

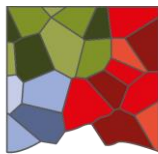
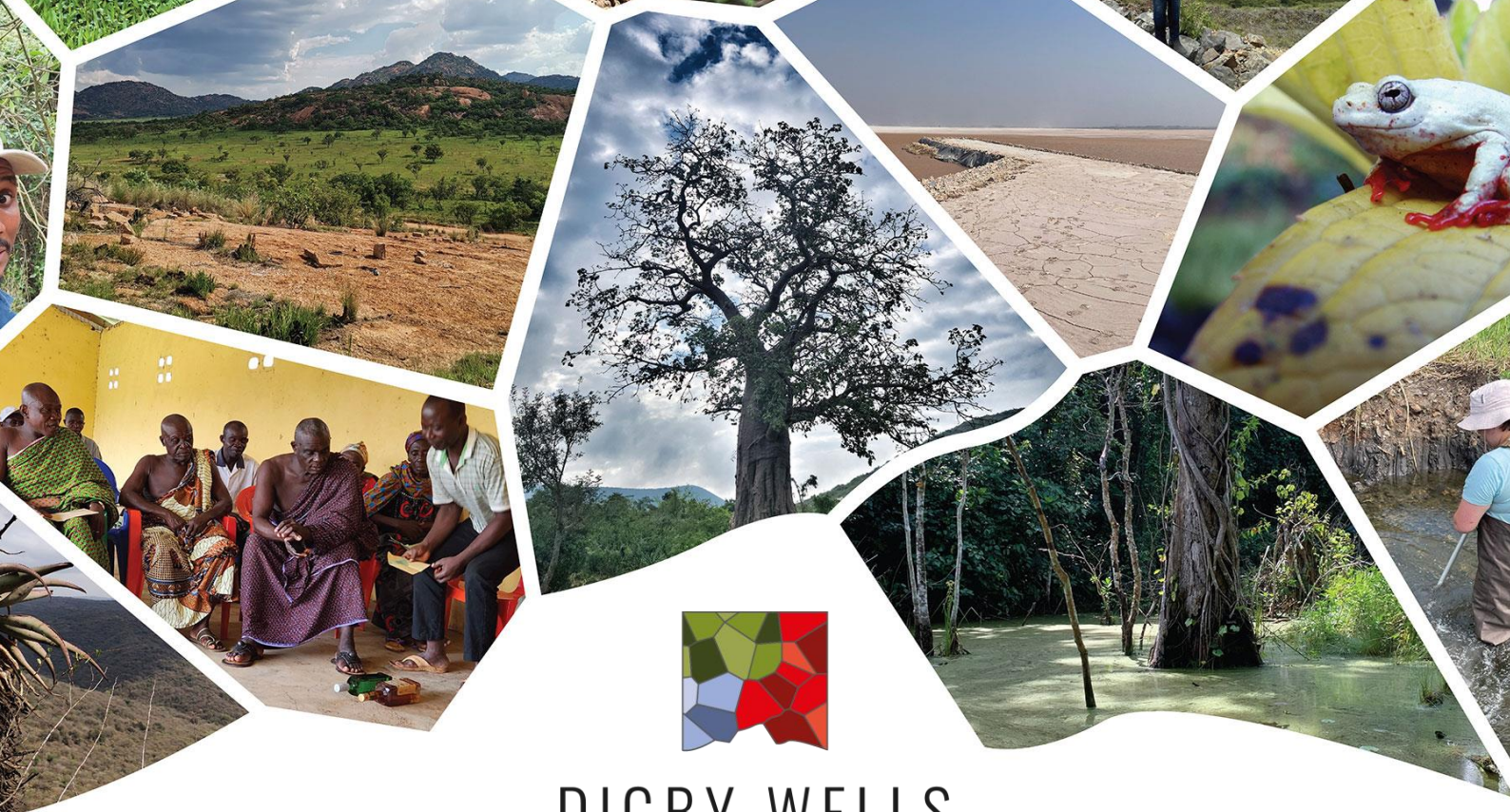


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Appendix A: Applicable Standards and Guidelines



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Reko Diq Mining Project, Pakistan

Appendix A

Prepared for:

Reko Diq Mining Company

Project Number:

BAR7212

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Appendix A

Table 1: Comparison of Ambient Air Quality Limits Prescribed in the SEQs, BEQS, NEQS, and IFC General EHS Guidelines

Pollutants	Units	Time-weighted Average	SEQS 2016	IFC Interim Target-1 2007	IFC Guideline Value 2007	BEQS 2020	NEQS 2010
Sulphur Dioxide (SO ₂)	µg/m ³	Annual Average	80	–	–	80	80
		24 hours	120	125	20	120	120
		10 minutes			500		
Oxide of Nitrogen as Nitric Oxide (NO)	µg/m ³	Annual Average	40	–	–	40	40
		24 hours	40	–	–	40	40
Oxide of Nitrogen as Nitrogen Dioxide (NO ₂)	µg/m ³	Annual Average	40	–	40	40	40
		24 hours	80	–	–	80	80
		1 hours			200		
Ozone (O ₃)	µg/m ³	8 hours		160	100		
		1 hour	130	–	–	130	180
Suspended Particulate Matter (SPM)	µg/m ³	Annual Average	360	–	–	360	400
		24 hours	500	–	–	500	550
Respirable particulate Matter PM ₁₀	µg/m ³	Annual Average	120	70	20	120	200



Pollutants	Units	Time-weighted Average	SEQS 2016	IFC Interim Target-1 2007	IFC Guideline Value 2007	BEQS 2020	NEQS 2010
		24 hours	150	150	50	150	250
Respirable Particulate Matter PM _{2.5}	µg/m ³	Annual Average	40	35	10	15	25
		24 hours	75	75	25	35	40
Lead (Pb)	µg/m ³	Annual Average	1	–	–	1	1.5
		24 hours	1.5	–	–	1.5	2
Carbon Monoxide (CO)	mg/m ³	8 hours	5	–	–	5	5
		1 hour	10	–	–	10	10

Table 2: Comparison of Industrial Gaseous Emissions Prescribed in the SEQs, BEQs, and NEQs (mg/Nm³, unless otherwise defined)

No.	Parameter	Source of Emission	SEQS 2016	BEQS 2020	NEQS 2010
1.	Smoke	Smoke opacity not to exceed	40% or 2 on Ringelmann Scale or equivalent smoke number	40% or 2 on Ringelmann Scale or equivalent smoke number	40% or 2 on Ringelmann Scale or equivalent smoke number
2.	Particulate Matter ¹	a) Boilers and furnaces			
		i) Oil-fired	300	300	300
		ii) Coal-fired	500	500	500
		iii) Cement kilns	300	300	300
		(b) Grinding, crushing, clinker coolers and related processes, metallurgical processes, converters, blast furnaces and cupolas	500	500	500
3.	Hydrogen chloride	Any	400	400	400
4.	Chlorine	Any	150	150	150
5.	Hydrogen fluoride	Any	150	150	150
6.	Hydrogen sulphide	Any	10	10	10
7.	Sulphur oxides ^{2, 3}	(a) Sulfuric acid/sulfonic acid plants	-	5,000	-
		(b) Other plants except power plants operating on oil and coal	1,700	1,700	1,700
8.	Carbon monoxide	Any	800	800	800
9.	Lead	Any	50	50	50
10.	Mercury	Any	10	10	10

No.	Parameter	Source of Emission	SEQS 2016	BEQS 2020	NEQS 2010
11.	Cadmium	Any	20	20	20
12.	Arsenic	Any	20	20	20
13.	Copper	Any	50	50	50
14.	Antimony	Any	20	20	20
15.	Zinc	Any	200	200	200
16.	Oxides of nitrogen ³	(a) Nitric acid manufacturing unit	3,000	3,000	3,000
		(b) Other plants except power plants operating on oil or coal:		-	-
		Gas-fired	400	400	400
		Oil-fired	600	600	600
		Coal-fired	1,200	1,200	1,200

Notes:

1. Based on the assumption that the size of the particulate is 10 microns or more.
2. Based on 1 percent sulphur content in fuel oil. Higher content of sulphur will cause standards to be pro-rated.
3. In respect of emissions of sulphur dioxide and nitrogen oxides, the power plants operating on oil and coal as fuel shall in addition to SEQS, BEQS, and NEQS above, comply with the standards stated in Table 5 and Table 6.

Table 3: Comparison of Noise Limits Prescribed in the SEQs, BEQS, NEQS, and IFC EHS Guidelines (General)

No.	Category of Area/Zone	SEQS 2016 (dBA)		IFC Guideline Value 2007 (dBA)		BEQS 2020 (dBA)		NEQS 2010 (dBA)	
		Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
1.	Residential area (A)	55	45	55	45	55	45	55	45
2.	Commercial area (B)	65	55	70	70	65	55	65	55
3.	Industrial area (C)	75	65	70	70	75	65	75	65
4.	Silence zone (D)	50	45	-	-	55	45	50	45

Notes:

- Noise limits are in dB(A) Leq (time weighted average of the level of sound in decibels on scale A which is relatable to human hearing)
- Day time hours: 6:00 am to 10:00 pm
- Nighttime hours: 10:00 pm to 6:00 am
- Silence zone: Zones that are declared as such by the competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts and courts.
- Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.

IFC EHS Sector Guidelines for Mining considers the IFC EHS General Guidelines.

The IFC EHS General Guidelines provides the same limit for institutional and educational areas like residential area limits.

Table 4: Comparison of Drinking Water Quality Limits Prescribed in the SEQs, BEQS, and NEQS and WHO Standards

Properties/ Parameters	SEQS 2016	BEQS 2020	NEQS 2012	WHO Standards
All water intended for drinking (E. Coli or Thermo tolerant Coliform bacteria) ¹	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample
Treated water entering the distribution system (E. Coli or thermo tolerant coliform and total coliform bacteria) ¹	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample
Treated water in the distribution system (E. coli or thermo tolerant coliform and total coliform bacteria) ¹	Must not be detectable in any 100 ml sample in case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample in case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample in case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample in case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.
Color	≤15 TCU	≤15 TCU	≤15 TCU	≤15 TCU
Taste	Non-objectionable/Acceptable	Non objectionable/ Acceptable	Non objectionable/ Acceptable	Non-objectionable/Acceptable
Odor	Non-objectionable/Acceptable	Non objectionable/ Acceptable	Non objectionable/ Acceptable	Non-objectionable/Acceptable
Turbidity	< 5 NTU	< 5 NTU	<5 NTU	< 5 NTU

Properties/ Parameters	SEQS 2016	BEQS 2020	NEQS 2012	WHO Standards
Total hardness as CaCO ₃	< 500 mg/l	< 500 mg/l	< 500 mg/l	–
TDS	< 1,000	< 1,000	< 1, 000	< 1,000
pH	6.5 – 8.5	6.5—8.5	6.5—8.5	6.5 – 8.5
Aluminium (Al) mg/l	≤0.2	≤0.2	≤0.2	0.2
Antimony (Sb)	≤0.005	≤0.005	≤0.005	0.02
Arsenic (As) ²	≤0.05	≤0.05	≤0.05	0.01
Barium (Ba)	0.7	0.7	0.7	0.7
Boron (B)	0.3	0.3	0.3	0.3
Cadmium (Cd) ²	0.01	0.01	0.01	0.003
Chloride (Cl)	<250	<250	<250	250
Chromium (Cr)	≤0.05	≤0.05	≤0.05	0.05
Copper (Cu)	2	2	2	2
Cyanide (CN) ²	≤0.05	≤0.05	≤0.05	0.07
Fluoride (F) ³	≤1.5	≤1.5	≤1.5	1.5
Lead (Pb) ²	≤0.05	≤0.05	≤0.05	0.01
Manganese (Mn)	≤ 0.5	≤ 0.5	≤ 0.5	0.5
Mercury (Hg)	≤0.001	≤0.001	≤0.001	0.001
Nickel (Ni)	≤0.02	≤0.05	≤0.02	0.02
Nitrate (NO ₃)	≤50	≤50	≤50	50

Properties/ Parameters	SEQS 2016	BEQS 2020	NEQS 2012	WHO Standards
Nitrite (NO ₂)	≤3	≤3	≤3	3
Selenium (Se)	0.01	0.01	0.01	0.01
Residual chlorine	0.2-0.5 at the consumer end 0.5-1.5 at the source	0.2-0.5 at consumer end 0.5-1.5 at source	0.2-0.5 at consumer end 0.5-1.5 at source	–
Zinc (Zn)	5.0	5.0	5.0	3
Pesticides		-	-	PSQCA No. 4639~2004, Page No. 4 Tahk- No. 3 Serial No. 20- 58 m;iy be consulted. ⁴
Phenolic compounds (as Phenols) mg/L		-	-	≤0.002
Polynuclear aromatic hydrocarbons (as PAH) g/L		-	-	0.01 (By GC/MS Method)
Alpha Emitters bq/L or pCi	0.1	0.1	0.1	0.1
Beta emitters	1	1	1	1

Notes:

1. Most Asian countries also follow WHO standards.
2. The standard for Pakistan is similar to most Asian developing countries.
3. Indicates priority health-related inorganic constituents that need regular monitoring.
4. PSQCA: Pakistan Standards Quality Control Authority

Table 5: Comparison of Sulphur Dioxide emitted by Power Plants Operating on Oil and Coal (SEQS, BEQS and NEQS)

Sulphur Dioxide Background Levels ($\mu\text{g}/\text{m}^3$)			SEQS/BEQS/NEQS	
			Criterion I	Criterion II
Background Air Quality (SO ₂ basis)	Annual Average	Maximum 24-Hour Interval	Max. SO ₂ Emissions (TPD)	Max. Allowable 1-Year Average Ground Level Increment to Ambient ($\mu\text{g}/\text{m}^3$)
Unpolluted	<50	<200	500	50
Moderately Polluted ¹				
Low	50	200	500	50
High	100	400	100	10
Very polluted ²	>100	>400	100	10

Notes:

1. For intermediate values between 50 and 100 $\mu\text{g}/\text{m}^3$ linear interpolations should be used.
2. No projects with Sulphur dioxide emissions will be recommended.

Table 6: Comparison of Nitrogen Oxide emitted by Power Plants Operating on Oil and Coal (SEQS, BEQS and NEQS)

Description of Parameter	SEQS/BEQS/NEQS
Annual arithmetic means of ambient air concentrations of nitrogen oxides (expressed as NO _x)	100 $\mu\text{g}/\text{m}^3$ (0.05 ppm)
Emission levels for stationary source discharge before mixing with the atmosphere: For fuel-fired steam generators	
Liquid fossil fuel	130 ng/J of heat input
Solid fossil fuel	300 ng/J of heat input
Lignite fossil fuel	260 ng/J of heat input

Notes: Dilution of gaseous emissions to bring them to the standards limiting value is not permissible through excess air mixing blowing before emitting into the environment.