



# Environmental and Social Quarterly Monitoring Report

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Project Number: 43903 (Loan 2722)  
September 2013

## PAKISTAN: Uch-II Power Project Environmental and Social Development Quarterly Monitoring Report (Q3 2013)

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**Asian Development Bank**

## ENVIRONMENTAL AND SOCIAL MONITORING REPORT

Q3 - 2013

A	Project/Business Name and Summary Information	
	<b>Development of 404 MW Gas Fired Combined Cycle Power Plant by Uch-II Power (Private) Limited</b>	
(i)	<i>Location of project/business</i>	Dera Murad Jamali, Baluchistan, Pakistan
(ii)	<i>Nature</i>	Construction, commissioning and operation of gas fired combined cycle power plant
(iii)	<i>Scale/size</i>	404 MW (ISO Gross Rating) 2 Gas Turbines x 01 Steam Turbine
(iv)	<i>Date of construction/operation commencement</i>	Construction activities commenced in July 2011. Overall project progress at end of Q3 FY2013 is 97.18% against the revised Extension Of Time (EOT) planned progress of 99.02%. Based on current rate of progress Project COD is expected by end of February 2014.
(v)	<i>Name, designation and signature of person responsible for preparing/reviewing the report</i>	Fida Muhammad Khan, Manager HSE Uch-II / Babar Saeed Khan, Deputy General Manager Construction Uch-II
B	Relevant Environmental Permits or Compliance Certificates	
(i)	<i>Summary of permit conditions &amp; media(s) covered</i>	"No Objection Certificate issued by BEPA"
(ii)	<i>Issue by which government Agency</i>	Baluchistan Environmental Protection Agency (BEPA)
(iii)	<i>Issuance date and duration of validity</i>	December 9, 2010 (Extension required before Operational Phase)
(iv)	<i>Renewal requirements</i>	None
C	Incidents of Violations or Non-Compliance	
(i)	<i>Recorded date and responsible agencies</i>	None in Q3-2013
(ii)	<i>Nature of non-compliance</i>	No reportable incident to authorities recorded during Q3-2013.
(iii)	<i>Violation or non-compliance based on what environmental standards and regulations</i>	N/A
(iv)	<i>Recorded dates and authorities</i>	During Q3-2013, EHS related observations of minor nature recorded during routine site monitoring. Log with corrective actions attached as Appendix A.
(v)	<i>Media or community reactions (if any)</i>	None in Q3-2013
(vi)	<i>Corrective actions, deadlines, identification of responsible parties</i>	Short term corrective actions identified thru regular site walks. Please refer to Appendix-A.
	<i>(a) short-term: remedial action</i>	Please refer to Appendix A
	<i>(b) long-term: preventative measures</i>	None in Q3-2013
D	Incidents of Environmental and Safety Accidents	
(i)	<i>Incident recorded dates and responsible agencies,</i>	None in Q3-2013
(ii)	<i>Scale of damage and injury (if any)</i>	None in Q3-2013
(iii)	<i>Authorities in charge of investigation/recording</i>	EPC contractors site management and HSE team is responsible for reporting and investigating the incidents
(iv)	<i>Media or community reactions (if any)</i>	None in Q3-2013
(v)	<i>Corrective actions, deadlines, identification of responsible parties</i>	None in Q3-2013
	<i>(a) short-term: remedial action</i>	None in Q3-2013
	<i>(b) long-term: preventative measures</i>	None in Q3-2013
E	Labour Relations and Conditions	
(i)	<i>Nature of labour dispute or grievance</i>	None reported by EPC in Q3-2013
(ii)	<i>Legal requirements, Permit conditions and renewal requirements</i>	None in Q3-2013
(iii)	<i>Authorities in charge of</i>	EPC contractor responsible for managing its labour relations and conditions

	<i>investigation/recording</i>	
(iv)	<i>Media or community reactions (if any)</i>	None in Q3-2013
(v)	<i>Corrective actions, deadlines, identification of responsible parties</i>	N/A
(vi)	<i>Labour relations and living conditions for construction labour force</i>	<p>No Labor related issues recorded during Q3-2013. Majority of labor residing at site in dormitories with satisfactory living conditions. Basic Medical facility with a qualified Doctor and nurse also available at site.</p> <p>EPC contractor's labour policies are in compliance with ILO core labour standards.</p> <p>EPC contractor use to revisit payrolls of labour as per requirement of Government policies (GOP minimum wages applicable in each cadre and local market). EPC workers also insured (group life insurance) as per national law.</p> <p>As per contractor's procedure for "Camp and Security Management" In-charge Personal &amp; Administration dept. at project site is responsible for maintenance of working and living conditions at site. Regular housekeeping inspections, hygiene inspections for messing facilities, toilet facilities of labor housing compound are performed by site HSE team.</p> <p>A mechanism for registering of complaints is available for labour. Workers complaint register and complaint drop boxes available at site and camp. No labour union exists at project site.</p>
<b>F</b>	<b>Environmental Capacity</b>	
(i)	<i>Staff capacities in environmental management (as relevant)</i>	Please find the EHS Organogram indicating Uch-II, Owners Engineer and EPC team attached as Appendix B. Uch-II HSE Manager and HSE Officer were already at site whereas 02 additional HSE Site Coordinators are also hired in August-2013.
(ii)	<i>Degree of awareness of: (i) environmental management, (ii) health and safety, (iii) environmental laws and regulations</i>	Relevant EPC, OE and Uch-II staff aware about the Project EMP & H&S Mgt plan and all other Environmental applicable & relevant Laws and regulations.
(iii)	<i>Training programs carried out</i>	<p>EPC contractor carrying out regular site HSE induction as per their procedure for its entire staff as well as subcontractors. Specific in house trainings regarding environmental awareness, safety during commissioning, work at height protocols, confined space entry, heavy lifting, fire fighting, first aid, safe driving, and other relevant topics carried out by EPC Health &amp; Safety management team. Altogether a total of 1566 workers trained on different EHS topics in Q3-2013.</p> <p>HIV/AIDs/STD awareness sessions are also conducted with site work force in Q3-2013 as per HSE training plan. Please refer to Appendix C</p> <p>Appendix C (EPC In house Training Statistics Q3- 2013)</p>
(iv)	<i>Needs assessment of environmental management capacity (as relevant)</i>	EPC, EHS staff capacity monitored regularly for effective implementation of EHS Program. Project EHS Organogram attached as Appendix B.
(v)	<i>Compliance audits carried out</i>	<p>Independent HSE audit of site performed by Owner Engineers (URS) in 3<sup>rd</sup> week of September-2013. Audit report has been shared with EPC Contractor for close out of recommended corrective actions.</p> <p>Uch-II 2<sup>nd</sup> biannual HSE audit FY-2013 is planned to perform in November-2013. Appendix D (Corrective Action Plan Matrix) EMP March-2013 Biannual Audit - updated October 2013)</p>
<b>G</b>	<b>Stakeholder Consultation/CSR Activities</b>	
(i)	<i>Details of consultations, if any, with local communities, nongovernmental organizations, civil society groups, and other stakeholders, including affected people</i>	None has been conducted in Q3-2013
(ii)	<i>Describe efforts to promote community</i>	Local manpower employed in project by EPC contractor and subsequently trained unskilled workers. Please find attached Appendix-I narrating nature of trainings

	<i>relations and local development for inhabitants of the project area.</i>	provided to unskilled work force in Q-3, 2013. No migration / movement of communities residing in the vicinity of project site.	
(iii)	<i>Project procedures for (a) hiring and (b) acquisition of goods and services</i>	EPC labour hiring procedure in place. Historical data of the labor hired in construction activities is presented in attached Appendix-G.	
(iv)	<i>Provide List of grievances and status of grievance resolution</i>	None in Q-3 2013. Grievance redress mechanism and LPU & GRTG available and in place.	
H	<b>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</b>		
	<b>Parameter</b>	<b>Issue</b>	<b>Status</b>
1	<i>Air</i>	None	Dust monitoring and suppression with water sprinkling on-going on the vehicles movement tracks / roads both on & offsite.
2	<i>Water (surface and ground water)</i>	None	Overall compliance with EMP (as applicable against specific parameters) in place. Attached is Appendix E, indicating waste water analysis and water consumption record Q3-2013.
3	<i>Waste generation and management</i>	None	Waste generated at site is being collected, segregated and quantified. Construction site sewage water disposal arranged to DMJ municipal area. Attached is Appendix E indicating waste generation record for Q3-2013.
4	<i>Noise and vibration</i>	None	EPC contractor monitoring ambient & occupational noise levels on monthly basis. Attached is Appendix E indicating occupational and ambient noise monitoring results.
5	<i>Occupational health and safety</i>	None	Monitoring of Health & Safety Key performance Indicators done by EPC. Site medical center / officer maintaining workers health records for reported cases.
6	<i>Community safety and security</i>	None	Community safety and security are ensured at project site through effective implementation of mitigation measures proposed by project environmental management plan. The mitigation measures include; development of traffic management plan to minimize disturbances to local communities, established a grievance redress management system to handle and resolve any community complaints that arise during construction and operation phase, limiting the non-local staff within the boundary wall of power plant to avoid project workforce and community interaction. EPC contractors SOP for security arrangements is also in place.
7	<i>CO<sub>2</sub> emissions by the Project</i>		1774.7 tons of CO <sub>2</sub> for site Diesel Gens sets and vehicular CO <sub>2</sub> emissions for construction site reported during Q-3 2013 by EPC contractor. Calculations based upon total Diesel fuel used for the same purpose by EPC and its subcontractors.  Assumptions used in total calculating CO <sub>2</sub> emissions provided in Appendix F.
8	<i>Environmental and Social Management Plan, including IFC E&amp;S Action Plan (September 29, 2010)</i>		Project H&S plan and EMP implementation and monitoring in place by EPC contractor.  Attached Appendix H summarizes the

			<div>compliance status of mitigation measures for E&amp;S plan (Ref Appendix A Table 4-1 of EIA)</div> <div>ESAP Update: OGDCL and NTDC's EIA has been completed. After public hearing BEPA issued NOC to OGDCL in May 2013.</div>
I	Summary Assessment of Client Performance and Recommendations		
<div>HRSG-I and HRSG-II hydro testing successfully completed and STG mechanical erection activities are mostly completed. Currently pre-commissioning activities (e.g. lube oil flushing) underway.</div> <div>220 KV Switchyard energized following successful completion of requisite PPA tests. Power feedback also achieved in September through GTG-1 Main Step up and Unit Auxiliary transformer.</div> <div>Medium and low voltage panels (Substation 11, 12, 13 and 14) have been energized.</div> <div>Distributed Control System termination with installed field instrumentation and Control loops checks currently underway.</div> <div>Cooling tower civil and mechanical erection activities completed. Commissioning activities commenced with first fill of basin. Raw, Potable, Service and Fire water system has been commissioned. Demin water system commissioning is currently underway.</div> <div>Raw water pumping station (at Pat feeder Canal) completed and raw water pond filling currently underway.</div> <div>HSD Tank fabrication, erection and associated fire protection system completed. First fill of 1.7 million liters has been procured with fuel deliveries and decanting underway.</div> <div><u>H&amp;S Activities</u></div> <div>Uch-II performed extensive Day and Night safety monitoring walks, deployed additional resources for effective H&amp;S supervision against increased workforce &amp; parallel works and maintained zero tolerance on non-conformances.</div> <div>Independent EHS audit of site performed in 3rd week of September-2013 by O.E (URS). Audit report is shared with EPC contractor for close out of recommended corrective actions. EPC implemented PTW / LOTO system for commissioning phase of the project. PTW trainings carried out by EPC for associated commissioning team (engineers &amp; supervisors) and construction labor safety induction for awareness of risks associated with energized systems. Emergency Response Procedure covering scenarios for emergency response/ mitigation measures in case of fire, spills, explosion and medical emergency etc. is developed and implemented. Fire response team, spill response team, rescue and first aid teams with designated responsibilities are trained and deployed to effectively cater emergency situations.</div> <div>HSE trainings provided to workers and supervisory staff by EPC HSE dept. as per training plan. HSE site monitoring, joint safety walks, hygiene and housekeeping inspections carried out as per plan.</div> <div>Uch-II arranged trainings for O&amp;M team with regards to H&amp;S Risk Management (chemical &amp; Oil spill response, First aid emergency, Incident root cause analysis etc.). EPC contractors' activities were closely monitored by Uch-II HSE management to ensure compliance with Project EMP and H&amp;S procedures. No significant safety incidents occurred during the period under review.</div> <div>No other significant Environmental &amp; Social issues to report.</div>			

**Uch-II Site Monitoring Summary Q3-2013**  
**Corrective Actions**

**Appendix-A**

Monitoring Conducted by	HSE Uch-II
Corrective Actions By	EPC Descon

S. No	Findings	Corrective Actions
1	A dumper found at site with faulty reverse horn and rotary light. <ul style="list-style-type: none"> <li>Housekeeping Issue</li> </ul>	Dumper sent out of work area and driver is instructed to rectify the reverse horn and rotary light.
2	Scaffold pipes, debris, empty drums and other waste material found in area front of steam turbine. <ul style="list-style-type: none"> <li>Housekeeping Issue</li> </ul>	Issue addressed and housekeeping performed by civil team.
3	Working inside confined space observed at steam turbine condenser transition. Confined space protocols were not followed. No CS checklist, entry log, standby man etc. were available. <ul style="list-style-type: none"> <li>Unsafe Condition</li> </ul>	EPC HSE team is informed about the non-compliance and advised to visit the workplace and ensure the compliance of confined space protocols before resuming the job.
4	Heavy construction machine (loader) was being operated without availability of banks man. <ul style="list-style-type: none"> <li>Non-compliance of TMP</li> </ul>	Stop the operation. Excavator operator arranged the banks man and resumed the job.
5	Civil labor performing masonry work under supervision of their supervisor at GT-2 without wearing safety gloves. <ul style="list-style-type: none"> <li>Non-compliance of PPEs</li> </ul>	Supervisor is counseled and instructed to ensure full PPEs compliance of his work staff.
6	Near CCR, hydro test area was not barricaded and no safety signs displayed. <ul style="list-style-type: none"> <li>Unsafe Condition</li> </ul>	Hydro test supervisor is advised to ensure safe work protocols, arrange to install hard barriers and post appropriate safety signs.
7	Hot job was being performed in between HRSG-II and HSD tank without following hot work protocols. JSA was not available at work place, fire extinguisher found empty. <ul style="list-style-type: none"> <li>Unsafe practice</li> </ul>	Job supervisor and HSE engineer are instructed to perform job safety analysis of the job and arrange healthy fire extinguisher.
8	Along with switch yard fence, un-identified gas cylinders were placed in a shed. Caps of few cylinders were also missing. <ul style="list-style-type: none"> <li>Unsafe Condition</li> </ul>	Identification tags on all cylinders are required to be pasted. Issue addressed to site management.
9	Fire extinguisher with damaged discharge nozzle and CO2 fire extinguisher without inspection tag found at waste water treatment area. <ul style="list-style-type: none"> <li>Unsafe Condition</li> </ul>	Informed to site HSE coordinator. Fire extinguishers replaced with healthy ones.

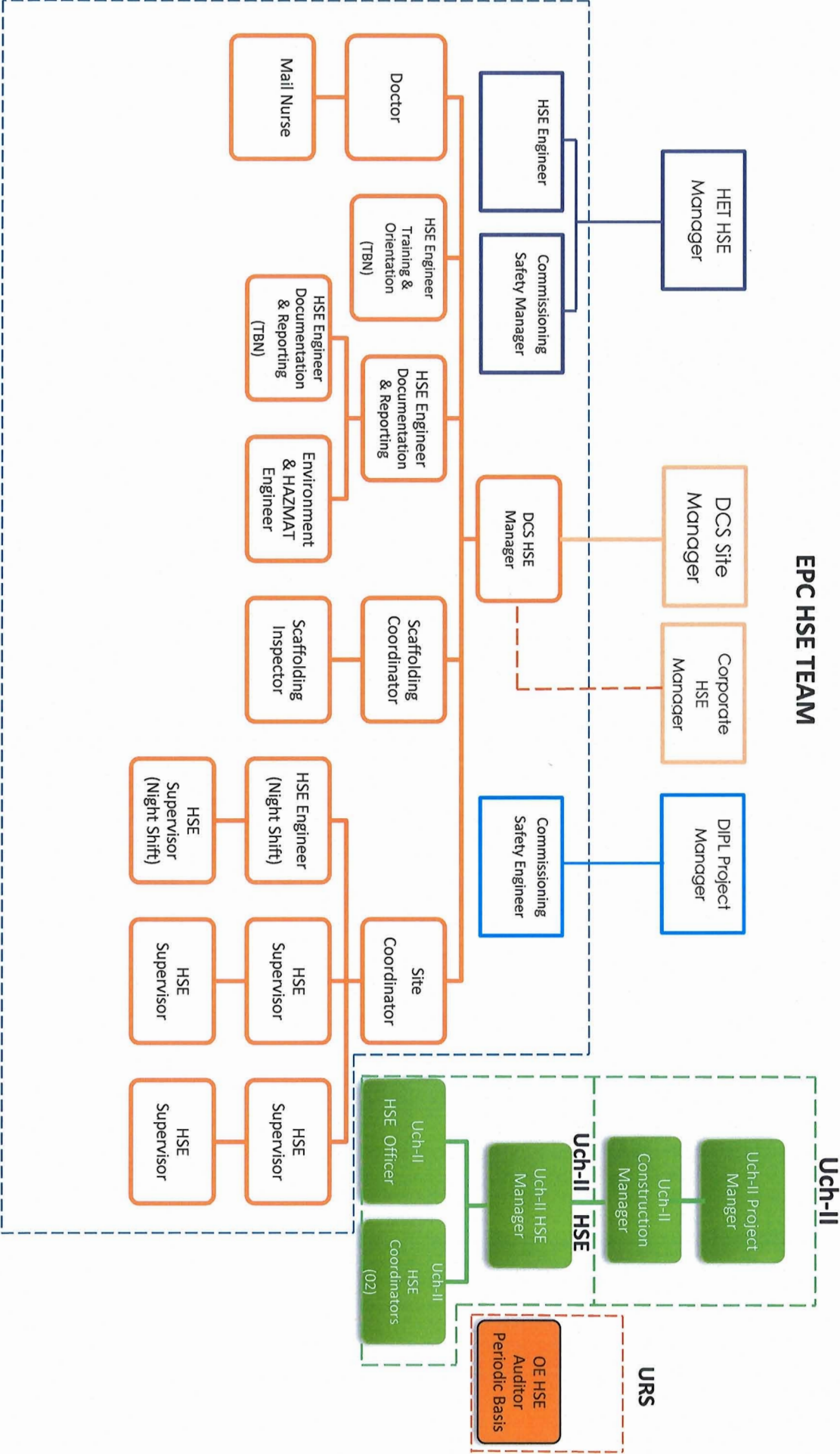
10	A temporary crossing platform at GT-1 area found without inspection scafftag. <ul style="list-style-type: none"> <li>Unsafe Condition</li> </ul>	Scaffold inspector inspected the platform and tagged the crossing.
11	An open / un barricaded pit at GT-2 area observed posing a fall hazard. <ul style="list-style-type: none"> <li>Fall Hazard</li> </ul>	Hard barrier installed around the pit.
12	Poor housekeeping observed along a cable trench at HRSG-II area. <ul style="list-style-type: none"> <li>Housekeeping Issue</li> </ul>	Housekeeping performed by civil team.
13	Non-compliance of work at height protocols observed at power island. Workers without latching safety harness observed working at top. <ul style="list-style-type: none"> <li>Non-compliance of work at height protocols</li> </ul>	The issue is addressed to site management. Meeting with execution team conducted by site HSE team to ensure full implementation and strict control of work at height protocols.
14	Hot work was being performed at fabrication workshop and HRSG-1 and HRSG-II areas without availability of fire extinguisher at job locations. <ul style="list-style-type: none"> <li>Unsafe Condition</li> </ul>	The issue is addressed to site management. Site HSE team ensured the availability of sufficient fire extinguishers for work site.
15	Lifting activity was being performed near shuttering workshop without barricading the area. <ul style="list-style-type: none"> <li>Unsafe Condition / Act</li> </ul>	Lifting supervisor is advised to barricade the area to restrict the entry of unconcerned personnel.
16	Electrical cables of a welding plant placed near CCR found damaged. <ul style="list-style-type: none"> <li>Electrical Hazard</li> </ul>	Damaged cables have been replaced.
17	Workers found without wearing PPEs inside RO building. <ul style="list-style-type: none"> <li>Non-compliance of PPEs</li> </ul>	TBT carried out with workers.
18	Unbounded waste material (debris, waste electrical cables etc.) found at gas conditioning skid area. <ul style="list-style-type: none"> <li>Housekeeping Issue</li> </ul>	Housekeeping of the area performed.
19	An excavated trench (5 feet deep approx.) at gas conditioning skid area found without hard barrication around. <ul style="list-style-type: none"> <li>Fall Hazard</li> </ul>	Informed site HSE coordinator. Barricade installed around the trench.
20	Poor illumination observed around a hot job performed during night at power island area. <ul style="list-style-type: none"> <li>Unsafe Condition</li> </ul>	Informed to night safety supervisor. Sufficient lighting arrangements around the hot job ensured.



Uch-II (404 MW – ISO) CCGT Power Project

Appendix B

HSE Management Organization Structure



Uch-II	04
EPC Total Strength	21
EPC Position Vacant	2
TBN	To be nominated



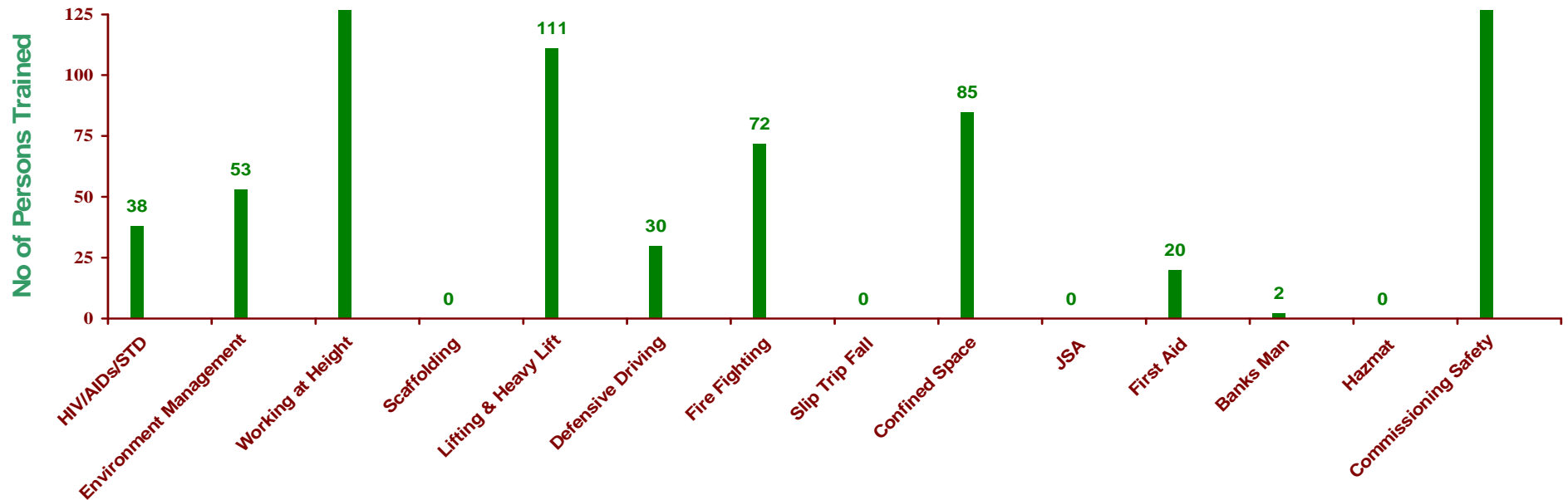
## Appendix C

### EPC (Descon) In house HSE Training Record

Q-3 2013

Training Topics	Jul-13	Aug-13	Sep-13	Total
HSE induction	150	133	122	405
Environmental Management	25	28		53
Working at Height	426	63	124	613
Scaffolding				
Lifting And Heavy Lift	17	94		111
Defensive Driving	1		29	30
Fire Fighting	27	45		72
Slip Trip Fall				
Confined Spaces	36	19	30	85
JSA				
First Aid			20	20
Banks Man		2		2
HAZMAT				
Commissioning Safety	94	9	34	137
HIV / AIDS / STD Awareness	8	9	21	38

Q-3 2013 1566



## Appendix D

### Corrective Action Plan Matrix (EMP Biannual Audit March2013)

No	EMP Action Item	Responsibility	Planned Finish Date	Status 05 May 2013	Remarks	Status 31 October 2013
<b>1</b>	<b>Environment Management System</b>					
1.1	<u>Environmental Policy Uch II Project Construction Site</u>					
	Environmental policy Uch-II is required to be signed by current site manager	EPC	25-04-2013	COMPL	Environmental policy is updated	Compliant
<b>2</b>	<b>Environmental KPIs</b>					
2.1	<u>HSE Inductions</u>					
	A mechanism to be established to ensure that all subcontractors of Hyundai & DIPL approaching at site for commissioning activities shall go thru safety induction program	EPC	05-05-2013	Action Awaited	A meeting carried out between EPC Contractor and Uch-II / O.E to finalize induction mechanism of commissioning team	Compliant
<b>3</b>	<b>Dust Control at Construction Site</b>					
3.1	<u>Water Sprinkling at Site</u>					
	More regular water sprinkling is required at dusty locations and tracks to minimize dust dispersion	EPC	30-04-2013	COMPL	Water sprinkling performed twice a day (morning and evening)	Compliant
<b>4</b>	<b>Equipment and Machinery / Vehicle Exhaust</b>					
4.1	<u>Exhaust Emission Testing</u>					
	Third party emission testing of vehicles and construction machinery / equipment is due	EPC	10-05-2013	Action Awaited	Third party emission testing is in progress	Compliant
<b>5</b>	<b>Solid Waste Management</b>					
5.1	<u>Kitchen waste &amp; Recyclable material</u>					
	EPC contractor to make arrangements for offsite disposal of waste through a certified waste contractor	EPC	10-05-2013	Action Awaited	Waste is being disposed offsite by EPC Contractor	Compliant
<b>6</b>	<b>Machinery</b>					
6.1	<u>Machinery Inspection</u>					
	In-house inspection of subcontractors' heavy machinery and cranes to be performed on monthly basis	EPC	10-05-2013	COMPL	Machinery inspection at E&P workshop is regularized on monthly basis	Compliant

<b>7</b>	<b>Fuel and Chemical Handling</b>					
7.1	<u>Storage Facility</u>					
	Paints and thinners to be stored at proper designated storage area with availability of fire detection system	EPC	10-05-2013	Action Awaited	Combustibles (paints / thinners) shifted to proper designated store. Fire detectors has been installed as per recommendations	Compliant
7.2	<u>Safety Signage</u>					
	Safety signs / posters needs to be enhanced at fuel / chemical storage area	EPC	05-05-2013	COMPL	Safety signage is increased at storage facility	Compliant
<b>8</b>	<b>Housekeeping</b>					
8.1	<u>Waste Collection</u>					
	Regular collection of hazardous and non-hazardous waste generated to be ensured at work areas	EPC	05-05-2013	COMPL	Regular housekeeping on daily basis is ensured at site	Compliant

## **Appendix E**

### **Uch-II Waste Generation Statistics**

Waste Type	Unit	Jul-13	Aug-13	Sep-13
Used oil	Ltr	460	420	1470
Metal	Tons	0.5	0.25	0.25
Paper/ Plastic/ Glass	Kg	2101	1223	1976
Empty Cement Bags	Tons	1.08	0.67	1.6
Food Waste	Tons	7.9	4.6	7.4
Waste Water	m <sup>3</sup>	3846	4400	3840
Oil Filters & Oily Rags	Kg	44	60	80
Used Batteries	Nos	0	6	2
Old Tyres	Nos	0	0	0

### **Uch-II Waste Water Analysis**

Parameters	NEQS Limit	Jul-13	Aug-13	Sep-13
pH	6--9	7	6.88	7.5
COD (ppm)	150	110	149	113
BOD (ppm)	80	48	51	67

### **Uch-II Water Consumption Record**

Water Type	Unit	Jul-13	Aug-13	Sep-13
Raw Water	m <sup>3</sup>	4043	4471	4925
Potable Water	m <sup>3</sup>	3452	3248	3228
Total Consumption	m <sup>3</sup>	7495	7719	8153

<b>Ambient Noise Levels (Decibels)</b>				
<b>Location / Area</b>	<b>Unit</b>	<b>Jul-13</b>	<b>Aug-13</b>	<b>Sep-13</b>
North East Corner	Decibels (dB)	40.6	45.5	45
North West Corner	dB	42	43	42
South East Corner	dB	45	47.8	47
South West Corner	dB	49	45	44

<b>Occupational Noise Levels (Decibels)</b>				
<b>Location / Equipment</b>	<b>Unit</b>	<b>Jul-13</b>	<b>Aug-13</b>	<b>Sep-13</b>
Camp Genset	Decibel (dB)	88	90	89
Excavator	dB	76	77	79
HRSG-II	dB	82	78	76
Transit Mixer	dB	77	77	78
Road Ruler	dB	78	--	75
Genset (Cooling Towers)	dB	91.5	90	88
Warehouse (Inside building)	dB	54	53.5	53
Admin Building (ground floor)	dB	58	59	58

### **Waste Disposal Contractor**

The Contractor responsible for offsite waste disposal is M/S Nazir Ahmed Solangi.

### **Third Party for Emission Testing**

PERAC RESEARCH AND DEVELOPMENT FOUNDATION (PRDF)  
Karachi-Pakistan

## Appendix-F

### Diesel to CO<sub>2</sub> conversion Methodology

Standard diesel fuels generally contain around 87% carbon by weight, the rest being hydrogen and other very minor components. The amount of carbon in a liter of diesel fuel varies, but this only affects the total CO<sub>2</sub> production slightly.

- 1 liter of diesel typically weighs 0.83kg (the density is 830 kg/m<sup>3</sup>)
- about 87% of this is carbon, so one liter of diesel contains  $0.83 \times 87\%$   
= 0.722 kg of Carbon.
- Each atom of carbon weighs 12 atomic units. When it combines with two atoms of Oxygen in the combustion process it becomes CO<sub>2</sub>, which weighs 44 atomic units.

The 0.722 kg of carbon in the original fuel then becomes  $0.722 \times 44/12$   
= 2.65 kg of CO<sub>2</sub>.

- So 01 liter of diesel fuel produces about 2.65 kg of CO<sub>2</sub>.

Actual diesel consumed at site in Q3, 2013 = 669721 liters

Total CO<sub>2</sub> produced =  $669721 \times 2.65 = 1774760$  Kg

Equivalent Tons of CO<sub>2</sub> produced = 1774.7 tons

## Reference used in the diesel to CO<sub>2</sub> conversion methodology



### Calculating CO<sub>2</sub> emissions

CO<sub>2</sub> production is related to the amount of fuel combusted and the fuel's carbon content. A lesser consideration is the fraction of the carbon oxidized, which is assumed to be 100 percent for emissions from transportation. The formula for CO<sub>2</sub> emissions from fossil fuels is Fuel Combusted X Carbon Content Coefficient X Fraction Oxidized X (44/12).

The [Intergovernmental Panel on Climate Change](#) (IPCC) guidelines for calculating emissions inventories require that an oxidation factor be applied to the carbon content to account for a small portion of the fuel that is not oxidized into CO<sub>2</sub>. For all oil and oil products, the oxidation factor used is 0.99 (99 percent of the carbon in the fuel is eventually oxidized, while 1 percent remains un-oxidized.)<sup>[1.]</sup>

Finally, to calculate the CO<sub>2</sub> emissions from a gallon of fuel, the carbon emissions are multiplied by the ratio of the molecular weight of CO<sub>2</sub> (m.w. 44) to the molecular weight of carbon (m.w.12): 44/12.

CO<sub>2</sub> emissions from a gallon of gasoline = 2,421 grams x 0.99 x (44/12) = 8,788 grams = 8.8 kg/gallon = 19.4 pounds/gallon or litre equivalent

CO<sub>2</sub> emissions from a gallon of diesel = 2,778 grams x 0.99 x (44/12) = 10,084 grams = 10.1 kg/gallon = 22.2 pounds/gallon or litre equivalent <sup>1</sup>.

GHG emissions are typically reported in terms of CO<sub>2</sub> equivalent (CO<sub>2</sub> Eq.) to provide a common unit of measure, and because CO<sub>2</sub> is the most prevalent of all GHGs. Other GHGs are converted into CO<sub>2</sub> equivalent on the basis of their global warming potential (GWP), for example 1 kilogram of another GHG may be estimated to have the same radiative forcing effect as a much larger number of kilograms of CO<sub>2</sub>. Guidelines are given in the IPCC 4<sup>th</sup> Assessment report

Transportation sources emit several other compounds that are believed to have an indirect effect on global warming but are not considered greenhouse gases. These substances include ozone, carbon monoxide, (CO) and aerosols. Scientists have not yet been able to quantify their impact with certainty, and these compounds are not included in the transportation GHG emissions estimates. For example, Ozone traps heat in the atmosphere and prevents a breakdown of CH<sub>4</sub>, but its lifetime in the atmosphere varies from weeks to months, making it difficult to estimate net radiative forcing effects. CO<sub>2</sub> on the other hand stays in the atmosphere for over 100 years before breaking down. CO indirectly affects global warming by reacting with atmospheric constituents that would otherwise destroy CH<sub>4</sub> and ozone. Aerosols are small airborne particles or liquid droplets that have both direct and indirect effects on global warming. The most prominent aerosols are sulfates and black carbon, or soot. Sulfate aerosols also have some cooling effect by reflecting light back into space. Traffic related black carbon is however considered to be a major pollutant and of growing concern for health reasons, in particular in Asia.

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<sup>1</sup> Note: These calculations and the supporting data have associated variation and uncertainty. Some agencies use other values in certain circumstances, and in some cases it may be appropriate to use a range of values

Prepared for the Climate Change section, Advocacy, UITP web site [www.uitp.org](http://www.uitp.org)



**Appendix-G****Number of Workers Engaged in UCH II Construction Activities**

Q1-2012						Q2-2012					Q3-2012				
	Local (Baluchistan Province)	Local (Rest of Pakistan)	Expatriate	Female Wokers	Total	Local (Baluchistan Province)	Local (Rest of Pakistan)	Expatriate	Female Wokers	Total	Local (Baluchista n Province)	Local (Rest of Pakistan)	Expatriate	Female Wokers	Total
<b>Skilled</b>	8	616	17	0	641	12	703	17	0	732	19	648	17	0	684
<b>Unskilled</b>	71	35	0	0	106	102	99	0	0	201	130	138	0	0	268
<b>Total</b>	79	651	17	0	<b>747</b>	114	802	17	0	<b>933</b>	149	786	17	0	<b>952</b>

Q4-2012						Q1-2013					Q2-2013				
	Local (Baluchistan Province)	Local (Rest of Pakistan)	Expatriate	Female Wokers	Total	Local (Baluchistan Province)	Local (Rest of Pakistan)	Expatriate	Female Wokers	Total	Local (Baluchista n Province)	Local (Rest of Pakistan)	Expatriate	Female Wokers	Total
<b>Skilled</b>	27	942	17	0	986	34	1358	28	0	1420	25	1446	28	0	1499
<b>Unskilled</b>	157	290	0	0	447	177	377	0	0	554	108	392	0	0	500
<b>Total</b>	184	1232	17	0	<b>1433</b>	211	1735	28	0	<b>1974</b>	133	1838	28	0	<b>1999</b>

Q3-2013					
	Local (Baluchistan Province)	Local (Rest of Pakistan)	Expatriate	Female Wokers	Total
<b>Skilled</b>	22	1500	30	0	1552
<b>Unskilled</b>	92	315	0	0	407
<b>Total</b>	114	1815	30	0	<b>1959</b>

## Compliance Status of EMP Control Measures Q3-2013

### Appendix-H

### Uch-II Project

<b>Environmental / Social Impacts</b>	<b>Control &amp; Mitigation Measures</b>	<b>Monitoring Frequency</b>	<b>Responsibility</b>	<b>Compliance Status</b>
<b>Construction Noise</b>	<ul style="list-style-type: none"> <li>- Regular maintenance of machinery to reduce construction noise</li> <li>- Use acoustic panels around high noise machines</li> <li>- Monthly monitoring of Uch-II ambient &amp; occupational noise</li> </ul>	Monthly	EPC Contractor	Complied
<b>Dust Emissions</b>	<ul style="list-style-type: none"> <li>- Daily monitoring of dust on roads and excavation areas</li> <li>- Water sprinkling at dusty areas / roads on daily basis</li> <li>- Use of dust masks by labor working in the dusty areas</li> </ul>	Daily	EPC Contractor	Complied
<b>Land Use</b>	<ul style="list-style-type: none"> <li>- Land update kept minimum required and restricted to existing compound area and within existing water supply pipeline</li> </ul>		EPC Contractor / Uch-II	Complied
<b>Water Sourcing</b>	<ul style="list-style-type: none"> <li>- Water consumption monitoring on monthly basis</li> <li>- Water conservation</li> </ul>	Monthly	EPC Contractor / Uch-II	Complied
<b>Vehicles &amp; Equipment Emissions Testing</b>	<ul style="list-style-type: none"> <li>- Periodic maintenance / tuning of all vehicles used during project</li> <li>- Third party emissions testing as per defined frequency</li> </ul>	Baseline when vehicle / equipment inducted in pool & subsequently after every year	EPC Contractor	Complied
<b>Soil and Land Contamination</b>	<ul style="list-style-type: none"> <li>- Fuel, lubricants and chemical storage in covered bunded areas</li> <li>- Regular inspection of work areas and storage areas to detect any leakages/ spillage</li> <li>- Safe movement of chemicals and fuels</li> <li>- Spill emergency response procedure</li> </ul>	Daily	EPC Contractor	Complied
<b>Drainage &amp; Storm Water Run-off</b>	<ul style="list-style-type: none"> <li>- Provision of proper drainage system at camp area and site area</li> <li>- Provision of storm water drainage system at entire site</li> <li>- Provision of following drainage system for power plant and all drains will discharge into evaporation pond after required treatment</li> </ul>	Ongoing (throughout the project phase)	EPC Contractor / Uch-II	Complied

	<ul style="list-style-type: none"> <li>Cooling Tower blow down, Demin plant regenerated waste water, Sanitary wastewater, Oily wastewater and Sludge from clarifiers</li> </ul>			
<b>Camp Effluent</b>	- Provision of proper septic tanks for construction camp effluents	Ongoing (throughout the project phase)	EPC Contractor	Complied
<b>Hazardous &amp; Non Hazardous Waste Management</b>	<ul style="list-style-type: none"> <li>Segregation of hazardous &amp; non hazardous waste</li> <li>Waste storage at designated areas</li> <li>Waste quantification on monthly basis</li> <li>Non-hazardous waste disposal to proper landfill</li> <li>Hazardous waste disposal through approved waste contractor</li> </ul>	Monthly	EPC Contractor	Complied
<b>Disturbance to Wild Life</b>	<ul style="list-style-type: none"> <li>Preying and hunting is prohibited at Uch-II site for all kind of animals and birds</li> <li>Any incident reported shall be investigated &amp; controlled.</li> </ul>	Ongoing (throughout the project phase)	EPC Contractor / Uch-II	Complied
<b>Community &amp; Power Plant Workers Safety</b>	<ul style="list-style-type: none"> <li>Following traffic and heavy load movement plan</li> <li>Monitoring safety hazards arising from traffic nuisance</li> <li>Taking corrective actions to prevent reoccurrence.</li> </ul>	Ongoing (throughout the project phase)	EPC Contractor / Uch-II	Complied
<b>Traffic Disturbance</b>	<ul style="list-style-type: none"> <li>Use of national highway for transportation</li> <li>Traffic rush hours avoided for transportation of heavy loads</li> <li>Follow speed limit rules</li> </ul>	Ongoing (throughout the project phase)	EPC Contractor	Complied
<b>Local Employment Conflicts</b>	- Providing employment to labors, & semi-skilled local population	Ongoing (throughout the project phase)	EPC Contractor	Complied
<b>Archaeological &amp; Cultural Resources</b>	<ul style="list-style-type: none"> <li>Monitoring excavation activities carefully</li> <li>Upon discovering any remains of archeological significance immediately informing Uch-II and preserving them</li> </ul>	Ongoing (throughout the project phase)	EPC Contractor / Uch-II	Complied
<b>Project/Community Interface</b>	<ul style="list-style-type: none"> <li>Non local project staff house in construction camp within boundary of power plant</li> <li>Grievance handling procedure developed to handle community social &amp; environmental complaints</li> </ul>	Ongoing (throughout the project phase)	EPC Contractor / Uch-II	Complied

**Appendix-I**

Un-skilled Workers Training Record		
	No of workers Trained	Nature of Trainings Provided
Q1-2013	149	Work at Height, Confined Spaces, Manual Handling Techniques, Hand Injuries/Pinch Points, Slip Trip Fall Hazards, Chemical & Fuel Handling, Hot Job Safety, Fire Fighting
Q2-2013	272	Burns First Aid, Health & Hygiene, Work at Height / Use of Scaffold, Confined Spaces, Grinder Safety, Defensive Driving, Slip Trip Fall Hazards, Manual Handling Techniques
Q3-2013	107	Commissioning Safety, HAZMAT, Spill Response, Work at Height / Use of Scaffold, Confined Spaces, Fire Fighting