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Sound Pollution and Radiation Impact Survey of OML II Green Energy 'Obolo' Nigeria

F. U. Nte[1] G. F. Aman[2]
Department of Physics, Faculty of Science
University of Port Harcourt
Port Harcourt, Rivers State
Nigeria

***Abstract*— Sound pollution has been a major challenge in both the developed and the developing nations and demand serious attention to check the health hazards, just as is the case of radiation studies. The effort is a drift from the urban noise to the rural oil and gas producing communities of Nigeria, taking Oil Mining Lease II as a case study. The communities cover Ebukuna, Ama-Ubulom, Amajob, Ama-Ngerenkpon, Agbalama, Otako, Okoloile, Ama-Friday, Otu-Ogon and Ngo town, in the other of 1 to 10 respectively. The communities have a noise range of 44.49dBA to 63.60dBA, with Ebukuna ranking highest and Otako lowest. This is indicative that the Oil and Gas industrial activities do not have adverse noise effect from delivery pipes. The participatory investigation shows severity from oil spills, which has left the creeks barren and caused migration of the citizenry across the shores of Nigeria and West Africa for green fishing. A complementary research results of the radionuclide contents of 40k (Bq/l), ^{235}Ra(Bq/L)m show the values twice above the recommended standard by WHO in table 2, which is indicative of the Oil spill impact in the region and transport from Ogoni spill down to Andoni (Obolo) as the ultimate sink. The UNSCEAR of the bottom sediment is even much higher**

Keywords*— *Radiation, Sound Pollution

I. INTRODUCTION

Andoni (Obolo) is one of the 774 local government areas of Nigeria and among the 23 local government areas of Rivers State. It is located on 7^0 18^1E and 7^0 33^1E of Greenwich meridian but transverse laterally by latitude 4^0 31^1N. it is bounded by the Ogoni's in the North, Bonny to the West, Imo River/Opobo /Ikot Abasi to the East and the Atlantic Ocean to the South. It has seven multinational firms on its land and offshore, namely;

1. AMNI, International Petroleum Development Company (Ngo field)
2. Chevron Tubu field Development OML 52
3. Elf Petroleum Nigeria Limited OML (100)
4. NNPC Joint Venture, Offshore Operations OML 99, OML 101, OML 102 with Production capacity of 500 million barrels of oil
5. Mobil Oil Fields Eastern Obolo and Ibeno Ethnic brothers.
6. Shell Petroleum Development Company of Nigeria Otakukpo field
7. The Green energy International Limited and Lek Oil Collaboration on OML II and OML 52.

A lot of competitive study has been done on sound pollution impact.
These include [1] – [23].
The study show both the impact of noise and radiological hazard index for most communities as above the WHO standards and need a good environmental health educators to enlighten the people and government

II. METHOD

The methods involves the use of a CEL 231 and CEL 254 Digilert 100 and radalert 200, geographical positioning system (GSP) and a participatory tool box for forensic investigation of Oil and Gas exploitation impact.
The result and analysis are as shown in table 1: Baseline flow station noise level of facilities while figures 1 - 4 tells us specific noise details at the surveyed point
At the close; table 2 gives us summary of the radiation index in water while fig 5 show us the contour of the spread, fig 6 at the summary is indicative of the average noise level for the 10 sampled communities, which is minimal.

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III. RESULTS

TABLE1. Sound pollution survey of flow station facilities

S/N	FACILITIES	OPERATION	NOISE LEVEL (Dba)	Range (m)
1	Wind level/ Helipad	Transport	60-80	500
2	Communication platform	Radio transmission	50-70	500
3	Oil pumps/engine/metering	Compression	80-100	1000
4	Perimeter drain and wall	Drainage	Negligible	Sink
5	Pipelines and manifold	Oil delivery	High pressure	Linear
6	Platform and gantry	'base/floor	Negligible	Static
7	Reservoir (fuel tank)/ gate vales	Storage	Negligible	Static
8	Rig stand/swids and operations	Base	65-135dBA impulsive	500
9	Roads and drill slot marine	Assess	Negligible	Static
10	Saver pit/flow channel	Drainage recycling	Negligible	Linear -
11	Swamp dozer, pipeline	Excavation and laying of pipe	80-90	500
12	Test separators/scrubbers	Processing	70-90	500
13	Seismic blast " exploration	Dynamites	100-140	1200
14	Simo pumps and bole hole	Pumping	60-80	400
15	Surge vessels	Vertical tank	50-70	200
16	Swamps and wild life	Ecological	Negligible	Random
17	Sewage/septic tanks	Discharge	Negligible	Static
18	Gas flare stark	Heat radiation and sound	N60-88	Zoom
19	Well head " Christmas tree"	Well	Negligible	Static
20	Work site/ generators	Camp	60-80	500

Average minimum 55dBA ± 2, average minimum 87dBA ± 5 SPDC facility

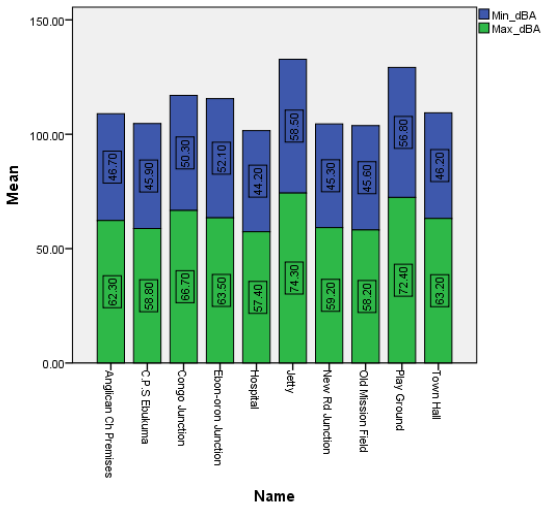

Figure1. Noise level of Ebukuma Community in Andoni L.G.A

From the above chart, we see that:

- The residents of Jetty village are exposed to the most noise (74.30dBA) in this community.
- Those living around Hospital are least affected (44.20dBA) by the noise in the community.

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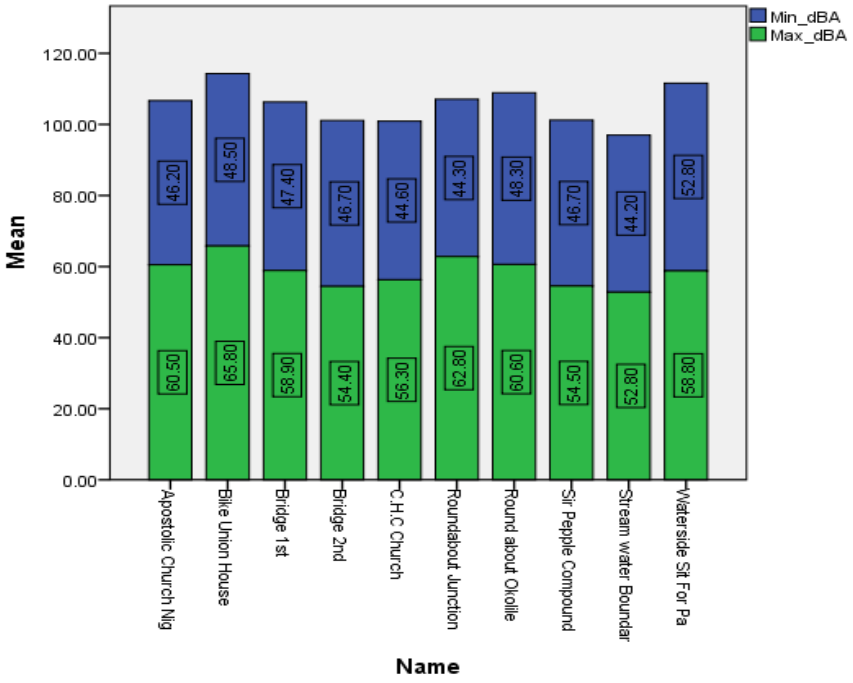

Figure 2. Noise Level of Ama-Ubulom Community in Andoni L.G.A

From the above chart, we see that:

-The residents of Bike Union House are exposed to the most noise (65.80 dBA) in this community.

-Those living around Stream Water Boundary are least affected (44.20 dBA) by the noise in the community.

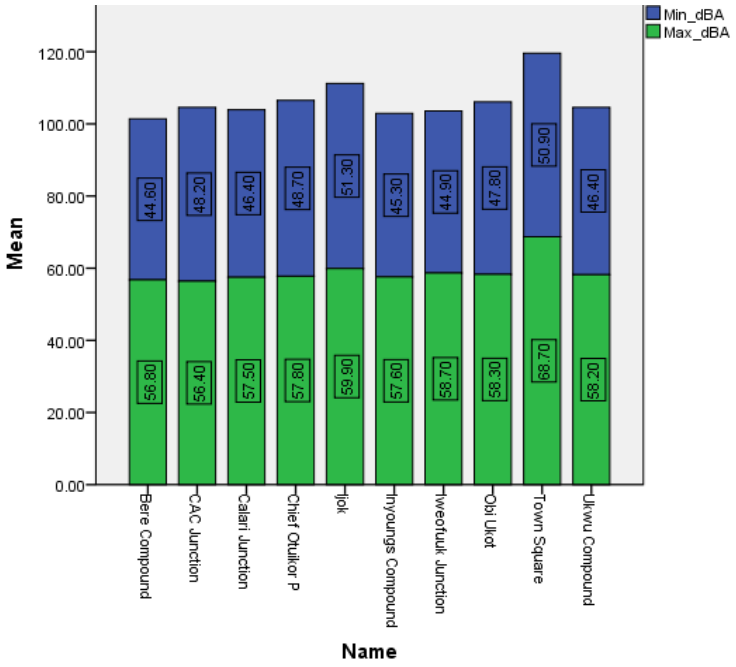

Figure3. Noise level of Agbalama Community in Andoni L.G.A

From the above chart, we see that:

-The villagers staying around Town Square are exposed to the most noise (68.70 dBA) in this community.

-Those living around Bere Compound are least affected (44.60 dBA) by the noise in the community.

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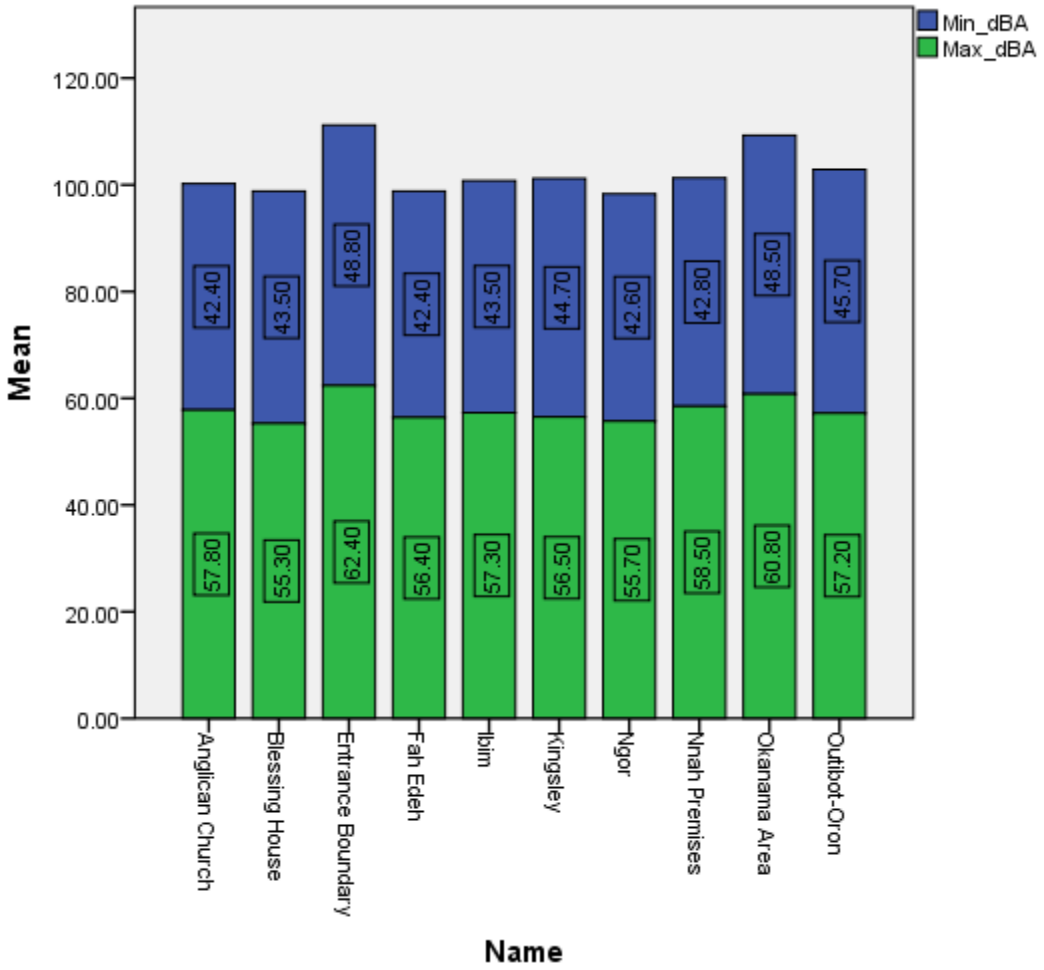

Figure4. Noise level of Otako Community in Andoni L.G.A

From the above chart, we see that:
-The villagers staying around the Entrance Boundary are exposed to the most noise (62.40 dBA) in this community.
-Those living around the Anglican Church and Fah Edeh are least affected (42.40 dBA) by the noise in the community.

Table2. Radiation hazard indices in sea water

S/N	Location	Raeq (Bq/l)	Hex ($mSvy^{-1}$)	Hin ($mSvy^{-1}$)	D ($nGyh^{-1}$)	AEDE ($mSvy^{-1}$)	Gonadal ($mSvy^{-1}$)	ELCR x 10^{-3}
1	NGS 1	153.33	0.414	0.497	67.71	0.08	456.27	0.29
2	NGS 2	201.35	0.544	0.617	88.70	0.11	598.58	0.38
3	NGS 3	103.99	0.281	0.337	46.68	0.06	317.59	0.20
4	NGS 4	166.85	0.451	0.492	73.61	0.09	498.15	0.32
5	NGS 5	166.81	0.450	0.498	73.52	0.09	496.89	0.32
6	ECS 6	117.20	0.317	0.394	52.02	0.06	350.93	0.22
7	AFS 7	150.14	0.406	0.494	66.40	0.08	447.45	0.29
8	AFS 8	149.35	0.403	0.468	65.71	0.08	442.62	0.28
9	OTS 9	118.96	0.321	0.364	52.66	0.07	356.40	0.23
10	AGS 10	99.12	0.268	0.352	44.06	0.05	296.55	0.19
MEAN VALUE		**142.71**	**0.385**	**0.451**	**63.11**	**0.08**	**426.14**	**0.27**
UNSCEAR 2000		**370**	**1**	**1**	**57**	**1**	**300**	**0.29**

From table 2 which shows the average Radiation Hazard Indices in Sea Water it is established that the index is above world health organization by twice the value and needs more caution as to the source and the impact on the fishing community which is a major discovery.

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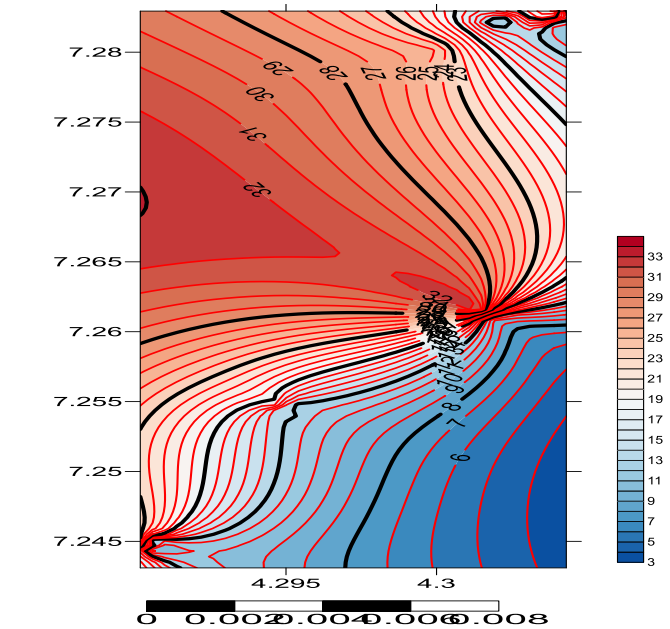

Figure5. Contour mapping of Ama-Friday, Otu-Ogoon, Ngo and Ebukuma Communities

The figure 5 shows the distribution of the Radiation Hazard Indices in Sea Water among the riverine community of the surveyed field.

IV. SUMMARY AND RECOMMENDATION

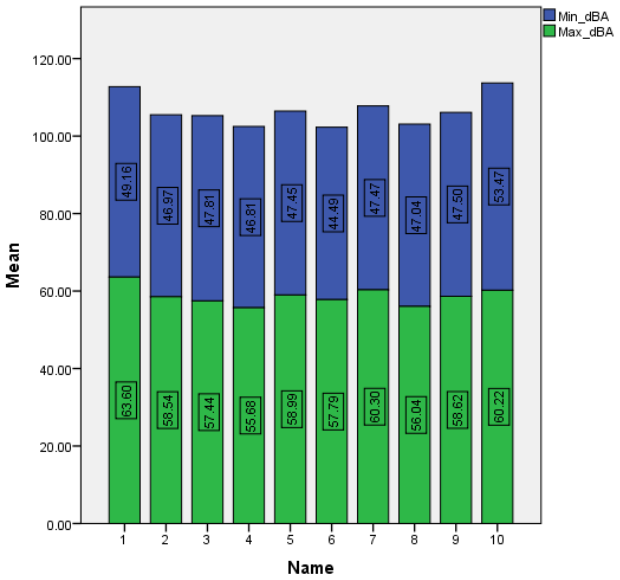

Figure6. Average noise level for all Communities showing minimal impact

Sound pollution and radiation impact survey of OML II was carried out. The findings shown in figure 1-4 is indicative that industrial noise impact from network of oil and gas pipeline is negligible but could escalate for flow stations on full production process. Reference table 1.

The radio nucleic activity concentration in the water of the study area is very high, reference Table 2. This is traceable to the heavy drill work in the area, oil spillages and drift oil and gas pollutant from the 'Ogoni' leakages and remediation work in Ogoni which is North of Andoni, the study area. The recommendation is for an integrated environmental evaluation, remediation and rehabilitation of the people on aqua cultural alternatives to boost fish production.

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