PRE-AUTHORIZATION (COMMISSIONING) AND REGULAR INSPECTION CHECKLIST FOR DIAGNOSTIC X-RAY INSTALLATIONS

i. VERIFYING GENERAL INFORMATION PROVIDED

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**
Expertise: Radiation Safety Officer
Name: ……..
Degree: ……...
Certification:…….
Experience: …….
……..
……..

Expertise: Physician-Diagnostic Radiology
Name: ……..
Degree: ……..……..
Certification: ……..……..
Experience: ……..
……..
……..

I-7 **The name and title of the Responsible representative** : ……..
…….

II VERIFICATION OF RADIATION SAFETY

II-1 Radiation Generating Equipment

Type of X-ray Equipment	Manufacturer	Model #	Number of X-ray Tubes	Max kV	Max mA mAs	Exposure time per Week	Weekly Work load

Identify any difference between current use of equipment and that approved by NNRA
……..
……..
……..
……..

II-2 Shielding Designing

……..
……..
……..
……..

Identify any modifications made from those approved by NNRA
(e.g. shielding design, construction materials, control cubicle etc.)

i) Is operated protection adequate?	Yes	No
ii) Are appropriate protective devices available and in use?	Yes	No
a) Protective barrier	Yes	No
b) Lead Apron(s)	Yes	No
c) Lead rubber gloves	Yes	No
d) Gonadal shields	Yes	No
e) Protective goggles	Yes	No

II-3 Safety Control and Equipment design

a) Radiology					
i)	Light beam diaphragm available		Yes	No
(ii)	Diaphragm opening symmetrically		Yes	No
(iii)	Grid movement satisfactory?		Yes	No
(iv)	Chest stand lead backing satisfactory		Yes	No
(v)	Diaphragm/cone available		Yes	No
(b)	Fluoroscopy			
(i)	Fluoroscopy screen brightness satisfactory?		Yes	No
(ii)	Table to screen alignment satisfactory?		Yes	No
(iii)	Beam confinement to screen at maximum field size and Table to screen at maximum		Yes	No
(iv)	Shutter movements satisfactory		Yes	No
(v)	Foot switch	Provided? Used?	Yes Yes	No No
(vi)	Diaphragm control knobs shielded		Yes	No
(vii)	Red light provided inside the room		Yes	No
(viii)	Room darkening adequate		Yes	No

(include others eg dental, paediatrics etc, - see diagnostic radiology code)

II-4 Warning Systems

a)	Exposure signals and explanation posted	Provided? Working?	Yes Yes	No No
b)	Warning notices available	Provided? Working? Legible? In local language?	Yes Yes Yes Yes	No No No No

II-5 Safety Operations Management

i)Is management knowledgeable about the terms and conditions of the certificate of authorization	Yes	No
ii) Has management provided adequate staff levels?	Yes	No
iii) Has management provided adequate powers to the Radiation Safety Officer to stop unsafe operations?	Yes	No
iv)Has management provided adequate monitoring equipment?	Yes	No
iv)Has management made provision for initial and continuing training for staff?	Yes	No
vi)Has management provided a mechanism for periodic program reviews, feedback from operating experience and recommendations?	Yes	No
a)Date of last program review ……		
b)Status of recommendations: …….. …….. …….. …….		

II-6 Safety Operations – Technical

i) Does the Radiation Safety Officer (RSO) have adequate knowledge and expertise?	Yes	No
ii) Is the RSO conversant with the terms and conditions of the authorization certificate ?	Yes	No
iii) Has the RSO sufficient time to give priority to attention radiation safety?	Yes	No
iv) Does the RSO conduct initial and continuing training of workers?	Yes	No
v) Does the RSO maintain adequate records to demonstrate worker and public protection?	Yes	No

II-7 Investigation and Quality Assurance

i)	Were there any incident or accident?		Yes	No
ii)	If so, were incident and or accident investigation reports prepared?		Yes	No
iii)	Were safety assessments reviewed or made based upon lessons learned from any accident or accidents at similar facilities		Yes	No
iv)	Is there a written quality assurance program		Yes	No
v)	Is maintenance and repair work in accordance with manufacturers recommendations?	Scheduled? Performed?	Yes Yes	No No
vi)	Are quality assurance procedures performed?		Yes	No
vii)	Are maintenance/repair procedures	Scheduled? Performed?	Yes Yes	No No

III VERIFICATION OF WORKER PROTECTION

III-1 Classification of work areas

i)	Are controlled areas demarcated ?		Yes	No
ii)	Are approved signs at access points?	Provided? Legible? In local language?	Yes Yes Yes	No No No
iii)	Are supervised area demarcated?		Yes	No
iv)	Are approved signs at access points?	Provided? Legible? In local language?	Yes Yes Yes	No No No

III-2 Local Rules and Supervision

i) Are rule established in writing ?	Yes	No
ii) Does the rules include investigation levels and procedures to follow when a level is exceeded?	Yes	No
iii) Are all workers associated with facility instructed in the implementation of procedures?	Yes	No
iv) Do workers have adequate supervision to ensure rules, procedures, protection measures and safety provisions are followed?	Yes	No

III-3 Monitoring

a)	i)	Are workers provided with personal dosimeters?		Yes	No
	ii)	Are the dosimeters worn properly?		Yes	No
	iii)	Are the dosimeters calibrated ?		Yes	No
	iv)	Are the dosimeters exchanged at the specified frequency?		Yes	No
	v)	Are Personnel exposes within the dose limits?		Yes	No
b)		Are survey meter(s) appropriate?	Calibrated? Operational Checked before use?	Yes	No
c)		Does the inspectors survey measurements agree with that done by the facility RSO?		Yes	No

If No, indicate any significant differences and investigate the causes for the discrepancies

……..……
……..

Instruments used:

Type/Model No:

Date of last calibration:

IV VERIFICATION OF PUBLIC PROTECTION

IV-1 Control of Visitors

i) Is adequate information provided to visitors entering controlled areas?	Yes	No
ii) Are there adequate controls over entries into controlled and supervised areas and appropriate posting?	Yes	No
iii) Are there adequate controls over entries into controlled and supervised areas and appropriate posting?	Yes	No

IV-2 Sources of exposure

i)	Are the shielding and other protective measures optimized for restricted public exposure to x-ray operation?	Yes	No
ii)	Are the floor plans and arrangement of equipment appropriate considering public and adjacent to the installation?	Yes	No

IV-3 Monitoring of Exposure

i)	Are routine measurements made of dose rate at places occupied by the members of the public by the RSO or qualified expert	Yes	No
ii)	Are the inspector independent measurements in agreement with those made by RSO or qualified expert?	Yes	No
iii)	Do the survey measurements indicate that adequate shielding is provided so that dose rates outside controlled and supervised areas meet authorized radiation levels?	Yes	No
	Indicate any differences and assign reasons for the discrepancies ……..…… …….	Yes	No
Type /Model No of survey meter used:			
Date of last calibration			

V EMERGENCY PREPAREDNESS

V-1 Emergency Plan

i)	Is there a written plan?	Yes	No
ii)	Is the plan periodically reviewed and updated?	Yes	No
iii)	Does the plan take account of lessons learned from Operating experience and accidents at similar facilities?	Yes	No
iv)	Have workers involved in implementing the plan received?	Yes	No
v)	Adequate training ?	Yes	No
vi)	Have provisions been made for the plan to be rehearsed at suitable intervals (e.g. fire accident, exposure does not terminate at a present time)?	Yes	No

VI MEDICAL EXPOSURE

VI-1 Responsibilities

i)	Are patients exposed unless prescribed by a qualified medical practitioner?	Yes	No
ii)	Are there adequately trained medical and paramedical staffs available to discharge assigned duties?	Yes	No
iii)	Are diagnostic imaging and QA requirements fulfilled with the advice of a qualified expert in radiodiagnostic physics?	Yes	No

VI-2 Justification

i)	Are diagnostic medical exposures justified by taking into account the benefits and risks of alternative techniques that do not involve medical exposure?	Yes	No
ii)	Are standards available and followed for radiological examination for screening of large populations or for occupational, legal, or health insurance purposes?	Yes	No

VI-3- Optimisation

i)	Does newly acquired equipment conform to National Standards, or any applicable International Standards such as IEC and ISO?	Yes	No
ii) Are acceptances testing performed by a qualified expert in radiodiagnostic physics before equipment is accepted for clinical use?		Yes	No

VI-4 Operational Considerations

i) Do medical practitioner ensure that appropriate equipment is used such that exposure to patients are kept to the minimum necessary to achieve the diagnostic objective, taking into account relevant information from previous examinations to avoid unnecessary additional exposure	Yes	No
ii) Do the medical practitioners, radiographers and other imaging staff select parameters such that their combination produces the minimum patient dose consistent with acceptable image quality and clinical purpose of the examination?	Yes	No
iii) Are radiological examination causing exposure of the abdomen or pelvis of women who are pregnant avoided unless there one strain clinical reasons for such examinations?	Yes	No
iv) Are examinations causing exposure of the abdomen or pelvis of women of reproductive capacity planned to deliver the minimum dose to any embryo or fetus?	Yes	No

VI-5 Calibration

i) Is the calibration of the x-ray machine used for medical exposure traceable to a secondary standards dosimetry laboratory?	Yes	No
ii) Was calibration done during commissioning, after maintenance that could affect dosimetry accuracy and at regular intervals?	Yes	No

VI-6 Clinical Dosimetry

i) Are representative values of adult patient entrance surface doses measured for the most common diagnostic procedures and documented?	Yes	No
ii) Did any equipment failure, accident, error, mishap or other unusual occurrence with potential for causing a patient exposure significantly different from that intended occur?	Yes	No
iii) If any incident/accident occur did the registrant/licensee estimate the dose received by the patient?	Yes	No
iv) Was the patient informed about the incident/accident as well as his/her doctor?	Yes	No

VII- Verification Of Records

i) Did the registrant/licensee display authorization certificate for inspection by inspectors		Yes	No
ii)	Are personal dosimetry records being kept	Yes	No
	(a) Current dose and analyzed?	Yes	No
	(b) Collect dose and analyzed?	Yes	No
iii)	Are area surveys records being kept?	Yes	No
iv)	Are records for maintenance and repair being kept?	Yes	No
v)	Are clinical dosimetry records being kept?	Yes	No
vi)	Are instruments tests and calibration records kept?	Yes	No
vii)	Are incident/accident records and reports being kept?	Yes	No
viii)	Are training program records being kept?	Yes	No
ix)	Is there evidence of health surveillance records?	Yes	No
x)	Is there documentation on audit and review of radiation safety program	Yes	No

VII-1 Quality Assurance

i)	Are quality assurance measurements and verification of physical parameters done at the commissioning and periodically thereafter?	Procedures available? Followed?	Yes Yes	No No
ii)	Are written records of relevant procedures and result kept?		Yes	No
iii) Are verification of calibration and operating conditions of dosimetry and monitoring equipment kept?			Yes	No
iv)	Are there procedures for verifying patient identification?		Yes	No
v)	Are regular and independent quality audit review done?		Yes	No

VII-2 Darkroom Procedures

i)	Is dark room light proof checked?	Yes	No
ii)	Is film storage condition satisfactory?	Yes	No
iii)	Cassette PACs box available?	Yes	No
iv)	Timer available?	Yes	No
v)	Are daily dark room QC performed? (i.e base + fog, speed Index & contrast Index)?	Yes	No
vi)	Temperature control in the dark room adequate?	Yes	No

VII-3 Film Processing

Type of film used? ……...	
ii)	Film developed/weak? ……...
iii)	Type of developer? ……
iv)	Developing Time? …….
v)	Frequency of change of processing solutions ……
vi)	Type of processor ……

VI-8 Investigation of accidental medical exposures

i)	Were investigations done where a diagnostic exposure was substantially greater than intended or resulting in dose repeatedly and substantially greater than guidance levels?	Yes	No

VII INSPECTION FINDINGS,

IV RECOMMENDATIONS

Name of Inspector:……..……

Signature :……Date…….