Environmental and Social Monitoring Report

Project Number: 43903-014
Quarterly Report (Jul - Sept 2016)
November 2016

Pakistan: Uch-II Power Project

Prepared by Uch-II Power (Private) Limited for the Asian Development Bank.

UCH-II POWER (PRIVATE) LIMITED

OPERATIONAL PHASE

ENVIRONMENTAL AND SOCIAL MONITORING REPORT

Q3-2016

(July 01, 2016 – September 30, 2016)

Submission Date: November 14, 2016

UCH-II POWER (PRIVATE) LIMITED

A	Project/Business Name and Summary Information	
	Development of 404 MW Gas Fired Combined Cycle Power Plant by Uch-II Power (Private) Limited	
(i)	*Location of project/business*	Dera Murad Jamali, Baluchistan, Pakistan
(ii)	*Nature*	Operation & Maintenance of low BTU gas fired combined cycle power plant
(iii)	*Scale/size*	404 MW (ISO Gross Rating) 2 Gas Turbines x 01 Steam Turbine
(iv)	*Date of construction/operation commencement*	Construction activities commenced in July 2011. Project achieved Commercial Operation Date (COD) on April 4, 2014. after successful completion of Reliability Run Test on April 3, 2014
(v)	*Name, designation and signature of person responsible for preparing/reviewing the report*	Fida Muhammad Khan, Manager HSE Uch-II / Waseem Ellahi Plant General Manager
B	**Relevant Environmental Permits or Compliance Certificates**	
(i)	*Summary of permit conditions & media(s) covered*	"No Objection Certificate issued by BEPA"
(ii)	*Issue by which government Agency*	Baluchistan Environmental Protection Agency (BEPA)
(iii)	*Issuance date and duration of validity*	December 9, 2010 – BEPA also issued Confirmation of compliance under PEPA Regulation 2000 in April 2014. Copy of BEPA confirmation of compliance attached as Appendix-H.
(iv)	*Renewal requirements*	None
C	**Incidents of Violations or Non-Compliance**	
(i)	*Recorded date and responsible agencies*	None in Q3-2016
(ii)	*Nature of non-compliance*	No reportable incident to authorities recorded during Q3-2016
(iii)	*Violation or non-compliance based on what environmental standards and regulations*	N/A
(iv)	*Recorded dates and authorities*	During the period Q3-2016, EHS related observations of minor nature recorded during routine site monitoring. Log with corrective actions attached as Appendix A.
(v)	*Media or community reactions (if any)*	None in Q3-2016
(vi)	*Corrective actions, deadlines, identification of responsible parties*	Short term corrective actions identified through regular site H&S walks. Please refer to Appendix A.
	(a) short--term: remedial action	Please refer to Appendix A
	(b) long-term: preventative measures	None in Q3-2016
D	**Incidents of Environmental and Safety Accidents**	
(i)	*Incident recorded dates and responsible agencies,*	None in Q3-2016
(ii)	*Scale of damage and injury (if any)*	None in Q3-2016
(iii)	*Authorities in charge of investigation/recording*	Uch-II Management responsible for recording and investigation.
(iv)	*Media or community reactions (if any)*	None in Q3-2016
(v)	*Corrective actions, deadlines, identification of responsible parties*	None in Q3-2016
	(a) short--term: remedial action	None in Q3-2016
	(b) long-term: preventative measures	None in Q3-2016
E	**Labour Relations and Conditions**	
(i)	*Nature of labour dispute or grievance*	None in Q3-2016
(ii)	*Legal requirements, Permit conditions and renewal requirements*	None in Q3-2016
(iii)	*Authorities in charge of investigation/recording*	Uch-II Management responsible for recording and investigation.

(iv)	*Media or community reactions (if any)*	None in Q3-2016
(v)	*Corrective actions, deadlines, identification of responsible parties*	N/A
(vi)	*Labour relations and living conditions for construction labour force*	Construction labour camp decommissioned after completion of project phase and EPC labour has been demobilized. Only warranty team is at site residing inside owner's housing compound with satisfactory living conditions.
F	**Environmental Capacity**	
(i)	*Staff capacities in environmental management (as relevant)*	Uch-II O&M Environmental Staff Consists of; (i) 01 Manager HSE (ii) 01 Senior Manager Operations (iii) 01 Manager Operations (iv) 01 Deputy Manager Chemical (Effluent treatment, analysis & Spill Response) (v) 01 Assistant Manager HSE (vi) 01 HSE Officer (vii) 02 Senior Chemists (Effluent treatment, analysis & Spill Response) (viii) 01 Chemical Assistants (Effluent treatment & Spill Response) (ix) 01 Manager Admin / PR (x) 01 Manager Colony & Security (xi) 01 Deputy Manager HR • Dedicated total 12 Personnel • Overall organizational structure of Uch-II O&M Environmental and social team and Health & Safety team is attached as Appendix-G.
(ii)	*Degree of awareness of: (i) environmental management, (ii) health and safety, (iii) environmental laws and regulations*	Project O&M phase H&S Management plan and all other Environmental applicable & relevant Laws and regulations orientation to O&M team on regular basis. Owner (Uch-II) project HSE department continues managing O&M phase. Very well updated on all the relevant HSE laws and regulations.
(iii)	*Training programs carried out*	Training sessions on IOSH Managing Safely, Emergency Response & Evacuation Work at Height, HSE Policy and Near Miss Reporting carried out with O&M and Contractor staff. • Pre Job TBTs conducted on regular basis • Weekly Fire drills performed by O&M Team
(iv)	*Needs assessment of environmental management capacity (as relevant)*	All positions filled as per O&M staffing plan.
(v)	*Compliance audits carried out*	None in Q3-2016
G	**Stakeholder Consultation/CSR Activities**	
(i)	*Details of consultations, if any, with local communities, nongovernmental organizations, civil society groups, and other stakeholders, including affected people*	None has been conducted in Q3-2016
(ii)	*Describe efforts to promote community relations and local development for inhabitants of the project area.*	No communities migrated or effected residing in the vicinity of project site due to facility setup. Uch-II is located within UPL boundary where UPL (owner of Uch-II) maintained a comprehensive CSR local community outreach and social development program since last many years. Main community development segments include; (i) Standardized primary education schools (ii) Modernized Emergency care centre (iii) 08 Drinking water treatment plants (iv) Internship and Trainee engineers program (v) Roads construction, calamity relief and free medical camps.
(iii)	*Project procedures for (a) hiring and (b) acquisition of goods and services*	UPL prefers hiring human resource from local area at all levels. Attached Appendix-I provides the local - Balochistan staff ratio at UPL site (including O&M employees & contractors staff).
(iv)	*Provide List of grievances and status of grievance resolution*	None in Q3-2016
H	**Issues, Status of Implementation of Mitigating Measures in the Environmental and Social Management Plan and Compliance with Environmental Qualities and Standards (national and international, as relevant) and Environmental and Social Requirements**	

	Parameter	Issue	Status
1	*Air*	None	Gas Turbines Stack emissions monitored through CEMS. Air Emissions data (HRSGs stacks) for Q3-2016 is attached as Appendix-B. Results of ambient air quality are provided in Appendix-B. A location map indicating ambient air quality monitoring points is attached as Appendix B-I.
2	*Water (surface and ground water)*	None	Overall compliance with EMP (as applicable against specific parameters) in place. Attached is Appendix C-I, indicating water consumption data for Q3-2016. Waste water generated is treated at water treatment plant and waste water treatment plant before disposal to evaporation pond. A brief description of waste water treatment is provided in Appendix C. Attached Appendix C-I indicate waste water qualitative and quantitative data for Q3-2016.
3	*Waste generation and management*	None	Solid waste managed through onsite land fill for Bio degradable and household waste. Recyclable waste provided to recycling contractor. Solid waste record indicated in Appendix-D for Q3-2016.
4	*Noise and vibration*	Plant high noise areas highlighted	Plant noise monitoring data (ambient & occupational noise levels) for Q3-2016 is indicated in Appendix-E. Issue of high noise levels around plant equipment is explained in Section-I of this report.
5	*Occupational health and safety*	None	Monitoring of Health & Safety Key performance Indicators by Uch-II in place. Well-equipped UPL Site medical center with Medical officer and 02 nurses available 24/7 for medical treatment & emergencies. Annual medical surveillance program for UPL employees in place.
6	*Community safety and security*	None	Community safety during road travel is ensured through driver's awareness and training program. The non-local staff within the boundary wall of power plant sensitized for taking care of local norms and customs and avoiding unnecessary interaction with local community.
7	*CO_2 emissions by the Project*		CO_2 emissions data indicated in Appendix-B for Q3-2016. Methodology for computation of the CO2 produced by the plant is provided in the Appendix-B).
8	*Environmental and Social Management Plan, including IFC E&S Action Plan (September 29, 2010)*		Project H&S plan and EMP implementation and monitoring maintained throughout project phase. Attached Appendix-F summarizes the compliance status of mitigation measures for E&S plan for Operational Phase for the period under review. (Ref Table 4-2 of EIA and Table 6-3 of EMP, both tables integrated into Appendix-F to avoid repetition of issues).

I Summary Assessment of Client Performance and Recommendations

Project Commercial Operation commenced on April 4, 2014 after completion of Reliability Run Test on April 3, 2014.
Total Power Generation for Q3-2016 remained 732.605 GWh.

Update Status on Pending Issues:

- The issue of high noise level inside CCR has been taken up by the site team. Quotations are invited for the replacement of damaged HVAC duct sound liners and air balancing in CCR for uniform air flow through all diffusers and for noise control. Vendor selection and finalization for the subject job is in process. High noise issue inside CCR will be resolved upon completion of aforementioned rectification work. For high noise levels around CW pumps, mechanical maintenance team has carried out lubrication and greasing of

all the main pumps. The plant operators have a very limited exposure to CW pumps (once in a day for around 5 minutes duration), the administrative controls and PPEs (including use of ear muffs by operators, high noise area indication by displaying safety signs, regular noise awareness sessions with staff etc.) have been applied to minimize occupation health hazard associated with high noise.

- RO plant is in operation with minor issues which are being dealt with EPC Contractor under warranty.

Positive Achievements:

- No environmental incident / breach reported in Q3-2016. There were no employees or contractors Lost Time Incident recorded during the period under review.
- A training session on "IOSH Managing Safely" has been conducted.
- Refurbishment of Uch-II plant safety signage carried out in Q3, 2016 with addition of new reflective type signage.
- During Q3-2016, HSE site monitoring walks, fresh eyes observations, tool box talks, in house safety trainings, point of work risk assessments carried out as per plan.

Acronyms

BEPA	Balochistan Environmental Protection Agency
CCR	Central Control Room
COD	Commercial Operation Date
CO_2	Carbon Dioxide
dB	Decibel
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
PEPA	Pakistan Environment Protection Agency
EPC	Engineering Procurement Construction
ESAP	Environment and Social Action Plan
E&S	Environmental and Social
GOB	Government of Balochistan
GOP	Government of Pakistan
GWh	Giga watt hours
HRSG	Heat Recovery Steam Generation
HSD	High Speed Diesel
HSE	Health Safety & Environment
H&S	Health and Safety
m^3	Cubic Meter
MSDS	Material Safety Data Sheet
MW	Mega Watt
NEQS	National Environment Quality Standards
NOC	No Objection Certificate
OGDCL	Oil and Gas Development Company Limited
O&M	Operation and Maintenance
pH	Hydrogen Ion Concentration
PPE	Personal Protective Equipment
PTW	Permit to Work
RA	Risk Assessment
RO	Reverse Osmosis
SOP	Standard Operating Procedure
SS	Sub Station (Electrical)
ST	Steam Turbine
TBT	Tool Box Talk
Uch-II	Uch-II Power (Private) Limited
WHO	World Health Organization
COSHH	Control of Substances Hazardous to Health
HVAC	Heating Ventilation & Air Conditioning

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Appendix-A ***Uch-II Site Monitoring Summary Q3-2016***

Corrective Actions

S. No	Findings	Corrective Actions	Compliance Status (as of September 30, 2016)
01	At instrument air receiver area, some non-system related bolts protruding from floor creating trip fall hazard.	Protruding bolts has been removed.	Completed
02	Dry chemical powder portable fire extinguisher placed in between the walkway of HRSG1 and HRSG2. Its inspection tag for the month of July was missing.	Informed to the fire team and inspection performed and extinguisher is tagged.	Completed
03	Un-attended temporary work scaffold platform spotted at FeCl3 dosing skid area without any inspection tag.	The issue highlighted to maintenance section and advised to remove the scaffold if not being used, otherwise to perform inspection and tag the scaffold accordingly. Scaffold removed by the maintenance section.	Completed
04	Sulfuric acid cans were stored in front of poly Fecl3 and poly dosing tanks. There was no barrication applied to restrict the un-authorized entry in the area.	The observation shared with the concerned section and storage area barricaded.	Completed
05	Area risk assessment was missing at 220 KV switch yard area.	Informed to Operations dept. and risk assessment was made available.	Completed
06	Safety signage on HRSGs Alimek Lifts required – "Not to be used by Unauthorized Persons"	Safety signage pasted at all three HRSGs lifts.	Completed
07	Wild growth (bushes) removal is required near Demin storage tank	Wild growth removed.	Completed
08	Oily drain of Instrument air dryer is routed to open floor that could create creating a slip hazard, housekeeping and environmental issue as well.	Informed to maintenance section and drain is routed to proper drain pit.	Completed
09	There is no cross over platform provided over cable tray near CW pumps A, B and C. Cable tray is approx. 1.5 feet high from ground and is a serious tripping hazard while crossing.	Cross over step platform provided over the cable trays of all three CW pumps.	Completed
10	At 220 KV switch yard, an HVAC out door unit installed on the walkway creating a tripping hazard.	Rectified	Completed
11	Unattended leftover material (corrugated sheets, pipes) placed around EDG area.	Material removed and housekeeping performed.	Completed

12	"Hot Surface" safety signage required on blowdown flash tanks.	Safety signs provided at the locations.	Completed
13	Uncontrolled access to an access controlled area (Fuel Gas Station) due to broken locking arrangement.	Informed to mechanical section and lock arrangement repaired.	Completed
14	Substation SS-11 emergency exit door found blocked with the sand bags.	Informed to operation team and sand bags removed.	Completed

Appendix-B

GTs Stack Emissions

Q3, 2016						
Stack Emissions	**Units**	**Average GT-1**	**Average GT-2**	**Average Both GTs**	**NEQS Limits**	**WB / IFC Guidelines**
Exhaust Temp.	°C	117	115.9	116.5	-	-
Particulate Matter	mg/Nm3	6.5	1.5	4.0	500	50
SO2	mg/Nm3	4.2	0.89	2.55	400	N/A
SO2	Metric ton/d			0.04	100	-
NOX *	mg/Nm3	22	29.5	25.75	400	152 (at 15% excess O2 level)
NOX	lb/MMBTU			0.05	0.2	-

*** The actual concentrations of NOx are at 15 % excess O2 levels**

CO2 Produced

Q3, 2016			
	Monthly Average [Tons]	Total Quantity [Tons]	Total Quantity [Kg/KWh]
CO2 Produced (including CO2 in fuel gas)	189,166.88	567,500.74	0.77
CO2 Produced (excluding CO2 in fuel gas)	106,193.78	318,581.39	0.43

YTD 2016 (i.e. up to Q3 2016)		
	YTD – Total Tons of CO2 Produced	YTD – Average KgCO2/KWh
CO2 Produced (including CO2 in fuel gas)	1,259,826.27	0.74
CO2 Produced (excluding CO2 in fuel gas)	707,236.44	0.41

Total electricity generation for the period Q3-2016 is 732.605 GWh.

YTD electricity generation is 1698.022 GWh.

CO_2 Calculation Methodology

1.0 Monthly average Natural Gas quality data is obtained from Gas chromatograph indicating Natural gas constituents in %age.

2.0 Mole fraction of constituents is calculated and CO2 weight is obtained.

3.0 The monthly gas consumption data is obtained from flow computers available at gas station in MMBTU.

Typical monthly computation data is as follows;

Data from Gas Chromatograph		
Gas Constituents		**Moles %**
Carbon Dioxide	CO_2	36.00976667
Nitrogen	N_2	20.44097333
Methane	CH_4	41.68367
Ethane	C_2H_6	1.11432
Propane	C3H8	0.41803
I-Butane	C4H10	0.11367
N-Butane	C4H10	0.121
I-Pentane	C5H12	0.03967
N-Pentane	C5H12	0.0300
Hexane	C6H14	0.0200
Molar Total	----	100.0

Manual Calculations					
Molecular weight	**Fraction of Gas Mole**	**Wt**	**Moles of CO_2 Generated**	**Wt of CO_2**	
44.0098	0.360098	15.847826	44	15.84430	
28.01348	0.204410	5.726228	0	0.00000	
16.04276	0.416837	6.687211	44	18.34081	
30.06964	0.011143	0.335072	88	0.98060	
44.09652	0.004180	0.184338	132	0.55180	
58.1234	0.001137	0.066069	176	0.20006	
58.1234	0.001210	0.070329	176	0.21296	
72.15028	0.000397	0.028620	220	0.08727	
72.15028	0.000300	0.021645	220	0.06600	
86.17716	0.000200	0.017235	264	0.05280	
	0.9999	28.984573		36.3366	Incl CO_2 in gas
				20.4923	Excl CO_2 in gas

Heating values

Constituents	HHV (dry) MJ/kg	LHV (dry) MJ/kg
Carbon Dioxide	0	0
Nitrogen	0	0
Methane	55.4850	49.9995
Ethane	51.8645	47.4742
Propane	50.3414	46.3418
Isobutane	49.5135	45.7279
N-Butane	49.5135	45.7279
Isopentane	48.9996	45.3419
N-Pentane	48.9996	45.3419
Hexanes	48.6694	45.0907

HHV (dry)	LHV (dry)	
0	0	
0	0	
371.0400	334.3574	
17.3783	15.9073	
9.2798	8.5426	
3.2713	3.0212	
3.4823	3.2160	
1.4024	1.2977	
1.0606	0.9814	
0.8388	0.7772	
407.7535	368.1007	MJ/mole of gas
MJ/kg	MJ/kg	
14.06795	12.69988	

For calculating CO_2 emissions the following formula is:

$$CO_2 \text{ Tons} = \frac{\text{Gas Consumed MJ / LCV (MJ/Kg) X Total wt of CO2}}{\text{(Molecular wt of Gas Kg x 1000)}}$$

Whereas 01 MJ = 1055.056 x MMBTU

If we have consumed Natural Gas = 1,830,729.00 MMBTU than Natural Gas than Total CO_2 Generated including CO_2 in Gas will be 190,667.7481 Tons and 107,528.5354 Tons excluding CO_2 in gas.

Energy Usage

Q3, 2016

Parameters	Units	July-16	August-16	September-16
Fuel gas consumed	m^3	100,331,399.2	115,051,996.6	111,801,987.2
Hours of Operation	Hours	663.85	740.34	715.89

Ambient Air Quality Data

Q3, 2016

Parameters	Units	**Monitoring Location:** Boundary Wall Corner (Monitoring Point # 3)	NEQS Limits
		24 Hours Average Concentration	
CO	mg/m^3	4.5	5 mg/m^3 (limit for 8 hours)
NO	$\mu g/m^3$	7.4	40 $\mu g/m^3$ (limit for 24 hours)
NO_2	$\mu g/m^3$	0	80 $\mu g/m^3$ (limit for 24 hours)
SO_2	$\mu g/m^3$	5.4	120 $\mu g/m^3$ (limit for 24 hours)

Vehicle Exhaust Emissions

Annual Vehicle Exhaust Emissions

Frequency of vehicle exhaust emissions testing is defined as “Annually” in the EMP and will be carried out during 3rd Party Annual Environmental Monitoring of Uch-II which is scheduled in November 2016.

Semi Annual Heavy Metals Emissions

Frequency of heavy metal emission testing is defined as Semi-annually in EMP. In 2016, heavy metal testing was performed in March 2016 and now this would be carried out during 3rd Party Annual Environmental Monitoring of Uch-II which is scheduled in November 2016.

Appendix B-I

Location Map – Ambient Air Quality Monitoring Points

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Appendix C

Raw Water Treatment Plant:

Raw water is supplied to Uch-II site from the Pat Feeder canal located approximately 3km away from site through a pipeline. Raw water is stored in a raw water storage pond. Raw water is pumped from the storage pond via pumps to clarifiers. Clarified water is forwarded via a surge tank for cooling water make-up, to the service water tank and to the potable water plant.

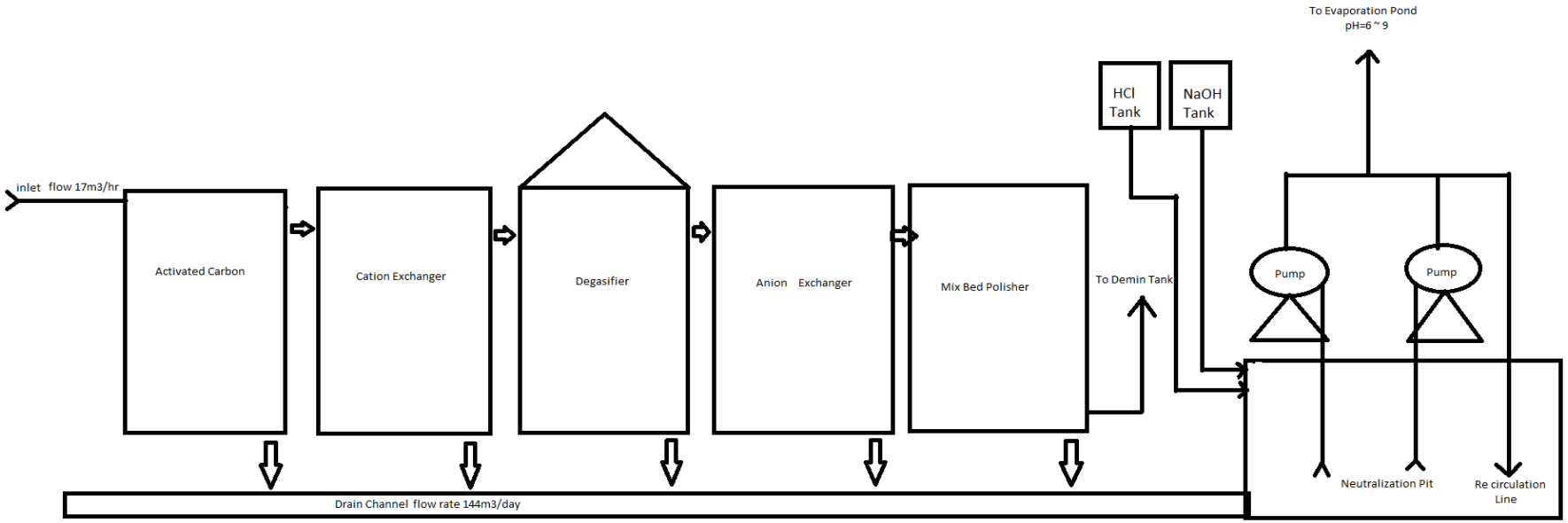
The water treatment demineralization building has two trains. Each train is comprised of carbon filter, cation bed, de-gasifier, anion and mixed bed. Regeneration of the resin beds use HCL and NaOH which is stored in bund tanks.

Treatment of Demin Plant Regenerated Wastewater:

Chemical waste from raw water pretreatment area and wastewater produced in demineralization building by backwashing of activated carbon filters, regeneration of Cation and Anion exchangers is collected in neutralization pit (10GCK01 BB010).

As acidic and alkaline effluent is collected in neutralization pit, pH of accumulated effluent is neutralized itself. However for variation in pH acid and caustic dosing system with pH controller is provided. A recirculation line is provided with effluent transfer pumps for uniform mixing of the chemicals. Once pH is neutralized in the pit, the effluent is discharged to evaporation pond through Effluent Transfer Pumps (10GCK01 AP019/020). Pumps start/stop is manual and would trip at low level in neutralization pit. Manual change over in case of fault of pumps is provided

Demin Plant and Neutralization Pit



Appendix C

Sanitary Wastewater:

Sanitary wastewater generated from plant, residential colony and offices first pass through the screen channel containing bar and mechanical screens for removal of any floating materials. Trash free wastewater is collected in the Sanitary Wastewater Tank (10GRK01 BB001). This tank serves the purpose of liquid holdup and pumping to the aeration tank (10GRC01 BB002). Two submersible pumps (10GRK01 AP001/002) are installed in the tank. Pumps start /stop at liquid level (HLL/LLL) and a level switch (LS 10GRK01CL101) is provided for automatic operation of submersible pumps. Manual change over in case of fault of pumps is provided.

Aeration Tank:

This unit supports the bacterial growth. Air is continuously supplied in this unit for biological reaction. Moreover this method of aeration offers the potential for high efficiency because bubbles of air rising through the water are continually exposed to fresh liquid surfaces maximizing water surface per unit of air.
The organic matter in the effluent is oxidized by the bacteria and is converted into harmless CO2 gas. Two air blowers (10GRC01 AN001/002) are provided for aeration in the aeration tank (10GRC01 BB002).A portion of the settled biomass from secondary clarifier (10GRD01AT002) is recycled back to maintain the desired concentration of cells in the aeration tank. The sludge recycling is achieved by continuously blowing air inside the liquid media in secondary clarifier.

Secondary Clarifier:

This is also called sedimentation tank. The purpose of secondary clarifier (10GRD01 AT002) is to remove the microorganism by sedimentation process. Hopper shaped secondary clarifier is provided for collection of sludge in the center for onward pumping for recycling and disposal as well.

The settled sludge in the secondary clarifier is continuously recycled in the aeration tank (10GRC01 BB002). Supernatant also referred as treated effluent is drawn from an effluent weir to the chlorination tank (10GRK01 BB004).

Chlorination Tank:

Chlorination Tank (10GRK01 BB004) is provided for disinfection of the treated effluent. Partition walls with opening at the end are provided for proper mixing of chlorine in the effluent for disinfection. Sodium Hypochlorite is used for disinfection.

Two pumps (10GRN01 AP003/004) are provided for chemical dosing. Sodium Hypochlorite dosing pumps are interlocked with sanitary wastewater pumps (10GRK01 AP001/002), however dry run protection is provided by level switch (LS 10GRN01CL101). Operation of pumps is continuous. Manual change over in case of fault of dosing pump is provided. The final treated water from this tank is then transferred to the evaporation pond.

Appendix C

Waste Water Treatment & RO.

Cooling tower blow down waste stream is sent to an onsite industrial wastewater tank where it is mixed with other wastewater streams from evaporative cooler and sludge drying bed water. Wastewater from industrial wastewater tank is transferred to a clarifier where clarified water and sludge is separated and transferred to clarifier tank and sludge drying bed respectively.

Clarified water first filtered through the multimedia filters and then passes through Reverse Osmosis (RO) membranes. Filtered water from RO is transferred to the CW system for reuse, whereas concentrate from RO is discharged to the evaporation pond for final disposal. pH of RO reject is 7~8 and no further treatment is required.

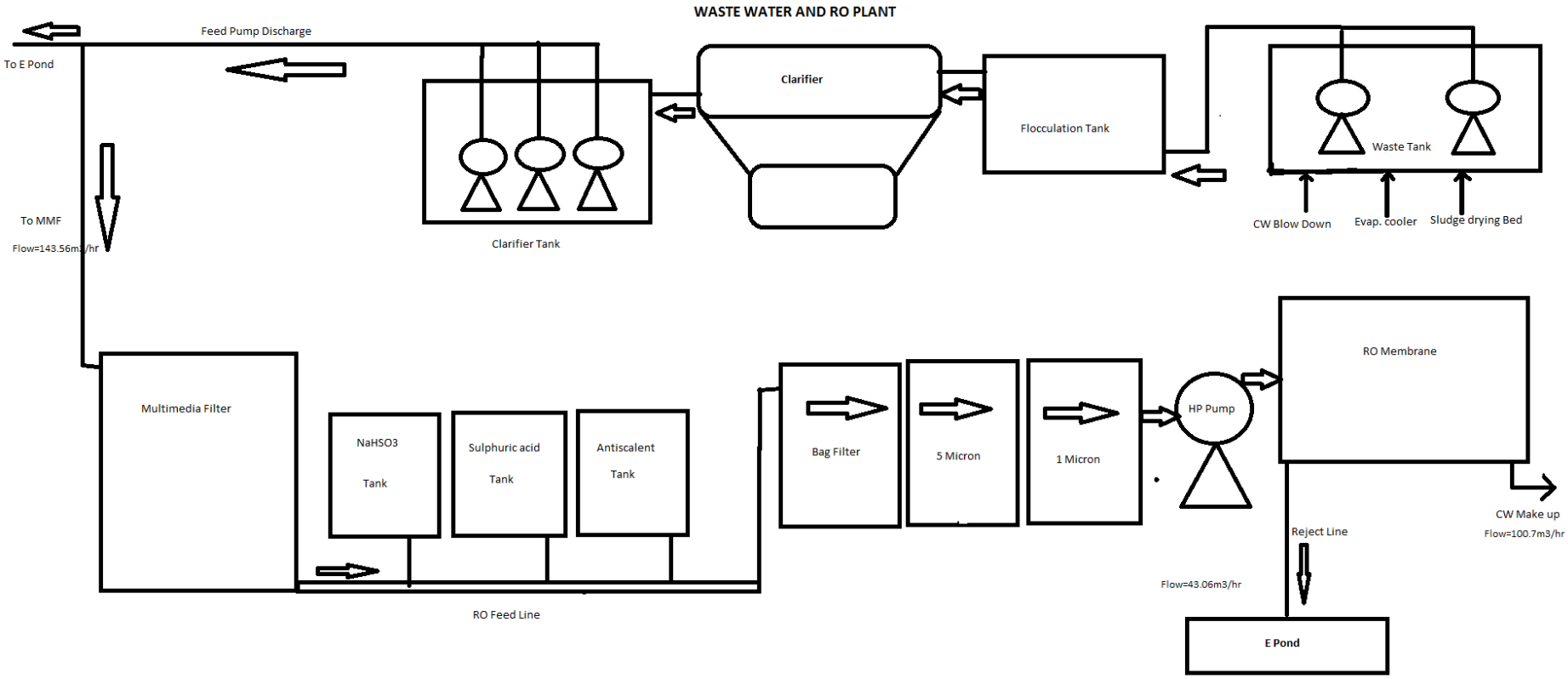
However other streams such as bypass line from filter feed pumps (10GNK02 AP007/008), effluent of pump sump (10GNK01 BB003) and overflow of clarified water tank (10GNK02 BB007) also be drained to evaporation pond occasionally.

Parameters for one train of RO are as below:

Feed water Quantity = 80m3/ hr.
Feed water pH = 8.0
Feed water conductivity = 2694 us/cm
Product water (Permeate) quantity= 53.9 m3/hr.
Product water (Permeate) conductivity = <280 us/cm.
Recovery = 70%

Appendix C

Waste Water & RO Plant - Single Line Diagram



Appendix-C I

Q3-2016

Cooling water

Location: Cooling tower discharge point

Parameters	Units	Jul-16	Aug-16	Sep-16	NEQS Limits
Temp	°C	35.4	35.3	34.6	40
pH	pH	8.32	8.32	8.3	6 to 10

Sewage Treatment Plant

Location: Sewage treatment discharge point

Parameters	Units	Jul-16	Aug-16	Sep-16	NEQS Limits
pH	pH	7.6	7.94	8.40	6 to 10
TSS	mg/liter	23	11	11	150
BOD	mg/liter	4.4	1.3	0.8	80
COD	mg/liter	35	31	40	150

Process Water Treatment Plant

Closed Cooling Water (CCW)

Parameters	Units	Jul-16	Aug-16	Sep-16	NEQS Limits
pH	pH	9.40	9.32	9.16	6 to 10
TSS	mg/liter	1	1	1	150
Cl-	mg/liter	<1.0	<1.0	<1.0	1000
Metals (Fe)	ppb	122	133	40	

Heat Recovery Steam Generator # 1 (HRSG-1)

Parameters	Units	Jul-16	Aug-16	Sep-16	NEQS Limits
pH	pH	9.59	9.66	9.63	6 to 10
TSS	mg/liter	< 1.0	< 1.0	< 1.0	150
Cl-	mg/liter	< 0.1	< 0.1	< 0.1	1000
Metals (Fe)	ppb	11	11	6	

Heat Recovery Steam Generator # 2 (HRSG-2)

Parameters	Units	Jul-16	Aug-16	Sep-16	NEQS Limits
pH	pH	9.6	9.62	9.67	6 to 10
TSS	mg/liter	<1.0	< 1.0	< 1.0	150
Cl-	mg/liter	<0.1	< 0.1	< 0.1	1000

Metals (Fe)	ppb	12	11	4	

Discharge Point RO Reject

Parameters	**Units**	Jul-16	Aug-16	Sep-16	NEQS Limits
pH	pH	7.31	7.6	7.9	6 to 10
TSS	mg/liter	5	3	1	150
Cl-	mg/liter	910	975	841	1000
Metals (Fe)	ppb	0.425	0.47	0.220	

Evaporation Pond

Location: Effluent flowing to evaporation pond

Parameters	**Units**	Jul-16	Aug-16	Sep-16	NEQS Limits
BOD	mg/liter	0	0	0	80
COD	mg/liter	37	46	41	150
Cl-	mg/liter	203	252	235	1000
metals (Fe, Zn)	mg/liter	0.87, 0.0	0.45, 0.0	0.45, 0.0	Fe 8.0 & Zn 5.0
Temp	°C	38	33	32	40
pH	pH	8.6	8.59	7.86	6 to 10
TSS	mg/liter	10	12	15	150
Oil & grease	mg/liter	0	0	1	10

Surface Drains

Location: Within 100m of turbines, WTP, Workshops /stores, oil water separator discharge

Parameters	Jul-16	Aug-16	Sep-16
Appearance & condition of oil & grease	No water in drains	No water in drains	No water in drains

Water Usage

Location: Pat Feeder Canal intake point

	Jul-16	Aug-16	Sep-16
Water usage (m^3)	438,600	422,483	396,042

Appendix-D

Q3, 2016

Uch-II Waste Generation Statistics				
Waste Type	**Unit**	**Jul-16**	**Aug-16**	**Sep-16**
Used oil	Ltr	35	49	45
Metal	Kg	5	15	12
Paper/ Plastic/ Glass	Kg	90	112	200
Wood & Food Waste	Kg	896	700	590
Oil Filters & Oily Rags	Kg	101	95	150
Used Batteries, wet/dry cells	Nos	4	0	6
Old Tyres	Nos	0	0	0

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Appendix-E

Occupational Noise Monitoring			Average Noise Monitoring Results (dB) A
S. No	Location of Equipment	Guarantee limits	Q3, 2016
1	East side of pump "A" at Raw Water Pumping Station	85 (dB) A	_
2	East side of pump "B" at Raw Water Pumping Station	85 (dB) A	81.7
3	South Side of potable water supply pump "B"	85 (dB) A	76
4	South Side of CT Basin Makeup Pump "A"	85 (dB) A	82.7
5	East Side of CT Basin Makeup Pump "B"	85 (dB) A	_
6	West side of DM distilation pump "B"	85 (dB) A	_
7	South side of Hot Well make up pump "B"	85 (dB) A	78.5
8	East side of Service Water pump "B"	85 (dB) A	85.1
9	North Side of CT at ground level close to cell #02	85 (dB) A	88
10	North Side of CT at ground level close to cell #04	85 (dB) A	85
11	North Side of CT at ground level close to cell #06	85 (dB) A	84.8
12	South Side of CT at ground level close to cell #08	85 (dB) A	84.7
13	East Side of Cooling Tower fan motor # 6(10PAB01-AN006)	85 (dB) A	84.9
14	East Side of Cooling Tower fan motor # 8 (10PAB01-AN008)	85 (dB) A	84.6
15	East Side of Fire water pump house with door close & Diesel pump Off	85 (dB) A	63.5
16	North Side of Fire water pump house with door close & Diesel pump Off	85 (dB) A	66.7
17	West side of HSD Decanting point # 3	85 (dB) A	62.9
18	North Side of HRSG-2 main stack	85 (dB) A	73.4
19	North side of GT -2 Generator	85 (dB) A	79
20	South side of GT -2 turbine combustion chamber	85 (dB) A	83.6
21	North side of GT -2 PEECC	85 (dB) A	71.9
22	South side of boiler feed pump "B" (HRSG-2)	85 (dB) A	85.2
23	South side of boiler feed pump "A" (HRSG-2)	85 (dB) A	_
24	South side of GT -1 PEECC	85 (dB) A	73
25	South side of GT -1 turbine combustion chamber	85 (dB) A	82.6
26	West side of GT -1 Generator	85 (dB) A	81.9
27	South side of GT -1 turbine compartment (shaft) entrance door	85 (dB) A	87
28	North Side of HRSG-1 main stack	85 (dB) A	74.5
29	West side of HRSG-1 at bottom close to HRSG duct entrance	85 (dB) A	85
30	West Side of Cooling water pumping station	85 (dB) A	85
31	West Side of CW pump "A" in cooling water pumping station	85 (dB) A	87
32	North Side of CW pump "A" in cooling water pumping station	85 (dB) A	86
33	West Side of CW pump "C" in cooling water pumping station	85 (dB) A	87
34	North Side of CW pump "C" in cooling water pumping station	85 (dB) A	88.1
35	West Side of Auxiliary CW pump # 1 in cooling water pumping station	85 (dB) A	87.5
36	East Side of Auxiliary CW pump # 1 in cooling water pumping station	85 (dB) A	90
37	West Side of Auxiliary CW pump # 2 in cooling water pumping station	85 (dB) A	_
38	East Side of Auxiliary CW pump # 2 in cooling water pumping station	85 (dB) A	_
39	North Side of CCW pump "B"	85 (dB) A	_
40	North Side of CCW pump "A"	85 (dB) A	79.4
41	North Side of instrument Air Compressor "A"	85 (dB) A	_
42	East Side of instrument Air Compressor "B"	85 (dB) A	82
43	North Side of instrument Air Compressor "B"	85 (dB) A	80.5
44	North Side of Boiler Feed Pump # 1 at HRSG-1 Bottom	85 (dB) A	_
45	North Side of Boiler Feed Pump # 2/B at HRSG-1 Bottom	85 (dB) A	85
46	East side of Steam Turbine	85 (dB) A	86.9
47	West side of Oil cooler in lube oil console skid for STG	85 (dB) A	83.5
48	West side of Steam Turbine	85 (dB) A	86
49	Waste Water Treatment plant near pump station	85 (dB) A	49.3
50	North Side of workshop	85 (dB) A	55.5
51	West side of HRSG-2, duct entrance	85 (dB) A	85
52	South Side of EDG	85 (dB) A	66.9
53	West Side of EDG	85 (dB) A	60.4
54	South side of sand filter pump B	85 (dB) A	_
55	South side of sand filter pump A	85 (dB) A	_

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Ambient Noise Monitoring			Average Noise Monitoring Results (dB) A
S. No	Noise Monitoring Locations	Guarantee limits	Q3, 2016
1	Main gate Uch-II	70 (dB) A	51.2
2	Check Post # 3 (at boundary wall)	70 (dB) A	47.3
3	Check Post # 6 (at boundary wall)	70 (dB) A	50
4	Check Post # 14 (at boundary wall)	70 (dB) A	48

Compliance Status of EMP Control Measures Q3-2016

Appendix-F

Uch-II Project

Environmental / Social Impacts	Control & Mitigation Measures	Monitoring Frequency	Responsibility	Compliance Status
Air Emissions	- Stack emissions monitoring in place through CEMS (Continues Emission Monitoring System) - Annual third party stack emissions and ambient air quality testing - Monitoring compliance with National Environmental Quality Standards	- Monthly - Annually	Uch-II O&M team	Complied
Plant Noise	- Noisy equipment are placed inside the acoustic enclosure - Availability of silencers at intake and exhaust channels - Plant routine noise monitoring in place - High noise areas are identified and high noise signage displayed to enhance awareness	Monthly	Uch-II O&M team	Complied
Waste Water	- Uch-II is zero liquid discharge facility - Waste streams generated from plant (sanitary waste water, cooling tower blow down, demin regeneration waste water, oily waste water etc.) disposed off into onsite evaporation pond after required treatment - Waste water sampling, analysis and test record being maintained - Compliance monitoring and reporting in place	Daily	Uch-II O&M team	Complied
Water Sourcing	- Fresh surface water sourced from Pat Feeder Canal as per project design and irrigation permits from Government of Balochistan - Water consumption monitoring on monthly basis - Water conservation – Reuse from waste Reverse osmosis Plant	On going	Uch-II O&M team	Complied
Hazardous Materials	- Segregation of hazardous waste - Separate storage area for hazardous wastes - Hazardous waste disposal through waste contractor - Hazardous waste quantification on monthly basis and record being maintained - Regular inspection of storage areas	Monthly	Uch-II O&M team	Complied
Solid Waste Management	- Waste Management Procedure in place - Color coded waste bins available at different plant locations for different waste types - Designated land fill area for disposal of food / kitchen waste - Non Hazardous waste quantification on monthly basis and record being maintained	Monthly	Uch-II O&M team	Complied

Occupational Health and Safety				
Electrical Hazards	- Permit to work / Lock out Tag out procedure in place. All electrical isolations are ensured before performing any activity on energized systems - Access to high voltage areas (electrical substations, 220 KV switchyard, panel rooms etc.) is controlled - Electrical safety signage displayed in respective areas to enhance the risk awareness of staff	Ongoing on regular basis	Uch-II O&M team	Complied
Confined Space Entry	- Identification of all confined spaces at plant - Confined Space entry procedure in place covering all confined space associated risks and control measures - Regular confined space training sessions with staff - Training sessions on Responsibilities of Standby Man	Ongoing on regular basis	Uch-II O&M team	Complied
Machine Guarding	- Moving and rotating parts of plant equipment are properly guarded to eliminate the risk of entanglement and injury - Permit to work / Lock out Tag out procedure in place to ensure the safety of staff working in plant equipment - All kinds of plant and machinery inherent dangers to workers are mitigated through engineering controls and safety devices	Ongoing on regular basis	Uch-II O&M team	Complied
Eye Head and Foot Protection	- Mandatory and Job specific personal protective equipment are provided to all staff and contractors working at plant - A procedure for provision, use & maintenance of PPEs in place - Open toe shoes are not allowed inside the plant area - PPEs awareness signage displayed at prominent locations at plant - Regular monitoring of PPEs compliance - Contractors and visitors safety induction program in place	Ongoing on regular basis	Uch-II O&M team	Complied
Fire and Explosion Hazards	- Portable fire extinguishers are available throughout the plant area and buildings as per design layout and clearly identifiable - Inspection of fire extinguishers on monthly basis - Fire water system composed of fire water storage tanks, fire water pumps, fire water ring main (hydrants, monitors) available as per design and clearly marked - Emergency exits are well marked luminaries - Emergency response plan in place - No smoking policy in place	Ongoing on regular basis	Uch-II O&M team	Complied
Housekeeping	- Regular housekeeping drives program in place - Regular safety walks and housekeeping inspections - Lock out Tag out procedure in place	Ongoing on regular basis	Uch-II O&M team	Complied

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Chemical Exposure	- Respirators are made available to staff works in chemical areas Regular inspection of work areas and storage areas to detect any leakages/ spillage - Safe movement of chemicals and fuels - Spill emergency response procedure	Ongoing on regular basis	Uch-II O&M team	Complied
Noise Levels	- Provision of ear defenders (ear muff, ear plugs) to staff - High noise safety signage displayed around noisy equipment to enhance awareness - Awareness session with workers on High Noise Risks and Control Measures	Ongoing on regular basis	Uch-II O&M team	Complied
Heat Related Stress / Illness	- Provision of cooling neck bands to employees, shaded rest areas for workers and cold drinking water facilities during summer season - Rest break system is ensured during works in hot weather - Heat Stress awareness session with staff	Ongoing on regular basis	Uch-II O&M team	Complied

Mitigation Measures – Photographs

Noise Signage at High Noise Equipment and Areas

Color Coded Waste Bins at different plant location

Safety Awareness Signage (PPEs, Housekeeping, Chemicals and Electrical Hazards)

Fire Equipment at Plant and Emergency Exits

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Uch-II ENVIRONMENTAL AND SOCIAL ACTION PLAN (ESAP)

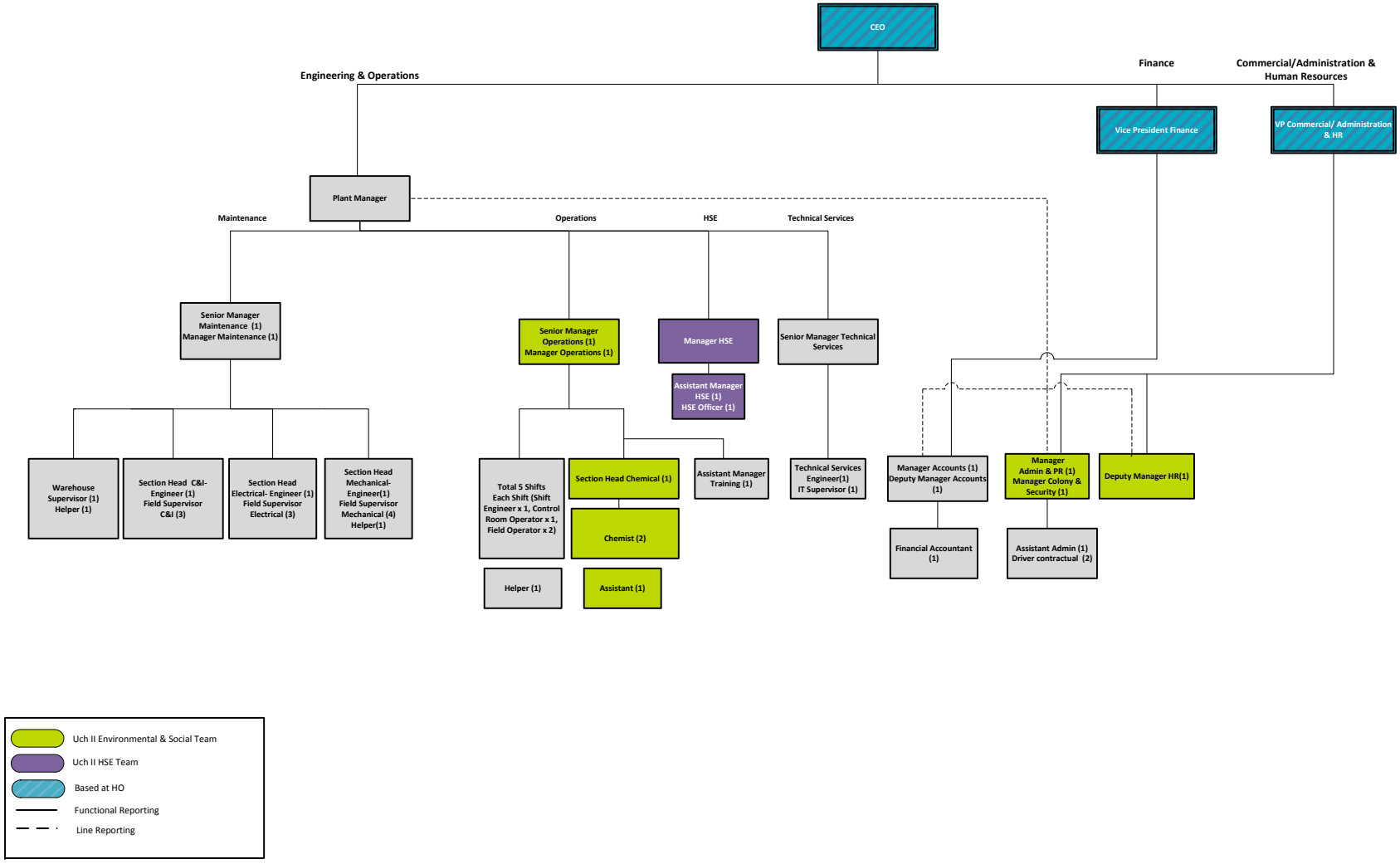
Compliance matrix for Operational Phase

Compliance status of E&S Action Plan items relevant to the operational phase of Uch-II is provided below.

No.	Action	To be verified by:	Schedule	Status
PS1-2	Update the Environmental Management Plan (Appendix A of the January 2010 EIA) based on the final arrangements of the Operation & Maintenance, and implement.	A copy of the updated Environmental Management Plan including detailed monitoring program for the operational phase.	Update: Before the Commercial Operations Date. Implement: During the operational phase.	Completed. The first table of this Appendix-F is a combination / integration of following two tables. Table 4-2of EIA: Environmental management and monitoring plan, operational phase Table 6-3of EMP: Mitigation Plan for Operation Phase This table indicates the environmental aspects to be monitored by O&M team for operation phase as per the requirements mentioned in EIA and EMP. It also explains the control and mitigation measures implemented by Uch-II, monitoring frequencies and status of compliance.
PS2-1	Establish and implement the labor hiring policy and procedure (including local employee hiring criteria) in line with IFC Performance Standard #2.	Copy of the local employee hiring procedure.	Construction phase: Before first disbursement. Operational phase: 6 months before the Commercial Operations Date.	Completed. A copy of local employee hiring policy will be made available in AMR 2016.
PS3-1	Incorporate the Company into the UPS Emergency Preparedness and Response Plan.	Copy of the Emergency Preparedness and Response Plan to cover both UPL and the Company operations.	Before commercial operation of the Company.	Completed. Emergency Response Procedure is in place.

Appendix G

Uch II Organizational Structure (O&M Team)



For Uch-II Project, the Owner (Uch-II) has appointed an O&M team comprising management / staff from UPL (Uch-I) with shared responsibilities. So this is basically a one team (Owner & O&M) directly reporting to Plant General Manager of UPL (Uch-I & Uch-II)

Appendix H

Attention: MR FIDA KHAN SB
M&S USE

OFFICE OF THE DIRECTOR GENERAL BALOCHISTAN
ENVIRONMENTAL PROTECTION AGENCY
GOVERNMENT OF BALOCHISTAN
SAMUNGLI ROAD QUETTA

Office: 081-9201840 Fax: 081-9201180 Email: epa_baluchistan@yahoo.com

No. DG (EPA)/ 4688 /2014 Dated: 22-04-/2014

To,

Mr. Babar Saeed Khan,
Construction Manager
48, Khayabar-e-Iqbal, Main Margalla Road
F-7/2 Islamabad-400 Pakistan
Tel: - +92512654901-4, Fax:-+92512654905

Subject;- **Request for Confirmation of Compliance under BEPA IEE/EIA Regulation 2000.**

With reference to your letter No.2.7.8/BEPA)/Corr dated 18th January, 2014 and to convey the approval of this Agency for the commencement of operation and commissioning of Combined Cycle subject to the conditions as already conveyed vide letter No. DG(EPA)/ 6269-72 dated 09-12-2010.

2. Furthermore, under section 14(1) of IEE/EIA Regulations,2000, the proponent is supposed to submit regular auditing and reporting in order to mitigate and manage the environmental impacts for the life of project.

(Naseer Khan Kashani)
Director General

Master file.

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Appendix - I

Q3-2016 UPL Site - Local Employment Ratio

Category	Total Strength	Local / Balochistan	Local Employment Ratio
O & M Staff	142	37	26.1%
Site Contractor Workers	456	192	42%
Others (TCF Schools, Hospitals Dera Murad Jamali)	113	113	100%