APPLICATION TO FSANZ

Application to amend Standard 1.5.3 of the Food Standards Code, Irradiation of Food, to increase the maximum energy of X-Rays permitted to irradiate food from 5 MeV to 7.5 MeV.

EXECUTIVE SUMMARY

Steritech Pty Ltd. has operated a food irradiation facility at Narangba, Queensland since 2003. Its radiation source is the radioactive isotope cobalt-60 (^{60}Co) which continuously emits gamma rays. There are increasing issues with the supply and cost of ^{60}Co, including security issues with the transport and use of radioactive sources. There is a trend towards replacing ^{60}Co with electrically-driven accelerator sources producing high-energy, high-power electron or X-Ray radiation only when required. Such sources will increase the long-term sustainability of irradiation facilities. The new 2020 Steritech irradiation facility at Merrifield, Melbourne is an accelerator producing X-Rays for irradiation of food.

Steritech is applying for a variation to Standard 1.5.3, section 1.5.3 – 7 of the Australia New Zealand Food Standards Code (the Code). The proposed variation seeks to increase the maximum energy for machines generating X-Rays from 5 to 7.5 megaelectronvolts (MeV) provided that the X-Ray target is made of tantalum or gold.

No change is sought to the currently approved foods in the Code that may be irradiated or the conditions imposed (sections 1.5.3 – 3, 4, 5), including the dose range. The variation requested is a technical adjustment to the delivery of the radiation dose only.

The primary purpose of the requested variation is to increase the efficiency with which the electron beam produced in an accelerator is converted into X-Rays which are then absorbed in the food. An increase in efficiency of 40 to 50% will be achieved when the maximum operating voltage of the accelerator is increased from 5 to 7.5 MeV. This will translate to increasing the radiation processing rate from approximately 12 pallets per hour to 17/18 pallets per hour.

A secondary purpose is to increase the sustainability of food irradiation through making the choice of an X-Ray source a more economic option for processors and to reduce the previous dependence on a radioactive source of radiation (^{60}Co).

If operated at 7.5 MeV rather than 5 MeV, the 40 to 50% increase in overall efficiency will result in -

- A comparable decrease in processing time and increased throughput;
- More rapid turnaround times that will reduce supply chain costs, reduce the time produce is out of temperature-controlled containers and keep food quality at the highest level possible;
- Greater ability to manage the variable throughput demands of an industry dealing with a range of perishable, seasonal products;
- Greater penetration into, and greater dose uniformity within, the food;
- Reduced costs to the food industry as a result of the above advantages.

The Codex General Standard for Irradiated Foods recommends 5 MeV as the maximum energy for X-Rays. This Standard was first issued in 1983 before X-ray sources became a practical option for commercial processing and when 5 MeV was thought to be the maximum energy likely to be used. Most countries still follow that recommendation.

If amended as requested, Standard 1.5.3 will no longer comply exactly with the Codex General Standard for Irradiated Foods. However, the USA, Canada, Indonesia, India and the Republic of Korea have already raised the maximum permitted energy for X-ray production to 7.5 MeV in their food regulations. As the need for irradiation treatments expands and the use of X-Rays becomes more common, other countries are expected to raise the energy maximum. The proviso that the X-Ray

target is made of tantalum or gold is in place because some other metal targets could theoretically induce higher amounts of radioactivity in the food than desirable.

The increased capital cost of a higher energy accelerator will be offset by cheaper operating costs resulting from increased efficiency and throughput. A change to 7.5 MeV X-Rays will result in lower costs to clients. A theoretical, best-case calculation suggested that the cost per ton of food treated might be 33% lower for 7.5 MeV X-Rays than 5 MeV X-Rays.

FSANZ has approved a series of applications to irradiate fresh produce, culminating in approval to treat all fresh produce except dried pulses, legumes, nuts and seeds. The approvals acknowledge the importance of phytosanitary treatment options to obtain market access for exports and to protect domestic horticulture. Irradiation provides an alternative option with several advantages to treatments that include chemical treatments and fumigation with an ozone-depleting gas.

Australian exports of irradiated fresh produce have been growing steadily since 2004. The approval by FSANZ for the phytosanitary irradiation of all fresh fruit and vegetables and the opening of a new X-Ray facility have further accelerated growth. The domestic (inter-state) use of irradiation has grown from less than 100 tons to over 1000 tonnes per year in less than 2 years. In 2021-22, Steritech facilities irradiated 7777 tonnes of fresh produce for export. The increased efficiency and reduced costs obtained with X-Rays with a maximum energy of 7.5 MeV will further enhance the competitiveness and use of phytosanitary irradiation.

Consumers should benefit from the decreased costs to the food trade and may see a greater variety of fresh produce on retail shelves. Generally, consumer perceptions of food irradiation are unlikely to change but a few well-informed consumers may appreciate the use of a radiation source that can be switched off when not in use rather than a radioactive source emitting continuous radiation.

Labelling requirements will be unchanged. Consumers may be more familiar with the term X-Rays rather than ionizing radiation should industry choose to use the term X-Rays on labels.

The proposed change will be cost neutral to the government agencies that regulate food irradiation facilities. Generally, the government will benefit from the potential to increase exports and protect local industry from pests.

Encouraging the use of X-Ray treatments of fresh produce through greater efficiency will have environmental benefits. The use of methyl bromide will be further reduced. X-Rays are only produced when required and there is no need for the storage and transportation of radioactive sources. This is positive for the environment, security and public acceptance.

There are no new toxicological or microbiological safety or nutritional adequacy issues implicit in this application since no change is requested to change the approved dose levels. The type and amount of chemical change brought about in the food depends upon the dose (the energy absorbed in the food). They do not depend upon the energy of the incident radiation.

The radiations permitted under Standard 1.5.3 do not increase the natural levels of radioactivity in the food significantly. Experimental methods cannot detect any induced radioactivity in food irradiated with either 5 or 7.5 MeV X-Rays. Theoretical calculations also show that any induced radioactivity and consequent radiation dose to consumers above natural levels are negligible at both energies provided the X-Ray converter is restricted to tantalum or gold.

None of the information in this application is confidential and no exclusive capturable commercial benefit will accrue to the applicant.