نبـــراس للطاقة
Nebras Power
Jordan
ريـادة طـاقـة الـمـسـتـقـبـل
Pioneering Future Energy

Nebras Power IPP4 / Jordan PSC Monitoring and Measurement

EMS/PRO/ 010 Monitoring and Measurement

1.0. Purpose/Scope:

The main purpose of this procedure is to follow the standard guideline for the measurement and monitoring of the Regulatory required parameters and fully comply with our permits.

Also all of the Regulatory required parameters (as well as guaranteed parameters) have to be submitted to the World Bank and all lenders as per the common term agreement.

- Stack Emission
- Evaporation pond water analysis Report
- Ambient air quality monitoring report

2.0. Scope:

The procedure describes the list of guaranteed parameters and how to monitor the above and the frequency of report.

3.0. Responsibilities:

3.1. (EHS Manager/EHS Engineer):

- Retain all environmental incidents and investigation reports for a minimum of five calendar years following the end of the year to which they relate.
- Ensures all the environment related reporting to lenders and local authorities.
- Maintain the "Log of all environmental incidents and reporting to internal and external concerned parties.

3.2. Executive Manager:

The Executive manager or designee will approve and be responsible for all notifications made outside of the Nebras Power IPP4 / Jordan PSC,

3.3. Instrument and Control Engineers:

Instrument and control Engineers are responsible for monitoring and calibrating Environmental Monitoring Equipment.

4.0. Procedure: Calibration and Maintenance of Environmental Monitoring Equipment

4.1. Relevant areas and departments shall ensure that environmental monitoring equipment is calibrated and maintained at a frequency consistent with manufacturers' recommendations, or at least every 6 months if those recommendations are unknown. Relevant areas and departments shall maintain calibration and maintenance records as necessary to prove conformance with this procedure.

4.2. Calibration and maintenance of environmental monitoring equipment shall be addressed in area and department preventative maintenance programs, where applicable, or in local work practices, if desired.

4.3. Business EHS Manager/engineer will maintain a list of EMS equipment requiring calibration and the corresponding calibration frequency.

4.4. **(Refer to the attached QA/AC Program for Calibration and Maintenance of Environmental Monitoring Equipment).**

5.0. Monitoring and measurement:

Environmental Aspect	Parameters Monitored	Frequency of Monitoring	Monitoring Equipment
DF-Engines stack emissions	NOx, CO, Sox and Dust	Continuous	On-line monitors
Treated effluent	BOD, COD, pH, TDS Ammonical Nitrogen, TSS	As needed, as it is a ZERO discharge plant	Outside certified Lab analysis
Workplace and ambient noise	Sound pressure level	Once in year	Sound pressure level meter
Ambient air quality	NOx, SOx, PM_{10}	Continuous	By onsite Monitoring station.

HSE Monitoring, Measurement and Inspection plans defined all the HSE Monitoring. IFC limits are defined in EIA and ESMMP.

In addition to the on-line/ automated monitoring system following monitoring systems are in place:

- Raising Near Miss
- EHS walk down
- Regular site visit by PE's during their shift and reporting of any leak, spill immediately.

5.1. Stack Emission Limits

TABLE 6.2: EMISSION GUIDELINES (mg/Nm^3)

Parameter	*World Bank / IFC Guidelines**	
NO_x	740	
SO_2	585 or use of 1% or less S in fuel	
PM_{10} / $PM_{2.5}$	50	
CO	---	

The World Bank / IFC Guidelines for Thermal Power Plants states that plants should meet emission targets for at least 95% of the time that the plant unit is operating. The remaining 5% is assumed to be for startup, shutdown, emergency fuel use and unexpected incidents.

5.2. Ambient Air

TABLE 5.1: JORDANIAN EMISSION STANDARDS FOR AMBIENT AIR QUALITY (1140/2006) – PARTS PER MILLION (PPM), MICROGRAMS PER CUBIC METRE OF AIR (µg/m^3)

Pollutant	*Averaging Period*	*Maximum Limit*	*Number of Exceedences*
NO_2	1 hour	0.21 ppm* (400 µg/m^3)	3 times during any consecutive 12 months
	24 hours	0.08 ppm (150 µg/m^3)	3 times during any consecutive 12 months
SO_2	1 hour	0.3 ppm (786 µg/m^3)	3 times during any consecutive 12 months
	24 hours	0.14 ppm (370 µg/m^3)	Once during any consecutive 12 months
PM_{10}	24 hours	120 µg/Nm^3	3 times during any consecutive 12 months
$PM_{2.5}$	24 hours	65 µg/Nm^3	3 times during any consecutive 12 months
CO	1 hour	26 ppm (30279 µg/m^3)	3 times during any consecutive 12 months
	8 hours	9 ppm (10481 µg/m^3)	3 times during any consecutive 12 months
TSP	24 hours	260 µg/m^3	3 times during any consecutive 12 months
H_2S	1 hour	0.030 ppm (42 µg/m^3)	3 times during any consecutive 12 months
	24 hours	0.010 ppm (14 µg/m^3)	3 times during any consecutive 12 months

5.3. Jordanian Waste Water Limits

TABLE 5.7: JORDANIAN WASTE WATER STANDARDS (JS:202/2007)

Parameter	*Maximum Allowable Limit * (Irrigation for green scaping land, fruitful tree and side road)*	*Maximum Allowable Limit * (Discharge to wadi)*
BOD_5	200	60
COD	500	150
DO	-	≤ 2
TSS	200	60
pH	6 – 9 SU	6 – 9 SU
NO_3	45	80
T-N	70	70
Color	-	15 PCU
Turbidity	-	15 NTU
Escherichia coli	1000 MPN/100 ml	1000 MPN/100 ml
Intestinal Helminthes Eggs	≤ 1 Eggs/l	≤ 1 Eggs/l
FOG	8	8
Phenol	< 0.002	< 0.002
MBAS	100	25
TDS	2000	2000
PO_4-P	30	15
Cl	400	350
SO_4	500	300
NH_4	-	5
HCO_3	400	400
SAR	9	9
TOC	-	55
CN	0.1	0.05
Ba	-	1
Al	5	2
As	0.1	0.05
Be	0.1	1
Cu	0.2	1.5
Fe	5	5
Li	0.075	2.5
Mn	2	2
Mo	0.01	0.01
Ni	0.2	0.2
Pb	0.2	0.2
Se	0.05	0.05
Cd	0.01	0.01
Zn		5
Cr	0.1	0.1
Hg	0.002	0.002
V	0.1	0.1
Co	0.05	0.05

5.4. World Bank Waste Water Limits

TABLE 5.8: THE WORLD BANK / IFC EFFLUENT DISCHARGE LIMITS

Parameter	*mg/L, except pH and Temperature*
pH	6-9
Total Suspended Solids (TSS)	50 mg/l
Oil and grease	10 mg/l
Total residual chlorine	0.2 mg/l
Chromium – Total (Cr)	0.5 mg/l
Copper (Cu)	0.5 mg/l
Iron (Fe)	1.0 mg/l
Zinc (Zn)	1.0 mg/l
Lead (Pb)	0.5 mg/l
Cadmium (Cd)	0.1 mg/l
Mercury (Hg)	0.005 mg/l
Arsenic (As)	0.5 mg/l
Temperature increase by thermal discharge from cooling system.	• Site specific requirement to be established by the Environmental Assessment. • Elevated temperature areas due to discharge of once-through cooling water (e.g. 1 Celsius above, 2 Celsius above, 3 Celsius above ambient water temperature) should be minimized by adjusting intake and outfall design through the project specific Environmental Assessment depending on the sensitive aquatic ecosystems around the discharge point.
Note: Applicability of heavy metals should be determined in the Environmental Assessment. Guideline limits in the Table are from various references of effluent performance by thermal power plants.	

5.6. Noise level under (WB guideline)

The noise level emissions associated with the operation of the power station complied with the industrial and commercial category emission of 70 dB(A) when measured at the boundary fence. For Jordanian Limit it will be 75 dB(A) day time and 65 dB(A) night time

Nebras Power IPP4 / Jordan PSC has accepted the World Bank noise limit (70 dBA) for the daytime, and the Jordanian limit (65 dBA for the nighttime.

6.0. Records:

Records shall be retained consistent with EMS/PRO/013.

7.0. Revision / Changes record:

Sr. No.	Revision No.	Reference No.	Details Of Change	Date	Approved By
1					