08	200
05	Chromium (trivalent)	mg/L	0.01	≤ 1.0
06	Iron	mg/L	0.56	≤ 8.0
07	Oil & Grease	mg/L	9.8	10
08	Chemical Oxygen Demand (COD)	mg/L	125	150

Conclusion

On the basis of data collection in above steps including laboratory results, actions or activities having potential to cause damage to environment were listed. The concerns were identified, evaluation of their significance was carried out and environmental compliance status of the facility was assessed in response to the observation record and collected data. In the light of above results it is concluded that environmental status of ASL facility is in compliance with Sindh Environmental Quality Standards and facility does not pose any adverse impacts on the environment.

Development of Recommendations:

Recommendations to mitigate major impacts and nonconformance were given to future researchers in accordance with SEP-Act and its guidelines.

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