OLKARIA V GEOTHERMAL PROJECT
Environment and Social Monitoring Form

Appendix 6

The latest results of the below monitoring items shall be submitted to JICA as part of attachment to Progress Report on once at Pre-construction phase and on quarterly basis at Construction Phase, and on annually base at Operation Phase. The items, standards for contract, measurement points, and frequency for each monitoring parameter are established based on the ESIA Report. Should there be any changes to the Original plan, such change shall be reviewed and evaluated by the environmental consultant.

(1) General

1)Phase of the Project

- Please mark the current phase.

□Pre-Construction Phase □Construction Phase ■Operation Phase

Commercial operation of Olkaria V Geothermal Power Plant started in November 2019. Defects Liability Period (DLP) ended in November 2020.

2) Obtainment of Environmental Permits

Name of permits	Expected issuance date	Actual issuance date	Concerned authority	Remarks (Conditions, etc.)
Water abstraction permits for Olkaria	Permit for domestic water abstraction issued on 26th July, 2017 (Permit Ref. no. WRMA/20/NSA/2GD/23/S)	Permit for abstraction of 795.4m³/day of water for domestic use was issued on 26th July2017, and is valid till 26th July 2022.	Water Resources Authority (WRA)	-The permits for domestic and industrial/commercial water abstraction are valid up to 2022.
	Permit for commercial &industrial water abstraction for Olkaria issued on 24th May 2017. (Permit Ref. no. WRMA/20/NSA/2GD/22/S)	Permit for abstraction of 8,000 m³/day of water for commercial & industrial use was issued on 24th May 2017, and is valid till 24th May 2022.		
EIA license	-The validity of EIA license applies during the	-Original license dated 12th September 2014	National Environment	-KenGen is adhering to EIA license conditions during the operation phase of the project.

Name of permits	Expected issuance date	Actual issuance date	Concerned authority	Remarks (Conditions, etc.)
	construction phase, and KenGen complied.	-1st variation of EIA license validity period dated 14th Nov 2016 -2nd variation of EIA license validity period dated 14th March 2019	Management Authority(NEMA)	-Initial environmental audit conducted for the facility and the respective report submitted to NEMA on 11th June 2021
Workplace Registration Certificate for Olkaria V Power Station as a	Workplace Registration certificate exists	Workplace Registration certificate issued on 19th May 2021 and valid up to 5th March 2022	Directorate of Occupational Safety and Health Service (DOSHS)	Certificates valid for 12 months from date of issuance
License for transportation of domestic (general) waste	Licenses for domestic waste transportation exists	License valid from 13th July 2020 to 13th July 2021	National Environment Management Authority (NEMA)	-The Cleaning Service Provider (Top Image Services Ltd) has contracted Nafo Chain Environmental & Construction Ltd for transportation of domestic waste. -

3) Response/Actions to Comments and Guidance from Government Authorities and the Public

Monitoring Item	Monitoring Results during Report Period	Duration of Report Period	Frequency
Number and contents of formal comments made by the public	There were no formal comments during this monitoring period	1 Day	Upon receipt of comments/complaints
Number and contents of responses from Government agencies			

(2) Monitoring Results

1) Air Quality

(A) Hydrogen Sulphide

Location	Item	Unit	Measured	Measured	Country's	Standards for	Referred	Frequency	Method	Note (Reason

			Value (Mean)	Value (Max.)	Standard	Contract	International Standard			of excess of the standard)
Residential Area	H_2S	ppm	0.001	0.002	0.1		0.1*(/24h)	Daily	Using gas detectors	Limit not exceeded.
Workers Area (Control room)	H_2S	ppm	0.001	0.003	10		10**(/24h)	Daily	Using gas detectors	Limit not exceeded

*) WHO Hydrogen Sulphide Guideline for ambient air quality

**) WHO Hydrogen SulphideGuideline for worker

(B) Sulfur Dioxide

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Frequency	Method	Remarks
Residential Area	SO_2	ppm	0	0	Quarterly	Using Testo 350 Emission Analyzer detectors	Within national standards
Workers Area	SO_2	ppm	0	0	Quarterly	Using Testo 350 Emission Analyzer detectors	Within national standards

(C) Carbon Monoxide

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Frequency	Method	Remarks
Residential Area	CO	ppm	0	0	Quarterly	Using Testo 350 Emission Analyzer detectors	Within national standards
Workers Area	CO	ppm	0	0	Quarterly	Using Testo 350 Emission Analyzer detectors	Within national standards

(D) Carbon Dioxide

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Frequency	Method	Remarks
Residential Area	CO_2	ppm	0	0	Quarterly	Using Testo 350 Emission Analyzer detectors	Within national standards

Workers Area	CO_2	ppm	0	0	Quarterly	Using Testo 350 Emission Analyzer detectors	Within national standards

(E) Methane

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Frequency	Method	Remarks
Residential Area	CH_4	ppm	N/A	N/A	Quarterly	Using gas detectors	Not measured
Workers Area	CH_4	ppm	N/A	N/A	Quarterly	Using gas detectors	Not measured

(F) Total Suspended Particles

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Frequency	Method	Remarks
Residential Area	TSP	µg/m³	16	25	Weekly	Using particulate matter in air analyzer equipment	According to Environmental Management and Coordination (Air Quality) Regulations of 2014, the ambient air quality tolerance limit for Total Suspended Particles over a 24-hour time weighted average at residential areas is 200 µg/m³.The measured levels do not exceed this limit.
Workers Area	TSP	µg/m³	366	420	Weekly	Using particulate matter in air analyzer equipment	According to Environmental Management and Coordination (Air Quality) Regulations of 2014, the ambient air quality tolerance limit for Total Suspended Particles over a 24-hour time weighted average at industrial areas is 500 µg/m³.The measured levels do not exceed this limit.

Complains from Residents

- Are there any complains from residents regarding air quality in this monitoring period? □Yes, □No

If yes, please describe the contents of complains and its countermeasures to fill in below the table.

Contents of Complains from Residents	Countermeasures
None	None

2) Water Quality

Measurement Point: Important water body

- Are there any effluents to water body in this monitoring period? □Yes, □No

If yes, please attach "KenGen Analysis Data Form for Effluent Quality Analysis" and fill in the items not to comply with NEMA Guideline (Environmental Management and Coordination (Water Quality) Regulations of 2006).

(A) Effluent Water Quality (Outlet)

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standard	Standards for Contract	Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
	TSS	mg/L			30*		-	Monthly	Sampling	
	COD	mg/L			50*		-	Monthly	Sampling	
	BOD	mg/L			30*		-	Monthly	Sampling	
	DO	mg/L			None		-	Monthly	Sampling	
	pH	-			6.5-8.5*		-	Monthly	Sampling	
	oil	mg/L			Nil*		-	Monthly	Sampling	
	phenol	mg/L			0.001*		-	Monthly	Sampling	

*) Environmental Management and Co-ordination (Water Quality) Regulations, 2006

Note: There was no effluent discharge from the project site within the Oct-Nov-Dec period

(B) Local Drinking Water Supply Source (Ambient)

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standard	Standards for Contract	Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
Olkaria V Kitchen	TSS	mg/L	2		30*		-	Monthly	Sampling	
	COD	mg/L	32		None		-	Monthly	Sampling	
	BOD	mg/L	5.2		None		-	Monthly	Sampling	
	DO	mg/L	6.8		None		-	Monthly	Sampling	
	pH	-	7.4		6.5-8.5*		-	Monthly	Sampling	
	oil	mg/L	<0.03 (Below		None		-	Monthly	Sampling	

			lowest limit of detection)							

*) Environmental Management and Co-ordination (Water Quality) Regulations, 2006

***Olkaria V staff are provided with bottled drinking water.**

(C) Important Water Bodies (Ambient)

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standard	Standards for Contract	Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
Lake Naivasha at Oserian Jetty	TSS	mg/L	9		30*		-	Monthly	Sampling	
	COD	mg/L	32		None	"	-	Monthly	Sampling	
	BOD	mg/L	5.5		None	"	-	Monthly	Sampling	
	DO	**mg/L**	7.3		None			Monthly	Sampling	
	pH	-	7.1		6.5-8.5*			Monthly	Sampling	
	Oil	mg/L	<0.03 (Below lowest limit of detection)		None			Monthly	Sampling	

*) Environmental Management and Co-ordination (Water Quality) Regulations, 2006

3)Water Use

Usage	Unit	Amount Permitted by WRA	Pumped Amount	Reused Amount	Total Water Usage	Measured Frequency	Measured Method	Note (Reason of excess of the standard)
Industrial	m^3	8,000m^3/day (720,000m^3 for 3 months)	135.1 m^3	N/A	Total water consumed at Olkaria V power station for the period under review is **135.1 m^3** (Apr -52m^3, May-60.8m^3, & June 22.3m^3,)	Monthly	Installed flow meters	Water used during the period under review was within the limits permitted by Water Resources Authority (WRA)
Domestic	m^3	795.4m^3/day			-			KenGen provides bottled drinking water

								to staff at the Olkaria V Station.
Other	m^3							

Item	Monitoring Results during Report Period	Note (issues to be arisen and its measures, if any)
Hydrology (Lake Levels)	The Lake Naivasha water levels readings for the months of April, May & June 2021 were 1890.961, 1891.118 and 1891.055 meters above sea level (masl) respectively	Water Resources Authority (WRA) restricts water abstraction if lake Naivasha levels fall below 1885.3 masl. The recorded values were within the allowable levels that allows for maximum abstraction as per the WRA permit.

4)Noise

Noise Level

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standard	Standards for Contract	Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
Residential Area	Leq (day)	dB(A)	41.9	43.9	50 (6am-6pm)*		55 (6am-10pm)***	Daily	Spot measurement using noise meter	Average noise levels do not exceed the limit.
Residential Area	Leq (night)	dB(A)	N/A	N/A	35 (6am-6pm)*		45 (10pm-6pm)***	-	-	We do not have night activities
Workers Area (Control Room)	Leq (day)	dB(A)	72.9	58.8	85 (8hrs)**		-	Daily	Spot measurement using noise meter	Noise levels do not exceed the occupational threshold. Maximum noise level was due to power plant testing and operation.

*) Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations of 2009 for Residential Area (Outdoor)

**) Occupational Safety and Health Act (OSHA) 2007 for Worker (8 hrs)

***WHO Noise Guideline for Residential Area (Outdoor)

Complaints from Residents

- Are there any complaints from residents regarding noise in this monitoring period? □Yes, □No

If yes, please describe the contents of complains and its countermeasures to fill in below the table.

Contents of Complaints from Residents	Countermeasures
There were no complaints regarding noise during this monitoring period	N/A

5)Solid Waste

Measurement Point: Disposal Sites for Sludge (including drilling mud)

- Are there any wastes of sludge in this monitoring period? □Yes, □No

If yes, please report the amount of sludge and fill in the results of solid waste management Activities.

Item	Generated from	Unit	Value	Solid Waste Management Activities
	Office operations	kgs	-	
General office waste	Power plant operation team	kgs	2,000	General office waste collected by Cleaning Service Provider for appropriate disposal at Naivasha sub-county disposal site
Oily rags	Power	kgs	400kg	Contained on site and disposed quarterly by a NEMA licensed waste handler

6)Soil erosion

Item	Monitoring Results during Report Period	Note (issues to be arisen and its measures, if any)
Soil erosion	• Rehabilitation along the cross-country steam line was completed • Slope protection with geo-cell installation, soil filling, grassing & watering	• Manage soil erosion at early stages to reduce on the effects and cost

	• Construction of power plant storm water drainage • The current rains have caused soil erosion in some areas	• Reduce the slope by adequately landscaping to reduce soil erosion • Make use of the naturally available drainage channels to minimize on increased volumes and velocity

7)Public Safety

Item	Unit	Value	Notes
Accident/Incident	No.	0	No industrial accident/incident has been reported within the period under review
Use of work permits	No.	-	-Work permits issued for mechanical and electrical works
Use of PPEs	No.	All workers	-Workers are donned with necessary PPE'S
Safety awareness	-	-	-Emergency drill conducted on 8th June 2021 -Awareness on COVID-19 conducted -Appropriate safety and warning signages in place - Job safety analysis awareness conducted for the team

8)Protected Areas and Ecosystems

Item	Monitoring Results during Report Period	Note (issues to be arisen and its measures, if any)
Flora (both in and around the HG National Park)	• Rehabilitation along the steam pipe network was done. • Proliferation of invasive plant species (such as *Nicotiana glauca*). Plans were underway for their removal.	• Put in place regular program for removal of invasive plant species around the power plant to minimize on its spread
Fauna (both in and around the HG National Park)	Park rules and regulations are being observed	The practice should continue as the project progresses
Hell's Gate National Park	The draft Hell's Gate-Mt. Longonot Ecosystem Management Plan 2019 -2029 under review	The review covers geothermal resource development and conservation

Landscape	Major landscaping and rehabilitation of the disturbed sites has been done	

9)Social considerations and others (excluding resettlement and livelihood restoration)

Item	Monitoring Results during Report Period	Note (issues to be arisen and its measures, if any)
Working Condition	Work was executed as per required labour standards	
Employment and economic opportunities	The Olkaria V Geothermal Power Plant is being managed by KenGen staff (a team of 32). There was no casual employment during the period under review.	
Education Scholarship	-Through SCC, Lot II (H-young) has offered two (2) university and one secondary education scholarship to local community as a way of empowering them. This was with effect from July 2018. -KenGen has sponsored 11 students from Olkaria RAPLand for Secondary education	
Infectious disease	None	
Misdistribution with unfair distribution of benefits and damages	For the period under review, there was fairness in the distribution of benefits through the SCC for Olkaria I Unit 6 under construction.	-

(End)