



Australian Government

Australian Radiation Protection and Nuclear Safety Agency

**Australian Radiation Protection
and Nuclear Safety Agency**

**Submission to the Senate Rural and Regional Affairs
and Transport Committee**

**Inquiry into the Aviation Security Amendment
(Screening) Bill 2012**

April 2012

On behalf of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) I wish to make the following submission in regard to the Aviation Transport Security Amendment (Screening) Bill 2012.

SUMMARY

The Aviation Security Amendment (Screening) Bill 2012 does not specify the body scanning equipment to be used for screening purposes. ARPANSA has a strong interest in ensuring any technologies used for airport screening purposes are: considered carefully before use; and implemented appropriately, from a radiation health and safety perspective.

In relation to the use of body scanning equipment for airport security, and from a radiation health and safety perspective, I wish to state the following;

- The currently proposed millimetre wave scanners emit *non*-ionising radiation at very low levels and do not cause ARPANSA concern from a radiation health perspective.
 - Any future use of *non*-ionising radiation technologies producing significantly higher exposure would require further scrutiny for potential health effects.
 - International guidance recommends that the use of ionising radiation for human imaging outside use for medical purposes is not justified, except in exceptional circumstances.
 - If a *non*-ionising technology option exists that achieves equivalent screening outcomes to any ionising radiation technology under consideration, then this *non*-ionising radiation option should be preferred.
 - ARPANSA is working with the state and territory radiation regulators and other Australian Government agencies, to develop a uniform approach to the consideration of any proposals for the justification and possible licensing of ionising radiation technologies within Australia.
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BACKGROUND AND DISCUSSION

Background

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), on behalf of the Australian Government, aims to protect people and the environment from the harmful effects of radiation.

ARPANSA is closely monitoring the proposed introduction of airport screening technology and is keen to establish a consistent national approach to regulating the procurement and safe use of these devices irrespective of jurisdiction.

Radiation protection in Australia follows principles, recommendations and standards, developed by the International Commission on Radiological Protection (ICRP) and the International Atomic Energy Agency (IAEA) for ionising radiation; and the International Commission on Non-Ionising Radiation Protection (ICNIRP) and the World Health Organization (WHO) for *non*-ionising radiation. ARPANSA's view on radiation protection associated with airport screening is based on guidance from the above organisations.

Scope

This submission provides discussion of the proposed amendments to the *Aviation Transport Security Act 2004* and the *Aviation Transport Security Regulations 2005*. This discussion is restricted to potential health effects, and the associated regulatory framework, of the types of equipment that may be used for routine aviation security screening purposes, to detect objects carried on the body and concealed under clothing.

As such, this submission is concerned with the proposed insertion after subsection 44(3), in particular (3A)(c):

(3A) Without limiting paragraph (2)(j), the equipment to be used for screening may include the following:

- (a) metal detection equipment;
- (b) explosive trace detection equipment;
- (c) body scanning equipment such as an active millimetre wave body scanner.

Discussion

The latest technologies for airport security screening are whole-body imaging scanners. Current examples of these machines expose the passenger's body to either X-ray (ionising radiation) or radiofrequency (RF) electromagnetic radiation (*non*-ionising radiation). Very low output backscatter X-ray whole-body scanners or

millimetre wave scanners provide alternatives to the traditional pat-down method of body searching and extend the detection capabilities of existing technologies.

Non-ionising millimetre wave body scanners

Millimetre waves are radiofrequency radiation similar to, but of a higher frequency than, that emitted by mobile phones. Millimetre wave body scanners are available in both active and passive forms. The active scanners illuminate the traveller's body with very low intensity millimetre waves, while the passive scanners simply collect the millimetre waves normally emitted by the human body.

On the basis of the information provided to ARPANSA by the company that produces the L-3 Communications Pro-Vision millimetre body scanners, ARPANSA advised the Department of Infrastructure and Transport that these scanners produce thousands of times less than the maximum permissible exposure levels for the public specified in ARPANSA's Radiation Protection Standard: *Maximum Exposure Levels to Radiofrequency Fields - 3 kHz to 300 GHz (2002)*. This standard can be accessed at: <http://www.arpansa.gov.au/Publications/codes/rps3.cfm>

Current exposure standards are intended to provide a large degree of protection against all known health effects. The very low intensity of the millimetre waves from the L-3 Pro-Vision machine and the short duration of the scan means that the person being scanned is exposed to less electromagnetic energy than from a short mobile phone call. It is not clear that future developments of *non-ionising* scanners will meet the exposure limits by such a large margin. Machines producing higher exposures would also need to be evaluated for electromagnetic compatibility (EMC) requirements of medical implants.

In conclusion: The currently proposed millimetre wave scanners do not cause ARPANSA concern from the radiation health perspective. However, any future use of *non-ionising* radiation technologies producing significantly higher exposure would require further scrutiny.

Ionising radiation body scanners

Currently, there are two types of ionising radiation body scanning systems available for security screening of humans, one type using x-ray radiation scattered back from an individual, the other type using x-ray radiation transmitted through an individual.

Backscatter x-ray systems use low energy x-rays where the image is formed from the x-rays backscattered from within the body surface or other material present. Backscatter x-ray systems are currently used in some countries (not in Australia) to scan selected airline passengers.

Transmission x-ray systems, similar to medical x-ray equipment, create an image by passing x-rays through the body to a detector on the other side of the body away from the x-ray source. The ionising radiation dose to a person being screened from a transmission x-ray system is in the order of 20–100 times higher than that received from a backscatter x-ray system. Transmission x-ray screening is currently applied to verify (or not) suspicions after a person has already been identified through other processes. In ARPANSA's view, transmission x-ray screening should only be used under limited circumstances and licensing conditions and ARPANSA would not support its use as 'routine screening' equipment.

Exposure to ionising radiation is known to cause harmful effects to the human body. It is assumed in international radiation protection guidance that all exposure to ionising radiation carries some level of risk, with the highest concern related to the possibility of cancer formation. Whenever a human activity causes an individual to be exposed to ionising radiation, the activity needs to be justified and the exposures should be as low as reasonably achievable.

While the ionising radiation exposure to individuals from the current generation of x-ray body scanners is very low, and the associated radiation risk is very small, international guidance recommends that the use of ionising radiation for human imaging outside use for medical purposes is not justified, except in exceptional circumstances.

ARPANSA concludes that if a non-ionising technology option exists that achieves equivalent screening outcomes to the ionising radiation technology under consideration then this non-ionising radiation option should be preferred.

ARPANSA

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), as part of the Health and Ageing Portfolio, is the Federal Government agency charged with

responsibility for protecting the health and safety of people, and the environment, from the harmful effects of radiation.

ARPANSA advises on radiation protection and the health effects of both ionising and *non*-ionising radiation; participates in the development of national and international knowledge and best practice of radiation protection and nuclear safety; promotes national uniformity; regulates the use of radiation sources, facilities and nuclear installations controlled by the Australian Government; and promotes public awareness of the harmful effects of radiation.

Operation of ionising radiation airport scanners would fall within the current radiation protection and radiation regulatory frameworks of Australian governments, including those of States and Territories. Use of *non*-ionising radiation scanners would not be regulated by State, Territory or Commonwealth radiation regulators under current arrangements.

ARPANSA is working with the state and territory radiation regulators and other Australian Government agencies, to develop a uniform approach to the consideration of any proposal for the justification and possible licensing of these ionising radiation technologies within Australia. ARPANSA guidance on the application of these radiation protection principles to the use of the technologies can be found at: <http://www.arpansa.gov.au/Regulation/screening.cfm>

I hope this information is of assistance. If you require any further information, please do not hesitate to contact me.

Yours sincerely,

Carl-Magnus Larsson

CEO, ARPANSA