

Overall Categorisation of Practice Types for Planned Compliance Activities

January 2024

Background

The *Radiation Safety Act 1999: Strategy to Achieve Compliance* provides the framework on how the Radiation Health Unit, Health Protection and Regulation Branch will ensure radiation-related activities (radiation practices) comply with the Act. It includes handling of complaints, enforcement decisions, education and the management of both planned and adhoc compliance activities.

The *Radiation Safety Act 1999: Compliance Plan* is a rolling two year plan of statewide approved proactive (planned) compliance activities.

This document establishes the Guidance Tool for Planned Compliance Activities which has been prepared to assist with the categorisation of practice types used in Queensland, and therefore inform the planned compliance activities of the Branch.

1. Guidance Tool for Planned Compliance Activities

Table 1 details the Guidance Tool for Planned Compliance Activities.

The Compliance Group determination of a particular radiation practice is based on the intersection of the outcome of the safety risk score and the compliance culture assessment of the industry sector.

It is intended for this tool to be used to inform the *Radiation Safety Act 1999* planned compliance activities.

Table 1: Guidance Tool for Planned Compliance Activities

		Consequence - Safety Risk				
		Level 1 <i>(low safety risk)</i>	Level 2	Level 3	Level 4	Level 5 <i>(high safety risk)</i>
Maturity of Compliance Culture	Category A <i>(developed)</i>	Compliance group 1	Compliance group 2	Compliance group 2	Compliance group 3	Compliance group 3
	Category B <i>(developing)</i>	Compliance group 2	Compliance group 2	Compliance group 3	Compliance group 3	Compliance group 4
	Category C <i>(emerging)</i>	Compliance group 2	Compliance group 3	Compliance group 3	Compliance group 4	Compliance group 4

Attachment 1 provides a list of common radiation practices in Queensland and their compliance group (current at July 2023).

Note: A particular client's compliance group may change depending on the number of radiation practices it undertakes and the size of its operations (e.g. number of businesses and locations it is responsible for). An individual assessment will need to be made for those practice types.

2. Compliance Groups

The term 'Compliance groups' refers to groupings of particular radiation practices according to the safety risk of a particular type of radiation practice and the maturity of the particular industry in complying with the requirements of the *Radiation Safety Act 1999*.

The application of the groupings is described in the *Radiation Safety Act 1999: Strategy to Achieve Compliance* and in the *Radiation Safety Act 1999: Compliance Plan*. For example, the compliance strategy may prescribe that radiation practices in Compliance Group 4 are expected to be audited once every 4 years, and the compliance plan may provide the expectation that 25% of these practices be audited every year.

Information on the safety risk and maturity of compliance culture is detailed below.

2.1 Consequence – Safety Risk

A nomogram methodology was used to determine the relative safety risk of each type of radiation practice.

For all radiation practices, a relative safety risk was determined for each of the following parameters:

1. Lack of appropriate training
2. Poor industry-wide safety culture
3. Poor manual handling of a radiation source
4. Reliance on PPE and safety devices
5. Unauthorised access to the apparatus
6. Failure of equipment

In addition to the above, for ionising radiation practices, a relative safety risk was also determined for each of the following parameters:

7. Radiation output from the source when uncontrolled
8. Environmental contamination
9. Unnecessary exposure during use

The results were then totalled to provide a total safety risk score and normalised to provide a safety risk ranking for all radiation practice types typically found in Queensland. The outcome was grouped to provide for five safety risk levels.

A Level 1 safety risk may be considered to be those practices which, by their nature, have minimal reliance on procedural or technical safety measures, while a Level 5 safety risk has a more stringent reliance on safety measures.

Attachment 2 describes in more detail the methodology used to determine the relative safety risk for each non-ionising and ionising radiation practice type.

For reference purposes, Attachment 3 provides the safety level determined for typical radiation practices in Queensland.

2.2 Maturity of Compliance Culture

The maturity of a particular industry sector is a subjective determination of the sector's compliance culture based on experience while engaging with the sector and administering the *Radiation Safety Act 1999*.

Three levels of maturity were considered – an emerging compliance culture, a developing compliance culture and a developed compliance culture.

A well-developed compliance culture shows good safety and corporate governance, a willingness and capacity to comply with legislation, a good reporting history, and strives for best practice. An emerging compliance culture may show an industry sector's need for more support by the regulator to assist it with achieving a minimum level of compliance.

It is acknowledged that a particular entity within an industry sector may demonstrate a different culture to the industry norm.

For reference purposes, Attachment 4 provides the compliance culture categorisation for typical radiation practices in Queensland.

3. Review of Compliance Grouping

Radiation practices evolve over time and developments in industry are dynamic. Consequently, it is expected that the safety risk and compliance culture methodology will be reviewed at least once every 5 years, and applied to the radiation practices current at that time.

Attachments

Attachment 1: List of Radiation Practices and their Compliance Group

Attachment 2: Methodology – Assessment of Safety Risk and Compliance Culture

Attachment 3: List of Safety Risk Levels for Radiation Practices

Attachment 4: List of Compliance Culture Categories for Radiation Practices

List of Radiation Practices and their Compliance Group

The safety risk score and the assessment of the maturity of the compliance culture of each radiation practice was considered against the Guidance Tool for Planned Compliance Activities to determine its compliance grouping. The following table provides the outcome of this assessment.

(current at July 2023)

Practice	Compliance Group
Tattoo laser removal – commercial context and medical oversight	4
Cosmetic laser – skin rejuvenation/capillary reduction – commercial context	4
Borehole logging – oil and gas	4
Manufacture of radioactive substances or sealed source apparatus	4
Product irradiation using a gamma irradiator	4
Storage and handling of radioactive waste, including dismantling and decommissioning	4
Therapeutic nuclear medicine	4
Industrial radiography using radioactive substances	4
Cosmetic laser – skin rejuvenation/capillary reduction – medical oversight	3
Hair laser reduction – commercial context	3
Medical or surgical laser procedures – other than dermatology and ophthalmic	3
Veterinary laser procedures	3
Brachytherapy	3
Diagnostic nuclear medicine	3
Industrial radiography using radiation apparatus	3
Ophthalmic laser procedures	2
Hair laser reduction – medical oversight	2
Dermatology laser procedures	2
Laser lipolysis	2
Non-cosmetic and non-ablative laser procedures	2
Dental laser procedures	2
Chiropractic imaging – plain imaging	2
Teaching the properties of radiation	2
Analytical apparatus for chemical or physical analysis (not enclosed)	2
Borehole logging – mineral (hard rock)	2
Cabinet radiation apparatus used for inspection of objects	2
Fluoroscopy – general and interventional procedures	2
Geotechnical measurements	2
Industrial gauging – sealed source apparatus	2
Radiolabelling of chemical compounds and associated studies	2
Storage only of radiation sources	2
Veterinary diagnostic imaging – plain	2

Practice	Compliance Group
Veterinary nuclear medicine	2
Dental imaging – intra-oral, plain extra-oral, dental cone beam CT	1
Borehole logging related – tracer studies	1
Calibration of equipment	1
Diagnostic imaging – computed tomography, DEXA, mammography, plain (excl. veterinary)	1
Enclosed analytical apparatus for chemical or physical analysis	1
Enclosed radiation apparatus for imaging	1
Industrial gauging – radiation apparatus	1
Plain imaging of objects	1
Product irradiation using a self-contained irradiator	1
Radiation therapy using linear accelerators	1
Veterinary diagnostic imaging – computed tomography	1
Veterinary radiation therapy	1

Methodology – Assessment of Safety Risk and Compliance Culture

The Compliance Group determination of a particular radiation practice is based on the intersection of the outcome of the safety risk score and the compliance culture assessment of the industry sector.

The methodology used to determine the safety risk and the compliance culture for each of the non-ionising and ionising radiation practice types typically undertaken in Queensland is described below.

1. Assessment - Safety Risk

A risk score nomogram was used to determine the relative safety risk for each of the following 6 parameters as it relates to all radiation practice types:

1. Lack of appropriate training (i.e. the likelihood of lack of training, the probability of this lack of training having an impact, and the severity of injury)
2. Poor industry-wide safety culture (i.e. the likelihood of a poor safety culture, the probability of this poor culture having an impact, and the severity of injury)
3. Poor manual handling of a radiation source (i.e. the likelihood of poor manual handling, the probability of this poor handling having an impact, and the severity of injury)
4. Reliance on PPE and safety devices (i.e. the likelihood of PPE/safety devices not being used, the probability of this lack of use having an impact, and the severity of injury)
5. Unauthorised access to the apparatus (i.e. the likelihood of unauthorised access occurring, the probability of this access having an impact, and the severity of injury)
6. Failure of equipment (i.e. the likelihood of equipment failing, and the probability of this failure having an impact, and the severity of injury)

The following additional parameters were also considered for each ionising radiation practice type:

7. Radiation output from the source when uncontrolled (i.e. the likelihood of the source being uncontrolled, the probability of this uncontrolled source having an impact, and the dose effect)
8. Environmental contamination (i.e. the likelihood of environmental contamination, the probability of contamination having an impact, and the dose effect)
9. Unnecessary exposure during use (i.e. the likelihood of unnecessary exposure occurring, the probability of this exposure having an impact, and the dose effect)

Normalising the total risk score provided for 5 clear safety risk levels:

- ≥ 80 to ≤ 100 (level 5)
- ≥ 60 to < 80 (level 4)
- ≥ 40 to < 60 (level 3)
- ≥ 20 to < 40 (level 2)
- ≥ 0 to < 20 (level 1)

2. Assessment - Maturity of Compliance Culture

In addition to the inherent safety risk of the radiation practice, an additional facet in deciding the overall risk of a particular radiation practice type is the compliance culture of the particular industry sector.

The compliance culture for each of the practice types was determined using the following categorisation.

- Developed compliance culture – Category A
- Developing compliance culture – Category B
- Emerging compliance culture – Category C

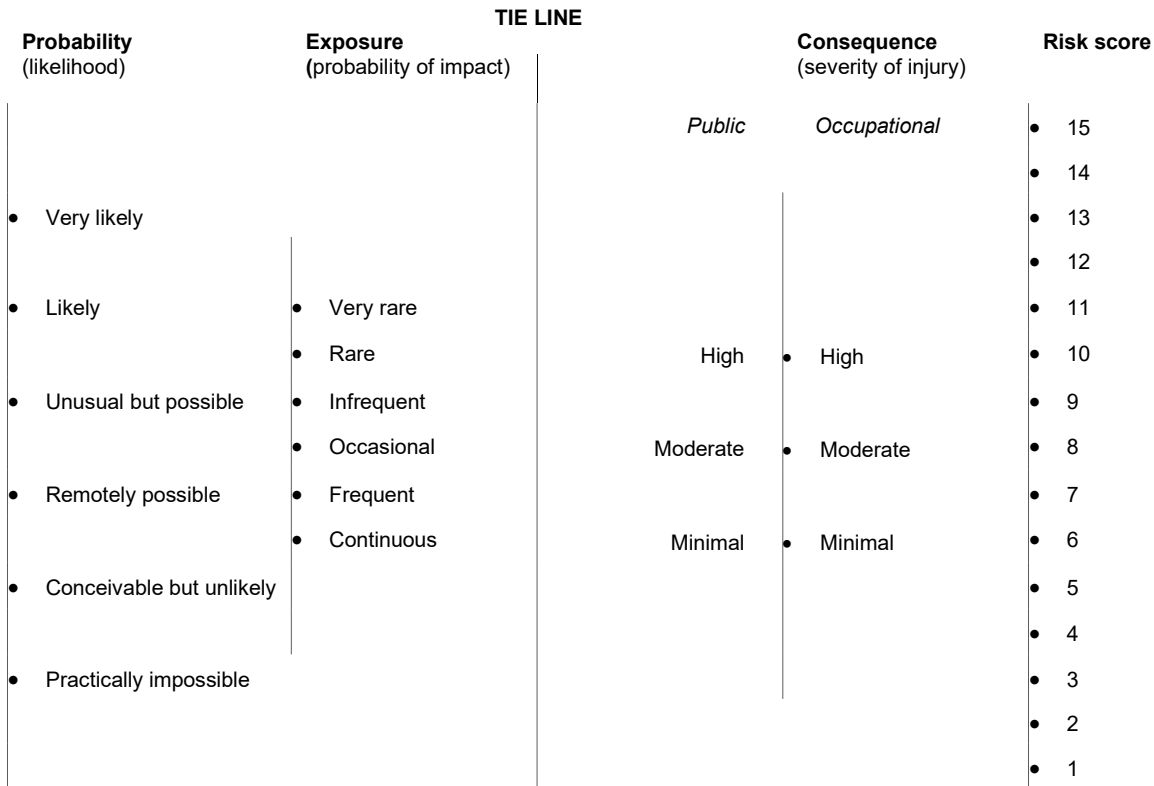
Risk Score Nomograms

The risk score nomogram used for the parameters relating to non-ionising radiation practices, with an example, and the nomogram used for the parameters relating to ionising radiation practices, with an example are attached.

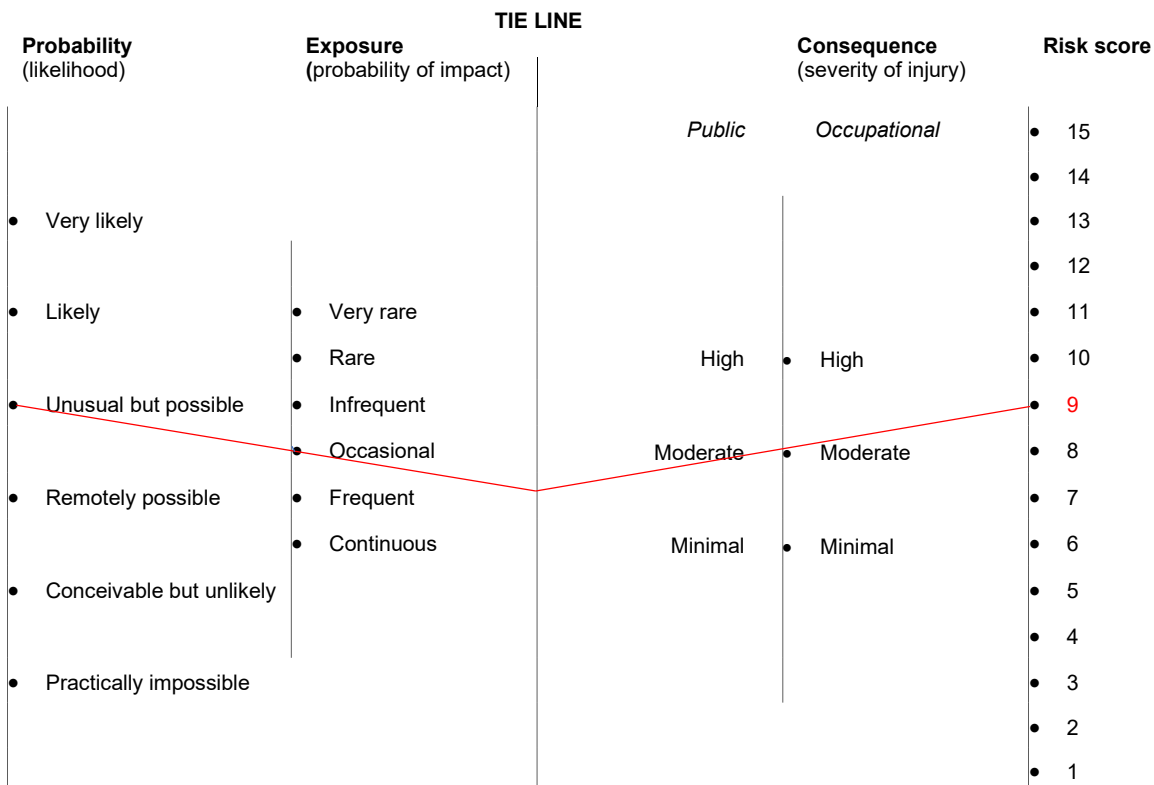
Attachment: Safety Risk Score Nomograms

The risk score nomogram used to determine the relative safety risk for each parameter relevant to a non-ionising radiation practice:

(the likelihood of <X>, the probability of <X> having an impact, and the severity of the injury as a result)

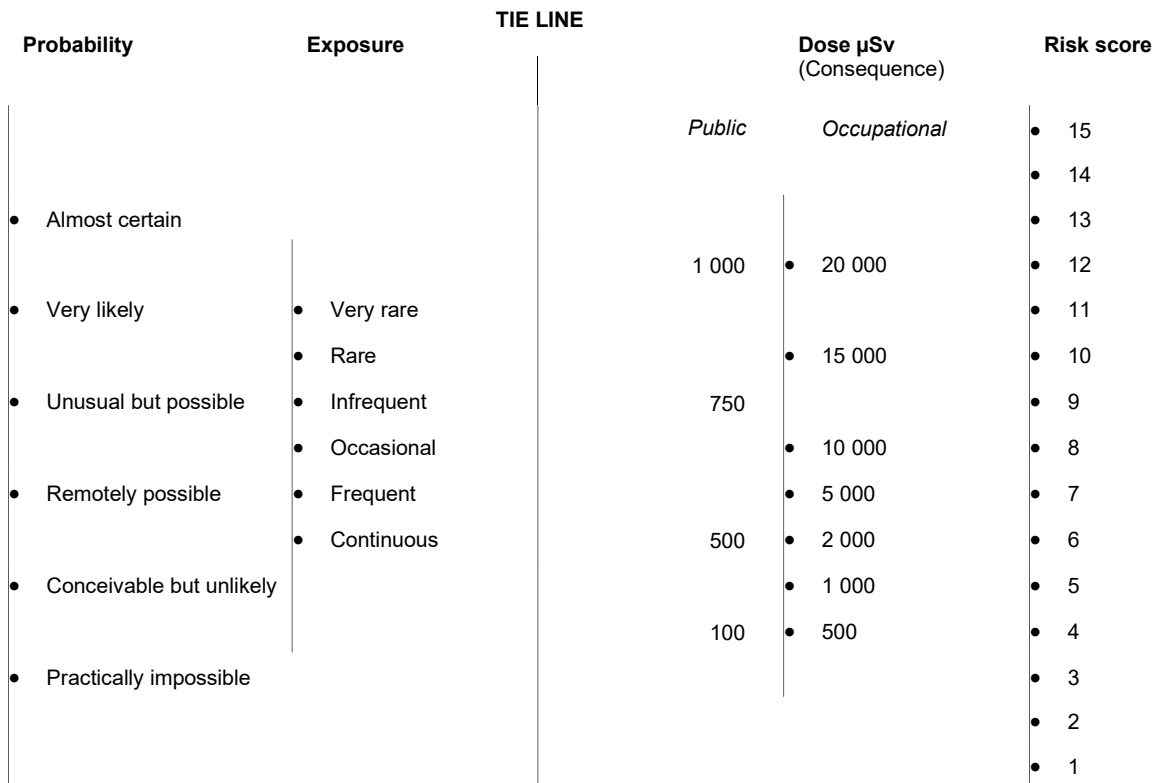


Example: The likelihood of lack of theoretical and practical training of operators at a medical practice undertaking tattoo removal is unusual but possible. The probability of this lack of training having an impact is occasional. The severity of injury is considered to be moderate. This provides a risk score for this particular parameter at: 9.

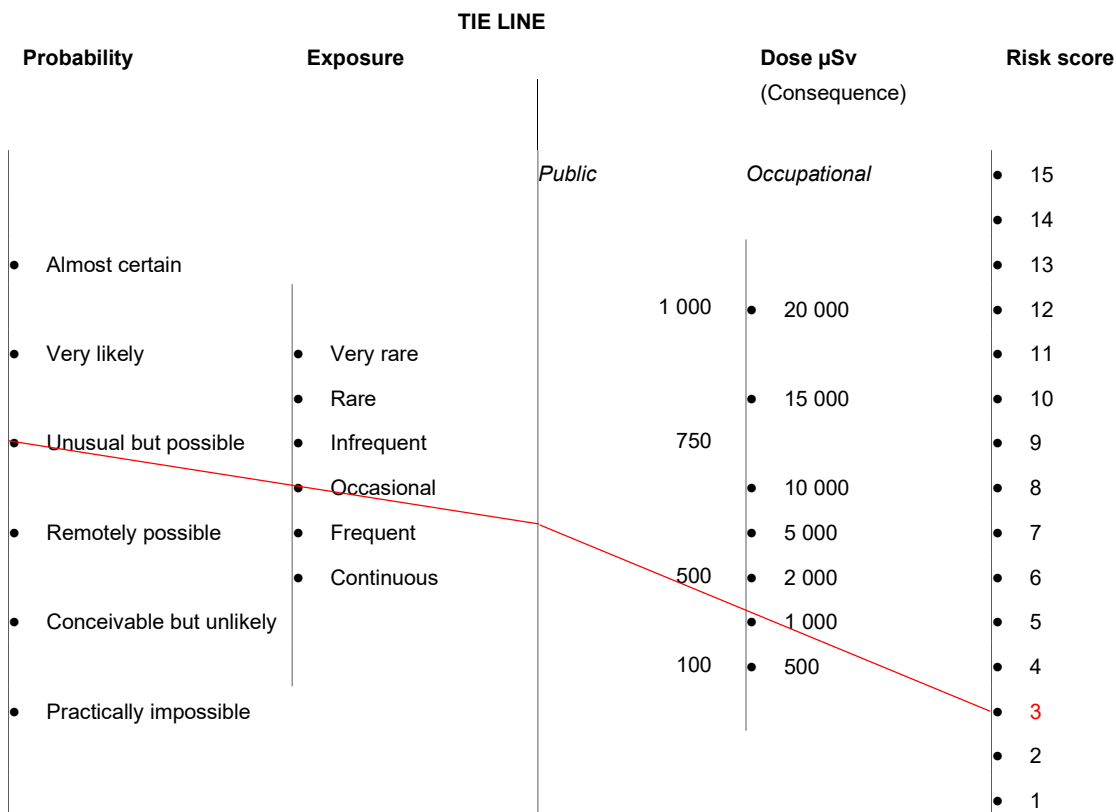


The risk score nomogram used to determine the relative safety risk for each parameter relevant to an ionising radiation practice:

(the likelihood of <X>, the probability of <X> having an impact, and the consequence as a result)



Example: The likelihood of lack of theoretical and practical training of operators using radioactive substances for oil and well logging is unusual but possible. The probability of this lack of training having an impact is occasional. The dose from this effect is considered to be 1 mSv (occupational). This provides a risk score for this particular parameter at: 3.



List of Safety Risk Levels for Radiation Practices

Based on the outcome of the normalised risk score, the following table provides the safety risk level for each type of ionising and non-ionising radiation practices in Queensland.

(current at July 2023)

Practice	Risk Level
Product irradiation using a gamma irradiator	5
Industrial radiography using radioactive substances	5
Therapeutic nuclear medicine	5
Tattoo removal – commercial context (laser)	5
Tattoo removal – medical oversight (laser)	5
Borehole logging – oil and gas	4
Manufacture of radioactive substances or sealed source apparatus	4
Cosmetic – skin rejuvenation/capillary reduction – commercial context	4
Medical or surgical procedures – other than dermatology and ophthalmic	4
Storage and handling of radioactive waste, including dismantling and decommissioning	4
Fluoroscopy - interventional	3
Diagnostic nuclear medicine	3
Cosmetic – skin rejuvenation/capillary reduction – medical oversight	3
Ophthalmic procedures	3
Brachytherapy	3
Industrial radiography using radiation apparatus	3
Hair reduction – commercial context	3
Veterinary laser procedures	3
Dermatology	2
Fluoroscopy – general procedures	2
Hair reduction – medical oversight	2
Dental procedures	2
Veterinary diagnostic imaging – plain	2
Veterinary nuclear medicine	2
Non-cosmetic and non-ablative procedures	2
Radiolabelling of chemical compounds and associated studies	1
Borehole logging – mineral (hard rock)	1
Geotechnical measurements	1
Storage only of radioactive substances	1
Laser lipolysis	1
Radiation therapy using linear accelerators	1
Veterinary radiation therapy	1
Borehole logging related – tracer studies	1
Industrial gauging – sealed source apparatus	1

Practice	Risk Level
Storage of laser apparatus only	1
Diagnostic imaging – plain	1
Diagnostic imaging – computed tomography	1
Veterinary diagnostic imaging – computed tomography	1
Calibration of equipment	1
Teaching the properties of radiation	1
Product irradiation using a self-contained irradiator	1
Diagnostic imaging – DEXA	1
Diagnostic imaging - mammography	1
Chiropractic imaging – plain	1
Plain imaging of objects	1
Dental imaging - intra-oral	1
Dental imaging – plain extra-oral	1
Dental imaging – cone beam CT	1
Enclosed radiation apparatus for imaging	1
Enclosed analytical apparatus for chemical or physical analysis	1
Cabinet radiation apparatus used for inspection of objects	1
Analytical apparatus for chemical or physical analysis (not enclosed)	1
Industrial gauging – radiation apparatus	1
Storage only of radiation apparatus	1

List of Compliance Culture Categories for Radiation Practices

The following table provides the subjective determination of the maturity of the compliance culture of both ionising and non-ionising radiation practices in Queensland. This provides for 3 clear categories:

- Developed compliance culture (Category A)
- Developing compliance culture (Category B)
- Emerging compliance culture (Category C)

(current at July 2023)

Radiation Practice	Compliance Culture
Tattoo removal – commercial context	C
Cosmetic – skin rejuvenation/capillary reduction – commercial context	C
Hair reduction – commercial context	C
Product irradiation using a gamma irradiator	C
Borehole logging – oil and gas	C
Chiropractic imaging – plain	C
Manufacture of radioactive substances or sealed source apparatus	C
Teaching the properties of radiation	C
Storage and handling of radioactive waste, including dismantling and decommissioning	C
Tattoo removal – medical oversight	B
Medical or surgical procedures – other than dermatology and ophthalmic	B
Cosmetic – skin rejuvenation/capillary reduction – medical oversight	B
Veterinary laser procedures	B
Dermatology	B
Hair reduction – medical oversight	B
Non-cosmetic and non-ablative procedures	B
Laser lipolysis	B
Storage only	B
Industrial radiography using radioactive substances	B
Industrial radiography using radiation apparatus	B
Therapeutic nuclear medicine	B
Diagnostic nuclear medicine	B
Fluoroscopy – general procedures	B
Radiolabelling of chemical compounds and associated studies	B
Geotechnical measurements	B
Brachytherapy	B
Borehole logging – mineral (hard rock)	B
Veterinary diagnostic imaging – plain	B
Dental imaging – cone beam CT	B

Cabinet radiation apparatus used for inspection of objects	B
Analytical apparatus for chemical or physical analysis (not enclosed)	B
Industrial gauging – sealed source apparatus	B
Storage only of radioactive substances	B
Storage only of radiation apparatus	B
Ophthalmic procedures	A
Dental procedures	A
Veterinary nuclear medicine	A
Product irradiation using a self-contained irradiator	A
Fluoroscopy - interventional	A
Radiation therapy using linear accelerators	A
Veterinary radiation therapy	A
Borehole logging related – tracer studies	A
Diagnostic imaging – plain	A
Diagnostic imaging – computed tomography	A
Diagnostic imaging – DEXA	A
Diagnostic imaging - mammography	A
Plain imaging of objects	A
Veterinary diagnostic imaging – computed tomography	A
Dental imaging - intra-oral	A
Dental imaging – plain extra-oral	A
Enclosed radiation apparatus for imaging	A
Enclosed analytical apparatus for chemical or physical analysis	A
Industrial gauging – radiation apparatus	A
Calibration of equipment	A