

CERTIFICATION BOARD FOR INSPECTION PERSONNEL

Guidelines for Certification Radiographic Testing

DOCUMENT No PRO-CER-16

Table of Contents

1.0	SCOPE AND GENERAL	4
1.1	Scope 4	
1.2	Application	4
1.3	Definitions.....	4
1.4	Discipline Recognition.....	5
1.4.1	RT1 Radiographic Testing Level 1.....	5
1.4.2	RT2 Radiographic Testing Level 2.....	5
1.4.3	Radiographic Testing Level 3 (RT3)	6
1.5	Sectors	6
2.0	TRAINING	7
2.1	Training Evidence.....	7
2.2	Formal Training.....	7
2.2.1	Radiographic Testing Level 1 (RT1)	7
2.2.2	Radiographic Testing Level 2 (RT2)	7
2.2.3	Radiographic Testing Level 3.....	8
2.2.3	Radiographic Testing – All Levels	8
3.0	DISCIPLINE RECOGNITION.....	8
3.1	Experience	8
3.1.1	Experience Prerequisite for Examination.....	8
3.1.2	Radiographic Testing Level 1 (RT1)	8
3.1.3	Radiographic Testing Level 2 (RT2)	9
3.1.4	Radiographic Testing Level 3 (RT3)	9
3.1.5	Possible reductions in experience.....	9
3.2	Changing Sectors.....	10
3.3	Radiation Safety Licence	10
4.0	EXAMINATION REQUIREMENTS.....	10
4.1	Initial Discipline Recognition.....	10
4.2	Recertification.....	11
4.3	Significant Interruption.....	11
4.4	Examination References	11
4.5	Radiographic Testing Level 1	11

RT1 (Level 1): General Paper (Written).....	11
RT1 (Level 1): Specific Paper (Written)	11
4.6 Radiographic Testing Level 2	12
RT2 (Level 2): General Paper (Written).....	12
RT2 (Level 2): Specific Paper (Written)	12
RT2 (Level 2): Practical examination	12
4.7 Practical Re-examination	13
5.0 EXAMINATION REQUIREMENTS LEVEL 3	13
RT3 (Level 3): Basic Paper (Written)	13
RT3 (Level 3): Main Paper (Written)	14
RT3 (Level 3): Practical examination	14
5.1 Recertification Level 3.....	14
5.2 Level 3 Credit System.....	14
APPENDIX A - Knowledge requirements (General)	16
APPENDIX B - SAMPLE EXAMINATION QUESTIONS.....	20
RT1 Radiographic Testing Level 1 General	20
RT1 Radiographic Testing Level 1 Specific Paper	20
RT2 Radiographic Testing Level 2 General Paper	21
RT2 Radiographic Testing Level 2 Specific Paper	21
APPENDIX C	22
RT1 and RT2 Practical examinations	22

Guidelines for Certification - Radiographic Testing

FOREWORD

This Guidelines for Certification - Radiographic Testing (GCRT), in conjunction with the Guidelines for Certification – General Requirements (PRO-CER-18), defines the requirements for the issue of Discipline Recognition to NDT personnel performing Radiographic Testing in New Zealand.

Certification and re-certification in accordance with PRO-CER-18 and this GCRT confirm the qualifications, training, and examined competence of Radiographic Testing personnel.

This GCRT must be read in conjunction with the Guidelines for Certification – General Requirements (PRO-CER-18).

This GCRT is prepared in accordance with ISO 9712, Qualification and Certification of NDT Personnel.

The qualifications described by this GCRT have been prepared for registration at level 6, on the NZQA framework.

1.0 SCOPE AND GENERAL

1.1 Scope

This Guidelines for Certification - Radiographic Testing (GCRT) defines the principles, training, experience and examination for the issue of a Discipline Recognition to Radiographic Testing personnel.

1.2 Application

Discipline Recognition granted under this GCRT applies to Radiographic Testing; During manufacturing of industrial equipment, and during the pre and in-service periods of industrial equipment.

For all product sectors as described in ISO 9712, Annex A, Clause A2.

1.3 Definitions

ISO 9712	Non-destructive testing - Qualification and certification of NDT personnel
AS 2177	Non-destructive testing - Radiographic testing of welded butt joints in metal
ASTM E1472	Standard Practice for Radiographic Examination
CBIP	Certification Board for Inspection Personnel
Certified	An individual is certified for the purpose of this GCRT when they hold a Discipline Recognition for Radiographic testing.

Except as modified below, all definitions used in ISO 9712 apply to this GCRT.

1.4 Discipline Recognition

Discipline Recognitions, which may be granted under this GCRT, and their scope, are:

1.4.1 RT1 Radiographic Testing Level 1

A person certified to Level 1 shall have demonstrated competence to carry out Radiographic testing according to Radiographic testing method instructions and under the supervision of Level 2 or Level 3 certified personnel who also hold a CBIP Competence Certificate. Within the scope defined on the Discipline Recognition, Level 1 personnel may, if they hold a CBIP Competence Certificate and are authorized by their employer, perform the following in accordance with Radiographic testing method instructions;

- Set up NDT equipment.
- Perform the test.
- Record and classify the results of the tests.
- Report the results.

A person certified to Level 1 may not work directly from general procedures or standards such as AS 2177 or ASTM E1472, as these require some interpretation. The Level 1 shall work under the supervision of, and be guided by, a Level 2 or 3 person.

Level 1 persons shall not be responsible for the choice of test method or technique to be used, nor for the interpretation of test results.

1.4.2 RT2 Radiographic Testing Level 2

A person certified to Level 2 shall have demonstrated competence to perform Radiographic testing according to established procedures. Within the scope of competence defined on the Discipline Recognition (Testing method / Sector), Level 2 personnel may, if they hold a CBIP Competence Certificate and are authorised by their employer,;

- Select the NDT technique for the test method to be used.
- Work directly from Radiographic testing standards and specifications such as AS 2177, and ASTM E1472
- Define the limitations of application of the testing method.
- Translate relevant NDT codes, standards, specifications and procedures into NDT instructions adapted to the actual working conditions.
- Set up and verify equipment settings.
- Perform and supervise relevant method / sector tests.
- Interpret and evaluate results according to the applicable codes, standards, specifications or procedures.
- Prepare and write Radiographic testing instructions
- Supervise, guide and train Level 1 personnel
- Report the results of Radiographic testing

1.4.3 Radiographic Testing Level 3 (RT3)

A person certified to Level 3 shall have demonstrated competence to perform radiographic inspections at Level 2. Additionally they shall demonstrate competence to:

- Evaluate and interpret results in terms of existing standards, codes, and specifications;
- Have sufficient practical knowledge of applicable materials, fabrication, process, and product technology to select NDT methods, establish NDT techniques, and assist in establishing acceptance criteria where none are otherwise available;
- Have a general familiarity with other NDT methods.

Level 3 personnel may be authorised by their employer to:

- Assume full responsibility for a test facility or examination centre and staff;
- Establish, review for editorial and technical correctness, and validate NDT instructions and procedures;
- Interpret standards, codes, specifications, and procedures;
- Designate the particular test methods, procedures, and NDT instructions to be used;
- Carry out and supervise all tasks at all levels;
- Provide guidance for NDT personnel at all levels.

1.5 Sectors

Sectors are defined by ISO 9712 Annex A, and as modified by this Guideline for Certification, covering Radiographic Testing at various stages of types of engineering industry including:

- Manufacturing
- Pre-Service
- Post and In-Service
- Fabrication

The products covered include:

- Welding
- Castings
- Forgings

NDT METHOD	LEVEL	Product Sector				Industry Sector	
		WELDS	CASTINGS	WROUGHT	FORGING	MANUFACTURING TESTING	PRE & IN-SERVICE TESTING
RADIOGRAPHIC TESTING	1	X	X		X	X	
RADIOGRAPHIC TESTING	2	X	X		X	X	
RADIOGRAPHIC TESTING	3	X	X		X	X	

2.0 TRAINING

2.1 Training Evidence

The Guidelines for Certification – General Requirements (PRO-CER-18), specify the requirements for the necessary evidence of training.

2.2 Formal Training

2.2.1 Radiographic Testing Level 1 (RT1)

Applicants for examination for Radiographic Testing Level 1 (RT1) shall have attended a theory course in Radiographic testing. The course shall total at least 16 hours.

- Training hours are based upon candidates possessing prior knowledge of materials and processes. If this is not the case, additional training may be required by CBIP.
- Training hours include both practical and theory courses.

2.2.2 Radiographic Testing Level 2 (RT2)

Applicants for examination for Radiographic Testing Level 2 (RT2) shall have attended a level two theory course or courses in Radiographic testing. The course(s) shall total at least 80 hours, exclusive of any Level 1 training.

- Training hours are based upon candidates possessing prior knowledge of materials and processes. If this is not the case, additional training may be required by CBIP.
- Training hours include both practical and theory courses.

2.2.3 Radiographic Testing Level 3

CBIP does not allow direct access to Level 3, therefore applicants are required to satisfy the training requirements for Level 2 (Clause 2.2.2). In addition documented evidence of additional training of 32 hours is required, which shall include aspects of the following:

- Procedure writing
- Code and standard interpretation
- Metallurgy
- Fabrication and welding
- Quality manual writing

2.2.3 Radiographic Testing – All Levels

- A reduction of up to 50% (outlined above) in the total required number of hours may be accredited by CBIP for candidates who have graduated from technical college or university, or have completed at least two years of engineering or science study at college or university.
- For candidates seeking certification in another NDT method at the same time as RT, or who already hold Discipline Recognition and a CBIP Competence Certificate, the training hours may be reduced proportional to the number of hours that the syllabus duplicates the other.
- The maximum reduction in total training hours is fifty percent (50%).
- Any reduction in training hours requires acceptance by CBIP.

3.0 DISCIPLINE RECOGNITION

3.1 Experience

Experience in months will be based on a nominal forty-hour week, provided the candidate is working full time in the Radiographic Testing method.

Radiation Safety Licence training may not be included as experience

3.1.1 Experience Pre-requisite for Examination

A minimum of Five (5) percent of the experience hours required for certification shall be completed prior to examination.

CBIP may accept reductions in experience hours prior to examination.

3.1.2 Radiographic Testing Level 1 (RT1)

Applicants for Level 1 shall have at least three months (or 480 hours) experience in the Radiographic Testing method, not including any organised theory or practical training courses. For the experience to be valid it should be gained under the direct supervision of a Level 2 or 3 certified person who also holds a CBIP Competence Certificate.

3.1.3 Radiographic Testing Level 2 (RT2)

Applicants for Level 2 shall have at least nine months (or 1,440 hours) experience in the Radiographic Testing method at Level 1. If qualifying directly to Level 2, the experience shall be 1920 (twelve months in total), not including any organised theory or practical training courses. For the experience to be valid it should be gained under the control of a Level 2 or 3 certified person who also holds a CBIP Competence Certificate.

If the candidate is not working full time in Radiographic Testing, then only hours doing Radiographic Testing, preparation, reporting and associated work may be logged.

Note: Time spent on Radiation Safety Training may not be included as experience

3.1.4 Radiographic Testing Level 3 (RT3)

Applicants for Level 3 shall have at least thirty months (or 4,800 hours) experience in the Radiographic Testing method at Level 2.

Level 3 responsibilities require knowledge beyond the technical scope of any specific NDT method. This broad knowledge may be acquired through a variety of combinations of education, training and experience, relevant to:

- RT procedure writing
- Code and standard interpretation
- Training Level 1 and 2 personnel
- Running an magnetic testing facility
- Writing RT quality systems
- Designing and operating RT calibration systems
- Appraisal of or designing new RT test equipment

3.1.5 Possible reductions in experience

Applicants may apply to CBIP for a reduction of up to 50% of the specified hours for experience in 3.1.1 and 3.1.2.

Reductions may be allowed for time spent on training courses (weighted by a factor of 5). Such courses shall consider practical solutions to testing problems and shall involve testing of known defects in specimens or actual fabrications.

Credit is allowed for work experience gained in other NDT methods, covered by ISO 9712, with the reduction for total experience for Radiographic Testing as follows:

- RT plus one other method: 25%
- RT plus two other methods: 33%
- RT plus three other method: 50%

The candidate shall show that he/she has at least fifty (50) percent of the experience time required for Discipline Recognition in each of the other methods.

CBIP must approve individual applications for reduction in experience time.

Note: The minimum experience hours shall be at least:

RT 1	-	240 hours
RT 2	-	720 hours (if RT1 held)
	-	960 hours (if RT1 not held)

3.2 Changing Sectors

CBIP will consider applications for sector changes (See ISO 9712 Annex A);

A certified Level 1 or 2 person changing sectors, or adding another sector in the same NDT method, shall be required to take only the new sector specific and practical examinations for that method.

A certified Level 3 person changing sectors or adding another sector for the same NDT method is exempt from the need to retake the basic examination and the Level 3 Part D of the main method examination

Application for sector changes shall be made in writing.

3.3 Radiation Safety Licence

It is a requirement that all personnel operating ionising equipment within New Zealand hold a current Radiation Safety Licence issued by the Ministry of Health Office at Radiation Safety. This Radiation Safety Licence also demonstrates that the person has achieved a certain level of awareness and knowledge regarding the safe handling and transport of ionising equipment.

Due to this CBIP requires documented evidence of a current Radiation Safety Licence prior to issue of RT1 or RT2 certification.

4.0 EXAMINATION REQUIREMENTS

4.1 Initial Discipline Recognition

A Discipline Recognition for both RT1 (Level 1) and RT2 (Level 2) requires three examinations consisting of two written examinations and a practical examination. The written exam papers shall comprise a general paper and a specific paper.

4.2 Recertification

Recertification shall be by way of a practical examination as per the Level 2 practical examination in Radiographic Testing.

The requirements of the Guidelines for Certification – General Requirements (PRO-CER-18), Section 10 shall also be complied with.

4.3 Significant Interruption

Where significant interruption has occurred, a recertification examination is required.

Refer to Guidelines for Certification – General Requirements (PRO-CER-18), Section 3 for a definition of Significant Interruption.

4.4 Examination References

References for open book examinations are listed on the CBIP website at www.cbip.co.nz.

4.5 Radiographic Testing Level 1

RT1 (Level 1): General Paper (Written)

- 40 multi choice questions covering the general theory of Radiographic Testing.
- 90 minutes duration in a closed book format.
- Refer to appendix B for exam topics and sample questions

RT1 (Level 1): Specific Paper (Written)

- 20 multi choice and 10 short answer questions covering specific applications of the Radiographic Testing method.
The questions may involve X-Ray and Gamma equipment, plus questions on standards, specifications and procedures. Some basic knowledge of testing equipment is also required.
- Permitted reference material AS 2177, ISO 9712 and this GCRT
- 2.5 Hour duration,
- Refer to appendix B for exam topics and sample questions

RT1 (Level 1): Practical examination

- The practical examination shall comprise of inspection and reporting on at least 3 samples. The examination shall be carried out in accordance with a detailed written instruction supplied by the examiner and should comply with AS 2177.
- An examination observer will be present and will allocate marks (15% of the total) in accordance with a check sheet supplied by CBIP.
- Written examination reports, including defect indications and datum, will be required to be presented to the examiner at the end of the examination.

- A report pro-forma will be supplied to the candidate.
- Time allowed will be 4 hours.
- See Appendix C for scope of practical examination

4.6 Radiographic Testing Level 2

RT2 (Level 2): General Paper (Written)

- 40 multi choice questions at level 2 covering the general theory of Radiographic testing.
- 90 minutes duration in a closed book format.
- Refer to appendix B for exam topics and sample questions

RT2 (Level 2): Specific Paper (Written)

- 20 multi choice and 10 short answer questions covering specific applications of the Radiographic Testing method. The questions may involve X-Ray and Gamma equipment, plus questions on standards, specifications and procedures. Knowledge of inspection equipment, calibration and use is also required.
- Permitted reference material AS 2177, ISO 9712 and this GCRT.
- 2.5 Hour duration,
- Refer to appendix B for exam topics and sample questions.

RT2 (Level 2): Practical examination

- The practical examination shall consist of two (2) parts. Time allowed for both parts will be 4 hours, 3 hours for the practical samples plus one hour for the written work instruction.

- **Practical Test**

The practical test shall consist of an inspection and reporting on at least 3 samples in the relevant product sectors (See ISO 9712 Annex A). The examination shall be carried out in accordance with a Standard Practice or General Procedure such as AS 2177. This will require the Level 2 candidate to interpret the document and determine the inspection procedure.

Permitted reference material – AS 2177 and/or the candidates Company Radiographic Testing procedure.

Written examination reports, including defect indications, datum and interpretation, will be required to be presented to the examiner at the end of the test. No pro-forma worksheet will be supplied, but candidates may use their own company report sheets.

- Written Instruction (Procedure)

The second part shall consist of producing a written instruction for the inspection of a specific part nominated by CBIP. The instruction shall be such that it complies with the requirements of AS 2177 or ASTM E1472 and can be used by a Level 1 with no interpretation required.

Permitted reference material – AS 2177 and ASTM E1472.

See Appendix C for scope of practical examination

4.7 Practical Re-examination

Applicants who do not obtain the required pass mark of 70% in the practical examination are only required to re-sit the failed sections.

The re-examination may take place one month after the first attempt, and no longer than two years after the original examination. The re-examination time may be less than one month if evidence of further training acceptable to the certification body is provided.

5.0 EXAMINATION REQUIREMENTS LEVEL 3

RT3 requires successful completion of one practical and two theory examinations.

RT3 (Level 3): Basic Paper (Written)

- 100 multi choice questions covering basic knowledge, as per the table below

Part	Subject	Number of questions
A	Technical knowledge in materials science and process technology.	25
B	Knowledge of the certification body's qualification and certification system based on this International Standard. This may be an open book examination.	10
C	General knowledge of at least four methods as required for Level 2 and chosen by the candidate from the methods given in Clause 1. These four methods shall include at least one volumetric method (RT or UT).	15 for each NDT method. 60 in total

RT3 (Level 3): Main Paper (Written)

- 100 multi choice questions covering RT knowledge, as per the table below

Part	Subject	Number of questions
D	Level 3 knowledge relating to RT	30
E	Application of RT, including the applicable codes, standards, specifications and procedures. This may be an open book examination in relation to codes, standards, specifications and procedures	20
F	Drafting of one or more RT procedures. The applicable codes, standards, specifications and other procedures shall be available to the candidate. For a candidate who has already drafted a RT procedure in a successfully passed Level 3 examination, the certification body may replace the drafting of a procedure with the critical analysis of an existing RT procedure containing errors and/or omissions.	–

RT3 (Level 3): Practical examination

- The practical examination shall be as per the Level 2, with the exemption of the Level 1 written instruction

5.1 Recertification Level 3

Recertification shall be by way of a practical examination, as per the Level 2, with the exemption of the Level 1 written instruction.

Plus either:

- Written examination 20 questions on the application of RT, which demonstrates an understanding of current NDT techniques, standards codes or specifications, and applied technology and, at the option of the certification body, five additional questions on the requirements of the certification scheme.

Or:

- Meeting the requirements for a structured credit system, as given in 5.2.

5.2 Level 3 Credit System

Credits are gained over a five year period prior to recertification, as per the table below. Note that there are a maximum number of points that can be gained in both a single year and over the five years.

A minimum of 70 points are required for a recertification.

A maximum of 25 points can be earned in a single year.

Item	Activity	Points accorded for each item (or function)	Maximum points per year per item	Maximum points per 5 year period per item
1	Membership of an NDT society, attendance at seminars, symposia, conferences and/or courses covering NDT and related sciences and technologies	1	3	8 ^a
2.1	Attendance at international and national standardization committees	1	3	8 ^a
2.2	Convenorship of standardization committees	1	3	8 ^{ab}
3.1	Attendance at sessions of other NDT committees	1	3	8 ^a
3.2	Convenorship of sessions of other NDT committees	1	3	8 ^{ab}
4.1	Attendance at sessions of NDT related working groups	1	5	15 ^a
4.2	Convenorship of NDT related working groups	1	5	15 ^{ab}
5.1	NDT related technical/scientific contributions or publications	3	6	20 ^{cd}
5.2	NDT related research work published	3	6	15 ^{cd}
5.3	NDT research activity	3	6	15 ^{cd}
6	NDT technical instructor (per 2 h) and/or NDT examiner (per examination)	1	10	30 ^d
7	Professional activity	—	—	—
7.1	within a NDT facility, NDT training centre or NDT examination facility or for Engineering of NDT (see Annex E) (for each full year)	10	10	40 ^d
7.2	Dealing with disputes referring to clients	1	5	15 ^d
7.3	Development of NDT applications	1	5	15 ^d
^a Maximum points for items 1 to 4: 20. ^b Points to be given for both convenorship and attendance. ^c If there is more than one author, the lead author shall define points for the other authors. ^d Maximum points for each of items 5 and 6: 30, and 7: 50.				

APPENDIX A - Knowledge requirements (General)

RADIOGRAPHIC TESTING

INTRODUCTION	RT1	RT2
Introduction to basic Radiographic Testing concepts	X	X
History	X	X
Capabilities and Limitations	X	X
PHYSICS of RADIOGRAPHY		
The Atom, Electron, Proton and Neutron	X	X
Atomic Number	X	X
Mass Number	X	X
Isotope	X	X
ELECTROMAGNETIC RADIATION		
Photon	X	X
X-Rays and Gamma rays	X	X
Alpha and Beta particles	X	X
Radioactive decay	X	X
Activity	X	X
Specific activity	X	X
RADIATION INTERACTION with MATTER		
Ionisation	X	X
Photoelectric effect	X	X
Pair production	X	X
Compton scattering	X	X
Attenuation	X	X
Coefficient of absorption	X	X
Half value layers	X	X
Inverse square law	X	X
THE X-RAY MACHINE		
Anode and Cathode	X	X
Voltage and tube/filament current	X	X
Shielding, hoods and inherent filtration	X	X
Anode Targets	X	X
Constant potential units	X	X
Characteristic X RAYS	X	X
Monochromatic radiation	X	X
Radiation energy/quality	X	X
Intensity	X	X
Linear accelerator	X	X
Betatron	X	X
Panoramic and end anode machines	X	X

GAMMA SOURCES		
Decay rate	X	X
Specific activity	X	X
Energy and intensity	X	X
Curie and source size	X	X
Source production Neutron capture		X
Alpha, Beta, Gamma emission	X	X
K. Capture		X
Self absorption		X
Iridium 192, Half life, penetrating ability and gamma energy	X	X
Cobalt 60 Half life, penetrating ability and gamma energy	X	X
Half life	X	X
Exposure devices and safety	X	X
Curie, Roentgen, Rad, Rem	X	X
Becquerel, Sievert, Gray	X	X
RADIOGRAPHIC FILMS		
Film emulsion	X	X
Grain size and speed	X	X
Characteristic (H and D) curves	X	X
Radiographic and Film contrast	X	X
Density including logs	X	X
Film selection	X	X
Lead screens	X	X
Fluorescent screens	X	X
PROCESSING		
Darkroom equipment	X	X
Developer and Fixer solutions	X	X
Developer activity	X	X
Wash baths	X	X
Temp and time	X	X
Development problems	X	X
Processing tanks and dryers	X	X
Automatic development	X	X
RADIOGRAPHIC QUALITY		
Radiographic contrast	X	X
Factors effecting Subject contrast	X	X
Factors effecting Film contrast	X	X
Definition	X	X
Ug	X	X
Focal or source size	X	X
FFD and SFD and Film to object distance	X	X
Film Graininess	X	X
IQI's and Penetrameters, Wire type and plaque/hole type	X	X

SCATTER		
Cones, diaphragms, collimators masks	X	X
Filters	X	X
Backscatter	X	X
Side scatter	X	X
Internal scatter	X	X
Undercut	X	X
RADIOGRAPHIC PROCEDURES		
Film radiography	X	X
Fluoroscopy		X
Image amplifier		X
Xeroradiography		X
Stereoradiography		X
Double exposure (Parallax)		X
Flash radiography		X
SCREENS		
Lead foil	X	X
Fluorescent	X	X
SAFETY		
Time, Distance and Shielding	X	X
Detection devices, Films, survey meters and dosimeters	X	X
Biological effects	X	X
Half Value Layers	X	X
ALARA	X	X
INTERPRETATION		
Film viewers	X	X
Density, sensitivity and contrast	X	X
Typical defect indications. Eg cracks, porosity and lack of fusion	X	X
EQUIPMENT CHECKS		
Processor checks	X	X
X-Ray unit calibration	X	X
FORMULA and CALCULATIONS		
Exposure eg MAM	X	X
Using the dated decay curve	X	X
Changing density using the Characteristic curve	X	X
Changing SFD	X	X
Using HVL's to estimate intensity		X

MATERIAL AND WELDING TECHNOLOGY		
Production of steel and fabrication processes. Common defects associated with the processing methods.	X	X
Welding processes and techniques, heat treatment, joint preparation and types of flaws associated with these welding processes.	X	X
In service defects, fatigue, stress corrosion.	X	X
CODES, STANDARDS and supporting documents		
This RTGC	X	X
CBIP Code of Ethics	X	X
AS 2177	X	X
ASTM E 1472	X	X

APPENDIX B - SAMPLE EXAMINATION QUESTIONS

RT1 RADIOGRAPHIC TESTING LEVEL 1 GENERAL

(40 Multi Choice)

- 1 The process by which a photon of energy removes an electron from the orbit of an atom is known as:
 - A. Cell division
 - B. K capture
 - C. Redundancy
 - D. Ionization

- 2 During manual film processing, the purpose of the stop bath is to:
 - A. Change the exposed silver salts to black metallic silver
 - B. Neutralize the developer and stop the developing process
 - C. Eliminate most water spots and streaks
 - D. None of the above

- 3 As a check on the quality of the radiograph, it is customary to use a set of small wires with different diameters, known as a:
 - A. Reference plate
 - B. Lead screen
 - C. Penetrameter or IQI
 - D. Illuminator

RT1 RADIOGRAPHIC TESTING LEVEL 1 SPECIFIC PAPER

(20 Multi Choice and 10 short answer)

- 1 According to the CBIP Guidelines for Certification Radiographic Testing, Level 1 personnel may be authorised to perform which of the following.
 - A. Set NDT equipment
 - B. Perform specific PT inspections only
 - C. Report on the results of the inspection
 - D. All of the above

- 2 Discuss how the intensity of radiation from a point source varies over distance, and estimate the change in intensity when the distance is tripled

RT2 RADIOGRAPHIC TESTING LEVEL 2 GENERAL PAPER

(40 Multi Choice)

- 1 The absorption of X-rays when passing through a particular material depends on:
 - A. The atomic number, density, and thickness of the material
 - B. The stress/strain relationship of the material
 - C. The temperature of the material
 - D. The temperature and elastic limit of the material

- 2 When radiographing a casting which contains a large crack, the crack will appear on the radiograph as:
 - A. A dark, intermittent or continuous line
 - B. A light, irregular line
 - C. A series of round dots
 - D. A light, intermittent or continuous line

- 3 One technique that could be used to produce a radiograph of a high speed event, such as an arrow in flight is known as:
 - A. Stereo radiography
 - B. Flash radiography
 - C. Gamma motion
 - D. Micro second Radiography

RT2 RADIOGRAPHIC TESTING LEVEL 2 SPECIFIC PAPER

(20 Multi Choice and 10 short answer)

- 1 List all the information that would usually be found on a X-Ray exposure chart

APPENDIX C

RT1 and RT2 Practical examinations

The marks allocated for the Level 1 and 2 Practical examinations will be in accordance with a set of pre defined criteria

The following gives general information on how the marks are allocated at each level

RT1

Correct use of the equipment
Correct interpretation of the written instruction
Performance of the inspection
Finding all mandatory indications
Defect datum
Reporting

Note: A candidate failing to report a defect specified on the master report as 'mandatory shall be awarded zero marks in the Recording and Reporting part of the practical examination.

RT2

Selection and correct use of the equipment
Equipment control and checks
Correct interpretation of standard / Code
Performance of the inspection
Finding all mandatory indications
Defect datum
Reporting
Writing Level 1 Instruction 15%

Note: A candidate failing to report a defect specified on the master report as 'mandatory shall be awarded zero marks in the Recording and Reporting part of the practical examination.