NIGERIAN NUCLEAR REGULATORY AUTHORITY
CHECKLIST FOR COMMISSIONING AND REGULAR INSPECTION OF LINEAR ACCELERATOR SCANNER (MOBILE)

Guidance Notes for Inspector(s):
Prepare a visit agenda to review the operating programme with details contained in the application for authorization, the authorization certificate, prior programme review/inspection reports and their implementation, relevant correspondence and other relevant documentation such as dosimetry reports.
- Check the following for compliance with the authorization and with the NNRA requirements.
- Monitoring equipment and accessories required should be available for use as and when required.
- Give entry briefing to the most senior management personnel

I IDENTIFYING INFORMATION

I-1 Name of the Institution: ……..

I-2 Address of Facility: ……..
……..
……..

I-3 Telephone/facsimile/email: Tel. #: …… Fax: ……..
Email: ……..

I-4 Authorization Number: ……..

I-5 Name and Qualification of the Radiation Safety Officer
Name: ……..
Degree: ……...
Certification:…….
Experience: …….
……..
……..
……..

I-6 Name and Qualification of any Qualified Experts retained
Name: ……..
Degree: ……...
Certification:…….

Name: …….. Experience: …….
Degree: …… ……..
Certification: …… ……..
Experience: ……. Name: ……..
……. Degree: ……..……..
…… Certification: ……..……..
Experience: ……..
……..
……..

I-7 The name and title of the Responsible Representative of the Legal Person:
……..
……..

II VERIFICATION OF SAFETY

II-1 Accelerators

Compare sources and devices with the application descriptions and design specifications.

Manufacturer of Equipments and X-ray tubes	Model Number	Serial Number	Voltage	Current
Compare the x-ray generator with application descriptions and design specifications. Note any differences and determine the standards to which devices were built:				

II-2 Facility Design

a) Was a safety assessment by a qualified expert performed prior to any modifications?		Yes	No
b) Is protection of the X-ray generators from adverse environmental conditions (heat, moisture, etc.)	Provided? Working?	Yes Yes	No No
c) Is fire detection and protection in the radiation areas:	Provided? Working?	Yes Yes	No No
d) Is the thickness and type of shielding appropriate for the types and intensity of radiation produced		Yes	No
e) Fixed area radiation monitor(s):	Provided? Working?	Yes Yes	No No
f) Mechanical door interlocks:	Provided? Working?	Yes Yes	No No
g) Prevention of unauthorized personnel entering exposure area:	Provided? Working?	Yes Yes	No No
h) Means of communication among personnel:	Provided? Working?	Yes Yes	No No
Describe any facility differences or modifications from those approved by the NNRA and considered in the safety assessment (e.g. shielding design, building materials, installed fire protection and controls, etc.): ……..……. ……..……. ……			

II-3 Safety Control Systems

a) Beam Electrical Indicators/Interlocks			
i) Inspection zone	Provided? Working?	Yes Yes	No No
ii) Head lock	Provided? Working?	Yes Yes	No No
iii) Off shield for driver and operator	Provided? Working?	Yes Yes	No No
iv) Hand control	Provided? Working?	Yes Yes	No No
v) Scanning mode	Provided? Working?	Yes Yes	No No
vi) Inspection angle	Provided? Working?	Yes Yes	No No

vii) Emergency stop buttons to interrupt the scanner	Provided? Working?	Yes Yes	No No
viii) Object collision	Provided? Working?	Yes Yes	No No
b) Beam Control Console Displays			
i) Power switch	Provided? Working?	Yes Yes	No No
ii) Reset switch	Provided? Working?	Yes Yes	No No
iii) Beam "ON" switch	Provided? Working?	Yes Yes	No No
iv) Beam "OFF" switch	Provided? Working?	Yes Yes	No No
v) Emergency switch	Provided? Working?	Yes Yes	No No
vi) Timer switch with scanning and elapsed time displays	Provided? Working?	Yes Yes	No No
vii) Mode Selection switch	Provided? Working?	Yes Yes	No No

II-4 Warning Systems

a) Exposure signals and posted explanation (e.g. audible or visible Alarms, illuminated signs)	Provided? Legible In local language?	Yes Yes Yes	No No No
b) Warning notices	Provided? Local language?	Yes Yes	No No

II-5 Safety Operations Management

a) Is management knowledgeable of the certificate of authorization and its restrictions and requirements?		Yes	No
b) Does management provide adequate staffing levels?		Yes	No
c) Has management provided the Radiation Safety Officer authority to stop unsafe operations?		Yes	No
d) Does management provide adequate resources for personnel training (time and money)?		Yes	No
e) Does management provide adequate equipment?		Yes	No
f) Does management provide for periodic programme reviews and recommendations?	Scheduled? Performed?	Yes Yes	No No
i) Date of the last programme review: …….. ii) Status of recommendations: …… ……..……			

II-6 Safety Operations Management

a) Is management knowledgeable of the certificate of authorization and its restrictions and requirements?		Yes	No
b) Does management provide adequate staffing levels?		Yes	No
c) Has management provided the Radiation safety officer authority to stop unsafe operations?		Yes	No
d) Does management provide adequate resources for personnel training (time and money)?		Yes	No
e) Does management provide adequate equipment?		Yes	No
f) Does management provide for periodic programme reviews and recommendations?	Scheduled? Performed?	Yes Yes	No No

i) Date of the last programme review: ……...
ii) Status of recommendations: ……..
…….
…….
…….

III VERIFICATION OF WORKER PROTECTION

III-1 Classification of Areas

a) Are controlled areas demarcated?		Yes	No
b) Are approved signs at access points?	Provided?	Yes	No
	Legible?	Yes	No
	local language?	Yes	No
c) Is radiation source storage at a physically defined location (e.g., pit, hot cell, room)?		Yes	No
i) locked/secured location with key control?		Yes	No
ii) radiation warning notices?	Provided?	Yes	No
	Legible?	Yes	No
	local language?	Yes	No
iii) proper shielding (e.g., individual containers, enclosure)?		Yes	No
d) Are x-ray generators labelled as a source of radiation:	Provided?	Yes	No
	Legible?	Yes	No
	local language?	Yes	No
e) Are supervised areas demarcated?		Yes	No
f) Are approved signs at access points?	Provided?	Yes	No
	Legible?	Yes	No
	local language?	Yes	No

III-2 Local rules and Supervision

a) Are rules established in writing?		Yes	No
b) Do rules include investigation levels and authorized levels and the procedure to be followed when a level is exceeded?		Yes	No
c) Are workers instructed in the implementing procedures?		Yes	No
d) Is Scanning done in accordance with prescribed operating procedures and conditions?		Yes	No
e) Do workers have adequate supervision to ensure rules, procedures, protective measures and safety provisions are followed?		Yes	No
f) Specifically, are operating and working procedures for:			
i) setting up controlled areas; including barriers, surveillance and posting at temporary job sites.	Provided?	Yes	No
	Adequate?	Yes	No
	Followed?	Yes	No
ii) set-up of exposures (radiation source output beam direction, use of collimators, beam height):	Provided?	Yes	No
	Adequate?	Yes	No
	Followed?	Yes	No
iii) use of personal dosimetry and use of protective equipment such as alarming rate dosimeter:	Provided?	Yes	No
	Adequate?	Yes	No
	Followed?	Yes	No
iv) performing repairs and maintenance of safety systems:	Provided?	Yes	No
	Adequate?	Yes	No
	Followed?	Yes	No
v) making surveys	Provided?	Yes	No
	Adequate?	Yes	No
	Followed?	Yes	No
vi) responding to alarm:	Provided?	Yes	No
	Adequate?	Yes	No
	Followed?	Yes	No

IV Monitoring

a) Does the authorized organization provide personal dosimeter?	Yes	No
b) Are the dosimeters:		
i) Worn properly?	Yes	No
ii) Calibrated	Yes	No
iii) Exchanged at required frequency?	Yes	No
c) Are personnel exposures within limits?	Yes	No
d) Area and portable survey instruments		
i) Appropriate?	Yes	No
ii) Calibrated?	Yes	No
iii) Operational?	Yes	No
iv) Operational check performed before use?	Yes	No
e) Do the authorized organization's surveys indicate that the operator and drivers cabin shielding is adequate and the dose rates around the cabins meet authorized radiation levels?	Yes	No
f) Is the instrumentation:		
i) Appropriate?	Yes	No
ii) Calibrated?	Yes	No
iii) Operational?	Yes	No
Record independent measurements made during the inspection: ……..…….. ……..		
Type/Model No. of Survey Meter:		
Date last calibrated:		
Do the inspector's independent surveys agree with the survey results of the authorized organization?	Yes	No
Document any significant differences and any agreed upon plan to resolve the different results: …….. ……..		

V VERIFICATION OF PUBLIC PROTECTION

V-1 Control of Visitors

a) Are visitors accompanied in controlled area?	Yes	No
b) Is adequate information provided to visitors entering controlled areas?	Yes	No
c) Are there adequate control over entries into supervised areas and appropriate postings?	Yes	No

V-2 Sources of Exposure

a) Are protective measures optimized for restricting public exposure to external sources of radiation?	Yes	No

V-3 Disposal of Equipment

a) Have provisions been made to transfer radiation generating equipment to an appropriate registrant or licensee or to an authorized waste disposal facility at the end of use?	Yes	No
b) If equipments are no longer in use and being stored, does the authorized organization have a plan for timely transfer or disposal of the equipment?	Yes	No

V-4 Monitoring of Public Exposure

a) Are routine periodic measurements of exposure rates in public areas adjacent to controlled and supervised areas made by the staff or qualified expert?	Yes	No
b) Do surveys shows that the dose rates outside the controlled and supervised areas meet authorized radiation levels?	Yes	No
c) Record independent measurements made during the inspection. ……. …….	Yes	No

Type/Model No. of Survey Meter: ..…… ……..		
Date last calibrated:		
Are the inspector's independent measurements in agreement with the organization routine measurements?	Yes	No
Document any significant differences and any agreed upon plan to resolve the different results: …….		

VI EMERGENCY PREPAREDNESS

VI-1 Emergency Plan

a) Is there a written plan?	Yes	No
b) Is the plan periodically reviewed and updated?	Yes	No
c) Does the plan take into account lessons learned from operating experience and accidents at similar facilities?	Yes	No

VI-2 Training and Exercises

a) Have workers involved in implementing the plan received training?	Yes	No
b) Have provisions been made of the plan to be rehearsed at suitable intervals in conjunction with any designated emergency response authorities?	Yes	No
c) Date of the last rehearsal: ……..		

VII Verification of Records

i)	Is a copy of authorization certificate available for inspection?	Yes	No
ii)	Are personal dosimetry records being kept?	Yes	No
iii)	Dosimetry		
a)	current dose and analyzed?	Yes	No
b)	collect dose and analyzed?	Yes	No
iv)	Area surveys records being kept?	Yes	No
v)	Are instrument tests records kept?	Yes	No
vi)	Are inventory of radiation equipment and accountability records kept?	Yes	No
vii)	Are audits and reviews of radiation safety programmes records kept?	Yes	No
viii)	Are incident and accident investigation reports kept?	Yes	No
ix)	Are maintenance and repair work records kept?	Yes	No
x)	Are facility modifications records kept?	Yes	No
xi)	Are training provided	Yes	No
a)	initial	Yes	No
b)	fresher	Yes	No
xii)	Are evidence of health surveillance records kept?	Yes	No
xiii)	Are waste disposals programme and records kept?	Yes	No
xiv)	Are transportation of radioactive material records kept?	Yes	No
a)	transfer/receipt documents?	Yes	No
b)	details of shipments dispatched?	Yes	No
xv)	Log of off site operations	Yes	No
a)	location	Yes	No
b)	name of responsible radiographer	Yes	No
c)	date	Yes	No

VIII COMMENTS AND RECOMMENDATIONS

Name of Radiation Safety Officer:…… Signature:……...

Name of Inspector: ……..

Signature: …….. Date: …….