

## STUDENT DETAILS PLEASE USE BLOCK LETTERS

<b>Student First Name<sup>1</sup>:</b>	<b>Date of Birth:</b> /    /
<b>Student Surname<sup>1</sup>:</b>	
<b>Address<sup>1</sup>:</b>	
<b>Suburb/City:</b>	<b>State:</b> <b>Post Code:</b>
<b>Phone:</b>	
<b>Student Email<sup>1</sup>:</b>	
<b>Payment of Fees by:</b> <input type="checkbox"/> <b>Student</b> <input type="checkbox"/> <b>Company</b> <small>By default, where course fees are paid by the company, course feedback and results may be provided to the student's employer, without prior consent. If you <b>do not</b> wish this to happen, please initial the box to the right.</small>	

<sup>1</sup> The name and address supplied above will be used for all correspondence including certificates and letters of results.

## COMPANY DETAILS – only required if Company is responsible for payment of fees

<b>Company Name:</b>		
<b>Billing Address:</b>		
<b>Suburb/City:</b>	<b>State:</b>	<b>Post Code:</b>
<b>Contact Name:</b>	<b>Email:</b>	
<b>Email for Invoice:</b>		
<b>Telephone:</b>		
<b>Company Purchase Order No: (Only for Approved Purchasers)</b>		

## COURSE DETAILS

Course	Venue i.e. Melbourne or Perth	Dates	Total Course Fees Payable
Radiography Level 2			\$

### I understand the following conditions of enrolment and acknowledge by my signature: -

- This Enrolment is subject to the scheduled course proceeding. In the unlikely event that this course is cancelled, all monies paid to ATTAR will be refunded in full.
- I have read and I understand the ATTAR Student Handbook.
- Satisfactory completion of an ATTAR training course is only part of the process that may be required for attaining certification. For further information on gaining or applying for certification please refer to the Australian Institute for Non-destructive Testing (AINDT)
- This course includes AINDT exams (where applicable). For all exams, my results and details may be supplied to the AINDT.
- I will not be allocated a place on my nominated course(s) until all course forms have been completed and course fees have been paid in full.
- I acknowledge the pre-requisites for this course as detailed on page 2.

<b>Student Signature:</b>	<b>Date:</b> /    /
---------------------------	---------------------

<b>Student name:</b>	<b>Date of birth:</b> /     /
----------------------	-------------------------------

## PRE-REQUISITE INFORMATION - Pre-requisites for ISO 9712 Training and Assessment

<b>Pre-requisites</b>
<b><u>Radiography &amp; Radiation Safety Training</u></b> All candidates must supply evidence of satisfactory completion of 40 hours of Radiography & Radiation Safety Training in accordance with National Module EA612, or equivalent.
<b><u>Radiation Safety Licence</u></b> Radiography Level 2 enrolments will not be processed without a copy of a <b>current Radiation Safety Licence</b> .
<b><u>Math &amp; Materials Technology</u></b> Algebra & Trigonometry Maths pre-requisite worksheets can be located at <a href="http://www.attar.com.au">www.attar.com.au</a> or contact ATTAR if you require them to be sent by hard copy. Materials Technology (or a knowledge of materials processes).

### The Student listed above hereby declares that:

- The total of my current industrial experience in Radiography is \_\_\_\_\_ hours.
- I have completed the RT2 Pre-Course Assessment on pages 4-7.
- I understand the ISO 9712 examinations held at the completion of the course will be difficult to successfully complete if I do not have the ISO9712 nominated industrial experience in this method and sector (1728 hours and 1000 images viewed.). Candidates who do not have the required industrial experience may defer their examinations. Contact [training@attar.com.au](mailto:training@attar.com.au) to arrange deferral.
- I understand that on the commencement of the course I will be examined on my basic maths and Radiation Safety knowledge to confirm suitability to attend the course and may be removed from the course if my knowledge is deemed inadequate.
- I understand that I must supply a current Film/OSL/TLD badge for the duration of the course.
- I have attached a copy of my current Radiation Safety Licence.
- I have attached evidence of my 40 hours of Radiography & Radiation Safety training.

<b>Student Signature:</b>	<b>Date:</b> /     /
---------------------------	----------------------



## RADIOGRAPHY LEVEL 2 PRE COURSE ASSESSMENT

A minimum result of 70% is required.

Name: \_\_\_\_\_

Mark: \_\_\_\_\_

### Declaration:

I \_\_\_\_\_ (candidate name), declare that the following answers are my own work and were completed without external assistance.

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

### SHOW FULL WORKING

1. If the dose rate at distance 10 metres from an Iridium 192 source is 1000 mSv/hr, then the dose rate at a distance 5 metres from the same source will be:
  
  
  
  
  
  
  
  
  
  
2. If the dose rate at distance 1.25 metres from an Iridium 192 source is 1000 mSv/hr, then the dose rate at a distance 5 metres from the same source will be:
  
  
  
  
  
  
  
  
  
  
3. If the dose rate at distance 9 metres from an Iridium 192 source is 1000 mSv per/hr, at what distance would the dose rate be 25 mSv per hour?

- 
4. The dose rate at 1 metre from a gamma ray source is  $52 \mu\text{Sv/hr}$  ( $52 \mu\text{Gy/hr}$ ). What is the dose rate at 2.5 metres?
  
  
  
  
  
  
  
  
  
  
  5. The dose rate at 0.35m from a gamma ray source is  $3 \text{ mSv/hr}$  ( $3\text{mGy/hr}$ ). What would be the dose rate at 5cm?
  
  
  
  
  
  
  
  
  
  
  6. The dose rate at 280mm from a gamma ray source is  $47 \text{ mSv/hr}$ . What would be the dose rate at 0.45m?
  
  
  
  
  
  
  
  
  
  
  7. What is the thickness of steel required to reduce the radiation from a  $1.3 \text{ TBq}$  Iridium-192 source to below  $25\mu\text{Sv/hr}$  at a distance of 2m from this source?

- 
8. A particular Ir-192 source (assume 75 days half life) was calibrated to have an activity of 67 Ci on Day 1. Calculate the activity of the source 50 days later.
9. A radiographer plans to use a 205 GBq Cobalt-60 source for radiography of a 15cm thick steel plate. At what distance, after transmission through the steel plate, will the dose rate in the direct beam be  $25 \mu\text{Sv/hr}$ ?
10. If using a source of Ir-192 of 1900GBq, using 6.4mm of lead as shielding at an open field site. What would be the maximum dose rate at the boundary?

## Supplementary Data

### HVL (mm)

Material	Source				
	Co 60	Ir 192	Se 75	100 kV X-rays	250 kV X-rays
Depleted Uranium	6.5	2			
Lead	12.4	6.4	1	0.24	.82
Steel	20	13	8	6.3	10
Concrete	66	48	30	19	28

### TVL (mm)

Material	Source				
	Co 60	Ir 192	Se 75	100 kV X-rays	250 kV X-rays
Depleted Uranium	22	6.5			
Lead	41	21	4.5	0.8	2.7
Steel	68	44	27.5	21	33
Concrete	220	157	90	64	94

### Characteristics of Radioisotope Sources

	COBALT CO-60	RADIUM RA-226	CAESIUM CE-137	IRIDIUM IR-192	SELENIUM SE 75
ENERGY (MeV)	1.25	1.22	0.66	0.355	0.279
HALF LIFE	5.3 yr	1620 yr	30yr	75 dy	120 dy

### Specific Outputs

Radiation Source	(uSv/hr per GBq at 1 metre)
Iridium 192	130
Cobalt 60	350
Selenium 75	46

Prefix	Symbol	Value
yotta	(Y)	10 <sup>24</sup>
zetta	(Z)	10 <sup>21</sup>
exa	(E)	10 <sup>18</sup>
peta	(P)	10 <sup>15</sup>
tera	(T)	10 <sup>12</sup>
giga	(G)	10 <sup>9</sup>
mega	(M)	10 <sup>6</sup>
kilo	(k)	10 <sup>3</sup>
hecto	(h)	10 <sup>2</sup>
deka	(da)	10 <sup>1</sup>

Prefix	Symbol	Value
deci	(d)	10 <sup>-1</sup>
centi	(c)	10 <sup>-2</sup>
milli	(m)	10 <sup>-3</sup>
micro	(u)	10 <sup>-6</sup>
nano	(n)	10 <sup>-9</sup>
pico	(p)	10 <sup>-12</sup>
femto	(f)	10 <sup>-15</sup>
atto	(a)	10 <sup>-18</sup>
zepto	(z)	10 <sup>-21</sup>
yocto	(y)	10 <sup>-24</sup>

Enrolments cannot be accepted unless all pages have been completed and full payment supplied.  
 Please forward your completed Enrolment form to – [training@attar.com.au](mailto:training@attar.com.au) or fax 03 9574 6133